Exelon Generation®

NP-12-0032
July 30, 2012

10 CFR 52, Subpart A

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Exelon Nuclear Texas Holdings, LLC
Victoria County Station
Early Site Permit Application
Environmental Report – Responses to ER RAI Letters No.12, No.14, and No.15
Docket No. 52-042

References: (1) USNRC letter to Ms. Marilyn C. Kray, Environmental Request for Additional Information Letter No.12 Related to Radiological Health Impacts for Victoria County Station Early Site Permit Application, dated May 31, 2012

(2) USNRC letter to Ms. Marilyn C. Kray, Environmental Request for Additional Information Letter No.14 Related to Meteorology & Air Quality for Victoria County Station Early Site Permit Application, dated May 31, 2012

(3) USNRC letter to Ms. Marilyn C. Kray, Environmental Request for Additional Information Letter No.15 Related to Hydrology for Victoria County Station Early Site Permit Application, dated June 4, 2012

Exelon is responding to the following questions contained in NRC Request for Additional Information (RAI) letter No.12 (Reference 1):

- HP-5.4.1-2 (eRAI No.6506)
- HP-5.4.1-3 (eRAI No.6506)

Exelon's responses to the above-referenced RAIs finalize the response to NRC RAI Letter No.12. Responses to the remaining questions in RAI letter No.12 were submitted via Exelon letter NP-12-0028, dated July 13, 2012. The responses to RAIs HP-5.4.1-2 and HP-5.4.1-3 are provided in Attachments 1 and 2, respectively.

Exelon is also responding to the following questions contained in NRC RAI letter No.14 (Reference 2):

- MET-3 (eRAI No.6453)
- MET-4 (eRAI No.6453)
- MET-6 (eRAI No.6453)

These responses constitute a partial response to RAI letter No.14. The responses to MET-1 and MET-5 were submitted via letter NP-12-0029, dated July 10, 2012. As previously discussed, Exelon will provide the response to RAI MET-2 no later than September 13, 2012 (i.e., 45 days beyond the 60-day response timeframe requested in RAI letter No.14). The MET-3, MET-4, and MET-6 responses are provided in Attachments 3, 4, and 5, respectively.

Additionally, Exelon is also responding to the following question contained in NRC RAI letter No.15 (Reference 3):

- HY-1 (6483)

The RAI HY-1 response constitutes a partial response to RAI letter No.15. The responses to HY-2, HY-3, HY-6, HY-8, and HY-9 were submitted via letter NP-12-0031, dated July 19, 2012. As previously discussed, Exelon will provide the response to RAI HY-5 no later than September 17, 2012 (i.e., 45 days beyond the 60-day response timeframe requested in RAI letter No.15). The HY-1 response is provided in Attachment 6.

Regulatory commitments are summarized in Attachment 7.

If additional information is required, please contact Joshua Trembley at (610) 765-5345.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 30th day of July, 2012.

Respectfully,

Marilyn C. Kray
Vice President, Nuclear Project Development

Attachments:

(1) Response to HP-5.4.1-2 (eRAI No.6506)
(2) Response to HP-5.4.1-3 (eRAI No.6506)
(3) Response to MET-3 (eRAI No.6453)
(4) Response to MET-4 (eRAI No.6453)
(5) Response to MET-6 (eRAI No.6453)
(6) Response to HY-1 (eRAI No.6483)
(7) Summary of Commitments

cc: USNRC, Director, Office of New Reactors/NRLPO
USNRC, Project Manager, VCS, Division of New Reactor Licensing
USNRC, Environmental Project Manager, VCS, Division of New Reactor Licensing
USNRC Region IV, Regional Administrator
Argonne National Laboratory, Project Manager, VCS
EDMS

HP-5.4.1-2 (eRAI No.6506):

NRC Request:

ESRP Section 5.4.1 directs the staff to review the description of the environmental pathways by which radiation and radioactive effluents can be transmitted from the proposed plant to living organisms. Projected population for 5 years from the time of the licensing action under consideration is needed to perform dose calculations. Provide justification for applying 2000 census data for 50-mile population to project the future population for FY2080 as listed in Table 5.4-1 of the ER. Provide justification for continued use of 2000 census data for projecting the future 50-mile population for the population dose estimation.

Response:

ER Tables 5.4-1 and 5.4-2 show the 50-mile population used to calculate population doses from liquid and gaseous effluents, respectively. As indicated in Table 5.4-1, doses are calculated using the projected population for the year 2080, based on 2000 Census data. Subsequent to the analysis, 2010 Census data became available.

The response to RAI ESP EIS 7.10-3 (Reference 1) compares the actual 2010 population to that projected from the 2000 Census. It shows the actual 2010 population within 10 miles of the plant is 8040, 11.7% higher than the projected value of 7195. However, for the population within the 50-mile region, the actual value is 241,925, 5.3% lower than the projected value of 255,337. Therefore, the 50-mile projection is conservative, while the 10-mile projection is slightly non-conservative. In terms of numbers of people, the 10-mile population in 2010 was underpredicted by the projection by 845 while the 10-50 mile population was overpredicted by the projection by 14,257.

The liquid effluent doses were calculated using the LADTAP II computer program. As indicated in ER Table 5.4-1, only the total 50-mile population is used as input into this program. Because the 50-mile population projection is conservative, the population dose is also conservative.

The gaseous effluent doses were calculated using the GASPAR II computer program. As indicated in ER Table 5.4-2, the 50-mile population is input into this program as a distribution in 160 sectors (distance and direction). The distribution is shown in ER Table 2.5.1-1, which projects that in 2080, the population will be 13,003 within 10 miles and 414,902 within 50 miles. Hence, only 3.1% of the 50-mile population resides within 10 miles of the plant. Table 2.5.1-1 further indicates that the population between 5 and 10 miles is 12,396, leaving the population between zero and five miles as less than 0.2% of the 50-mile total.

In calculating population doses, GASPAR II multiplies the sector-dependent population by atmospheric dispersion factors (χ/Q values) and ground deposition factors (D/Q values) to obtain concentration-weighted population dispersion factors and population deposition factors, respectively (Reference 2, Section 3.1.1). Because the population within five miles is negligible, the χ/Q and D/Q values for 5-10 miles may be considered representative of the χ/Q and D/Q values between zero and 10 miles. Being near the midpoint of the region between 10 and 50 miles, the 20-30 mile χ/Q and D/Q values may be considered representative of the χ/Q and D/Q values between 10 and 50 miles.

A review of the χ/Q and D/Q values in ER Tables 2.7-19, 2.7-21, 2.7-23, and 2.7-25 indicates that the 5-10 mile χ/Q and D/Q values are a factor of 5 to 10 greater than the 20-30 mile χ/Q and D/Q values. On the other hand, the 10-50 mile population is about a factor of 30 greater than that within 10 miles. Considering the dose to be proportional to the product of population and χ/Q or D/Q, it may be reasonably concluded that the 10-50 mile dose is at least three times greater than that between zero and 10 miles. An increase in the 10-mile dose due to the addition of 845 people will be more than offset by the decrease in the 10-50 mile population of 14,257. Therefore, the population doses based on the 2000 Census projection are conservative. Furthermore, even with the conservatism in the analysis, the population doses from the plant are negligible, being orders of magnitude below the background dose, as shown in Table 5.4-8.

References:

1. Letter from Marilyn C. Kray of Exelon to U.S. Nuclear Regulatory Commission, Response to RAI Letter No. 7, NP-12-0023, June 5, 2012.
2. NUREG/CR-4653, GASPAR II – Technical Reference and User Guide, 1987

Associated ESPA Revisions:

There are no ER revisions associated with this response.

HP-5.4.1-3 (eRAI No.6506):

NRC Request

ESRP Section 5.4.1 directs the staff to review the description of the environmental pathways by which radiation and radioactive effluents can be transmitted from the proposed plant to living organisms. Present and known future drinking water intake locations within 80 km (50 mi) of the plant radwaste discharge (downstream or radius) are needed to perform dose calculations. Table 5.4-1 of the ER lists liquid pathway parameter values for "50-mile drinking water population" based on the current municipal water usage in the 12 counties within 50 miles of the plant from the Guadalupe River but does not provide any known future intake locations. Provide the present and known future drinking water intake locations within 50 miles of the facility radionuclide effluent discharge.

Response:

As presented in ER Subsection 3.5.2, the radionuclide effluent from the liquid radwaste system will be discharged to the Guadalupe River and will be controlled and monitored to measure the activity released. The geographic region used in the dose analysis to determine the “50-mile drinking water population” parameter included the following counties which are fully or nearly fully contained within 50 miles of the VCS liquid effluent discharge: Aransas, Calhoun, DeWitt, Goliad, Jackson, Refugio, and Victoria; and the following counties which are partially contained within 50 miles of the plant: Bee, Karns, Lavaca, Matagorda, and San Patricio.

The Texas Commission on Environmental Quality (TCEQ) provides data for both surface water intakes and surface water rights within the designated 50-mile region. The following surface water intakes from the Guadalupe River were identified from TCEQ data: the Guadalupe State Park and the cities of Victoria, Kerrville, Seguin, and Gonzales (TCEQ, 2012). The Guadalupe State Park and the cities of Kerrville, Seguin, and Gonzales are located further than 50 miles from the location of the liquid effluent discharge for the VCS site and therefore would not be considered in the liquid pathway parameter values for radiological doses. Furthermore, these intakes are located upstream of the discharge and would not contribute to doses to members of the public. The city of Victoria is also located upstream relative to the VCS site plant discharge. Therefore, there were no surface water intakes identified downstream of the VCS radionuclide effluent discharge. Specific locations of known surface water intakes may be found on the TCEQ website at http://www.tceq.state.tx.us/gis/sites.html (TCEQ, 2012).

In addition to the surface water intakes identified above, surface water rights have been issued by the TCEQ and predecessor agencies to individuals, cities, industries, water districts, and water authorities for diversion from flowing streams in the South Central Texas Region, including the Guadalupe River. The water use designation for some of these diversions is “Municipal/Domestic”. ER Subsection 2.3.2.3.2 discusses local surface water use and ER Tables 2.3.2-9 through 2.3.2-11 identify the surface water users, the body of water from which withdrawals are made, and the permitted maximum volume of surface water withdrawals, where applicable, for the Guadalupe-San Antonio River Basin. The locations of the surface water users are plotted on ER Figure 2.3.2-4 using latitude and longitude information provided by the TCEQ. From ER Tables 2.3.2-9 through 2.3.2-11 and ER Figure 2.3.2-4, there are portions of the following surface water rights located downstream of the designated VCS site liquid effluent discharge location on the Guadalupe River with at least part of the water use permitted diversion amount designated as "Municipal/Domestic". These surface water rights have been issued by the State of Texas to the Guadalupe-Blanco River Authority (GBRA) (See Table 1).

Table 1: Downstream Surface Water Rights

Water Right Number	Owner	County
3863	GBRA	Victoria
5176	GBRA/Union Carbide	Calhoun
5177	GBRA/Union Carbide	Calhoun
5178	GBRA/Union Carbide	Calhoun

As shown in ER Table 2.3.2-13, the surface water rights for Calhoun County were further broken out for municipal use. From the years 2000 through 2006, an average of 6,450 ac-ft/year was used for municipal customers for the City of Port Lavaca, Port O'Connor Municipal Utility District, and Calhoun County Rural Water System. The Port Lavaca Water Treatment Plant provides the City of Port Lavaca, Port O'Connor Municipal Utility District, and the Calhoun County Rural Water System with a municipal drinking water supply provided by the diversion of water from the Guadalupe River near Tivoli by GBRA's Calhoun Canal System. The service population for the Port Lavaca Water Treatment Plant is 15,000. (GBRA, 2012)

Specific information concerning future intake locations is unavailable in the Texas Water Development Board (TWDB) and TCEQ databases; however, the South Central Texas Regional Water Planning Group's *2011 Regional Water Plan* shows a potential project, the GBRA Lower Basin Storage, as a possible municipal water user on the Guadalupe River downstream of plant discharge (Regional Water, 2010).

From ER Table 5.4-1, the dose analysis assumed that approximately 17.1 percent of the population within the designated 50-mile geographic region receives its drinking water from the Guadalupe River. This value was derived based on 2004 water use estimates provided by the TWDB. The TWDB database was queried to determine the quantity of municipal water usage (e.g., drinking, washing, toilet flushing and landscape irrigation) from the Guadalupe River along with the total municipal water usage for each county within the 50-mile geographic region. From these queries, it was determined that 17.1 percent of the municipal water usage in the 50-mile geographic region comes from the Guadalupe River. Note that the 17.1 percent total municipal water supplied by the Guadalupe River was assumed to be constant over time, and this percentage was then applied to the 50-mile population projected to the year 2080. Therefore, the 50-mile drinking water population parameter value, 70,800, provided in ER Table 5.4-1, conservatively treats users both upstream and downstream as downstream users from the VCS site and accounts for all municipal water used, as indicated in the TWDB dataset, from the Guadalupe Basin within 50 miles of the VCS site.

References:

GBRA, 2012, Guadalupe-Blanco River Authority: Port Lavaca Water Treatment Plant Divison, Available at: http://www.gbra.org/operations/portlavaca.aspx, accessed July 17, 2012.

Regional Water, 2010. South Central Texas Regional Water Planning Group, *South Central Texas Regional Water Planning Area – 2011 Regional Water Plan,* September 2010.

TCEQ, 2012. Texas Commission on Environmental Quality, *Public Water System Wells and Surface Water Intakes,* February 21, 2012. Available at http://www.tceq.state.tx.us/gis/sites.html. Accessed July 19, 2012.

TWDB, 2004. Texas Water Development Board, *Water Use Estimates by Location of Use*. 2004. Available at http://www.twdb.state.tx.us/wushistorical/DesktopDefault.aspx?PageID=1. Accessed July 19, 2012.

Associated ESPA Revisions:

There are no ER changes associated with this response.

MET-3 (eRAI No.6453):

NRC Request:

ESP EIS 2.9-1

MET-3 - NRC Supplemental Staff Guidance in NUREG-1555 (Accession No. ML100990204) directs the staff to review the analysis for reactor applications to ensure that the applicant has evaluated emissions from the uranium fuel cycle as well as from construction and operation of the facility to be licensed. The environmental report (ER) contains no discussion of expected air quality emissions Greenhouse Gases (GHG) in terms of CO_2 emissions associated with construction activities. Emissions should be quantified, including for example those related to providing fill, (i.e., trucking of fill to raise the elevation of the power block area), for the VCS site and each alternative site. Quantify all GHG emissions associated with construction activities at the VCS site and each alternative site.

Response:

Table 1 provides estimates for carbon dioxide (CO_2) equivalent emissions associated with workforce transport and deliveries of construction materials to the VCS site. The workforce and deliveries estimates assume construction of two advanced light water reactors (ALWRs) at the VCS site. The workforce transport estimates are based on an average of 4100 construction workers commuting to the site over an approximately 7 year construction period and conservatively assume one worker per vehicle. Exelon also estimates 100 truck deliveries would be made daily to the construction site. Although travel distances would vary from site to site, Exelon estimates that vehicle related emissions for the VCS site would be representative for the alternative sites.

Table 1. Construction Vehicle CO_2 Emissions (metric tons CO_2 equivalents)

	Workforce	Deliveries
Round trips per day	4100	100
Miles per round trip	31	50
Days per year	365	365
Years	7	7
Miles traveled	3.2×10^{8}	1.3×10^{7}
Miles per gallon[a]	19.7	19.7
Gallons fuel burned	1.6×10^{7}	6.5×10^{5}
Metric tons CO_2 per gallon[b, c]	8.8×10^{-3}	1.0×10^{-2}
Metric tons CO_2	1.5×10^{5}	6.6×10^{3}
CO_2 equivalent factor[d]	0.971	0.971
Metric tons CO_2 equivalent	1.4×10^{5}	6.4×10^{3}

a. FHWA 2006
b. Gasoline CO_2 emissions factor for workforce from EPA 2007a
c. Diesel CO_2 emissions factor for deliveries from EPA 2009
d. EPA 2007b

Potential greenhouse gas emissions from construction activities are summarized in Table 2. The reference 1000-MW(e) reactor construction estimate presented in NRC (2011) includes emissions for construction of a single unit at a site requiring a moderate amount of terrain modification. The reference reactor construction greenhouse gas emissions estimate was doubled to represent a two-ALWR plant at the VCS site. Construction activities that could lead to increased emissions at a particular site are discussed below and presented in Table 2. This is a conservative estimate as there is likely some overlap between the site-specific activities and those encompassed by the reference reactor construction estimates.

The response to RAI 6395 transmitted by Exelon letter NP-12-0022 dated June 18, 2012, provided estimates of fill required to address the flooding potential for the VCS, Matagorda County, and Buckeye sites. (As noted in that RAI response, the Bravo and Alpha sites were excluded because the evaluation concluded the powerblock did not need to be elevated.) Exelon estimated the machine-hours required to establish conditions suitable for construction of the power block at each of the sites as described in that RAI response. The estimates include loading, transport, placement, and compaction of fill material. The potential greenhouse gas emissions associated with those activities are provided in Table 2.

Exelon also estimated the machine-hours required to construct the cooling basin at the VCS and Buckeye sites and the water retention basin at the Bravo site. The estimate included clearing and grubbing, topsoil removal, excavation, and construction of the berm. The potential greenhouse gas emissions associated with the basin construction activities are provided in Table 2.

Table 2. Construction CO_2 Emissions Comparison (metric tons CO_2 equivalents)

	Reference Reactor Construction[a]	Powerblock Fill	Basin Construction	Total
VCS Site	7.0×10^4	2.7×10^4	1.8×10^5	2.8×10^5
Matagorda County Site	7.0×10^4	4.5×10^4	-	1.2×10^5
Buckeye Site	7.0×10^4	3.8×10^4	1.9×10^5	3.0×10^5
Alpha Site	7.0×10^4	-	-	7.0×10^4
Bravo Site	7.0×10^4	-	4.6×10^4	1.2×10^5

a. NRC 2011

As indicated in NRC (2011), equipment emissions for decommissioning are estimated to be one half of those for construction.

References:

EPA (U.S. Environmental Protection Agency) 2007a. "Conversion Factors to Energy Units (Heat Equivalents) Heat Contents and Carbon Content Coefficients of Various Fuel Types." *Inventory of U. S. Greenhouse Gas Emissions and Sinks: Fast Facts 1990-2005*. EPA-430-R-07-002. U.S. Environmental Protection Agency, Washington, D.C.

EPA (U.S. Environmental Protection Agency) 2007b. *Inventory of U. S. Greenhouse Gas Emissions and Sinks: 1990-2005*. U.S. Environmental Protection Agency, Washington, D.C.

EPA (U.S. Environmental Protection Agency) 2009. *Potential for Reducing Greenhouse Gas Emissions in the Construction Sector*, U.S. Environmental Protection Agency, Washington, D.C., February 2009. Available at: http://www.epa.gov/sectors/pdf/construction-sector-report.pdf.

FHWA (Federal Highway Administration) 2006. *Highway Statistics 2005* (Table VM-1). Office of Highway Policy Information, US Department of Transportation, Washington, D.C.

NRC (U.S. Nuclear Regulatory Commission) 2011. Memorandum from B. Clayton to S. C. Flanders, "Revision 1 – Addressing the Construction and Preconstruction Activities, Greenhouse Gas Issues, General Conformity Determinations, Environmental Justice, The Need for Power, Cumulative Impact Analysis and Cultural/Historical Resources Analysis Issues in Environmental Impact Statements," U.S. Nuclear Regulatory Commission, Office of New Reactors, March 4, 2011.

Associated ESPA Revisions:

There are no ER changes associated with this response.

MET-4 (eRAI No.6453):

<u>NRC Request</u>:

ESP EIS 2.9-1

MET-4 - NRC Supplemental Staff Guidance in NUREG-1555 (Accession No. ML100990271) and ESRP Section 4.7 direct the staff to review the applicant's cumulative impacts analysis in all resource areas. The ER contains no discussion of air quality cumulative impacts in Section 4.7 and Table 4.7-1. Cumulative air quality impact analysis associated with the proposed project when considered in the context of other past, present, and reasonably foreseeable future actions should be addressed in ER. Provide a discussion of air quality cumulative impacts.

<u>Response</u>:

Exelon has identified three current and reasonably foreseeable projects within the region of VCS for inclusion in the cumulative air quality impact analysis: Coleto Creek 2, White Stallion Energy Center, and the Formosa Plastics Corporation Plant Expansion.

International Power and the South Texas Electric Cooperative plan to construct a 650 MW, supercritical, pulverized coal-fueled electric generating unit (Unit 2) in Goliad County, TX. It will be constructed at the existing Coleto Creek Power Station. Coleto Creek Unit 2 will emit nitrogen oxides (NO_X), carbon monoxide (CO), sulfur dioxide (SO_2), volatile organic compounds (VOCs), lead, particulate matter including particulate matter less than 10 microns in diameter (PM_{10}), fluorides, sulfuric acid mist, hydrogen chloride, mercury, ammonia (NH_3), and other products of coal combustion. Emissions estimates for Coleto Creek Unit 2 are provided in TCEQ (2010a). National ambient air quality standards (NAAQS) have been established for NO_2, CO, SO_2, PM_{10} $PM_{2.5,}$ ozone and lead. Prevention of Significant Deterioration (PSD) increments have been established for NO_2, SO_2 and PM_{10}. The Texas Commission on Environmental Quality (TCEQ) has granted the State Air Quality permit, PSD permit, and Hazardous Air Pollutant (HAP) major source permit for Coleto Creek Unit 2 (TCEQ 2010a). In its permitting decision, TCEQ concludes that the impact of the proposed Coleto Creek Unit 2 emissions will not cause or measurably contribute to air pollution in violation of any NAAQS or PSD increment. In addition, emissions from the Coleto Creek Power Station, including the Unit 2 project, will not cause an exceedance of any applicable State property-line standard.

The White Stallion Energy Center (WSEC) will be a 1,320 megawatt, base-load, solid-fueled electric power generating station located in Matagorda County, TX. WSEC will emit NO_X, CO, SO_2, VOCs, lead, PM_{10}, fluorides, sulfuric acid mist, hydrogen chloride, mercury, NH_3, and other products of coal combustion. Emissions estimates for WSEC are provided in TCEQ (2010b). The TCEQ has granted the State Air Quality permit, PSD permit, Plant–wide Applicability Limits (PAL) permit, and HAP major source permit for WSEC (TCEQ 2010b). In its permitting decision, TCEQ concludes that the impact of the proposed WSEC allowable emissions will not cause or contribute to air pollution in violation of any NAAQS or PSD increment. In addition, WSEC emissions will not cause an exceedance of any applicable State property-line standard.

The Formosa Plastics Corporation is currently constructing an expansion to their photochemical and plastics manufacturing facility in Point Comfort, Calhoun County, TX. Emissions from this facility will include CO, NO_2, particulate matter (PM), SO_2, volatile organic compounds (VOC), phenylethane, ethenylbenzene, dimethylbenzene, ethylene dichloride, octane and propylene as well as many other pollutants typically emitted from photochemical and plastics manufacturing (EPA 2012).

Coleto Creek Unit 2 and the Formosa Plastics Corporation Plant Expansion are located in the same air quality control region (AQCR) as VCS, the Corpus Christi-Victoria Intrastate AQCR (40 CFR 81.136). WSEC is located in the Metropolitan Houston-Galveston Intrastate AQCR (40 CFR 81.38). Victoria, Goliad, Calhoun and Matagorda Counties are all in attainment for the NAAQS (40 CFR 81.344).

All past and present emission sources have been included in the current attainment status of each county; therefore, Exelon did not analyze individual past and present actions. Exelon considered that all counties within the region of VCS were in attainment for all NAAQS, which represents the air quality impacts from all past and present actions. Thus, the cumulative impacts of past and present projects would be SMALL.

The cumulative impacts for reasonably foreseeable future projects are discussed below.

Construction Impacts

As described in ER Section 4.4.1.3, temporary and minor impacts to local ambient air quality could occur as a result of normal construction activities. Fugitive dust and fine particulate matter emissions, including PM_{10}, would be generated during earth-moving and material-handling activities. Construction equipment and offsite vehicles used for hauling debris, equipment, and supplies also produce emissions. The pollutants of primary concern include PM_{10} fugitive dust, reactive organic gases, NO_x, CO, and, to a lesser extent, SO_2. Impacts on air quality can be minimized by compliance with all federal, state, and local regulations that govern construction activities and emissions, as well as through the implementation of mitigation measures. Mitigation measures to minimize fugitive and vehicular emissions (including paving disturbed areas, water suppression, covering truck loads and debris stockpiles, reduced material handling, limiting vehicle speed, and visual inspection of emission control equipment) could be instituted. Odors resulting from exhaust emissions would dissipate onsite. Given the fugitive/exhaust emission control measures discussed above, no discernible impact on the local air quality would be realized from VCS construction. Considering the relatively minor impacts, limited duration, and geographic separation, there would be very little overlap between the effects of VCS construction and those of construction of Coleto Creek Unit 2, WSEC, and the Formosa Plastics Plant expansion. Construction emissions from any of these projects would not have a noticeable cumulative impact with construction emissions from VCS. Thus, the cumulative impacts to air quality from reasonably foreseeable future projects would be SMALL.

Operations Impacts

Emissions from VCS operations will primarily result from workers' vehicles, diesel generators, boilers, mechanical draft cooling towers, and other machinery and tools. Emissions from these sources will be NO_X, CO, SO_2, VOC, NH_3 and PM. As discussed in ER Section 5.3.3.1, operation of the mechanical draft cooling towers would result in (1) noise and salt deposition that do not impact the area beyond site boundary and (2) plumes that would impact areas beyond the site boundary with minor shadowing and a very small increase in precipitation. The effects associated with VCS operation would not overlap with those from other projects. The emissions from VCS would be small in comparison to those emitted by coal plants such as Coleto Creek Unit 2 and WSEC. The Formosa Plastics Corporation Plant will primarily emit different pollutants than those emitted by VCS. Given that the areas in which these projects are located are presently in attainment and that TCEQ air permit decisions do not indicate that operation of any of these facilities will be detrimental to air quality, the cumulative impacts from the reasonably foreseeable projects and VCS will be SMALL.

References:

EPA (U.S. Environmental Protection Agency) 2012. EPA Envirofacts website, Formosa Point Comfort Plant, Available at: http://oaspub.epa.gov/enviro/afs_reports.detail_plt_view?p_state_county_compliance_src=4805700015&p_plant_id= 110018925957, accessed June 29, 2012.

TCEQ (Texas Commission on Environmental Quality) 2010a. State Air Quality Permit for Coleto Creek Unit 2, Permit Numbers 83778, PSDTX1118, and HAP 18. June 24, 2010. Available at: http://www12.tceq.state.tx.us/crpub/index.cfm?fuseaction=iwr.viewAddnDetail&addn_id=880388832008094&return=regent

TCEQ (Texas Commission on Environmental Quality) 2010b. State Air Quality Permit for White Stallion Energy Center (WSEC), Permit Numbers 86088, HAP28, PAL26, and PSDTX1160, December 16, 2010. Available at: http://www12.tceq.state.tx.us/crpub/index.cfm?fuseaction=iwr.viewAddnDetail&addn_id=630446882008252&return=regent

Associated ESPA Revisions:

There are no ER changes associated with this response.

MET-6 (eRAI No.6453):

NRC Request:

ESP EIS 2.9-1

MET-6 - NRC Supplemental Staff Guidance in NUREG-1555 (Accession No. ML100990185) directs the staff to review the applicant's GHG analysis. The ER contained a short discussion of GHG in Section 5.8.1.2 based on operations at other Exelon Nuclear plants. It is not clear that these operational estimates were made following the guidance in the NRC Supplemental Staff Guidance in NUREG-1555 (Accession No. ML100990185). There is also a requirement to include a GHG analysis for not only operation, but also for construction and decommissioning. The ER Section 4.4.1.3 briefly mentions GHG due to construction of a typical nuclear power plant, but this should be coupled with site specific construction activities with estimates made following the guidance which can be found in ADAMS (Accession No. ML100990185). Perform and provide GHG analysis.

Response:

Greenhouse gas emissions associated with VCS construction are addressed in the response to RAI 6453, MET-3.

ER Section 5.8.1.2 provides an estimate of potential greenhouse gas emissions based on data collected for 11 operating nuclear power plants operated by Exelon or with Exelon ownership interest. The data were scaled based on electrical output to an estimated 3,663 metric tons of CO_2 equivalent in a year representing a 1000-MW(e) reference plant. The Exelon emissions data included stationary combustion sources, fleet vehicle fuel usage, hydrofluorocarbon/perfluorocarbon refrigerant leakage, CO_2 usage or leakage, building energy usage (electricity) and non-electric sources. The NRC guidance (NRC 2011) estimates potential nuclear plant operation emissions by assuming a number of operating hours per year for emergency diesel generators and station blackout diesel generators. Stationary sources such as diesel generators were considered as part of the Exelon greenhouse gas emissions data.

Workforce commuting vehicle related emissions were not considered in the Exelon fleet data. An estimate for those greenhouse gas emissions is provided in this response.

Table 1 provides estimates for carbon dioxide equivalent emissions associated with operations workforce transport to the VCS site. The estimate is based on a 40-year operating life. As discussed in ER Section 5.8.1.4, workforce transportation estimates are based on an onsite workforce of 800 workers. The estimates conservatively assume one worker per vehicle and that the entire workforce travels to the site each day.

Table 1. Lifetime Operations Vehicle CO_2 Emissions (metric tons CO_2 equivalents)

	Operation
Round trips per day	800
Miles per round trip	31
Day per year	365
Years	40
Miles Traveled	3.6×10^8
Miles per gallon[a]	19.7
Gallons fuel burned	1.8×10^7
Metric tons CO_2 per gallon[b]	8.8×10^{-3}
Metric tons CO_2	1.6×10^5
CO_2 equivalent factor[c]	0.971
Metric tons CO_2 equivalent	1.6×10^5

e. FHWA 2006
f. EPA 2007a
g. EPA 2007b

<u>References</u>:

EPA (U.S. Environmental Protection Agency) 2007a. “Conversion Factors to Energy Units (Heat Equivalents) Heat Contents and Carbon Content Coefficients of Various Fuel Types.” *Inventory of U. S. Greenhouse Gas Emissions and Sinks: Fast Facts 1990-2005*. EPA-430-R-07-002. U.S. Environmental Protection Agency, Washington, D.C.

EPA (U.S. Environmental Protection Agency) 2007b. *Inventory of U. S. Greenhouse Gas Emissions and Sinks: 1990-2005*. U.S. Environmental Protection Agency, Washington, D.C.

FHWA (Federal Highway Administration) 2006. *Highway Statistics 2005* (Table VM-1). Office of Highway Policy Information, US Department of Transportation. Washington, D.C.

NRC (U.S. Nuclear Regulatory Commission) 2011. Memorandum from B. Clayton to S. C. Flanders, “Revision 1 – Addressing the Construction and Preconstruction Activities, Greenhouse Gas Issues, General Conformity Determinations, Environmental Justice, The Need for Power, Cumulative Impact Analysis and Cultural/Historical Resources Analysis Issues in Environmental Impact Statements,” U.S. Nuclear Regulatory Commission, Office of New Reactors, March 4, 2011.

Associated ESPA Revisions:

The ninth paragraph of Section 5.8.1.2 will be revised in a future revision as follows:

Exelon has compiled 2008 data on greenhouse gas emissions (in CO_2 equivalents) for ~~its~~ 11 operating nuclear power plants operated by Exelon or with Exelon ownership interest. During 2008, these plants emitted approximately 64,000 metric tons (MT) of CO_2 equivalents, while generating 139 million megawatt-hours (MWh) of electricity. Using these data, Exelon concludes that its greenhouse gas emission rate is approximately 0.00046 MT/MWh. Therefore, a 1,000 MW plant operating at 90 percent capacity factor would emit 3,663 MT of CO_2 equivalent in a year. This value can be compared to values the U.S. Department of Energy prepared for the same sized fossil-fueled plants (Hagen et al. Nov 2001):

HY-1 (eRAI No.6483):

NRC Request:

ESP EIS 2.3.2-1

HY-1 ESRP Section 2.3, "Water Use" directs the staff to obtain information for the proposed site related to the potential impacts on existing and known future water users during the period of project operation. ESRP Section 4.2 directs staff to obtain information to describe the hydrological alterations and water-use impacts from construction. ESRP Section 9.3 the staff to perform similar analyses for alternative sites in the region of interest. The staff needs to review surface water and groundwater uses at the alternative sites, particularly with regard to cumulative effects. The applicant agreed to provide links to water authorities that have this information. However, this form of reference citation only partially fulfills the applicant's responsibility to provide this information, and we therefore request that the applicant compile the information from the source documents. Provide information on past, present, and reasonably foreseeable water users in the vicinity of the alternative sites; i.e., users that could impact surface water and groundwater use and quality in bodies used by or affected by a potential nuclear plant at that location during the periods of construction and operation.

Response:

Consideration of past, present and reasonably foreseeable water users and their impacts to water use and quality is inherent in the State of Texas' regional water planning process, which is managed by the Texas Water Development Board (TWDB). As part of that process, water planners project water demands for a 50-year period (currently 2010 through 2060) within each of the 16 planning regions in the State. Regional water planners also assess current supplies and those needed to meet the projected water needs throughout the planning horizon. Chapter 4 of each regional water plan identifies projected water needs of various users after existing supplies are allocated to meet projected demands and water management strategies recommended to meet future water needs. The plans evaluate means to satisfy the projected demands while avoiding or mitigating adverse impacts to water users or the environment. The process includes evaluation of a broad range of issues including protection of natural resources and agricultural resources, water conservation and drought contingency, and water management strategy quantity, reliability, and cost.

For example, Section 8.1.3 of TWDB (2012) states:

> To assess how the implementation of water management strategies could potentially affect water quality, planning groups identified key water quality parameters within their regions. These parameters were generally based on surface and groundwater quality standards, the list of impaired waters developed by the Texas Commission on Environmental Quality, and input from local and regional water management entities and the public.
>
> Regional water planning groups presented high-level assessments of how the implementation of strategies could potentially affect the water quality of surface water and groundwater sources. Regions used different approaches, including categorical assessments (such as "low" "moderate," or "high"), or numerical impact classifications such as "1-5." Statewide, about a third of the

> recommended water management strategies were designated by the regional water planning groups to have no adverse impacts, while more than half were estimated to only have low or minimum impacts. Approximately 10 percent were classified as having medium or moderate impacts to water quality. No water management strategies recommended by the regional water planning groups were expected to have a high impact on water quality.
>
> Although many recommended water management strategies include water treatment as part of the project implementation, seven regional water planning areas recommended water management strategies whose primary goal is to improve the quality of the source water …

Section 8.2 of TWDB (2012) states:

> In addition to considering the potential impact of strategies on water quality, planning groups also evaluated the potential impacts of each water management strategy on the state's water, agricultural, and natural resources. In analyzing the impact of water management strategies on the state's water resources, the planning groups honored all existing water rights and contracts and considered conservation strategies for all municipal water user groups with a water supply need. They also based their analyses of environmental flow needs for specific water management strategies on Consensus Criteria for Environmental Flow Needs or site-specific studies. … In addition, planning groups were required to consider water management strategies to meet the water supply needs of irrigated agriculture and livestock production.

The regional water planning process includes the evaluation of water demands, identification of water supplies, and development of water management strategies designed to meet potential water shortages. Recommended water management strategies are determined to satisfy projected demands while avoiding or mitigating impacts to water quality, water users, or environmental flows.

The assumed surface water and groundwater use during construction and operation at each of the alternative sites are discussed in the following subsections:

9.3.3.1.3 Matagorda County Site
9.3.3.2.3 Buckeye Site
9.3.3.3.3 Alpha Site
9.3.3.4.3 Bravo Site

Surface water diversions at any of the alternative sites would require water rights. Exelon could acquire these water rights directly or contract for them. Because it is not possible to determine which water rights would be obtained without detailed contractual negotiations and water rights are generally not required to extract groundwater, the conclusion that there is adequate surface water or groundwater to support a nuclear power plant at an alternative site and that other water users and water quality would not be adversely affected by the plant water usage is based on the applicable regional plan's evaluation of supply, demands, and recommended water management strategies. With the exception of the Matagorda County site, which does not require a fresh surface water diversion, the construction of a nuclear power plant at an alternative site would be expected to be factored into the regional planning process. These regional planning processes would include identification of additional water management strategies, if necessary. The identification and evaluation of the proposed VCS project in the 2011 Region L Regional Water Plan, as discussed in ER Section 5.2.2.1, provides an example of the regional planning process that would be carried out an alternative site. A summary of surface and groundwater planning activities applicable to each of the alternative sites is provided below.

As discussed in ER Section 9.3.3 and in the response to information need NR-5 (see Exelon letter NP-12-0016, dated April 9, 2012), the discharges at an alternative site would be compliant with the Texas Commission on Environmental Quality (TCEQ) regulations and conditions of the facility's discharge permit, including limits on thermal impacts and chemical constituents. In establishing discharge limits for a power plant at one of the alternative sites, TCEQ would consider existing water quality and other discharges. Therefore, the combined effects of the plant effluents and other discharges would not be expected to adversely affect supporting the designated uses of the receiving water bodies. As described in the response to NR-5, the human health impacts associated with the cooling system discharges at each alternative site would be SMALL.

<u>Matagorda County Site</u>

The Matagorda County site cooling system would consist of onsite cooling towers with a makeup water intake line from the Gulf Intracoastal Waterway (GIWW) and a discharge line to Tres Palacios Bay. The Matagorda County site would use groundwater from the Evangeline aquifer during construction and operations.

Surface and groundwater resources could support a potential nuclear power plant at the Matagorda County site. Regional planning indicates the water resources would also support present and reasonably foreseeable future users in the area.

Surface water use

The Matagorda County site is located in the Lower Colorado River Water Planning Area (LCRWPA) (LCRWPG 2010, Figure 1.10). Matagorda Bay and Tres Palacios Bay fall within the boundaries of the LCRWPA, but the regional water planning process does not extend to salt water bodies other than consideration of freshwater inflow needs to the estuaries.

Withdrawing water from the GIWW would not change conditions beyond natural variation that presently occurs in the GIWW. Water would flow into the GIWW from the Gulf of Mexico, a large water body that furnishes an unlimited source of cooling water even under drought conditions without affecting other water users or altering the hydrology or water quality of the GIWW. The intake would be designed and operated to not interfere with navigation in the GIWW.

Groundwater use

The Matagorda County site is located within the outcrop area for the Gulf Coast Aquifer. The portion of the Gulf Coast Aquifer that includes the site lies within the Coastal Plains Groundwater Conservation District (CPGCD). The CPGCD includes all of Matagorda County (CPGCD undated). The CPGCD groundwater management plan adopts water supply and demand projections set forth in the state and regional water plans (CPGCD 2009).

Matagorda County is part of the LCRWPA, which is required to plan for future water needs under drought conditions. Groundwater use from the Gulf Coast Aquifer within the LCRWPA occurs in Colorado, Fayette, Matagorda, and Wharton Counties. TWDB records indicate that total groundwater pumpage from the Gulf Coast Aquifer in these counties was 195,761 acre-feet for the year 2000. Municipal uses accounted for 10 percent of the total, manufacturing accounted for 1 percent, power plants accounted for 1 percent, mining accounted for 1 percent, irrigation accounted for 86 percent, and livestock accounted for 1 percent. (LCRWPG 2010, Section 3.2.2.1.1)

According to the 2011 Lower Colorado Regional Water Plan (LCRWPG 2010, Table 3.10), the projected groundwater supply available in the Lower Colorado Region from the Gulf Coast Aquifer is 198,425 acre-feet per year throughout the 2010 through 2060 projection period. The total groundwater available within Matagorda County is estimated at 49,221 acre-feet per year. Groundwater allocations to water user groups in Matagorda County are projected to range from 38,838 to 38,842 acre-feet per year over the 2010 to 2060 period (LCRWPG 2010, Table 3.29). The groundwater use projections reflect current permits and infrastructure capacities as discussed in Section 3.4.2 of LCRWPG (2010).

Surface water quality

The intake and discharge for the Matagorda site would be located in GIWW and Tres Palacios Bay, respectively. These water bodies are not covered by the State of Texas Clean Water Act 303(d) list of impaired waters. However, the Tres Palacios River is listed on the 303(d) list as an impaired water body for elevated fecal coliform and dissolved oxygen standards violations (TCEQ 2010). Occasionally, high bacteria levels in the river, especially after storm events, have resulted in oyster bed closings in Tres Palacios Bay (LCRA 1999).

Groundwater quality

See discussion for Buckeye site.

<u>Buckeye Site</u>

The Buckeye site cooling system would include an approximately 5300-acre cooling pond. Makeup water would be supplied from and blowdown from the pond would be discharged to the Colorado River. The Colorado River also serves as the makeup water source and discharge location for the South Texas Project (STP) main cooling reservoir (MCR). Approximately 6 to 8 river miles separate the Buckeye and STP sites' intake and discharge locations. The Buckeye site would use groundwater from the Evangeline aquifer during construction and operations. Discussion of surface and groundwater use and quality presented in the STP Units 1 and 2 License Renewal Environmental Report (STPNOC 2010) and the STP Units 3 and 4 COLA Environmental Report (STPNOC 2011) would also apply to the Buckeye site.

Surface and groundwater resources could support a potential nuclear power plant at the Buckeye site. Regional planning indicates the water resources would also support present and reasonably foreseeable future users in the area.

Surface water use

The Buckeye site is located in the Lower Colorado River Basin. The Lower Colorado River Basin, which includes all or parts of 14 counties, stretches from Mills County southeast to Matagorda County. The LCRWPA, designated Region K, is roughly consistent with the Lower Colorado River Basin. (LCRWPG 2010) Regional and state water planning includes consideration of future water needs under drought conditions. In the state and regional water plans, present and reasonably foreseeable future projects are evaluated as potential future water users over a 50-year planning period.

Water user groups in Region K were anticipated to need 255,709 acre-feet of additional water in 2010 and 367,671 acre-feet by 2060 under drought conditions (TWDB 2012, Table K.1 and Figure K.2). Water management strategies included in the Regional Water Plan would provide 646,167 acre-feet of additional water supply by the year 2060 (TWDB 2012, Figures K.3 and K.4). The primary recommended water management strategy is the Lower Colorado River Authority-San Antonio Water System (LCRA-SAWS) project that consists of off-channel reservoirs, agricultural water conservation, additional groundwater development, and new and/or amended surface water rights. The costs associated with this project would be paid for by the City of San Antonio and are included in the 2011 South Central Texas Regional Water Plan. If this project is not implemented jointly by the participants, a number of the individual components are recommended as alternate water management strategies to meet Lower Colorado Region needs. There are no unmet needs in the Region K plan. (TWDB 2012, Chapter 2: Lower Colorado (K) Region Summary, pages 92-97)

The LCRA-SAWS project is described in Section 4.6.1.9 of the Regional Water Plan (LCRWPG 2010). This water sharing proposal would temporarily transfer 150,000 acre-feet per year from the Lower Colorado River Basin to the Region L water planning area. The inter-basin transfer could help meet long-term needs in the lower Colorado River Basin and the San Antonio area and satisfy long-term shortages in both Region K and Region L. The viability of the future LCRA-SAWS water management strategy and its use to meet various needs in Region K is currently unclear due to a recent lawsuit filed by SAWS. The LCRWPG has identified alternative strategies that would meet the various needs if the LCRA-SAWS strategy was no longer an option. In addition, the LCRA is looking at several options to help meet future needs while the LCRA-SAWS evaluation process continues (LCRWPG 2010, Section 4.15).

A proposed project in the Lower Colorado River Basin is STP Units 3 and 4. The STP MCR is a 7,000-acre off-channel reservoir located in Matagorda County. Makeup water to the MCR is withdrawn from the Colorado River adjacent to the STP site. Pumping from the river is intermittent, and this diversion normally occurs during periods of high river flow. The reservoir design incorporates storage to account for periods during which river water is unavailable for the reservoir in order to support operation through a repeat of the drought of record. The 2011 Region K regional water plan includes several South Texas Project Nuclear Operating Company (STPNOC) water management strategies to satisfy demand over the 50-year planning horizon. These include the management strategies of (1) continued run-of-the-river diversions of up to 102,000 acre-feet per year, under Certificate of Adjudication No. 14-5437; (2) continued use of STPNOC's existing off-channel reservoirs authorized under Certificate of Adjudication No. 14-5437 and a potential amendment to 14-5437 to pump greater than 102,000 acre-feet when the water is available (Water Right Permit Amendment strategy); and (3) continued pumpage of groundwater for the purposes of incorporation in STPNOC's processes. Supplementing its run-of-the-river diversions, STPNOC also has a contract with LCRA for firm backup water of 20,000 acre-feet for 2-unit operation and 40,000 acre-feet for additional generating units, for so long as electric generation facilities are operated at the site. (LCRWPG 2010, Section 4.13.3)

White Stallion Energy Center (WSEC) is a planned 1320-megawatt electric power generating station using clean-coal technology. The plant site is south of the Port of Bay City in Matagorda County. The plant would be built near the Lower Colorado River, which could serve as its water source. WSEC originally proposed to purchase water through the LCRA. Approximately 30,000 acre-feet per year of water purchased under LCRA contract to support new steam-electric generating capacity in Matagorda County beginning in 2020 was included in the 2011 Region K Regional Water Plan (LCRWPG 2010, Table 4.32). WSEC recently announced plans to use dry cooling (WSEC 2011) and is no longer expected to contribute to future water demands from the Lower Colorado River.

Groundwater use

The Buckeye site is located within the outcrop area for the Gulf Coast Aquifer. The portion of the Gulf Coast Aquifer that includes the site lies within the Coastal Plains Groundwater Conservation District (CPGCD). The CPGCD includes all of Matagorda County (CPGCD undated). The CPGCD groundwater management plan adopts water supply and demand projections set forth in the state and regional water plans (CPGCD 2009).

Matagorda County is part of the LCRWPA, which is required to plan for future water needs under drought conditions. Groundwater use from the Gulf Coast Aquifer within the LCRWPA occurs in Colorado, Fayette, Matagorda, and Wharton Counties. TWDB records indicate that total groundwater pumpage from the Gulf Coast Aquifer in these counties was 195,761 acre-feet for the year 2000. Municipal uses accounted for 10 percent of the total, manufacturing accounted for 1 percent, power plants accounted for 1 percent, mining accounted for 1 percent, irrigation accounted for 86 percent, and livestock accounted for 1 percent. (LCRWPG 2010, Section 3.2.2.1.1)

According to the 2011 Lower Colorado Regional Water Plan (LCRWPG 2010, Table 3.10), the projected groundwater supply available in the Lower Colorado Region from the Gulf Coast Aquifer is 198,425 acre-feet per year throughout the 2010 through 2060 projection period. The total groundwater available within Matagorda County is estimated at 49,221 acre-feet per year. Groundwater allocations to water user groups in Matagorda County are projected to range from 38,838 to 38,842 acre-feet per year over the 2010 to 2060 period (LCRWPG 2010, Table 3.29). The groundwater use projections reflect current permits and infrastructure capacities as discussed in Section 3.4.2 of LCRWPG (2010).

Surface water quality

The Buckeye site intake and discharge would be located in the portion of the Colorado River (Segment 1401) that has been classified by the Texas Commission on Environmental Quality (TCEQ) as Tidal. Segment 1401 water uses support aquatic life, contact recreation, general use, and fish consumption. In 2010, Segment 1401 was assessed as "fully supporting" or "no concern" for aquatic life and general use parameters. Fish consumption was not assessed. The draft 2010 water body assessment list shows Segment 1401 as not supporting contact recreational use due to the presence of the bacteria *Enterococcus*. The segment was first listed in 2006. The report also shows the segment exceeding nutrient screening levels for nitrate and chlorophyll-α. (TCEQ 2011a)

Enterococcus is normally found in human and animal waste. Water quality associated with bacteria generally deteriorates during periods of heavy precipitation.

Segment 1401 is monitored at the LCRA's Selkirk Island monitoring station (Site 12281). Based on aerial imagery, the Segment 1401 watershed is rural. Much of the land along the river is farmed. Immediately upstream of the monitoring site, vegetated buffers are maintained along the east bank of the river, but much of the west bank above the monitoring site does not contain a riparian buffer strip. There are no urban developments in Segment 1401. A small subdivision is located along the river at the monitoring site. The houses appear to have been built in the 1960s and 1970's and presumably use septic systems. (LCRA 2011)

Two permitted discharges are located upstream of the monitoring site. OXEA Corporation, a maker of solvents, has a permit to discharge 2.28 MGD of treated domestic wastewater and process water. The discharge is located 8 miles upstream of the monitoring station. The other permit belongs to Equistar Chemical plant, a producer of polymers and plastics. Equistar has a permit to discharge 0.65 MGD of treated domestic wastewater and process water and is located 2 miles upstream of the monitoring site. STP discharges stormwater and water from the MCR embankment protection system from a point just upstream of Site 12281. (LCRA 2011)

There is currently no routine discharge from the STP MCR to the Colorado River. STP has discharged water from the MCR to the Colorado River once, in 1997. The STP Units 1 and 2 wastewater treatment facility currently discharges treated water to the MCR where it is diluted by water of the MCR and reused. MCR water quality is currently maintained by selective pumping during high river flow conditions (>1200 cfs). Projections of the MCR water quality and additional demands upriver could necessitate the use of the STP permitted reservoir blowdown system to maintain water quality. STPNOC would monitor the MCR water quality on a regular basis in conjunction with the MCR water level to determine if and when blowdown is necessary. STPNOC would continue to monitor flow of the Colorado River prior to withdrawing surface water and discharging water to the Colorado River. Under the STP TPDES permit 001908000, discharge from the MCR cannot occur when the Colorado River is less than 800 cfs and cannot exceed 12.5 percent of the river flow. (STPNOC 2011, Section 5.2.3.1)

Segment 1401 was first placed on the 2006 303(d) List as not supporting contact recreation based on elevated levels of *Enterococcus* bacteria. It remained on the Draft 2010 List with 15 out of 40 (38 percent) grab samples exceeding the single sample criterion of 89. The geometric mean of 40 samples was 55 (most probable number), exceeding the criterion of 35. All samples were collected between December 31, 2001 and November 30, 2008. In 2008, Segment 1401 was assigned Category 5c, meaning more data should be collected before a water quality project is implemented. The Draft 2010 Integrated Report also identified a concern for nitrates based on data from Site 12281. Seventeen of 42 (40 percent) samples exceeded the screening level of 1.1 mg/L. (LCRA 2011)

Potential Causes of Impairment at Site 12281

Point Sources	• Equistar Chemicals • Oxea Corporation • STP discharge into the river upstream of the sampling point
Nonpoint Sources	• On-site sewage facilities - Septic systems located just upstream of the monitoring site may leech into the river • Agriculture - Based on aerial imagery, there is little agricultural activity along the river for 2 miles upstream of Site 12281, but it is difficult to rule out the influence of agriculture based on limited available data • Wildlife - Deer, feral hog and domestic livestock may contribute bacteria in the segment

Prior to 2006, fecal coliform was the primary indicator of bacteria in tidal water bodies. The 2006 Integrated Report was the first time TCEQ performed a full assessment using *Enterococcus* as the indicator for contact recreation standards attainment. Of the 23 tidally influenced water bodies listed for bacteria since 1996, 39 percent occurred in 2006, with another 22 percent occurring in 2010 (2008 was a targeted assessment in which data for unlisted water bodies was not considered). This includes three tidally influenced segments (1304, 1401 and 1501) monitored by LCRA. This sudden increase in coastal water impairment may be due to the use of *Enterococcus* or the method of analysis. (LCRA 2011)

Groundwater quality

Groundwater quality in the Gulf Coast Aquifer varies with depth and location and is good in terms of dissolved solids in the central and northeastern parts of the aquifer where the aquifer contains less than 500 milligrams per liter (mg/L) of total dissolved solids, but declines to the south where the total dissolved solids range from 1000 to more than 10,000 mg/L (TWDB 2012). The water quality is generally good northeast of the San Antonio River but declines to the southwest due to increased chloride concentrations and saltwater encroachment near the coast. Heavy pumpage has caused saltwater intrusion to occur along the coast as far north as Orange County. Pumping from the Gulf Coast Aquifer between 1985 and 2000 ranged from around 1 million to 1.3 million acre-feet per year. Water level declines of up to 350 feet in Harris, Galveston, Fort Bend, Jasper, and Wharton counties have led to land-surface subsidence. (TWDB 2006, page 9)

As noted in VCS ER Section 2.3.3.1, groundwater from the Evangeline aquifer in areas south of Bee County has elevated concentrations of radioactivity relative to the rest of the Gulf Coast Aquifer system. Radioactivity generally increases from the northern part to the southern part of the Gulf Coast Aquifer, occurs irregularly with depth, and shows no trend in composition. STPNOC notes radionuclides, including uranium, radium, and radon gas are naturally occurring within the central and northeastern portion of the Gulf Coast Aquifer, with a high occurrence in the Harris County area located northeast of Matagorda County (STPNOC 2011, Section 2.3.3.2). The TWDB indicates the Gulf Coast Aquifer has significant numbers of wells with high levels of gross alpha radiation. Although contamination from human activity can be a source of radionuclides, most of the radionuclides in Texas groundwater occur naturally. (TWDB 2012, Section 8.1.2)

Alpha Site

The Alpha site cooling system would consist of onsite cooling towers with intake and discharge lines to the proposed Brazos River Authority (BRA) Allens Creek Reservoir. The reservoir would receive water from and discharge to the Brazos River. The Alpha site would use groundwater from the Gulf Coast Aquifer during construction and operations.

Surface and groundwater resources could support a potential nuclear power plant at the Alpha site. Regional planning indicates the water resources would also support present and reasonably foreseeable future users in the area.

Surface water use

Austin County is part of the Region H Water Planning Group, which is required to plan for future water needs under drought conditions. The 2011 Region H Water Plan meets all projected water demands over the 50-year planning period at an estimated capital cost of approximately $12.0 billion for the recommended water management strategies (RHWPG 2010, Section ES4.2). Table ES-8 shows the recommended combination of strategies required for each county to meet its projected water shortages.

According to the 2011 Regional Water Plan, the projected water supply available in Region H from the Brazos River Basin would range from 573,081 acre-feet per year in 2010 to 573,342 acre-feet per year in 2060. Those supplies include 155,031 acre-feet per year of firm water currently contracted from upstream BRA system reservoirs to Region H customers. (RHWPG 2010, Table ES-6).

Recommended water management strategies in the 2011 Regional Water Plan include the proposed BRA Allens Creek Reservoir with a projected volume of 99,650 acre-feet per year beginning in planning year 2020. The BRA project would divert peak (storm water) flows from the Brazos River and impound these flows into the reservoir to create storage yield. The permit conditions regarding the diversions from the Brazos River are based upon the consensus criteria for environmental flow needs. (RHWPG 2010, Table ES-7 and Appendix 4B, page 4B26-1)

The BRA submitted a water right application in 2004 for additional yield gained through System Operations. The technical study in support of the application determined that additional firm yield could be realized from the BRA system when their reservoirs are operated as a system instead of as separate sources. The additional yield comes from a combination of reservoir capacity not recognized in the existing permits, efficiencies realized when operated as a system, and the ability to use unreliable river flows, when available, to meet demands and thus increase the amount of stored water for drought periods. (RHWPG 2010, Section 4.3.1) Currently, the Allens Creek Reservoir is included in the BRA System model, potentially generating additional system yield (in addition to the original 99,650 acre-feet per year yield) (RHWPG 2010, page 4B26-2).

Groundwater use

The Alpha site lies over the northern portion of the Gulf Coast Aquifer System. The portion of the Gulf Coast Aquifer that includes the Alpha site lies within the Bluebonnet Groundwater Conservation District (BGCD). The BGCD includes Austin, Grimes, Walker, and Waller counties (BGCD undated). The BGCD groundwater management plan (BGCD 2010) adopts water usage data from the TWDB. The estimated amount of groundwater being used in the District on an annual basis is 49,613 acre-feet per year. That estimate is from the TWDB Annual Water Use Survey for the Year 2004, which is the most recent data available. The District adopts groundwater demand projections from the State Water Planning Database. The projected groundwater demand by county within the District is summarized in Table 9 of BGCD (2010). The estimates of projected groundwater demand for Austin County range from 16,411 acre-feet per year in 2010 to 17,368 acre-feet per year in 2060. A breakdown of the projected demand over the 50-year planning period by water user group is provided in Appendix E of BGCD (2010).

Groundwater resources in Region H include two major aquifers, the Gulf Coast Aquifer and the Carrizo-Wilcox Aquifer, with the Gulf Coast Aquifer furnishing the majority of groundwater in the region south of and within Waller and Walker Counties (RHWPG 2010, Section 3.2.1). The Brazos River alluvium is one of four minor aquifers in the region. The Brazos River alluvium occurs in the floodplain and terrace deposits of the Brazos River in Austin, Fort Bend and Waller Counties as shown on Figure 3-2 of RHWPG (2010). The Brazos River alluvium supplies groundwater for domestic and agricultural purposes in Fort Bend and Waller Counties. In Austin County, it supplies groundwater for domestic, manufacturing, and agricultural uses. (RHWPG 2010)

According to the 2011 Regional Water Plan, the projected groundwater supply available in Region H from the Gulf Coast Aquifer would decrease from 812,709 acre-feet per year in 2010 to 685,853 acre-feet per year in 2060. The Brazos River Alluvium would supply 41,539 acre-feet per year over the 2010 to 2060 period (RHWPG 2010, Table ES-6).

The Regional Water Plan considers groundwater availability within Austin, Waller and Walker Counties is based on information provided by the BGCD. Current water supply sources available during drought of record conditions are presented in Table 3A-1 of RHWPG (2010). Groundwater in the region is used for domestic, municipal, manufacturing, steam-electric power cooling and agricultural purposes. Municipal usage accounts for approximately 78 percent of the water pumped in the region. The majority of the groundwater usage is in the southern part of the region where more of the population, industrial, and agricultural demands exist and where the aquifer is capable of providing large quantities of water for the various uses. Tables 3-1 through 3-3 of RHWPG (2010) indicate a total of 671,566 acre-feet of groundwater usage in 2000 for Region H. Austin County used a total of 13,004 acre-feet in 2000, of which 71 percent was agricultural use, 27 percent municipal use, and 2 percent industrial use.

Subsidence has occurred principally in Harris, Galveston, Brazoria, Fort Bend, and Chambers Counties, as the result of the withdrawal of large quantities of groundwater from the Chicot and Evangeline aquifers. Harris-Galveston Subsidence District (HGSD) has developed regulatory plans that prescribe general areal pumpage limits for Harris and Galveston Counties. Groundwater pumping in Harris and Galveston Counties has decreased over the past 23 years as additional surface water has been utilized and less groundwater has been pumped. (RHWPG 2010, Sections 3.2.2 and 3.2.4)

Surface water quality

Surface water throughout Region H is of sufficient water quality to be treated for municipal use using conventional measures. Contact recreation use is limited in the lower Trinity River due to fecal coliform bacteria levels. Growth in the San Jacinto River Basin has increased nutrient loading and fecal coliform levels in many streams, particularly Buffalo Bayou. Sand mining, in particular, has increased nutrient loads in the San Jacinto River which can result in an increase in cyanobacteria levels. Nutrients, dissolved minerals and elevated fecal coliform levels have been identified in the Lower Brazos River. Also of concern in the lower Brazos River are seasonal low flows, which allow the tidal salt-wedge to reach municipal and industrial freshwater intakes in Freeport. (RHWPG 2010, Section 1.5.1)

The intake and discharge to the Allens Creek Reservoir would be located in TCEQ Surface Water Quality Segment 1202 (Brazos River below the Navasota River, Assessment Unit 1202-03). In 2010, Segment 1202 was assessed as "fully supported" for aquatic life, contact recreation, general uses, and public water supply (TCEQ 2011b). Allen's Creek (segment 1202H) is included on the 303(d) list of impaired waters for high levels of bacteria (TCEQ 2010).

Groundwater quality

Groundwater within Region H is generally of good quality, with total dissolved solids below 1000 mg/L. Iron is a concern in some portions of the Carrizo-Wilcox Aquifer, and calcium, magnesium and sulfate cause high total hardness in portions of the Brazos River Alluvium. Some groundwater supplies contain arsenic and radon. The current maximum contaminant level (MCL) for arsenic in water used for public supply is 0.01 mg/L set by the Environmental Protection Agency (EPA) in January of 2006. Currently, most groundwater produced within Region H has an arsenic content below the existing MCL. There is a limited area within the northwest part of Harris County where the concentration of arsenic in some sands of the Gulf Coast Aquifer exceeds 0.01 mg/L. Wells are now constructed to not screen these sands. (RHWPG 2010, Section 1.5.1)

Radon is not a regulated constituent, as an MCL has not been established for it. There are some areas in the west part of Harris County where isolated sands can contain water with higher concentrations of radon. Through geophysical logging to identify these depth intervals and by the use of well construction techniques that isolate the sands, production wells produce water with low levels of radon. (RHWPG 2010, Section 1.5.1)

Groundwater quality in the Gulf Coast Aquifer varies with depth and location and is good in terms of dissolved solids in the central and northeastern parts of the aquifer where the aquifer contains less than 500 mg/L of total dissolved solids, but declines to the south where the total dissolved solids range from 1000 to more than 10,000 mg/L (TWDB 2012). The water quality is generally good northeast of the San Antonio River but declines to the southwest due to increased chloride concentrations and saltwater encroachment near the coast. Heavy pumpage has caused saltwater intrusion to occur along the coast as far north as Orange County. Water level declines of up to 350 feet in Harris, Galveston, Fort Bend, Jasper, and Wharton counties have led to land-surface subsidence. (TWDB 2006, page 9)

Bravo Site

The Bravo site cooling system would consist of onsite cooling towers with an intake line to the Cedar Creek Reservoir, an onsite makeup water retention basin, and a discharge line to Walnut Creek. The Bravo site would use groundwater from the Carrizo-Wilcox Aquifer during construction and operations.

Surface and groundwater resources could support a potential nuclear power plant at the Bravo site. Regional planning indicates the water resources would also support present and reasonably foreseeable future users in the area.

Surface water use

Henderson County is divided between the Region C and Region I water planning areas. The Bravo site is located in western Henderson County which is part of Region C. The Region C portion of Henderson County includes approximately 70 percent of the total population in the county (RCWPG 2010, Table 1.1). Water usage in the portion of Henderson County within Region C was 8344 acre-feet in 2006, with 3786 acre-feet from groundwater and 4558 acre-feet from surface water. Total water usage in Region C was 1,404,535 acre-feet in 2006 (RCWPG 2010, Table 1.9).

Region C is heavily urbanized, with 81 percent of the population located in cities with populations in excess of 20,000 people. The two most populous counties in Region C, Dallas and Tarrant, account for approximately two-thirds of the population in the Region, and roughly two-thirds of the water usage. (RCWPG 2010, Section ES.1 and page 1.20) The 2011 Regional Water Plan projects the population of Region C to grow from 5,254,722 in the year 2000 to 9,171,650 in 2030 and 13,045,592 in 2060. This represents a substantial slowing in the rate of growth that has been experienced in Region C over the last 50 years. (RCWPG 2010, Section ES.5)

Water use in Region C has increased significantly in recent years, primarily in response to increasing population and municipal demand. About 90 percent of the water usage in the region is for municipal supply. Although Region C includes over 25 percent of Texas' population, it accounted for only 8.2 percent of the state's water use in 2006. Over half of the water used for municipal supply in Region C is discharged as treated effluent from wastewater treatment plants, making wastewater reclamation and reuse a potentially significant source of water supply for the region. (RCWPG 2010, Section ES.1)

Most of Region C is in the upper portion of the Trinity River Basin, with smaller parts in the Red, Brazos, Sulphur, and Sabine River Basins. There are thirty-four major reservoirs in Region C with conservation storages in excess of 5,000 acre-feet. These reservoirs and others outside of Region C provide most of the region's water supply. (RCWPG 2010, Section ES.1) The Cedar Creek Reservoir, which would serve as the makeup water supply for the Bravo site, has a permitted conservation storage of 678,900 acre-feet and permitted diversion rate of 175,000 acre-feet per year, excluding reuse. Based on TCEQ water use records, 96,632 acre-feet were diverted from the reservoir in 2006 (RCWPG 2010, Table 1.10). Cedar Creek reservoir is owned and operated by the Tarrant Regional Water District (TRWD) (RCWPG 2010, page 1.46).

According to the 2011 Regional Water Plan, the projected water demands for Henderson County would range from 11,244 acre-feet in 2000 to 29,342 acre-feet in 2060 (RCWPG

2010, page ES.36). These water demands are met through the implementation of recommended water strategies.

Region C considered a variety of water management strategies to meet needs. In all, the strategies provide an additional 2.4 million acre-feet by 2060 with a total capital cost of $21.5 billion if all the recommended water management strategies are implemented. The plan recommends four new major reservoirs: Lower Bois d'Arc, Ralph Hall, Marvin Nichols, and Fastrill Replacement Project. Conservation strategies account for approximately 12 percent (290,709 acre-feet) of the total volume of water associated with all recommended strategies. (TWDB 2012, page 46)

Recommended water management strategies for developing additional water supplies in Region C include TRWD plans to divert return flows of treated wastewater from the Trinity River into Cedar Creek and Richland-Chambers Reservoirs. TRWD also plans to complete the Integrated Pipeline Project, a recommended water management strategy, in cooperation with Dallas Water Utilities (RCWPG 2010, Section 1.6) The Integrated Pipeline Project would support the interbasin transfer of more than 100,000 acre-feet from Lake Palestine on the Neches River to Dallas (RCWPG 2010, Section 4D.12). The Project would include pipelines to deliver water from Cedar Creek and Richland-Chambers Reservoirs to Tarrant County for TRWD (RCWPG 2010, page 4E.17). Recommended strategies include development of the Marvin Nichols Reservoir, which would be located outside Region C on the Sulphur River. Approximately 80 percent of the water supplied from the reservoir would serve customers in Region C. Table 4E.4 summarizes water supply and demand for the recommended water management strategies for TRWD and projects a reserve (supply > demand) of at least 56,000 acre-feet per year in each decade over the 2010 to 2060 planning period.

Groundwater use

The Bravo site lies over the Carrizo-Wilcox Aquifer. The Carrizo-Wilcox Aquifer extends from the Rio Grande in South Texas northeast into Arkansas and Louisiana, providing water to all or parts of 60 counties (NTVGCD undated). The portion of the Carrizo-Wilcox Aquifer that includes the Bravo site lies within the Neches and Trinity Valleys Groundwater Conservation District (NTVGCD). The NTVGCD includes all of Cherokee and Henderson Counties and the majority of Anderson County (95.58 percent), excluding the portion under the Anderson County Underground Water Conservation District (NTVGCD 2008).

The Carrizo-Wilcox Aquifer is the primary source of groundwater within the NTVGCD. The Queen City and Sparta are other minor aquifers with pumping for use within the District. The depth of the aquifer sands is highly variable within the NTVGCD. Groundwater represents 32 percent of the water source within the District with surface water being the major remaining source. The estimated water pumped during 1999 by aquifer was 90.4 percent from Carrizo-Wilcox; 4 percent from Queen City; 5.4 percent from Sparta; and the balance from undifferentiated aquifers. Municipal and irrigation pumpage account for about 35 and 51 percent, respectively, of pumping from the Carrizo-Wilcox Aquifer. (NTVGCD 2009)

The managed available groundwater is the amount of groundwater available for permitting purposes in each of the aquifers within the district. The desired future conditions (DFCs) are the conditions we would want the aquifers to be by the year 2060. The managed available groundwater will be determined by the TWDB after the DFCs have been approved for the Groundwater Management Area 11 (GMA-11). The NTVGCD is participating with the other groundwater districts in determining the DFCs for GMA-11. (NTVGCD 2009)

Total annual water usage in the NTVGCD in 2004 was 34,627 acre-feet, including 17,677 acre-feet of groundwater (NTVGCD 2009). Total water demand within the District is summarized in Figures 4, 5, and 6 of NTVGCD 2009. The projections are derived from the 2007 State Water Plan and include agriculture, municipal and industrial use. In 2006, Henderson County pumped a total of approximately 4111 acre-feet of groundwater of which 3428 acre-feet were pumped from the Carrizo-Wilcox Aquifer (RCWPG 2010, Table 1.12).

NTVGCD (2008) states total water use within the District was 49,222 acre-feet in 2000 and is projected to increase to 73,215 acre-feet by 2050. The majority of the increase is attributed to steam–electric power generation with demand increasing from 9000 acre-feet in 2000 to 35,209 acre-feet in 2050. NTVGCD indicates the projected water supply from all sources within the District is estimated to be 81,462 acre-feet in 2050.

Surface water quality

The intake to the Bravo site cooling system would be located in Cedar Creek Reservoir, TCEQ Surface Water Quality Segment 0818. In 2010, Segment 0818 was assessed as “fully supported” for aquatic life, contact recreation, and public water supply use (TCEQ 2011c). Cedar Creek Reservoir is included on the 303(d) list of impaired waters for pH levels in excess of general use standards (TCEQ 2010). Portions of the reservoir exceed nutrient screening levels for ammonia, chlorophyll-α, orthophosphorus, and total phosphorus (TCEQ 2011c). Dissolved oxygen below the screening level for aquatic life use was observed in Cedar Creek cove (TCEQ 2011c).

The discharge from the Bravo site cooling system would be directed to the water retention basin, which would have occasional blowdown to Walnut Creek. Walnut Creek is an unclassified water body (TCEQ segment 0838C) that was assessed as “fully supported” for aquatic life use. The 2010 water body assessment list shows Segment 0838C as not supporting contact recreational use due to the presence of bacteria (TCEQ 2011c). Walnut Creek discharges to Cedar Creek which flows to the Trinity River.

Groundwater quality

Maps showing the extent of the Carrizo-Wilcox Aquifer and the outcrop and downdip are provided in NTVGCD (undated) and TWDB (2009). Regionally, water from the Carrizo-Wilcox Aquifer is fresh to slightly saline. In the outcrop, the water is hard, yet usually low in dissolved solids. Downdip, the water is softer, has a higher temperature, and contains more dissolved solids. Hydrogen sulfide and methane may occur locally. In much of the northeastern part of the aquifer, water is excessively corrosive and has high iron content. In this area, the groundwater may also have high concentrations of TDS, sulfate, and chloride. Some of these sites may be mineralized due to waters passing through lignite deposits, especially in the case of high sulfate. Another cause may be the historic practice of storing oil field brines in unlined surface storage pits. Localized contamination of the aquifer in the Winter Garden area in South Texas is attributed to direct infiltration of oil field brines on the surface and to downward leakage of saline water to the overlying Bigford Formation. (NTVGCD undated and RCWPG 2010, pages 1.88 and 1.96)

In 2005 and 2006, TWDB analyzed groundwater samples from the Carrizo-Wilcox Aquifer for major and minor ions, trace elements, and radionuclides (TWDB 2009). Although the quality of the groundwater was generally good, some of the samples exceeded the MCLs and secondary standards for nitrate, lead, fluoride, chloride, sulfate, iron, manganese, and total dissolved solids. For the most part, groundwater salinity showed little change over time in wells from the northern and central sections of the aquifer, although some changes were noted in wells in the southern section of the aquifer. Most changes in groundwater salinity were moderate, of no more than 100 mg/L over the period of record; however, larger fluctuations were observed at locations in Zavala, Dimmit, and Frio counties. The nitrate in groundwater has generally been within the admissible limits for drinking water. Samples collected in Henderson County showed less than 500 mg/L total dissolved solids, nitrate concentrations less than the MCL of 44.3 mg/L, and sulfate and chloride concentrations less than 200 mg/L (TWDB 2009, Figures 4-1 through 4-4).

Significant water-level declines have developed in the semiarid Winter Garden portion of the Carrizo aquifer in South Texas, as the region is heavily dependent on groundwater for irrigation. Since 1920, water levels have declined as much as 100 feet in much of the area and more than 250 feet in the Crystal City area of Zavala County. Significant water-level declines resulting from extensive municipal and industrial pumpage also have occurred in Northeast Texas. Tyler and the Lufkin-Nacogdoches area have experienced declines in excess of 400 feet, and in a few wells, as much as 500 feet since the 1940s. Conversion to surface-water use is slowing the rate of water-level decline in the area. The northeast outcrop area has been dewatered in the vicinity of lignite surface-mining operations, and the Simsboro Sand Formation of the Wilcox Group has been affected by water-level declines in parts of Robertson and Milam counties. (NTVGCD undated)

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Associated ESPA Revisions:

The third paragraph of ER Section 9.3.3.1.3 will be modified in a future revision as shown below:

Matagorda County is part of the Lower Colorado Regional Water Planning Group, which is required to plan for future water needs under drought conditions. According to the 2006 Lower Colorado Regional Water Plan, the projected groundwater supply available in the Lower Colorado Region from the Gulf Coast Aquifer during drought of record conditions is 198,425 acre-feet per year throughout the 2010 through 2060 projection period. Groundwater allocations from the Gulf Coast Aquifer are projected to decline by 50.1 percent from 848,782 acre-feet per year to 423,328 acre-feet per year over the same period. (LCRWPG Jan 2006) In 2004, Matagorda County pumped approximately 47,279 acre-feet of groundwater from the Gulf Coast Aquifer (TWDB 2012).

The third paragraph of ER Section 9.3.3.2.3 will be modified in a future revision as shown below:

Matagorda County is part of the Lower Colorado Regional Water Planning Group, which is required to plan for future water needs under drought conditions. According to the 2006 Lower Colorado Regional Water Plan, the projected groundwater supply available in the Lower Colorado Region from the Gulf Coast Aquifer during drought of record conditions is 198,425 acre-feet per year throughout the 2010 through 2060 projection period. Groundwater allocations from the Gulf Coast Aquifer are projected to decline by 50.1 percent from 848,782 acre-feet per year to 423,328 acre-feet per year over the same period. (LCRWPG Jan 2006) In 2004, Matagorda County pumped approximately 47,279 acre-feet of groundwater from the Gulf Coast Aquifer (TWDB 2012).

The third paragraph of ER Section 9.3.3.2.3 will be modified in a future revision as shown below:

The portion of Henderson County where the Bravo site is located is part of the Region C Water Planning Group, which is required to plan for future water needs under drought conditions. According to the 2006 Region C Water Plan, the projected groundwater supply available in Region C from the Carrizo-Wilcox Aquifer is 12,203 acre-feet per year throughout the 2010 through 2060 projection period (RCWPG Jan 2006). In 2004, Henderson County pumped approximately 5870 acre-feet of groundwater from the Carrizo-Wilcox Aquifer (T~~D~~WDB 2008).

A new reference will be added to Section 9.3.5 in a future revision:

TWDB 2012. Texas Water Development Board, Historical Water Use Information. Available at http://www.twdb.state.tx.us/wushistorical/DesktopDefault.aspx?PageID=1. Accessed July 10, 2012.

ATTACHMENT 7

SUMMARY OF REGULATORY COMMITMENTS

(Exelon Letter to USNRC No. NP-12-0032, dated July 30, 2012)

The following table identifies commitments made in this document. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	Programmatic (Yes/No)
Exelon will provide the response to RAI MET-2 no later than September 13, 2012 (i.e., 45 days beyond the 60-day response timeframe requested in RAI letter No.14).	September 13, 2012	Yes	No
Exelon will provide the response to RAI HY-5 no later than September 17, 2012 (i.e., 45 days beyond the 60-day response timeframe requested in RAI letter No.15).	September 17, 2012	Yes	No
The ninth paragraph of Section 5.8.1.2 will be revised in a future revision to clarify Exelon's interest in the 11 operating nuclear plants included in the GHG accounting. [RAI MET-6 Response (6453)]	March 31, 2013	Yes	No
ER Subsections 9.3.3 and 9.3.5 will be updated in a future ESPA revision to include changes resulting from the response to RAI HY-1. [RAI HY-1 Response (6483)]	March 31, 2013	Yes	No