Comments Regarding Draft Environmental Impact Statement for Combined Licenses for South Texas Project Units 3 and 4

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I have reviewed the Nuclear Regulatory Commission's Draft Environmental Impact Statement for Combined Licenses for South Texas Project Nuclear Power Plant, Units 3 and 4, and I offer the following comments regarding the revision based on my best professional judgment.

Summary

After reviewing the draft, it is my professional judgment that the NRC Staff has committed numerous errors of omission in their analysis of global climate change including:

- The significance of climate change on the environment,
- the methods of calculating the global climate change emissions from the proposed nuclear generating facility,
- the significance of the emissions from this plant compared to alternatives,
- the impact of climate change on the operations of this plant, and

The DEIS has also failed in the need for power discussion to adequately consider reductions in demand for power and additional capacity from renewable and energy storage.

Since the DEIS was released, at least two significant events have occurred:

- The US EPA released a new report on April 27th 2010 entitled "Climate Change Indicators in the United States," which details many ways in which the climate is being disrupted by emissions of greenhouse gasses**.**

- The Corpus Christi, Texas, City Council has approved the sale of water to the proposed Las Brisas coal plant. The City will be piping water from the Colorado River to the serve the needs of this plant. This new plant will could withdraw as much as **19,356** acre feet a year from the Colorado, thus decreasing water flow to STP Units 3 and 4.[1]

These developments are discussed below.

[1] Data from Water Demand Projections for Power Generation in Texas Prepared for Texas Water Development Board Bureau of Economic Geology Scott W. Tinker, Director John A and Katherine G. Jackson School of Geosciences The University of Texas at Austin, Austin, Texas 78713-8924

The NRC Staff's DEIS is flawed because it failed to do a thorough analysis of the need for power. [2]

NRC Staff failed to adequately consider:

1) The much lower cost of energy efficiency.

As an example, recent reports by Nexant[3] in a study of the San Antonio demand side management program show that their energy efficiency program has significant energy savings at very low cost. They stated in their report to San Antonio, "As programs expand, CPS Energy should continue planning for the resources necessary to support large-scale deployment of DSM program portfolio and to achieve both short-term and long-term goals." The overall cost of the program as defined for the energy efficiency programs only is: "**Cost of Saved Energy = $0.032/kWh."** This does not take into account the additional reduction in peak costs that their load management programs achieved. The combined programs were determined to have achieved a reduction of 44.7 MW of peak energy with an expected energy savings of 86,712,978 KWh.

The Texas Public Utility Commission has been considering modifying the state's energy efficiency incentive program and has released a Strawman rule[4] that will change the goal of the program. The proposed rule will increase the annual reduction from the current standard of 20% of new growth in demand to 50% of new growth in demand or 1% of peak demand, whichever is greater. Using the published ERCOT consumption data[5] this would reduce energy consumption in the regulated areas of the state by 635 MW annually

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[2] Standards for critiquing the need for power section are from Draft NUREG-1937 D-54 March 2010:

> *Affected states or regions may prepare a need for power evaluation and assessment of the regional power system for planning or regulatory purposes. A need for power analysis may also be prepared by a regulated utility and submitted to a regulatory authority, such as a state public utility commission. However, the data may be supplemented by information from other sources. The determination for the need for power is not under NRC's regulatory purview. When another agency has the regulatory authority over an issue, NRC defers to that agency's decision. The NRC staff will review the need for power and determine if it is (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. If the need for power evaluation is found to be acceptable, no additional independent review by the NRC is needed. The information provided in this comment will be considered to determine whether it significantly affects the forecast on which the applicant relied for its need for power analysis.*

[3] Jim Herndon, Senior Project Manager Energy and Carbon Management CPS Nexant Measurement and Verification of CPS Energy's 2009 DSM Program Offerings 4/26/2010

[4] PUC project # 37623 closed for comments 3/31/2010

[5] Ercot May 2010 load forecast and reserve margin update.

using the published 2009 actual value and 705 Mw annually using the 2015 ERCOT estimated peak demand forecast, this would reduce the need for additional generation by at least 3200 MW by 2020 and if the ERCOT forecast is accurate, would be over 3500MW.

ERCOT does not currently use energy efficiency other than those based on Texas HB3693 in its projections and is currently shown to be calculated at only 242 MW annually.

2) ERCOT/PUC energy forecast (DEIS page 8-20, Need for Power):

ERCOT recently revised their load forecast, as released in their May 2010 load forecast and reserve margin update prepared for the ERCOT board of directors, dated May 18, 2010. According to this report ERCOT has **reduced** its estimate of forecasted demand from 72,172 MW to 70,517 MW for a reduction of 1655 MW or a **2.2%** peak reduction in 2015.

ERCOT has also increased their estimate of wind carrying capacity reported in their March 2010 report from 708 MW to 793 MW or a 12% increase in just 2 months and an additional increase of 115 MW[6] by 2015. This does not take into account any increases in effective load carrying capacity (ELCC) factor that coastal or off shore wind developments might add or the addition of large scale storage in the market to time shift the energy provided by wind or solar generation assets.

[6] This is ERCOT's effective load carrying capacity (ELCC) of additional wind generation expected to be available from planed units installed by 2015. The ERCOT Effective Load Carrying Capacity is an estimate calculation by ECROT on the availability of wind recourse to carry firm load for an extended period of time. In effect it takes the most conservative approach to derate the amount of energy that wind provides to the market. It does not take into account the availability of wind generation to provide energy to the market but is a obsolete worst case calculation that is used to perform generation planning. On 3/25/2010 ERCOT reported on a new study to revise these calculations as the old capacity factor has become dated with the installation of thousands of MW new wind generation all across the ERCOT market that have substantially different generation profiles than originally calculated. In addition the original calculation did not take into account all hours of the year but used a statistical sampling, a low number of iterations were used to simplify the calculation and only randomized days were modeled for each month. The new calculation should provide a higher ELLC that more accurately characterizes the generation capability provided by the wind generation recourses. However It will not take into consideration the deployment of energy storage and other technologies being deployed to optimize delivery of the energy generated.
From the ERCOT report dated 3/25/2010 they will be addressing these shortcomings for the 2012 projections and realize that this adjustment will have to be updated to account for additional generation as it is deployed.

New additional generation of 2,073MW in the ERCOT generation portfolio was also reported[7].

Additionally 26,182MW of planned units in the Full Interconnection Study Phase are also reported, providing an Ercot total estimate of 31,757MW[8] of additional generation available in 2015. By ERCOT's estimates the reserve capacity will exceed 51% under these conditions.

3) Texas Non-wind RPS

The PUC is considering adding an additional renewable energy mandate to the state's existing Renewable Portfolio Standard. This has been assigned a project #35792 and a strawman has been issued.[9] This would provide an additional 500 MW of generating capacity in the ERCOT market.

4) New Building codes.

The State Energy Conservation Office (SECO) has announced that the state will be adopting the IECC 2009 building code[10].

> The International Energy Conservation Code (IECC) is a national, consensus-based, model code. The 2009 IECC is expected to result in significant energy savings and related emissions reductions, estimated at 12 to 15% annual improvement for average homes. In a report examining the potential for energy efficiency in Texas, the American Council for an Energy Efficient Economy estimates that with this new code, Texas could save 10,533 kilowatt hours of electricity annually and 2,362 megawatts annually of peak summer demand by 2023.[11],[12]

These new standards have significant increases in the requirements for energy savings that are required for all new construction.[13]

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[7] Coleto Creek Unit 2, 756MW, Papalote Creek Wind (198MW nameplate) 17MW , Panda Temple Power 1300MW

[8] Mothballed capacity 5,022, 50% of non-synchronous ties 553MW, planned units in full interconnection study phase 26,182

[9] The hearing on this rule was held 4/30/2010, final comments were filed 5/11/2010, rule would apply starting in 2011 at 100MW and ramp to 500 MW by 2015

[10] http://www.seco.cpa.state.tx.us/news/2010/seco_ch19.php

[11] House Energy Resources Subcommittee for Energy Efficiency and Renewables April 2, 2009, Written Testimony of Kate Robertson, Energy Efficiency Specialist Environmental Defense Fund

[12] ACEEE, *Potential for Energy Efficiency, Demand Response, and Onsite Renewable Energy to Meet Texas's Growing Electricity Needs* (Report Number E073), March 2007.

13 SUBCHAPTER E. TEXAS BUILDING ENERGY PERFORMANCE STANDARDS 34 TAC §19.53
"The Comptroller of Public Accounts proposes new §19.53, concerning building energy efficiency performance standards. The new section is created in compliance with Health and Safety Code, §388.003(b-1), which authorizes the State Energy Conservation Office (SECO) to adopt equivalent or more stringent energy codes than those adopted in Health and Safety Code, §388.003(a) and (b).
New §19.53(a) adopts the energy efficiency provisions of the International Residential Code as they existed on May 1, 2009, as the energy code for single family residential dwellings, as that term is defined in Health

According to the Building Code's Assistance Project (BCAP)[14] if Texas began implementing the 2009 IECC and Standard 90.1-2007 statewide in 2011, businesses and homeowners would save an estimated $785 million annually by 2020 and $1,605 million annually by 2030 in energy costs (assuming 2006 prices).

Additionally, implementing the latest model codes would help avoid about 213.9 trillion Btu of primary annual energy use by 2030 and annual emissions of more than 15.6 million metric tons of CO^2 by 2030.[15]

5) In the new study on Energy Efficiency in the South they found that fewer new power plants would be needed with a commitment to energy efficiency.[16]

> Our analysis of nine illustrative policies shows the ability to retire almost 25 GW of older power plants – approximately 10 GW more than in the reference case. The nine policies would also avoid over the next twenty years the need to construct 49 GW of new plants to meet a growing electricity demand from the RCI sectors.[17]

Further,

> The industry sector offers the greatest energy efficiency potential in Texas. In 2020, savings from all three sectors is about 10% (1,180 TBtu) of the total energy consumed by the State in 2007. Electricity savings constitute 668 TBtu of this amount. With these policies, the generation of electricity from the equivalent of 17 power plants of 500-MW each could be avoided in the year 2020.[18]

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and Safety Code, §388.002(12). New §19.53(b) adopts the International Energy Conservation Code as it existed on May 1, 2009, for all other residential, commercial, and industrial construction in this state.
§19.53.Building Energy Efficiency Performance Standards.
(a) Single-family residential construction. Effective January 1, 2012, the energy efficiency provisions of the International Residential Code as they existed on May 1, 2009, are adopted as the energy code in this state for single-family residential construction as it is defined in Health and Safety Code, §388.002(12).
(b) All other residential, commercial, and industrial construction. Effective January 1, 2011, the International Energy Conservation Code as it existed on May 1, 2009, is adopted as the energy code for use in this state for all residential, commercial, and industrial construction that is not single-family residential construction under subsection (a) of this section.
This agency hereby certifies that the proposal has been reviewed by legal counsel and found to be within the agency's legal authority to adopt.
Filed with the Office of the Secretary of State on March 11, 2010."

[14] http://bcap-energy.org/

[15] http://bcap-ocean.org/state-country/texas

[16] April 13, 2010 Georgia Institute of Technology and Duke University STATE PROFILES OF ENERGY EFFICIENCY OPPORTUNITIES IN THE SOUTH: TEXAS

[17] Id.

[18] Id.

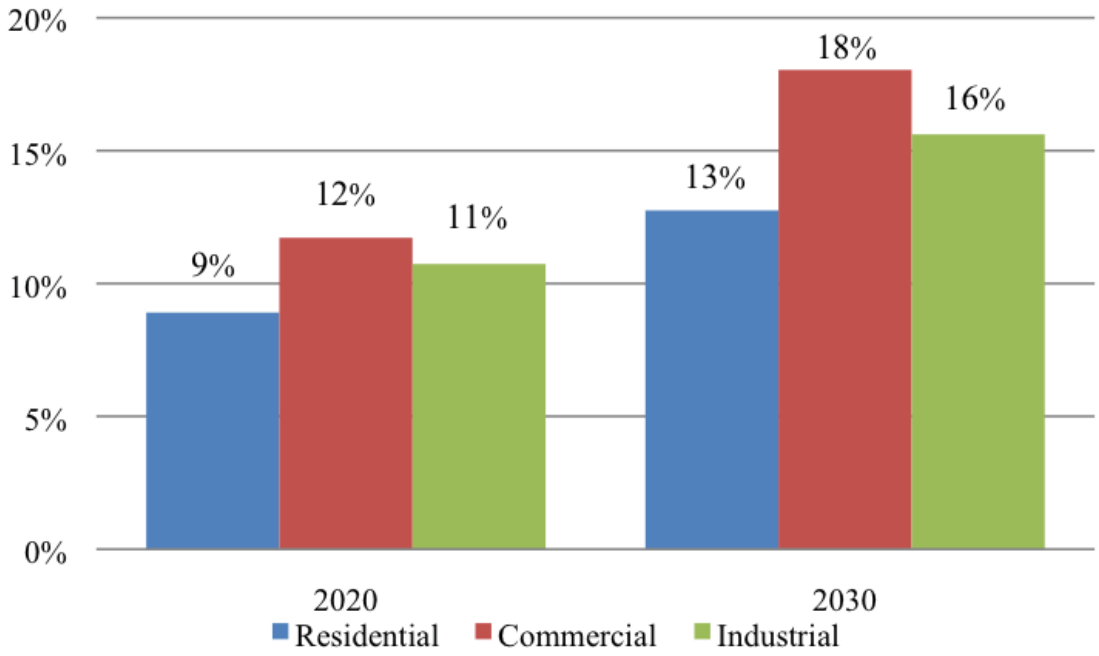

Figure ES.2 Energy-Efficiency Potential by Sector, in 2020 and 2030[19]

6) Additional Federal Incentives.

In addition to the $218 million in funding from the American Recovery and Reinvestment Act, additional Federal incentives for energy efficiency programs recently passed in the House of Representatives in HB5019 and would provide over $6 billion in energy efficiency retrofit incentives further reducing the need for new generation.

7) Compressed Air Energy Storage

Significant advances in energy storage technologies are being made. This will provide additional firming or increase in the capacity factor of wind generation. New projects have been announced similar to one by ConocoPhillips with General Compression announced on April 14, 2010. [20]

> General Compression, Inc. ("GC"), a Massachusetts company developing an innovative compressed air energy storage system, today announced it has signed an agreement with ConocoPhillips (NYSE: COP) of Houston, Texas, to develop compressed air energy storage projects, beginning with a pilot project in Texas, using General Compression's Advanced Energy Storage ("GC*AES*™") technology. GC and ConocoPhillips are evaluating a multiple-phase pilot project in Texas that would incorporate GC*AES*™ technology with wind energy, underground air storage and power sales.
>
> GC's near-isothermal compressor/expander module is used to create 2 MW to 1,000 MW, 8 to 300 hour discharge, compressed air energy storage (CAES) projects.

[19] Id.
[20] http://www.generalcompression.com/gcaes.html

According to the engineering designs, "The projects shape power from the wind farm so that it arrives to the customer 5 days a week for 8 hours (Peaking), 5-7 days a week for 16 hours (Intermediate) or 7 days a week for 24 hours (Baseload), or any other demand curve that a customer provides. Projects are designed to bid into firm power contracts, and to have enough storage duration, from 20-300 hours, to meet contracted delivery commitments."[21]

In addition "Shell and Luminant will also explore the use of compressed air storage, in which excess power could be used to pump air underground for later use in generating electricity. This technology will further improve reliability and grid usage and becomes more economical with large-scale projects, such as proposed for Briscoe County."[22]

As discussed in the "Comments Regarding Luminant's Revision to the Comanche Peak Nuclear Power Plant" by Raymond H. Dean, Ph.D,[23] there has been considerable additional information on the conclusions of combining new generation power sources with storage that would also apply in this instance. Natural gas, wind, solar; and energy storage either individually or in combination, are viable alternatives that could both produce baseload power and be environmentally preferable to nuclear generation.[24]

> What really matters is whether grid managers understand, know how to deal with, and have experience dealing with them in the dynamic electrical-grid environment. For example, there are several decades of experience using CAES to absorb power from the grid when customer demand is weak and supply power to the grid when customer demand is strong. This is not significantly different from using CAES to absorb power from the grid when wind power is strong and supply power to the grid when wind power is weak.[25]

Conclusion

When considering all reductions in demand, due to efficiencies and DSM programs that are implemented by municipally owned utilities, the forecast reflects a likely decrease in the total need for energy of 35,877 MW by 2020. This reduction in demand, combined with the anticipated additional non-nuclear generation, including increased capacity for wind, solar, geothermal and other renewables, makes the addition of STP Units 3&4 unnecessary to meet baseload needs. Then, if the industrial customers[26] follow the recommended guidelines, an additional 8,500 MW of reduction could be achieved for a total of 44,377MW. Any need for additional generation to serve the market at this time would have to be in doubt. The following chart summarizes the combination of increased efficiencies and generation capacity.

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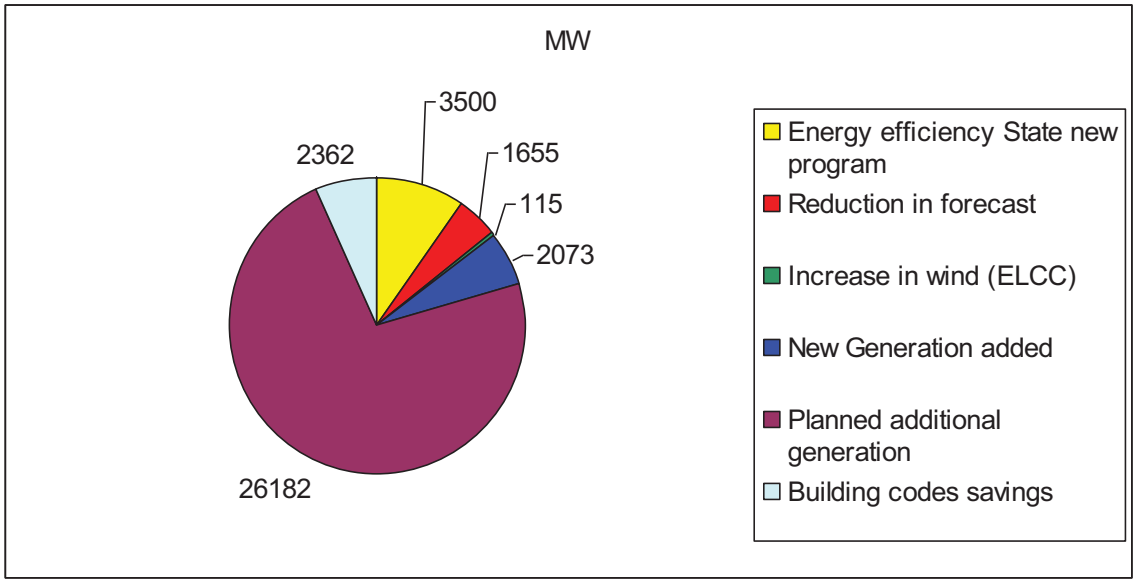
[21] Id.
[22] http://www.luminant.com/news/newsrel/detail.aspx?prid=1087
[23] Raymond H. Dean, Ph.D. Comments Regarding Luminant's Revision to the Comanche Peak Nuclear Power Plant,Units 3 & 4 COL Application Part 3 – Environmental Report, attached.
[24] Id at pp. 4-5.
[25] Id at p. 4.
[26] Industrials do not currently participate in the State energy efficiency programs



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The DEIS is flawed because it failed to do a thorough analysis of the significance of climate change.

In their summary the NRC Staff concludes:

> **7.6.2 Greenhouse Gas Emissions**
> The review team concludes that the cumulative impacts of greenhouse emissions around the world as presented in the report are the appropriate basis for it's evaluation of cumulative impacts. Based on the impacts set forth in the GCRP report, the review team concludes that the national and worldwide cumulative impacts of greenhouse gas emissions are noticeable but not destabilizing. (p**.** 7-43, 44)

This conclusion is contradicted by the newest EPA study entitled "Climate Change Indicators in the United States" released April 27, 2010 which concludes:

> The indicators in this report present compelling evidence that the composition of the atmosphere and many fundamental measures of climate in the United States are changing. These changes include rising air and water temperatures, more heavy precipitation, and, over the last several decades, more frequent heat waves and intense Atlantic hurricanes. Assessment reports from the Intergovernmental Panel on Climate Change and the U.S. Global Change Research Program have linked many of these changes to increasing greenhouse gas emissions from human activities, which are also documented in this report.
>
> Analysis of the indicators presented here suggests that these climate changes are affecting the environment in ways that are important for society and ecosystems. Sea levels are

> rising, snow cover is decreasing, glaciers are melting, and planting zones are shifting (see Summary of Key Findings on p. 4). Although the indicators in this report were developed from some of the most complete data sets currently available, they represent just a small sample of the growing portfolio of potential indicators. Considering that future warming projected for the 21st century is very likely to be greater than observed warming over the past century,1 indicators of climate change should only become more clear, numerous, and compelling.[27]

It also notes that:

> Temperature is a fundamental component of climate, and it can have wide-ranging effects on human life and ecosystems, as many of the other indicators in this report demonstrate. For example, increases in air temperature can lead to more intense heat waves, which can cause illness and death in vulnerable populations. Temperature patterns also determine what types of animals and plants can survive in a particular place. Changes in temperature can ***disrupt*** a wide range of natural processes, particularly if these changes occur abruptly and plant and animal species do not have time to adapt.[28]

Its hard to conclude that changes in temperature that "can disrupt a wide range of natural processes and "cause illness and death in vulnerable populations" are not destabilizing.

The DEIS is flawed because it failed to do a thorough analysis of the impact of climate change on the operation of STP Units 3 and 4.

In its review the NRC staff found:

> **7.3.2 Aquatic Ecosystem Impacts,**
>
> GCC could lead to decreased precipitation, increased sea levels, varying freshwater inflow, increased temperatures, increased storm surges, greater intensity of coastal storms, and increased nonpoint source pollution from runoff during these storms, in the water bodies in the geographic area of interest (Nielsen-Gammon 1995; Montagna et al. 1995; Karl et al. 2009). Such changes could alter salinity, change freshwater inflow, and reduce dissolved oxygen, which could directly affect aquatic habitat. Rising sea water due to global climate change could affect water levels in the lower Colorado River and Matagorda Bay and subsequently change the water quality associated with the mixing of freshwater and estuarine waters (Montagna et al. 1995; Karl et al. 2009). (**p.7-33,4)**
>
> The staff further noted: While the GCRP has not incrementally forecasted the change in precipitation by decade to align with the licensing action, the projected change in precipitation from the 'recent past' (1961-1979) to the period 2080 to 2099 is a decrease of between 10 to 30 percent (Karl et al. 2009). (page 125 note 117)

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[27] Pg 68 http://www.epa.gov/climatechange/indicators/pdfs/CI-conclusion.pdf

[28] Emphasis added, Pg 22 http://www.epa.gov/climatechange/indicators/pdfs/CI-weather-and-climate.pdf

The NRC staff also notes that:

> As stated in Section 2.3.1.1, it is reasonably foreseeable that sea level rise may exceed 3 ft by the end of the century due to GCC (Karl et al. 2009). Actual changes in shorelines would also be influenced by geological changes in shoreline regions (such as sinking due to subsidence).
>
> The increase in sea level relative to the Colorado River bed, coupled with reduced streamflow (also due to GCC), could result in the salt water front in the Colorado River moving up towards the Reservoir Makeup Pumping Facility (RMPF). **p.7-18**

The Karl study the NRC selectively cited notes**, "**Sea level rise is expected to increase saltwater incursion into coastal freshwater aquifers, making some unusable without desalinization," (Karl page 47-note 146)

However, even with these concerns being explicitly stated, no analysis has been conducted in the DEIS on the impact of the salt water incursion into the Reservoir Makeup Pumping Facility or the increased salinity of the groundwater used for makeup. If the salinity increases the current fresh water based cooling system will be subject to corrosion and may be come inoperable or need to be replaced by a desalinization facility.

The DEIS also failed to analyze the impact of increased ambient air and cooling water temperatures on operations. Nor did it analyze the impact of the increase thermal loading resulting from the discharge.

In its review the NRC staff found:

> The review team determined that the forecasted changes could affect water supply and water quality in the Colorado River Basin during operation of the proposed STP Units 3 and 4. For the water use and water quality assessments discussed below, the review team considered forecasted changes to temperature and precipitation for the entire Colorado River watershed.
>
> The projected change in temperature from 'present day' (1993-2008) to the period encompassing the licensing action (i.e., the period of 2040 to 2059 in the GCRP report) for the Colorado River watershed is an increase of between 0 to 5°F.
>
> GCC could result in decreased precipitation and increased temperatures in the lower Colorado River basin. These forecasted changes have the potential to reduce surface runoff and increase evapotranspiration. The changes may result in reduction in the surface water resource in the region. (**p.7-13)**

The review team failed to examine the impact of increased ambient temperature on the temperature of the cooling water reservoir.

Large coal and nuclear plants have been limited in their operations by reduced river levels caused by higher temperatures and thermal limits on water discharge.[29]

[29] 191 U.S. Global Change Research Program **Global Climate Change Impacts in the United States pg 56** http://downloads.climatescience.gov/usimpacts/pdfs/energy.pdf

A recent study by EDF and the University of Texas notes:

> During the heat wave in France in 2003 that was responsible for approximately 15,000 deaths, nuclear power plants had to reduce their power output because of the high inlet temperatures of the cooling water just when electricity demand was spiking due to air conditioning use.
>
> Environmental regulations in France (and the United States) limit the rejection temperature of power plant cooling water to avoid ecosystem damage from thermal pollution. When the heat wave raised river temperatures, the nuclear power plants could not achieve sufficient cooling within the environmental limits, and so they reduced their power output at a time when electricity demand was spiking by residents turning on their air conditioners.[30]

The review team also found: "the projected change in precipitation from the 'recent past' (1961-1979) to the period 2080 to 2099 is a decrease of between 10 to 30 percent (Karl et al. 2009)." (page 125 note 117)

An additional recent study for the Texas Water Development board found: "The recent drought in the Southeastern U.S. during 2007 has drawn attention to the vulnerability of electric power production to low stream flows. In the Fall of 2007, the governor of Alabama wrote a letter to President Bush regarding a proposed Georgia water conservation strategy that threatened to shut down the Farley Nuclear Plant in Alabama due to a limited supply of cooling water [Riley, 2007]. As water consumption in other sectors increases over the next 50 years, the power sector, Central and West Texas in particular, will become increasingly vulnerable to drought. Drought can threaten the ability to cool a steam-electric power plant if insufficient water is available for diversion and/or withdrawal. [31i]"

Additional Water Demands Not Addressed in the DEIS

Two new proposed coal plants will use significantly more water than is currently withdrawn from the Colorado River. Since the DEIS was written, the Corpus Christi City Council has authorized the City Manger to negotiate a contract to sell water from the Colorado River to the Las Brisas Energy Center.[32] That means a total of nearly 39,000 acre feet of Colorado water will consumed before it reaches the STP water intake, thus reducing the availability of make-up water.

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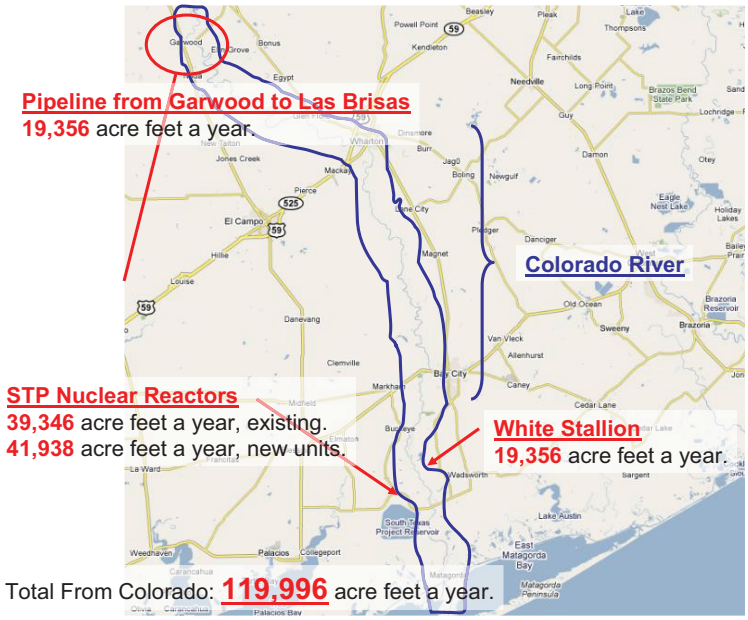
[30] Energy Water Nexus in Texas. The University Of Texas at Austin | Environmental Defense Fund April 2009

[31] Data from Water Demand Projections for Power Generation in Texas Prepared for Texas Water Development Board Bureau of Economic Geology Scott W. Tinker, Director John A and Katherine G. Jackson School of Geosciences The University of Texas at Austin Austin, Texas 78713-8924

[32] Corpus Christi Caller Times, May 11, 2010, updated May 12, 2010.



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The review team failed to analyze the impact of increased ambient air and cooling water temperatures on operations. Nor did it analyze the impact of the increase thermal loading resulting from the discharge. Both of these impacts were raised during public comments on this plants, The failure of the NRC's staff to analyze these impacts is a serious omission.