Nuclear Operating Company

South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

July 2, 2008
ABR-AE-08000048

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Requests for Additional Information

Reference: Letter, Paul Kallan to Greg Gibson, "Request for Additional Information, Letter Number One Related to the Environmental Report for the South Texas Combined License Application", dated May 19, 2008 (AE-ABR-08000097)

Attached are 69 responses to NRC questions included in the above referenced letter. Sixty-eight of these responses are for the 45-day response group and are listed below by Question Number:

02.02.01-01	02.04.02-10	04.05-02	07.02-04
02.02-01	02.05-01	04.06-01	07.02-05
02.03-02	02.05-03	05.03.02-03	07.02-06
02.03-03	02.05-08	05.03.03.01-02	07.02-07
02.03-04	02.05-09	05.03.04-03	07.02-08
02.03-05	02.05-10	05.03.04-04	07.02-09
02.03-07	02.05-27	05.04.01-01	07.03-01
02.03-08	02.06-01	05.04.01-02	08.00-01
02.03-10	03.04.01-01	05.04.01-03	09.03.02-01
02.03-13	03.05-01	05.04.01-04	09.03.02-04
02.03-14	04.01.03-01	05.04.04-01	09.03.03-01
02.04.02-04	04.02-06	05.10-01	09.03.03-02
02.04.02-05	04.03.02-02	05.10-02	09.03.03-03
02.04.02-06	04.03.02-03	05.10-03	09.03-05
02.04.02-07	04.03.02-04	07.02-01	09.03-06
02.04.02-08	04.04-19	07.02-02	09.03-07
02.04.02-09	04.05-01	07.02-03	09.03-08

Also, one RAI response from the 90-day response group (04.05-03) was completed and is included.

When a change to the COLA is indicated by a question response, the change will be incorporated into the next routine revision of the COLA following NRC acceptance of the question response.

STPNOC is extending the schedule for the remaining 72 responses to NRC questions that were in the 45-day response group. The majority of these responses were assigned to STPNOC's prime environmental contractor, Tetra Tech, who was unable to deliver them within the 45-day response period they originally agreed to meet. STPNOC is currently working with Tetra Tech to produce quality responses and will deliver them to the NRC within 30 days. These include:

02.03-09	02.05-21	04.02-08	04.04-17
02.03-11	02.05-22	04.02-09	04.04-18
02.03-12	02.05-23	04.02-10	04.06-02
02.03-15	02.05-24	04.02-11	05.02-01
02.04.01-05	02.05-25	04.03.01-01	05.02-02
02.05-04	02.05-26	04.03.02-01	05.02-03
02.05-05	02.05-28	04.04-01	05.03.01.02-01
02.05-06	02.07-01	04.04-02	05.03.01.02-02
02.05-07	02.07-02	04.04-03	05.03.02-02
02.05-11	02.07-03	04.04-04	05.03.03.01-01
02.05-12	02.07-04	04.04-05	05.03.04-01
02.05-13	02.07-05	04.04-06	05.08-03
02.05-14	04.02-01	04.04-07	06.03-01
02.05-16	04.02-02	04.04-08	07.01-01
02.05-17	04.02-03	04.04-09	07.01-02
02.05-18	04.02-04	04.04-12	09.03.02-02
02.05-19	04.02-05	04.04-15	09.03.02-03
02.05-20	04.02-07	04.04-16	09.04-01

In addition to the above, Tetra Tech has identified 05.03.02-01 as requiring extension from 60- to 90-days.

There are no new commitments made in this letter.

If you have any questions, please feel free to contact me at (361) 972-4626, or Russell W. Kiesling at (361)-972-4716

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 2, 2008

Greg Gibson
Manager, Regulatory Affairs
South Texas Project, Units 3 & 4

rwk

Enclosure:
CD – MACCS2 Input and Output Files (Question 07.02-01)

Attachments:

1. Question 02.02.01-01
2. Question 02.02-01
3. Question 02.03-02
4. Question 02.03-03
5. Question 02.03-04
6. Question 02.03-05
7. Question 02.03-07
8. Question 02.03-08
9. Question 02.03-10
10. Question 02.03-13
11. Question 02.03-14
12. Question 02.04.02-04
13. Question 02.04.02-05
14. Question 02.04.02-06
15. Question 02.04.02-07
16. Question 02.04.02-08
17. Question 02.04.02-09
18. Question 02.04.02-10
19. Question 02.05-01
20. Question 02.05-03
21. Question 02.05-08
22. Question 02.05-09
23. Question 02.05-10
24. Question 02.05-27
25. Question 02.06-01
26. Question 03.04.01-01
27. Question 03.05-01
28. Question 04.01.03-01
29. Question 04.02-06
30. Question 04.03.02-02
31. Question 04.03.02-03
32. Question 04.03.02-04
33. Question 04.04-19
34. Question 04.05-01
35. Question 04.05-02
36. Question 04.05-03
37. Question 04.06-01
38. Question 05.03.02-03
39. Question 05.03.03.01-02
40. Question 05.03.04-03
41. Question 05.03.04-04
42. Question 05.04.01-01
43. Question 05.04.01-02
44. Question 05.04.01-03
45. Question 05.04.01-04
46. Question 05.04.04-01
47. Question 05.10-01
48. Question 05.10-02
49. Question 05.10-03
50. Question 07.02-01
51. Question 07.02-02
52. Question 07.02-03
53. Question 07.02-04
54. Question 07.02-05
55. Question 07.02-06
56. Question 07.02-07
57. Question 07.02-08
58. Question 07.02-09
59. Question 07.03-01
60. Question 08.00-01
61. Question 09.03.02-01
62. Question 09.03.02-04
63. Question 09.03.03-01
64. Question 09.03.03-02
65. Question 09.03.03-03
66. Question 09.03-05
67. Question 09.03-06
68. Question 09.03-07
69. Question 09.03-08

cc: w/o attachment except*
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Question 02.02.01-01

QUESTION:

Revise Tables 2.2–1 and 2.2–2 in the ER to reflect land occupied by STP units 1 and 2 and auxiliary facilities.

Full Text (Supporting Information):

Tables 2.2–1 and 2.2–2 in the ER omit information regarding the land occupied by STP Units 1 & 2 and auxiliary facilities. Provide an update to these tables to reflect this land activity.

RESPONSE:

Tables 2.2-1 and 2.2-2 will be revised to include the land occupied by the existing units and auxiliary facilities. Because more specific information has become available regarding land cover for the site, this information will be substituted for the NOAA land use/land cover information. The tables will also be revised so that 2.2-1 addresses the site, and 2.2-2 addresses the 6-mile, rather than percentages and acreage, respectively. The revised tables follow:

Table 2.2-1. Land Use within the Site

Land Use Category	Acres	Percent
Bottomland	1,176	9.6
Units 1 and 2 Construction Spoil Area	41	0.3
Essential Cooling Pond (ECP)	46	0.4
Existing Facilities	300	2.5
Forested Communities	53	0.4
Forested/Mixed Pastureland	91	0.7
Leased Agricultural Lands	536	4.4
Main Cooling Reservoir	7,000	57.3
Maintained and Disturbed Areas	468	3.8
Mixed Grass Communities	486	4.0
Scrub Shrub Communities	976	8.0
Wetlands	155	1.3
Other – Reservoir Levee Systems	759	6.2
Dredge Materials Disposal Area	133	1.1
Total	12,220	100.0

Table 2.2-2. Land Use within the Six-Mile Vicinity

Land Use Category	Acres	Percent
Agricultural Land	48,404	67.1%
Forest Land	10,668	14.8%
Water	7,700	10.7%
Wetland	678	0.9%
Rangeland/Grassland/Bottomland	2,736	3.8%
Barren Land	262	0.4%
Urban or Built-up	1,657	2.3%
Total	72,105	100%

CANDIDATE COLA REVISION:

Revisions to Section 2.2.1.1, Page 2.2-2, 4th full paragraph:

Of the approximately 12,220 acres within the STP property (Table 2.2-1), approximately 57.57% comprises water (Essential Cooling Pond and Main Cooling Reservoir), ~~33.1% agricultural land, 8.8% forest land, with the remaining land use (0.7%) classified as rangeland~~, 9.6% is bottomland, 0.3% is construction spoil area for Units 1 and 2, 2.5% is existing facilities, 1.1% is forested or forested/mixed pastureland, 4.4% is leased agricultural lands, 3.8% is maintained and disturbed areas, 12.0% is mixed grass or scrub shrub communities, 1.3% is wetlands, and 6.2% represents other uses (reservoir levee systems).

Revisions to Section 2.2.1.2, Page 2.2-3, 5th paragraph in section:

Of the approximately 72,100 acres within the six-mile radius of the site (Figure 2.2-2~~,~~ and Table~~s 2.2-1 and~~ 2.2-2), approximately 67.7% comprise agricultural land, 14.8% is forest land, 10.7% is water, 3.8% rangeland, with the remaining land use classified as wetland, barren land or urban or built-up (at 0.9%, 0.4%, and 1.8%, respectively).

Table 2.2-1 and 2.2-2 will be revised in ER Section 2.2:

~~**Table 2.2-1 Land Use as Percent (%) within the Site and Six-Mile Vicinity**~~

~~Land Use Category~~	~~Site [1]~~	~~Six-Mile Vicinity [1]~~
~~Agricultural Land~~	~~33.1%~~	~~67.7%~~
~~Forest Land~~	~~8.8%~~	~~14.8%~~
~~Water~~	~~57.5%~~	~~10.7%~~
~~Wetland~~	~~–~~	~~0.9%~~
~~Rangeland~~	~~0.7%~~	~~3.8%~~
~~Barren Land~~	~~–~~	~~0.4%~~
~~Urban~~	~~–~~	~~1.8%~~

~~(1) Note- sums may not equal 100% due to rounding~~

~~Table 2.2-2 Land Use within the Site and Six-Mile Vicinity~~

~~Land Use Category~~	~~STP Site Acres~~	~~Six-Mile Vicinity Acres~~
~~Agricultural Land~~	~~4080~~	~~48,791~~
~~Forest Land~~	~~1084~~	~~10,668~~
~~Water~~	~~7096~~	~~7700~~
~~Wetland~~	~~—~~	~~678~~
~~Rangeland~~	~~81~~	~~2736~~
~~Barren Land~~	~~—~~	~~262~~
~~Urban or Built-up~~	~~—~~	~~1270~~

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Wetlands	155	1.3
Other – Reservoir Levee Systems	759	6.2
Dredge Materials Disposal Area	133	1.1
Total	12,220	100.0

[1] Note—sums may not equal 100% due to rounding

Table 2.2-2. Land Use within the Six-Mile Vicinity

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Wetland	678	0.9%
Rangeland/Grassland/Bottomland	2,736	3.8%
Barren Land	262	0.4%
Urban or Built-up	1,657	2.3%
Total	72,105	100%

Question 02.02-01

RAI 02.02-01

QUESTION:

Provide a more complete description of mineral and petroleum resources in Matagorda County adjacent to the proposed facilities. The presence of petroleum wells in the vicinity of the site makes it necessary to explain why there are no mineral or petroleum "resources adjacent to or within the site boundary presently being exploited or of known commercial value."

Provide a more complete statement on the control of mineral rights, and, hence, the control of future drilling at the STP site.

Full Text (Supporting Information):

The statement on mineral and petroleum resources at the site needs to address the potential presence of resources in the vicinity of the site (ESRP 2.2.1 "vicinity" = 6-mile band). Include references (e.g., USGS or State of Texas reports) detailing the mineral and petroleum resources in the county or region. This information is needed to more fully support the statement made in the application that no mineral or petroleum (oil, gas) resources adjacent to or within the site are of known commercial value (ER section 2.2.1.1). Why exactly would petroleum wells be of commercial value so close to the property, (i.e., between Bay City and the site) but not adjacent to or within the property? Is there a geologic structure that precludes the presence of mineral or petroleum reserves within the site?

Who else owns the mineral rights for the STP site and what percentage do they own? Does STP control all potential drilling on the property or do the other owners also have control over drilling within the site boundary?

RESPONSE:

According to the Railroad Commission (RRC) of Texas there are 26 gas wells within the vicinity (6-mile radius) and some include gas transmission pipelines, which are of commercial value (RRC 2007).

There are two petroleum wells within the property and they are plugged. According the RRC, the governing body of gas and oil wells and pipelines in Texas, there are seven petroleum wells within the 6-mile vicinity and 9 oil/gas wells (RRC 2007).

The STP owners own or control all of the mineral rights in the same percentage as their ownership interest, which is:

NRG South Texas LLC – 44%,

City Public Service Board of San Antonio – 40%, and
City of Austin -16%.
Eventually there will be three owners:
:

- Percentage ownership of STP Units 1 and 2

NRG South Texas LLC – 44%,
City Public Service Board of San Antonio – 40%, and
City of Austin -16%.

- Percentage ownership of STP Unit 3 and 4

Indirectly, NRG South Texas 3 LLC and NRG South Texas 4 LLC are wholly owned subsidiaries of Nuclear Innovation North America LLC (NINA). NINA is a joint venture between NRG Energy, Inc. (88%) and Toshiba America Nuclear Energy Corporation (12%). South Texas Project Unit 3 will be owned by NRG South Texas 3 LLC and the City of San Antonio, Texas, acting by and through the City Public Service Board (CPS or CPS Energy). South Texas Project Unit 4 will be owned by NRG South Texas 4 LLC and CPS Energy.

- Percentage ownership of STP Common Station Facilities

Per STP (and Cox, Smith, Matthews Incorporated), the owners control the surface and any drilling. In addition, the owners of the South Texas Project have agreed to not exercise their right to use the surface in any area within the Exclusion Area Boundary to explore or recover minerals or convey or lease their mineral rights within the Exclusion Area Boundary to any third party without the approval of STP Nuclear Operating Company.

CANDIDATE COLA REVISION:

Upon approval of this RAI response, the 6th paragraph on page 2.2-1 in section 2.2 of the Environmental Report will be changed as shown below:

The co-owners of STP also own ~~most~~ or control all of the mineral interests within the site boundary in the same percentage as their ownership interest and have the power to acquire such outstanding mineral interests in the subsurface estate as may be required for operation of the facility. The co-owners control the surface minerals and any drilling used to recover minerals. However, the co-owners of STP have agreed to not exercise their right to use any area within the EAB for explorations or recovery of minerals, or convey or lease mineral rights to any third party without proper approval of STP Nuclear Operating Company. There are ~~no~~ mineral resources (e.g. sand and gravel, coal, oil, natural gas, and ores) adjacent to (within the 6-mile vicinity) ~~or~~ and within the site boundary presently being exploited or of known commercial value. According to the Railroad Commission (RRC) of Texas, there are two petroleum wells within the site property that have been plugged and abandoned and there are seven petroleum wells within the 6-mile vicinity. There are 26 gas wells and nine oil/gas wells within the 6-mile vicinity (RRC 2007).

Reference to add:

RRC (Railroad Commission of Texas). 2007. Wells.

Question 02.03-02

QUESTION:

Describe the existing storm water treatment and outfalls, and the water bodies into which they discharge.

Full Text (Supporting Information):

Describe existing storm water outfalls including any storm water treatment associated with each. Also, describe the water bodies these outfalls discharge into.

RESPONSE:

The outfalls associated with the current Industrial Storm Water Pollution Prevention Plan for the South Texas Generating Station are summarized below and are shown on STPNOC 2004 Storm Water Pollution Prevention Plan Site Map (Figure 1-1 attached). Descriptions of the receiving waters are provided in ER Sections 2.3.1, 2.3.2, 4.2, 5.2, and RAI Response for 4.2-2. There is no associated treatment associated with the outfalls.

Outfall A drains approximately 925 acres which includes approximately half the area outside of the MCR in the northeastern and eastern portions of the site. The runoff coefficient is medium (approximately 45%) with at least half of the area covered in vegetation. The main area here associated with industrial activity is the Units 1 and 2 Protected Area where most of the potential pollutant sources are located. The outfall sample location is located in the plant area ditch south of Well No. 7 near the RMPF. The discharge flow direction in the drainage area is toward the Colorado River.

Outfall B drains approximately 128 acres and includes the discharge area from the MCR. The runoff coefficient is low (approximately 20%) due to vegetative cover in the spillway channel from the MCR as it approaches the Colorado River. The outfall sample location for the spillway is located just prior to entry to the Colorado River. The only potential pollutant source located in the area is leakage from the MCR spillway gates. MCR blowdown would be sampled in accordance with TPDES Permit No. 01908 at outfall 001. STP currently does not monitor outfall B

Outfall C drains approximately 1934 acres along the eastern boundary of the MCR to the Colorado River. The runoff coefficient is very low (less than 20%) due to the low-land habitat and the vegetative cover. The area drains a small parking lot at the firing range and some construction material stockpiles. The discharge flow direction is toward the west branch of the Colorado River and toward the southeastern property boundary. The sample location is on the West Branch of the Colorado River at the property boundary. However, there is currently no sampling being performed at this sampling location.

Outfall D drains approximately 211 acres. The runoff coefficient is low (approximately 25%) again due in part to a vegetative cover. There is no runoff associated with industrial activity other than the MCR relief wells identified in TPDES Permit No. 01908. The discharge flow direction is toward along the southeastern portion of the MCR. The sampling location is at the property boundary at the Eastern Branch of Robbins Slough. However, there is currently no sampling being performed at this sampling location.

Outfall E drains approximately 337 acres and includes facilities such as the switch yard, a hazardous drum storage area, scale inhibitor tanks, and hypochlorite storage tanks. The runoff coefficient is medium (approximately 50%). The sample location is on the plant drainage ditch southwest of Building 20 and discharge is to Little Robbins Slough in the northwestern portion of the site.

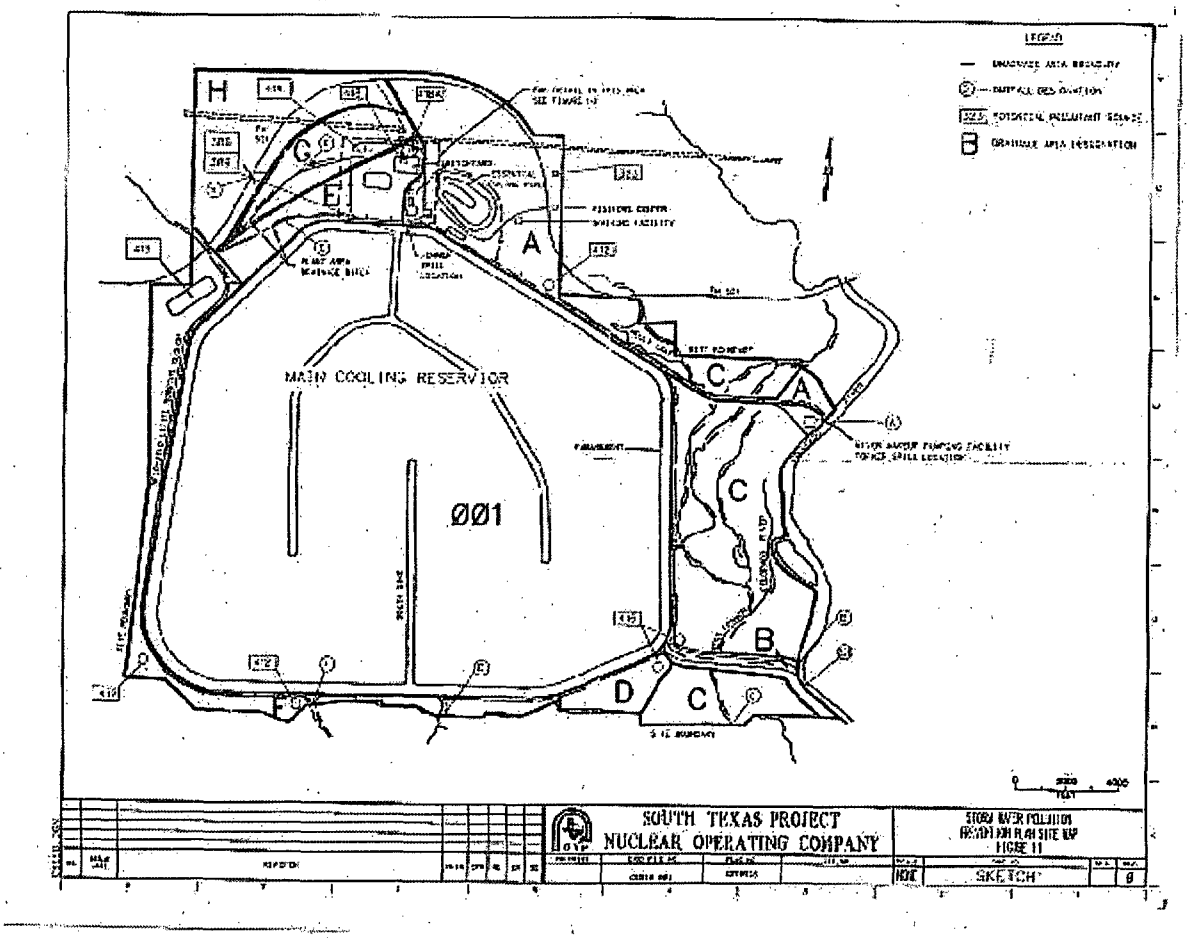
Outfall F drains approximately 549 acres along the western and southwestern portions of the site. The runoff coefficient is low (approximately 25%) due to vegetation cover. There is no industrial activity other than the MCR relief wells identified in TPDES Permit No. 01908. This outfall also serves to monitor stockpiled construction material and a Class 3 landfill when precipitation causes flow from the landfill. The discharge from this outfall is directed to the relocated portion of Little Robbins Slough on the western portion of the site.

Outfall G drains approximately 293 acres in the northwestern portion of the site. The runoff Coefficient is low (approximately 25%) due to vegetation cover. There is no runoff associated with industrial activity other than the land application site. The sample location is southwest of the land application site in the adjacent drainage ditch with flow toward Little Robbins Slough.

Outfall H drains approximately 611 acres located in the northwestern corner of the site. The runoff coefficient is low (approximately 25%) due to vegetation cover. There is no industrial activity associated with this drainage area. The area flows toward unnamed drainage ditch which flows to Little Robbins Slough. The sample location is located on the unnamed drainage feature. There is no industrial activity associated with this drainage area. Therefore there is no sampling currently being performed at this sample location.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.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SOUTH TEXAS PROJECT
NUCLEAR OPERATING COMPANY
SKETCH

Question 02.03-03

QUESTION:

Provide information regarding water rights under severe droughts.

Full Text (Supporting Information):

Explain how water rights for MCR makeup may be affected by a drought more severe than the drought of record.

RESPONSE:

The STP site currently has surface water rights for 102,000 acre-feet per year (four-unit operation) and an additional 20,000 acre-feet/year of backup water for two-unit operation and 40,000 acre-feet/year for four-unit operation during periods when the water necessary to maintain the Main Cooling Reservoir (MCR) at or above an operational elevation of 27 feet mean sea level (msl) is not available from the Colorado River. If this situation were to occur, the backup water would be released by the LCRA from firm stored water or any other sources of water originating upstream of the Bay City Dam.

As discussed in Section 5.2, if conditions are worse than the drought of record, which occurred from the late 1940s through the 1950s, the LCRA must curtail and distribute the available supply of firm water among all of its firm water supply customers (which includes the STP site) on a pro rata basis . If this situation were to occur, the backup water would be released by the LCRA from firm stored water in the Highland Lakes system or any other sources of water originating upstream of the Bay City Dam.

During a drought worse than the drought of record, should the level of the MCR drop to 30 feet msl, STPNOC would pursue emergency relief of pumping restrictions pursuant to Texas Water Code Section 11.148 or other applicable statues as necessary to prevent the water elevation of the MCR from dropping below its minimum operating level of 25.5 feet msl. If relief were granted, STPNOC would continue to pump water from the Colorado River at the Reservoir Makeup Pumping Facility. Should this occur, STPNOC would be pumping saline water from the river causing a decrease in the water quality of the MCR. The water quality of the MCR would be improved through the operation of the MCR blowdown activities once sufficient flow of the Colorado River has resumed. If makeup water were not available under relief of Texas Water Code Section 11.148 in order to maintain the 25.5-foot minimum operational level of the MCR, the units would shut down.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 02.03-04

QUESTION:

Provide water requirements downstream of the STP intake.

Full Text (Supporting Information):

Describe the water use requirements in Segment 1401 of the Colorado River downstream of the Reservoir Makeup Pumping Facility (RMPF).

RESPONSE:

As indicated in ER Section 2.3.2 Table 2.3.2-4 major users of surface water from the Colorado River in Matagorda County are STP, the LCRA, and OXEA (formerly Celanese). No surface water is withdrawn for municipal water supply from this river reach. The closest upstream public water supply to the STP site that uses the Colorado River as its water source is located in the vicinity of the city of Austin. As of February 2008, there are no existing or pending permits to withdraw surface water from Colorado River Segment 1401 downstream of the RMPF.

Texas law does not mandate specific freshwater inflow needs to bays and estuaries. However, state policy calls for the "maintenance of a proper ecological environment of the bays and estuaries of Texas and the health of living marine resources." The LCRA has submitted a revised Water Management Plan to TCEQ for approval based on the results of the "Matagorda Bay Freshwater Inflow Needs Study" dated August 2006. The Target Inflows and Critical Flow to Matagorda Bay are discussed in ER Section 2.3.3. Targeted inflow need is defined in the "Matagorda Bay Freshwater Inflow Needs Study," as "The amount, timing, and location of freshwater inflows needed to optimize selected estuarine species productivity. This inflow level is used in water management for above average years where there are sufficient inflows to maximize biological productivity." Critical freshwater inflow needs is defined as "The amount of freshwater inflows to provide a fishery sanctuary habitat at specific locations in Matagorda Bay defined as 25 parts per thousand (ppt) or an annual average. This inflow level is used in water management during drier periods or drought from which finfish or shellfish species are expected to recover and repopulate the bay when normal weather conditions return." ER Table 2.3.3-2 shows the Targeted Colorado River freshwater inflows by month. Computer modeling indicated that an average monthly inflow of 36,000 acre-feet (equal to a rate of approximately 597 cfs) would be required to maintain an average salinity of 25 parts per thousand in the nursery area. However, this would be an increase from the 14,260 acre-feet of water per month (equal to a rate of approximately 236 cfs) flow to Matagorda Bay from a 1997 study previously included in the LCRA Water Management Plan for the Lower Colorado River, which became effective in 1989 and remains in effect until the current plan submittal has been approved.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 02.03-05

QUESTION:

Provide the location and other pertinent data for the salinity wedge in the Colorado River during various discharges.

Full Text (Supporting Information):

Provide pertinent data and information on the location of the salinity interface opposite the intakes in the Colorado River, and its position during different river flow conditions.

RESPONSE:

Historical data, pre-construction of the Colorado River diversion canal, from the Lower Colorado River Authority (LCRA) monitoring station at Selkirk Island on the Lower Colorado River for the period from October 1982 through December 1992 (Table below) was used to determine the location of a subsurface salt water intrusion. The Selkirk Island monitoring location was chosen because it is the closest permanent monitoring location to the STP site. Salinity data was not collected by the LCRA. Total dissolved solids and chlorine were either not collected or not collected at varying depths or with enough frequency for use in the data evaluation. Therefore, historical specific conductivity readings were used to identify the absence or presence of a "subsurface salt water intrusion" in the vicinity of the STP Reservoir Makeup Pumping Facility (RMPF).

U.S. Geological Survey data range for freshwater [0 to 1300 micro Siemens per centimeter (µS/cm)], brackish water (1301 to 28,000 µS/cm), and salty water (> 28,000 µS/cm) may be used to evaluate the specific conductance data for the occurrence of brackish water. The data presented in the Table below are in micromhos per centimeter (µmhos/cm). Micro Siemens per centimeter are equivalent to micromhos per centimeter. For reference, drinking water typically has a specific conductance of less than 100 µS/cm or 100 µmhos/cm.

The LCRA (pre-diversion canal) data (Table 1) indicate that a base flow of 1,000 cubic feet per second (cfs) or less in the lower Colorado River is associated with subsurface salt water intrusion in the vicinity of Selkirk Island, and thus the STP site. However, anomalies and inconsistencies in the LCRA data argue against using the 1,000 cfs threshold as a basis for any policy or operational decisions. There have been occasions when higher flows were associated with sub-surface salt water intrusion and, conversely, occasions when lower flows were not associated with salt water intrusion. These inconsistencies could be due to differences in tidal amplitude, wind speed/wind direction, an abundance of freshwater within the upper reaches of the bay or some other unknown factor.

The LCRA data, post diversion canal, does not incorporate data sufficient to determine the presence of a subsurface saltwater intrusion. However, as part of an ENSR aquatic resources study of the Colorado River, salinity and flow data were collected September 2007 through May 2008 from navigational mile marker 1 to 12. The data representing navigational mile marker 5 to 9 are located in the vicinity of the STP site from just below the STP discharge canal to just above the STP RMPF. The data as presented on ENSR Figures 21 through 29 represent the monthly salinity readings collected and the mean monthly flows for the period of September 2007 through May 2008. The data presented would indicate the presence of freshwater [Salinity less than 0.5 parts per thousand (ppt)] in the vicinity of the intake during September and February 2008 when the mean monthly flow of the Colorado River varied from 1800 cfs to 2900 cfs. However, at a flow of 1800 cfs the subsurface salt water intrusion (concentration approximately 15 ppt) was upstream of the STP discharge outfall.

The daily salinity data collected by ENSR for the portion of the Colorado River adjacent to the STP site (Table 2) was compared to the U.S. Geological Survey data recorded at the Bay City monitoring station. A comparison of the ENSR salinity data to flow would indicate a subsurface saltwater intrusion occurs adjacent to the site when flow is below a range of approximately 1000 cfs to 1200 cfs. The ENSR data appears to be reasonably consistent with the conclusions drawn for the pre-diversion LCRA data.

STP currently operates the RMPF to obtain surface water of sufficient quality (less than 2100 µS/cm) when the river flow is at least 1200 cfs. for 2 to 3 days to purge brackish water from the intake area. The STP water permit restricts pumping to 55% of the flow over the 300 cfs min through flow requirements.

A study of the freshwater inflow to Matagorda Bay and the potential impact on the salinity of Colorado River Segment 1401 is currently being performed by the LCRA. The results of the study should be available in approximately October 2008.

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda county

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	10/1/1982	0.3	LCRA	960	
12281	10/1/1982	1.52	LCRA	1068	
12281	10/1/1982	3.05	LCRA	14050	667
12281	10/1/1982	4.57	LCRA	22300	
12281	10/1/1982	6.1	LCRA	23000	
12281	11/17/1982	0.3	LCRA	5040	
12281	11/17/1982	1.52	LCRA	21600	
12281	11/17/1982	3.05	LCRA	28300	431
12281	11/17/1982	4.57	LCRA	29400	
12281	11/17/1982	6.1	LCRA	29500	
12281	5/25/1983	0.3	LCRA	275	10,900
12281	5/25/1983	1.52	LCRA	275	
12281	6/15/1983	0.3	LCRA	488	
12281	6/15/1983	1.52	LCRA	488	
12281	6/15/1983	3.05	LCRA	488	612
12281	6/15/1983	4.57	LCRA	488	
12281	6/15/1983	6.1	LCRA	487	
12281	7/13/1983	0.3	LCRA	2240	
12281	7/13/1983	1.52	LCRA	16200	
12281	7/13/1983	3.05	LCRA	26400	571
12281	7/13/1983	4.57	LCRA	26800	
12281	7/13/1983	6.1	LCRA	26900	
12281	8/30/1983	0.3	LCRA	12690	
12281	8/30/1983	1.52	LCRA	23000	
12281	8/30/1983	3.05	LCRA	33700	140
12281	8/30/1983	4.57	LCRA	31800	
12281	8/30/1983	5.79	LCRA	36100	
12281	9/20/1983	0.3	LCRA	164	18,100
12281	10/20/1983	0.3	LCRA	188	
12281	10/20/1983	1.52	LCRA	188	
12281	10/20/1983	3.05	LCRA	188	3130
12281	10/20/1983	4.57	LCRA	188	
12281	10/20/1983	6.1	LCRA	188	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	11/17/1983	0.3	LCRA	610	
12281	11/17/1983	1.52	LCRA	3800	
12281	11/17/1983	3.05	LCRA	15050	542
12281	11/17/1983	4.57	LCRA	15570	
12281	11/17/1983	6.1	LCRA	15590	
12281	12/13/1983	0.3	LCRA	2400	
12281	12/13/1983	1.52	LCRA	2820	
12281	12/13/1983	3.05	LCRA	33300	552
12281	12/13/1983	4.57	LCRA	35200	
12281	12/13/1983	6.1	LCRA	35200	
12281	1/17/1984	0.3	LCRA	3350	
12281	1/17/1984	1.52	LCRA	10050	
12281	1/17/1984	3.05	LCRA	34500	682
12281	1/17/1984	4.57	LCRA	35800	
12281	1/17/1984	6.1	LCRA	35900	
12281	2/9/1984	0.3	LCRA	3760	
12281	2/9/1984	1.52	LCRA	13530	488
12281	2/9/1984	3.05	LCRA	28500	
12281	2/9/1984	4.57	LCRA	37100	
12281	3/15/1984	0.3	LCRA	3550	
12281	3/15/1984	1.52	LCRA	3570	376
12281	3/15/1984	3.05	LCRA	3940	
12281	3/15/1984	4.57	LCRA	4140	
12281	4/5/1984	0.3	LCRA	20500	
12281	4/5/1984	1.52	LCRA	38700	
12281	4/5/1984	3.05	LCRA	42800	302
12281	4/5/1984	4.57	LCRA	45800	
12281	4/5/1984	6.71	LCRA	46700	
12281	5/10/1984	0.3	LCRA	9400	
12281	5/10/1984	1.52	LCRA	11500	
12281	5/10/1984	3.05	LCRA	28900	37
12281	5/10/1984	4.57	LCRA	32900	
12281	5/10/1984	6.1	LCRA	32900	
12281	5/10/1984	7.62	LCRA	33000	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	6/14/1984	0.3	LCRA	1035	
12281	6/14/1984	1.52	LCRA	1280	
12281	6/14/1984	3.05	LCRA	5000	680
12281	6/14/1984	4.57	LCRA	12250	
12281	6/14/1984	6.1	LCRA	24900	
12281	6/14/1984	7.62	LCRA	30300	
12281	7/11/1984	0.3	LCRA	4100	
12281	7/11/1984	1.52	LCRA	7320	
12281	7/11/1984	3.05	LCRA	31300	400
12281	7/11/1984	4.57	LCRA	36600	
12281	7/11/1984	6.1	LCRA	38700	
12281	8/8/1984	0.3	LCRA	2780	
12281	8/8/1984	1.52	LCRA	4500	
12281	8/8/1984	3.05	LCRA	28200	367
12281	8/8/1984	4.57	LCRA	40900	
12281	8/8/1984	6.1	LCRA	44700	
12281	8/8/1984	7.92	LCRA	46300	
12281	9/13/1984	0.3	LCRA	3800	
12281	9/13/1984	1.52	LCRA	18250	
12281	9/13/1984	3.05	LCRA	28700	356
12281	9/13/1984	4.57	LCRA	40900	
12281	9/13/1984	6.1	LCRA	43000	
12281	9/13/1984	7.32	LCRA	43600	
12281	10/4/1984	0.3	LCRA	4940	
12281	10/4/1984	1.52	LCRA	15270	
12281	10/4/1984	3.05	LCRA	21800	332
12281	10/4/1984	4.57	LCRA	26400	
12281	10/4/1984	6.1	LCRA	27600	
12281	11/8/1984	0.3	LCRA	416	
12281	11/8/1984	1.52	LCRA	416	
12281	11/8/1984	3.05	LCRA	414	
12281	11/8/1984	4.57	LCRA	415	1210
12281	11/8/1984	6.1	LCRA	415	
12281	11/8/1984	7.62	LCRA	415	
12281	11/8/1984	9.14	LCRA	419	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	12/13/1984	0.3	LCRA	1689	
12281	12/13/1984	1.52	LCRA	1869	
12281	12/13/1984	3.05	LCRA	18150	660
12281	12/13/1984	4.57	LCRA	25880	
12281	12/13/1984	6.1	LCRA	26400	
12281	12/13/1984	7.92	LCRA	27400	
12281	1/10/1985	0.3	LCRA	465	1360
12281	2/7/1985	0.3	LCRA	2200	
12281	2/7/1985	1.52	LCRA	2400	
12281	2/7/1985	3.05	LCRA	32800	
12281	2/7/1985	4.57	LCRA	34900	743
12281	2/7/1985	6.1	LCRA	35500	
12281	2/7/1985	7.62	LCRA	35800	
12281	2/7/1985	8.53	LCRA	35700	
12281	3/7/1985	0.3	LCRA	346	
12281	3/7/1985	1.52	LCRA	346	
12281	3/7/1985	3.05	LCRA	346	
12281	3/7/1985	4.57	LCRA	347	2170
12281	3/7/1985	6.1	LCRA	347	
12281	3/7/1985	7.62	LCRA	347	
12281	3/7/1985	8.53	LCRA	356	
12281	4/11/1985	0.3	LCRA	662	
12281	4/11/1985	1.52	LCRA	663	
12281	4/11/1985	3.05	LCRA	664	
12281	4/11/1985	4.57	LCRA	666	1580
12281	4/11/1985	6.1	LCRA	667	
12281	4/11/1985	7.62	LCRA	670	
12281	4/11/1985	8.53	LCRA	673	
12281	5/9/1985	0.3	LCRA	1230	
12281	5/9/1985	1.52	LCRA	1648	
12281	5/9/1985	3.05	LCRA	3410	
12281	5/9/1985	4.57	LCRA	12170	502
12281	5/9/1985	6.1	LCRA	17500	
12281	5/9/1985	7.62	LCRA	19370	
12281	5/9/1985	8.84	LCRA	19640	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	6/6/1985	0.3	LCRA	2400	
12281	6/6/1985	1.52	LCRA	2490	
12281	6/6/1985	3.05	LCRA	27700	465
12281	6/6/1985	4.57	LCRA	34900	
12281	6/6/1985	6.1	LCRA	35800	
12281	6/6/1985	7.92	LCRA	36400	
12281	7/18/1985	0.3	LCRA	1454	
12281	7/18/1985	1.52	LCRA	1530	
12281	7/18/1985	3.05	LCRA	13140	
12281	7/18/1985	4.57	LCRA	22500	548
12281	7/18/1985	6.1	LCRA	23400	
12281	7/18/1985	7.62	LCRA	24700	
12281	7/18/1985	8.23	LCRA	25200	
12281	8/22/1985	0.3	LCRA	3960	
12281	8/22/1985	1.52	LCRA	4860	
12281	8/22/1985	3.05	LCRA	31400	450
12281	8/22/1985	4.57	LCRA	38200	
12281	8/22/1985	6.1	LCRA	41200	
12281	8/22/1985	7.62	LCRA	42100	
12281	9/12/1985	0.3	LCRA	3430	
12281	9/12/1985	1.52	LCRA	22200	
12281	9/12/1985	3.05	LCRA	37400	637
12281	9/12/1985	4.57	LCRA	39800	
12281	9/12/1985	6.1	LCRA	40200	
12281	9/12/1985	7.92	LCRA	40700	
12281	10/10/1985	0.3	LCRA	4730	
12281	10/10/1985	1.52	LCRA	19000	
12281	10/10/1985	3.05	LCRA	33100	490
12281	10/10/1985	4.57	LCRA	34900	
12281	10/10/1985	6.1	LCRA	35300	
12281	10/10/1985	7.32	LCRA	35300	
12281	11/7/1985	0.3	LCRA	4840	
12281	11/7/1985	1.52	LCRA	5800	
12281	11/7/1985	3.05	LCRA	29400	627
12281	11/7/1985	4.57	LCRA	31300	
12281	11/7/1985	6.1	LCRA	33000	
12281	11/7/1985	7.01	LCRA	33300	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	12/5/1985	0.3	LCRA	355	
12281	12/5/1985	3.05	LCRA	356	2780
12281	12/5/1985	6.71	LCRA	357	
12281	1/9/1986	0.3	LCRA	788	1430
12281	2/6/1986	0.3	LCRA	932	
12281	2/6/1986	1.52	LCRA	1166	
12281	2/6/1986	3.05	LCRA	16950	2320
12281	2/6/1986	4.57	LCRA	20900	
12281	2/6/1986	6.1	LCRA	23700	
12281	2/6/1986	7.32	LCRA	24000	
12281	3/6/1986	0.3	LCRA	920	
12281	3/6/1986	1.52	LCRA	2230	
12281	3/6/1986	3.05	LCRA	15000	1900
12281	3/6/1986	4.57	LCRA	27500	
12281	3/6/1986	6.4	LCRA	30300	
12281	4/17/1986	0.3	LCRA	2450	
12281	4/17/1986	1.52	LCRA	2450	
12281	4/17/1986	3.05	LCRA	11000	649
12281	4/17/1986	4.57	LCRA	23600	
12281	4/17/1986	6.1	LCRA	28400	
12281	4/17/1986	7.62	LCRA	29100	
12281	5/8/1986	0.3	LCRA	518	
12281	5/8/1986	1.52	LCRA	520	
12281	5/8/1986	3.05	LCRA	519	
12281	5/8/1986	4.57	LCRA	518	1200
12281	5/8/1986	6.1	LCRA	528	
12281	5/8/1986	7.62	LCRA	24800	
12281	5/8/1986	8.23	LCRA	29800	
12281	6/4/1986	0.3	LCRA	370	
12281	6/4/1986	1.52	LCRA	357	
12281	6/4/1986	3.05	LCRA	357	2690
12281	6/4/1986	4.57	LCRA	355	
12281	6/4/1986	6.1	LCRA	356	
12281	6/4/1986	7.62	LCRA	357	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	7/10/1986	0.3	LCRA	1386	
12281	7/10/1986	1.52	LCRA	1400	
12281	7/10/1986	3.05	LCRA	17830	849
12281	7/10/1986	4.57	LCRA	27200	
12281	7/10/1986	6.1	LCRA	27600	
12281	7/10/1986	7.62	LCRA	27900	
12281	8/7/1986	0.3	LCRA	2890	
12281	8/7/1986	1.52	LCRA	2910	
12281	8/7/1986	3.05	LCRA	37000	916
12281	8/7/1986	4.57	LCRA	38300	
12281	8/7/1986	6.1	LCRA	38600	
12281	8/7/1986	7.62	LCRA	39500	
12281	9/11/1986	0.3	LCRA	275	
12281	9/11/1986	1.52	LCRA	276	
12281	9/11/1986	3.05	LCRA	276	3010
12281	9/11/1986	4.57	LCRA	275	
12281	9/11/1986	6.1	LCRA	276	
12281	9/11/1986	7.62	LCRA	473	
12281	10/9/1986	0.3	LCRA	2620	
12281	10/9/1986	1.52	LCRA	3850	
12281	10/9/1986	3.05	LCRA	34700	642
12281	10/9/1986	4.57	LCRA	35400	
12281	10/9/1986	6.1	LCRA	35600	
12281	10/9/1986	7.62	LCRA	36100	
12281	11/6/1986	0.3	LCRA	464	
12281	11/6/1986	1.52	LCRA	464	
12281	11/6/1986	3.05	LCRA	464	5860
12281	11/6/1986	4.57	LCRA	464	
12281	11/6/1986	6.1	LCRA	463	
12281	11/6/1986	7.62	LCRA	462	
12281	12/4/1986	0.3	LCRA	432	
12281	12/4/1986	1.52	LCRA	432	
12281	12/4/1986	3.05	LCRA	432	4040
12281	12/4/1986	4.57	LCRA	432	
12281	12/4/1986	6.1	LCRA	432	
12281	12/4/1986	7.62	LCRA	432	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	1/8/1987	0.3	LCRA	524	
12281	1/8/1987	1.52	LCRA	524	
12281	1/8/1987	3.05	LCRA	523	6980
12281	1/8/1987	4.57	LCRA	523	
12281	1/8/1987	6.1	LCRA	523	
12281	1/8/1987	8.23	LCRA	524	
12281	2/5/1987	0.3	LCRA	505	
12281	2/5/1987	1.52	LCRA	505	
12281	2/5/1987	3.05	LCRA	506	3900
12281	2/5/1987	4.57	LCRA	506	
12281	2/5/1987	6.1	LCRA	505	
12281	2/5/1987	7.62	LCRA	506	
12281	3/5/1987	0.3	LCRA	423	
12281	3/5/1987	1.52	LCRA	422	
12281	3/5/1987	3.05	LCRA	422	6280
12281	3/5/1987	4.57	LCRA	422	
12281	3/5/1987	6.1	LCRA	422	
12281	3/5/1987	8.23	LCRA	422	
12281	4/9/1987	0.3	LCRA	572	
12281	4/9/1987	1.52	LCRA	572	
12281	4/9/1987	3.05	LCRA	572	4040
12281	4/9/1987	4.57	LCRA	571	
12281	4/9/1987	5.49	LCRA	572	
12281	5/6/1987	0.3	LCRA	443	
12281	5/6/1987	1.52	LCRA	1650	
12281	5/6/1987	3.05	LCRA	12000	1520
12281	5/6/1987	4.57	LCRA	38400	
12281	5/6/1987	6.1	LCRA	40000	
12281	5/6/1987	7.62	LCRA	41100	
12281	6/4/1987	0.3	LCRA	322	
12281	6/4/1987	1.52	LCRA	324	21,500
12281	6/4/1987	3.05	LCRA	322	
12281	7/15/1987	0.3	LCRA	598	
12281	7/15/1987	1.52	LCRA	594	
12281	7/15/1987	3.05	LCRA	594	3740
12281	7/15/1987	4.57	LCRA	592	
12281	7/15/1987	6.1	LCRA	592	
12281	7/15/1987	7.62	LCRA	590	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	8/6/1987	0.3	LCRA	741	
12281	8/6/1987	1.52	LCRA	705	
12281	8/6/1987	3.05	LCRA	694	2310
12281	8/6/1987	4.57	LCRA	691	
12281	8/6/1987	6.1	LCRA	686	
12281	8/6/1987	7.62	LCRA	685	
12281	9/10/1987	0.3	LCRA	602	
12281	9/10/1987	1.52	LCRA	603	
12281	9/10/1987	3.05	LCRA	605	1780
12281	9/10/1987	4.57	LCRA	605	
12281	9/10/1987	6.1	LCRA	610	
12281	9/10/1987	7.01	LCRA	612	
12281	10/8/1987	0.3	LCRA	621	
12281	10/8/1987	1.52	LCRA	620	
12281	10/8/1987	3.05	LCRA	617	1550
12281	10/8/1987	4.57	LCRA	615	
12281	10/8/1987	6.4	LCRA	616	
12281	11/5/1987	0.3	LCRA	612	
12281	11/5/1987	1.52	LCRA	612	
12281	11/5/1987	3.05	LCRA	611	1880
12281	11/5/1987	4.57	LCRA	610	
12281	11/5/1987	6.71	LCRA	609	
12281	12/3/1987	0.3	LCRA	617	
12281	12/3/1987	1.52	LCRA	618	
12281	12/3/1987	3.05	LCRA	615	1030
12281	12/3/1987	4.57	LCRA	615	
12281	12/3/1987	5.49	LCRA	619	
12281	1/7/1988	0.3	LCRA	4330	
12281	1/7/1988	1.52	LCRA	21100	
12281	1/7/1988	3.05	LCRA	29500	815
12281	1/7/1988	4.57	LCRA	31500	
12281	1/7/1988	6.1	LCRA	31600	
12281	1/7/1988	7.01	LCRA	31700	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	2/4/1988	0.3	LCRA	1060	
12281	2/4/1988	1.52	LCRA	24000	
12281	2/4/1988	3.05	LCRA	40400	565
12281	2/4/1988	4.57	LCRA	41400	
12281	2/4/1988	5.79	LCRA	41400	
12281	3/3/1988	0.3	LCRA	3040	
12281	3/3/1988	1.52	LCRA	3920	529
12281	3/3/1988	3.66	LCRA	33500	
12281	4/7/1988	0.3	LCRA	2280	
12281	4/7/1988	1.52	LCRA	3400	
12281	4/7/1988	3.05	LCRA	27900	1040
12281	4/7/1988	4.57	LCRA	29500	
12281	4/7/1988	5.79	LCRA	30400	
12281	5/12/1988	0.3	LCRA	6910	
12281	5/12/1988	1.52	LCRA	18570	
12281	5/12/1988	3.05	LCRA	35100	171
12281	5/12/1988	4.57	LCRA	36200	
12281	5/12/1988	6.1	LCRA	36300	
12281	6/16/1988	0.3	LCRA	1820	
12281	6/16/1988	1.52	LCRA	30100	
12281	6/16/1988	3.05	LCRA	37600	45
12281	6/16/1988	4.57	LCRA	38300	
12281	6/16/1988	6.1	LCRA	38700	
12281	6/16/1988	7.62	LCRA	38700	
12281	7/14/1988	0.3	LCRA	1969	
12281	7/14/1988	1.52	LCRA	1980	
12281	7/14/1988	3.05	LCRA	33400	435
12281	7/14/1988	4.57	LCRA	36400	
12281	7/14/1988	6.1	LCRA	36700	
12281	8/11/1988	0.3	LCRA	2670	
12281	8/11/1988	1.52	LCRA	3230	
12281	8/11/1988	3.05	LCRA	30100	892
12281	8/11/1988	4.57	LCRA	35100	
12281	8/11/1988	6.1	LCRA	35100	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	9/22/1988	0.3	LCRA	4950	
12281	9/22/1988	1.52	LCRA	5210	
12281	9/22/1988	3.05	LCRA	37500	366
12281	9/22/1988	4.57	LCRA	39000	
12281	9/22/1988	6.1	LCRA	39700	
12281	9/22/1988	7.32	LCRA	39800	
12281	10/19/1988	0.3	LCRA	3670	
12281	10/19/1988	1.52	LCRA	6930	
12281	10/19/1988	3.05	LCRA	35000	536
12281	10/19/1988	4.57	LCRA	38600	
12281	10/19/1988	6.1	LCRA	38900	
12281	10/19/1988	7.62	LCRA	38900	
12281	11/17/1988	0.3	LCRA	6340	
12281	11/17/1988	1.52	LCRA	25200	
12281	11/17/1988	3.05	LCRA	40500	387
12281	11/17/1988	4.57	LCRA	40600	
12281	11/17/1988	6.1	LCRA	40800	
12281	12/29/1988	0.3	LCRA	7140	
12281	12/29/1988	1.52	LCRA	8260	
12281	12/29/1988	3.05	LCRA	37500	392
12281	12/29/1988	4.57	LCRA	40800	
12281	12/29/1988	6.71	LCRA	41400	
12281	1/25/1989	0.3	LCRA	614	
12281	1/25/1989	1.52	LCRA	690	
12281	1/25/1989	3.05	LCRA	3110	1260
12281	1/25/1989	4.57	LCRA	28100	
12281	1/25/1989	6.4	LCRA	29100	
12281	2/15/1989	0.3	LCRA	1480	
12281	2/15/1989	1.52	LCRA	1670	
12281	2/15/1989	3.05	LCRA	31000	751
12281	2/15/1989	4.57	LCRA	33500	
12281	2/15/1989	5.49	LCRA	33600	
12281	3/9/1989	0.3	LCRA	4400	
12281	3/9/1989	1.52	LCRA	30200	
12281	3/9/1989	3.05	LCRA	34900	448
12281	3/9/1989	4.57	LCRA	35300	
12281	3/9/1989	6.1	LCRA	35400	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	4/12/1989	0.3	LCRA	13360	
12281	4/12/1989	1.52	LCRA	28000	
12281	4/12/1989	3.05	LCRA	38000	311
12281	4/12/1989	4.57	LCRA	39300	
12281	4/12/1989	6.71	LCRA	39400	
12281	5/10/1989	0.3	LCRA	1530	831
12281	6/14/1989	0.3	LCRA	1990	1690
12281	8/17/1989	0.3	LCRA	5090	181
12281	10/5/1989	0.3	LCRA	21400	
12281	10/5/1989	1.52	LCRA	28700	
12281	10/5/1989	3.05	LCRA	34300	81
12281	10/5/1989	4.57	LCRA	34700	
12281	10/5/1989	6.1	LCRA	34700	
12281	12/14/1989	0.3	LCRA	14360	
12281	12/14/1989	1.52	LCRA	26500	
12281	12/14/1989	3.05	LCRA	30900	261
12281	12/14/1989	4.57	LCRA	31000	
12281	12/14/1989	6.1	LCRA	31200	
12281	1/26/1990	0.3	LCRA	8540	
12281	1/26/1990	1.52	LCRA	25200	230
12281	1/26/1990	3.05	LCRA	29100	
12281	1/26/1990	5.18	LCRA	31000	
12281	3/28/1990	0.3	LCRA	10910	
12281	3/28/1990	1.52	LCRA	30100	
12281	3/28/1990	3.05	LCRA	33300	108
12281	3/28/1990	4.57	LCRA	33400	
12281	3/28/1990	6.4	LCRA	33400	
12281	5/24/1990	0.3	LCRA	863	1740
12281	8/14/1990	0.3	LCRA	19800	
12281	8/14/1990	1.52	LCRA	32400	
12281	8/14/1990	3.05	LCRA	37700	176
12281	8/14/1990	4.57	LCRA	37900	
12281	8/14/1990	6.4	LCRA	38000	

Table 1
Specific Conductance and Estimated Flow at Selkirk Island Monitoring Station
Matagorda County (Continued)

Sample location [1]	Date [1]	Depth (m) [1]	Source [1]	Specific Conductivity (µmhos/cm) [1]	River Flow at Bay City (cfs) [2]
12281	10/17/1990	0.3	LCRA	5230	
12281	10/17/1990	1.52	LCRA	14900	
12281	10/17/1990	3.05	LCRA	35900	534
12281	10/17/1990	4.57	LCRA	37500	
12281	10/17/1990	6.1	LCRA	37800	
12281	12/12/1990	0.3	LCRA	4240	
12281	12/12/1990	1.52	LCRA	4510	
12281	12/12/1990	3.05	LCRA	25900	297
12281	12/12/1990	4.57	LCRA	39000	
12281	12/12/1990	5.79	LCRA	39200	
12281	2/13/1991	0.3	LCRA	438	1650
12281	4/10/1991	0.3	LCRA	315	5530
12281	6/19/1991	0.3	LCRA	653	1080
12281	8/14/1991	0.3	LCRA	5020	446
12281	10/29/1991	0.3	LCRA	6180	624
12281	12/11/1991	0.3	LCRA	446	735
12281	2/10/1992	0.3	LCRA	460	51,500
12281	4/22/1992	0.3	LCRA	294	15,600
12281	6/17/1992	0.3	LCRA	507	29,400
12281	8/26/1992	0.3	LCRA	1470	
12281	8/26/1992	1.52	LCRA	3460	
12281	8/26/1992	3.05	LCRA	9680	873
12281	8/26/1992	4.57	LCRA	22540	
12281	8/26/1992	6.1	LCRA	25270	
12281	10/14/1992	0.3	LCRA	7370	1080
12281	12/15/1992	0.3	LCRA	2160	1560

Reference: 1) LCRA 2008 2) USGS 2008

Table 2
Bottom Salinity For Portion of the Colorado River adjacent to the STP Site

Date	Flow (cfs) [1]	Bottom Salinity (%) [2]
2/21/2007	682	0.5
3/20/2007	2550	No Data
4/9/2007	1790	13.1
5/12/2007	710	19.3
6/11/2007	3650	0.2
6/12/2007	3490	0.2
8/28/2007	4920	0.2
8/29/2007	6170	0.2
9/26/2007	1810	1.9
9/27/2007	1600	1.9
10/30/2007	1050	17.5
10/31/2007	1130	18.7
11/14/2007	851	17.5
11/15/2007	722	17
12/12/2007	999	17.9
12/13/2007	922	17.5
1/23/2008	2740	0.4
1/24/2008	2430	0.2
2/20/2008	2870	0
2/21/2008	2980	1
3/19/2008	1110	3
3/20/2008	919	1
4/8/2008	770	11.3
4/9/2008	950	1
5/12/2008	263	19.4
5/13/2008	378	19.2

References:

1) USGS 2008
2) ENSR 2008

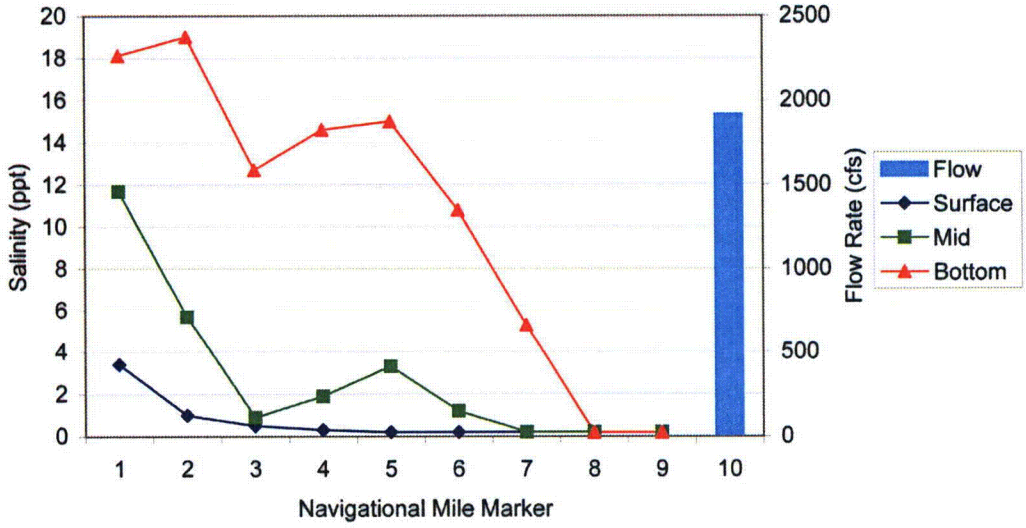

Figure 21. September salinity readings from navigational mile marker locations on the lower Colorado River compared to the mean monthly river flow rate, 2007-2008.

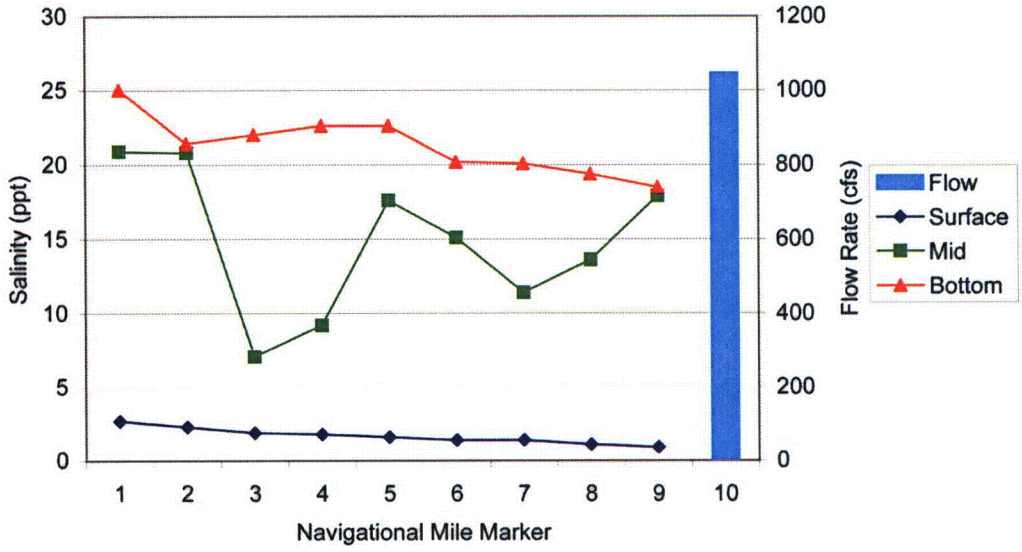

Figure 22. October salinity readings from navigational mile marker locations on the lower Colorado River compared to the mean monthly river flow rate, 2007-2008.

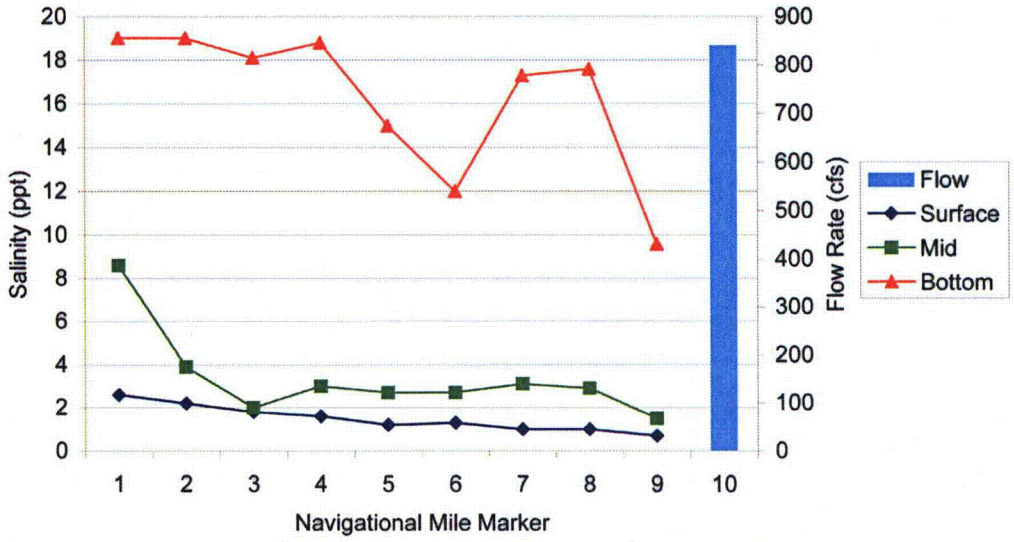

Figure 23. November salinity readings from navigational mile marker locations on the lower Colorado River compared to the mean montly flow rate, 2007-2008.

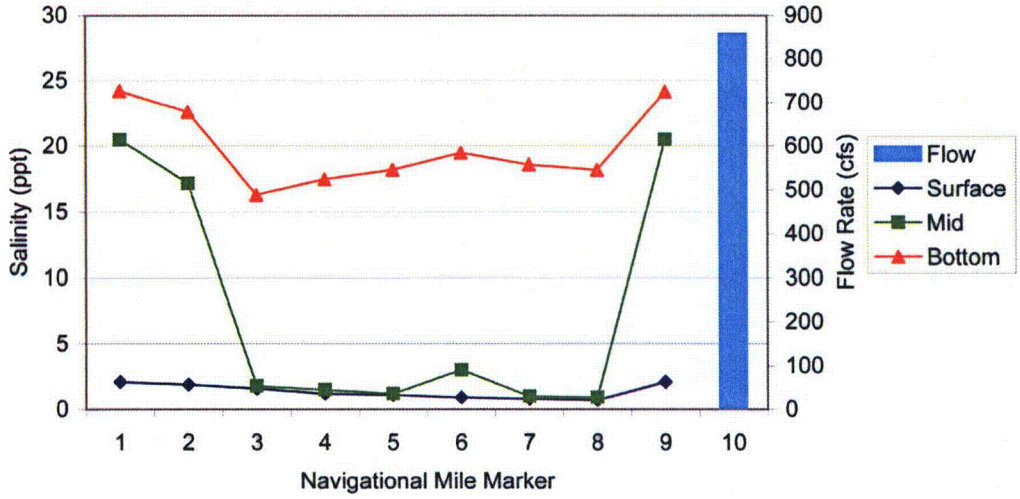

Figure 24. December salinity readings from navigational mile marker locations on the lower Colorado River compared to the mean montly flow rate, 2007-2008.

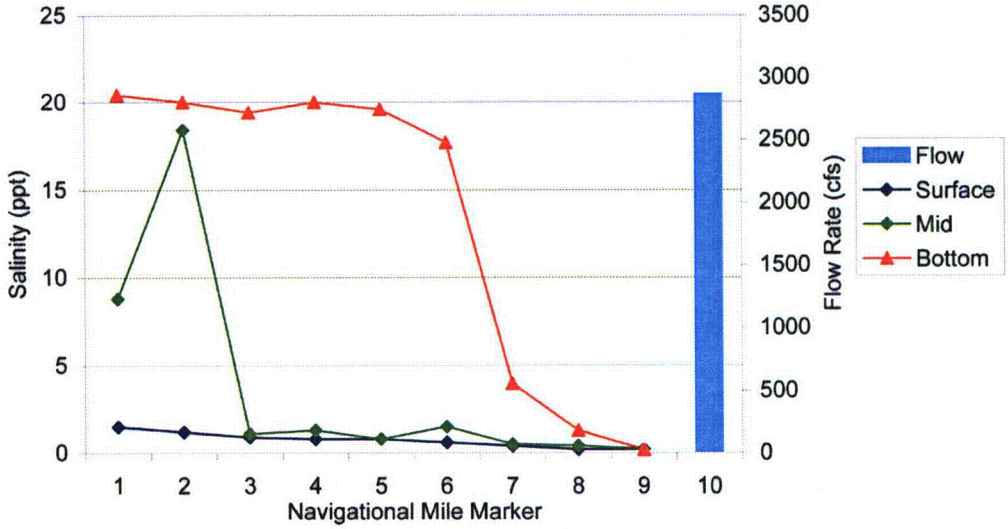

Figure 25. January salinity readings from navigational mile marker locations on the lower Colorado River compared to the mean monthly flow rate, 2007-2008.

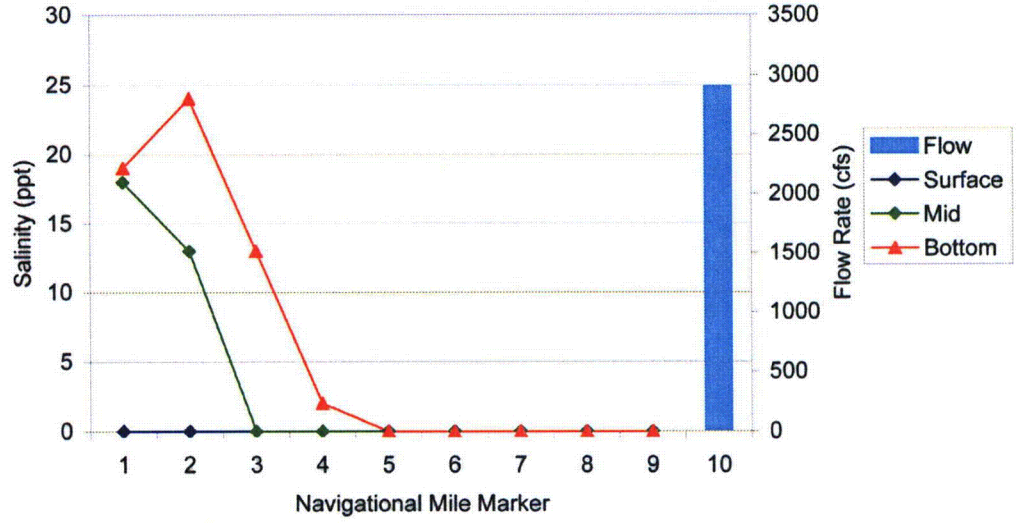

Figure 26. February salinity readings from navigations mile marker locations on the lower Colorado River compared to the mean montly flow rate, 2007-2008.

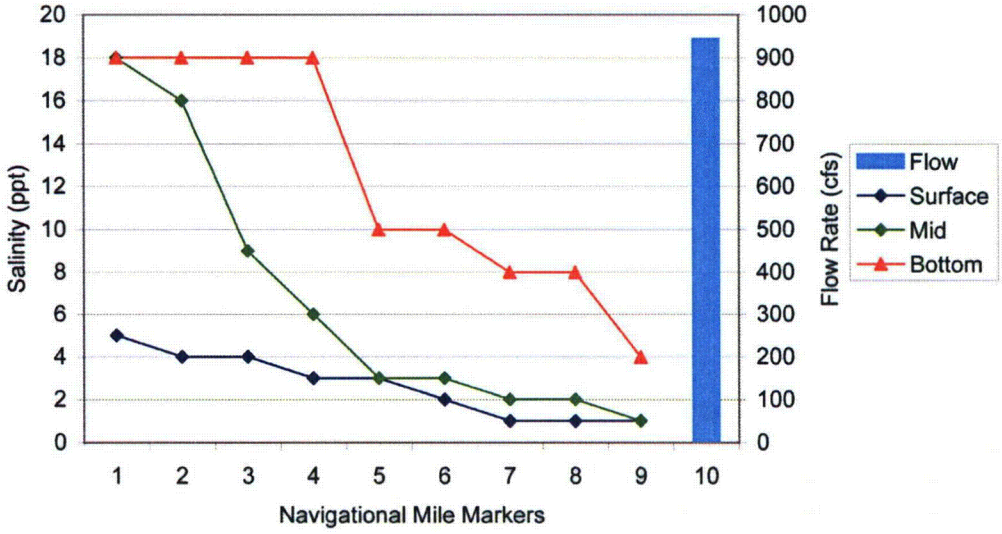

Figure 27. March salinity readings from navigational mile marker locations on the lower Colorado River compared to the mean montly flow rate, 2007-2008.

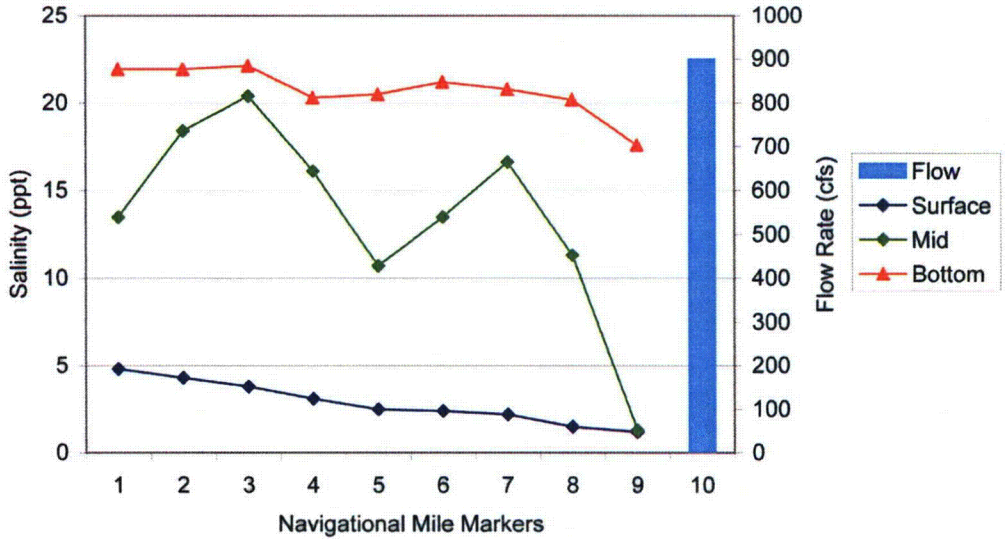

Figure 28. April salinity readings from navigational mile marker locations on the lower Colorado River compared to the mean monthly flow rate, 2007-2008.

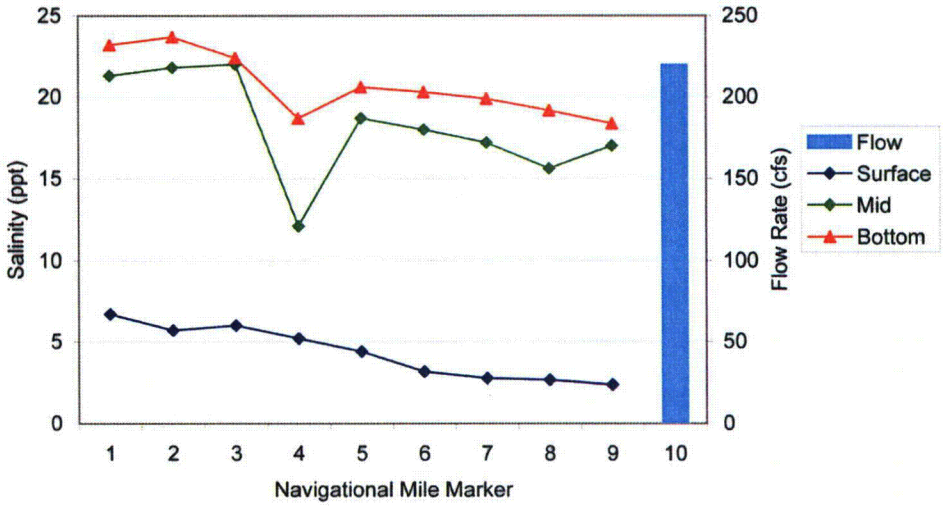

Figure 29. May salinity readings from navigational mile marker locations on the lower Colorado River compared with to mean montly flow rate, 2007-2008.

STP Nuclear Operating Company
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CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 02.03-07

QUESTION:

Provide details of the process followed in the selection of the site hydrogeologic conceptual model.

Full Text (Supporting Information):

Provide a statement of the process followed to develop the site hydrogeologic conceptual model so staff can better understand alternate conceptual models that had been considered, those rejected, and those adopted. The site hydrogeologic conceptual model provides the contextual background to explain (a) drawdown at offsite wells, (b) potential impacts to wetlands, (c) potential alteration of groundwater gradients, (d) changes in water quality, (e) the relationship between the MCR and surrounding relief, observation, and production wells, and (f) the estimate of the sustainable, safe yield, or available groundwater resource. The process to be followed, and the representation that it was followed, should be evident on the record for the staff to rely upon it.

RESPONSE:

The final hydrogeologic conceptual model presented in Subsection 2.3.1.2 of the Environmental Report (ER) was developed from multiple conceptual hydrogeologic models that were considered, based on framework and scale differences. Consideration of these differences was not mutually exclusive, but was intertwined during a series of steps designed to develop a tenable site hydrogeologic conceptual model. Four steps were involved in the development of the scale-dependent conceptual models:

- A regional "desktop" study based on published state, federal and informational sources;
- A review of documentation from obtainable sources addressing existing STP Units 1 & 2, including the STP Units 1 & 2 UFSAR;
- A site-specific geotechnical, geologic, and hydrogeologic field study conducted for proposed Units 3 & 4; and
- An evaluation of the site-specific data in conjunction with the regional, local and STP site information.

Intertwined with these four steps, two main hydrostratigraphic frameworks were investigated during formulation of the conceptual site model; STP site-specific conceptual models and a regional hydrogeologic conceptual model. The basis for the site-specific conceptual model was the existing Units 1 & 2 UFSAR. The regional conceptual model contained greater uncertainty due to limited information on near site conditions and future groundwater development within the county.

The first step of site model conceptualization involved formulating an understanding of the hydrogeologic conditions in Southern Texas and Matagorda County by reviewing regional

geologic and hydrogeologic information from the United States Geological Survey (USGS) and the State of Texas. One regional conceptual hydrostratigraphic model considered was based on the USGS Groundwater Atlas of the United Sates – Oklahoma, Texas (ER Section 2.3.1.2.1, Reference 2.3.1-21) and other USGS publications. This concept includes five permeable zones (denoted A through E) and two confining units (D and E, both units located down dip at the top permeable zones D and E respectfully) within the Coastal Lowlands Aquifer System. A second regional conceptual hydrostratigraphic model considered was based on information obtained from the Texas Water Development Board. This concept, which is generally accepted in Texas, includes three aquifers – the Chicot, Evangeline and Jasper, and two confining units – the Burkeville and Catahoula. The Chicot aquifer includes all of permeable zone A and most of B. The Evangeline aquifer includes the rest of permeable zone B and all of C. The Jasper aquifer is roughly equivalent to permeable zones D and E. Both concepts include the Vicksburg-Jackson confining unit as the basal confining unit to the Coastal Lowlands Aquifer System. Figure 2.3.1-16 illustrates the correlation between the USGS and Texas nomenclature.

During the first step in model conceptualization, this information along with additional research concentrated on the hydrogeologic conditions of Matagorda County was used to evaluate geologic structures, hydrogeologic properties, flow paths, regional sources and sinks, water use, and surface water interactions within the county. The resulting regional conceptual hydrogeologic model is discussed in Subsection 2.3.1.2.2 and other 2.3.1.2 subsections. Due to the scale of the regional conceptual model, a gap in understanding temporal and localized effects on the regional flow systems from groundwater use and surface water interactions in the vicinity of the STP site was evident. This included interactions between the shallow and deep aquifer zones within the Chicot Aquifer, groundwater flow directions and gradients within these zones, and current and estimated groundwater use projections.

The second step involved a review of documentation addressing local hydrogeologic conditions, such as the STP Units 1 & 2 UFSAR and the Annual Environmental Operating Report, to resolve the temporal and localized unknowns. The information provided a summary of the hydrogeologic conditions beneath the site based on geotechnical borings, observation wells, permeability tests, dewatering activities, Main Cooling Reservoir (MCR) design requirements, groundwater use, and other information previously generated for Units 1 & 2. This information provided a good description of the subsurface conditions that could be expected beneath and in the vicinity of the proposed Units 3 & 4 facility. This included the identification of aquifer units, hydrogeologic parameter values, vertical and horizontal flow gradients and groundwater flow paths that could be expected in the aquifers beneath the STP site.

Incorporating the conceptual site model with regional concepts, the Chicot aquifer was subdivided into two distinct aquifers – the confined "Deep Aquifer" and the semi-confined to confined "Shallow Aquifer" (separated into Upper and Lower Shallow Aquifer zones). This conceptual model is discussed in Subsection 2.3.1.2.3.1 of the ER. The Shallow Aquifer identified in the Units 1 & 2 UFSAR was targeted for further hydrogeologic investigation as part of the Units 3 & 4 subsurface site investigation (SI). The Deep Aquifer identified in the regional data and the Units 1 & 2 UFSAR was further evaluated through well permits, STP historical records and literature searches. The UFSAR and supporting information suggested approximately 100 feet of hydraulic separation between the Shallow and Deep Aquifers. The

critical hydrogeologic unknowns for Units 3 & 4 were to understand localized flow paths and the possible effects on these flow paths from operating the MCR and the STP maintained wetlands (located to the north of Units 1 & 2).

The third step involved incorporating information gathered from the site-specific Units 3 & 4 SI. The SI included geotechnical borings, installation of groundwater observation wells, water level monitoring, water quality analyses, and aquifer tests. The site-specific conceptual model is discussed in Subsection 2.3.1.2.3.2 of the ER. The SI hydrogeologic target zones identified as the result of the regional and site specific information presented in the Units 1 & 2 UFSAR were, in general, confirmed with the exception of a few outliers (where the sands of the Lower Shallow Aquifer were not well defined at two of the well cluster locations).

The fourth step involved evaluation of the SI field data with the regional and local information, and historical STP information. This included evaluation of:

- regional & local groundwater movement;
- vertical gradients between the aquifers;
- site-specific slug test results and local and regional pumping test results; and
- water levels to assess possible localized influence of the MCR and the northeast wetland on the Shallow Aquifer.

From this effort, site-specific data were integrated with existing STP information and regional information to formulate the final conceptual site model. The final conceptual model was developed as part of the preparation of FSAR Section 2.4S.12 and was summarized in ER Subsection 2.3.1.2. The development of the conceptual site model provides an insight to address the following:

(a) Drawdown at offsite wells:
Based on the conceptual model presented, drawdown from Units 3 & 4 construction dewatering within the Shallow Aquifer and increased groundwater withdrawals from the Deep Aquifer during construction and operation of Units 3 & 4 may potentially impact off site wells.

Units 3 & 4 construction dewatering will occur within the Shallow Aquifer to depths of about 90 feet at the two reactors within the power block area. Using a deep well dewatering system, drawdowns from the proposed dewatering could potentially be up to 19 feet at distances along an 1,800-foot radius from the power block area (the distance to Unit 1); up to10 feet at a 2,200-foot radius (MCR dike); and up to 9 feet at a 2,250-foot radius (Unit 2). Based on these estimates, drawdown is expected to remain within the STP site boundaries. The conceptual construction dewatering approach is described in FSAR 2.4S.12 and ER 4.0. The EPC is developing a detailed construction dewatering plan that will include the use of slurry walls. The use of slurry walls would limit the dewatering cone of depression and reduce the drawdown estimates stated above.

The operation of four reactors at STP would result in a groundwater withdrawal of about 3,000 AF/Y from the Deep Aquifer. Peak demands would exceed this volume. This withdrawal is discussed in Subsection 2.3.1.2.4.3 of the ER. The STP units operate four Deep Aquifer

production wells and one fire suppression well at the nuclear training facility. To meet the increase in demand by Units 3 & 4, up to three additional Deep Aquifer production wells are being considered. The environmental and potentiometric impacts of the increased groundwater demand are discussed in ER Section 4.2.

(b) Potential impacts to wetlands:
Wetland distributions are shown in Figure 2.3.1-9 of the ER. Detrimental impacts from changes to the groundwater regime during construction dewatering activities would only be expected (if any) at wetlands to the northeast and those associated with Kelly Lake to the southeast (if sufficient groundwater base flow was removed to the streams feeding the lake). In the unlikely event this occurred, discharge from the aquifer during construction dewatering could be used to mitigate impacts to wetlands. Wetlands are further discussed in ER Sections 2.3.1.1.4 and 4.3.1.1.1.

(c) Potential alteration of groundwater gradients:
Potential alteration of groundwater gradients are summarized in Subsection 2.3.1.2.3.4 of the ER for both aquifers at the site. During dewatering activities in the Shallow Aquifer, a hydraulic sink would develop within the site boundaries. Flow gradients in the northern portion of the site would flow toward this sink. After construction and during operation, the depths of building foundation and backfill material could cause localized flow gradient changes within the facility area. Flow from the northwest and north may be directed easterly and southwesterly around the facility; however, the general flow conditions described in Subsection 2.3.1.2.3.4 are expected to remain the same, diverging around the MCR in the Upper Shallow Aquifer zone and southeasterly in the Lower Shallow Aquifer zone. The backfilled excavations may allow communication between the Upper and Lower Shallow Aquifers similar to that at Units 1 & 2 (Subsections 2.3.1.2.5 and 2.3.1.2.6).

(d) Changes in water quality:
Existing geochemical conditions are described in Subsection 2.3.1.2.3.6. Temporary alterations to the Shallow Aquifer would result from construction dewatering. Potential long-term alteration would be from the building foundations penetrating the groundwater system. These effects are considered minor as the hydrogeochemical data for observation wells OW-930-U&L and OW-934-U&L, located downgradient of Units 1 & 2, are similar to the hydrogeochemical data from observations wells located upgradient of Units 1 & 2 (Table 2.3.1-20).

Due to the depth and the separation of the Deep Aquifer from the Shallow Aquifer, the hydrogeochemical characteristics described in ER Subsection 2.3.1.2.3.6 are not expected to change. In addition, maximizing well separation will limit interference effects and the upward movement of brackish water from the deeper sands of the aquifer.

(e) Relationship between the MCR and surrounding relief, observation, and production wells:
The design and setting of the 7,000-acre MCR are described in ER Subsection 2.3.1.2.3.3. The MCR was formed by constructing an earthfill embankment above the natural ground surface. The normal maximum operating level is EL 49 ft MSL and was originally sized for four units. The MCR relief well system is described in the STP Units 1 & 2 UFSAR. Relief well screen interval depths vary, but are typically 30 feet below ground surface (bgs), penetrating the sands

of the Upper Shallow Aquifer. Seepage occurs through the reservoir bottom to the groundwater system. Part of this seepage is intercepted by the relief wells installed around the perimeter of the MCR. The relief well system passively discharges the intercepted water to drainage ditches along the dike toe, which is then discharged to surface water features at various locations. Seepage not intercepted by the relief wells remains in the groundwater system.

The STP production wells are screened in the Deep Aquifer and are considered to be unaffected by the MCR due to their depth and approximately 100 feet of hydrogeologic separation from the overlying Shallow Aquifer beneath the MCR. Pre-existing STP piezometers and observation wells are screened in either the Shallow or Deep Aquifer (Units 1 & 2 UFSAR). The Units 3 & 4 observation wells are screened in the Upper and Lower Shallow Aquifer.

(f) The estimate of the sustainable groundwater resource:
Matagorda County lies within the Coastal Plains Groundwater Conservation District (CPGCD), which exists within Texas Groundwater Management Area 15, and is affiliated with the Lower Colorado Regional Water Planning Group - Region K (LCRWPG). The CPGCD regulates groundwater use permits to manage the groundwater resources in Matagorda County. The CPGCD has granted STP a permit to use 3,000 AF/Y of groundwater. STP currently uses about 1,200 to 1,300 AF/Y of groundwater. Normal operation with four reactors would require approximately 3,000 AF/Y of groundwater, not including the permitted surface water requirements and peak demand during outages. The short-term peak water demand would be met by carefully managing water usage during normal operation or from storage of water within the MCR.

The TWDB-approved CPGCD Groundwater Management Plan states that the LCRWPG estimated 49,221 AF/Y of usable groundwater is available from the Gulf Coast aquifer in the county, but cautions that this number is an estimated value (Turner Collie & Braden, Inc., May 2004). In this Plan, the CPGCD states that the average total groundwater used between 1980 and 2000 was 30,233 AF/Y, and groundwater use in the county is projected to be 35,785 AF/Y in 2050 (Turner Collie & Braden, Inc., May 2004). Using Region K estimates, CPGCD predicts the projected total water demands (groundwater + surface water) for Matagorda County may exceed projected supplies, and that LCRWPG recommends water management strategies be developed to meet the identified shortages (Turner Collie & Braden, Inc., May 2004).

CANDIDATE COLA REVISION:

The following paragraphs will be inserted at the end of ER Subsection 2.3.1.2.1:

The hydrogeologic conceptual model presented herein was developed from multiple conceptual hydrogeologic models that vary in scale and hydrostratigraphic framework. Consideration of the scale and framework were not mutual exclusive, but were intertwined during a series of steps designed to develop a tenable site hydrogeologic conceptual model. Four steps were involved in the development of the scale-dependent conceptual models, and include:

- A regional "desktop" study based on published state, federal and other sources;

- A review of documentation addressing STP Units 1 & 2;
- A site-specific geotechnical, geologic, and hydrogeologic field study conducted for proposed Units 3 & 4; and
- An evaluation of site-specific data in conjunction with regional and local information.

The first step of site model conceptualization involved formulating an understanding of the hydrogeologic conditions in Southern Texas and Matagorda County by reviewing regional geologic and hydrogeologic information available from the USGS and Texas. Research indicates that the USGS and the State of Texas developed separate regional hydrogeologic conceptual models to describe the Coastal Lowlands Aquifer System, with the Texas model being the more widely used. Although nomenclature between the two conceptual models varies significantly, the frameworks are largely comparable (Table 2.3.1-16).

The second step involved a review of documentation addressing local hydrogeologic conditions, such as the STP Units 1 & 2 UFSAR and the Annual Environmental Operating Report, to resolve the temporal and localized unknowns. Incorporating the conceptual site model with regional concepts, the Chicot aquifer was subdivided into two distinct confined aquifers – the "Deep Aquifer" and the "Shallow Aquifer".

During the third step, a site-specific subsurface site investigation (SI) was implemented at the proposed Units 3 & 4 site area, concentrated within the STP northern site boundaries and the proposed Units 3 & 4 facility footprint.

The fourth step involved evaluation of the SI field data with the regional and local STP information. This included evaluation of:

- regional & local groundwater movement;
- vertical gradients between the aquifers;
- site-specific slug test results and local and regional pumping test results; and
- natural and manmade (i.e., MCR) impacts on water levels in the Shallow Aquifer.

From this effort, site-specific data was integrated with existing STP Units 1 & 2 information and regional information to formulate the conceptual site model described in the following section.

REFERENCES:

1) Turner Collie & Braden, Inc., May 2004, *Groundwater Management Plan, prepared for: Coastal Plains Groundwater Conservation District*, 20 p. http://www.twdb.state.tx.us/gwrd/GCD/plans/Coastal_Plains_GCD_Management_Plan_2004.pdf

Question 02.03-08

QUESTION:

Provide groundwater observations for a sufficiently long period to reveal seasonal Trends. If available, also provide long-term trend data on groundwater in the vicinity of the proposed facility.

Full Text (Supporting Information):

Section 2.3.1.2.3.2 of the ER states "Monthly water level measurements from these groundwater observation wells began in December 2006 and will be continued through December 2007." The application does not include groundwater observations for this complete period. Provide the complete period of observation data to reveal seasonal trends and an assessment that it is representative of long-term conditions. If available in the STP site records, provide the long-term historical data to reveal the long-term trend for wells within the STP site boundary, especially any near or adjacent to the proposed facilities.

RESPONSE:

A full year of monthly water level measurements from the upper and lower Shallow Aquifer wells was completed on December 17, 2007. A table of these readings is provided. with this response. The monthly 2007 data are being evaluated and included as data sets, figures, and narrative for future revisions to the Environmental Report (ER) and FSAR.

Historical data are available from STP piezometers 601, 602A, and 603 B, which are near or adjacent to the proposed facilities. Figure 2.3.1-28 presents the hydrographs for these piezometers, including precipitation data and the Palmer Drought Severity Index, from 1994 through 2004. These data indicate that over this ten-year period the maximum recorded elevation of the water table in the Shallow Aquifer was about 27 feet MSL, which is approximately 8 feet below the proposed power block safety-related building grade elevation of 35 ft MSL. Review of earlier historical data (between the years 1973 and 1986) presented as potentiometric surface maps and hydrographs in STP Units 1 & 2 USFAR Figures 2.4.13-17 through 2.4.13-19A indicate historical potentiometric surface levels in the Upper and Lower Shallow Aquifers were less than elevation 27 feet MSL. Other Shallow Aquifer historic water level information at STP Units 1 & 2 includes monitoring conducted before the dewatering for Units 1 & 2, which commenced in November 1975. These data (September 1973 continuously to November 1975) are documented in STP Units 1 & 2 UFSAR Figures 2.5.4-67 through -69, and also show water levels were at or below elevation 27 feet MSL.

CANDIDATE COLA REVISION:

The second to the last sentence of the second paragraph of ER Subsection 2.3.1.2.3.2 will be revised as follows to include a statement that one year of water level measurements have now been collected:

> Twenty-eight (28) groundwater observation wells were installed in the vicinity of STP 3 & 4 and completed in the Upper and Lower Shallow Aquifer. The wells were located to supplement the existing STP site piezometer network in order to provide (a) an adequate distribution for determining groundwater flow directions and (b) hydraulic gradients in the vicinity of STP 3 & 4. Well pairs were installed at selected locations to determine vertical hydraulic gradients. Field hydraulic conductivity tests (slug tests) were conducted in each observation well. Monthly water level measurements from these groundwater observation wells began in December 2006 and ~~will be~~ continued through December 2007. Figure 2.3.1-20 shows the locations of observation wells and piezometers at the STP site.

WELL ID	WELL DEPTH	BOTTOM OF SCREEN	REFERENCE POINT ELEVATION	December 28, 2006		January 30, 2007		February 22, 2007		March 29, 2007		April 27, 2007		May 25, 2007		June 27, 2007		July 30, 2007		August 30, 2007 (2)		September 26, 2007		October 30, 2007		November 19, 2007		December 17, 2007	
				Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation
	(ft bgs)	(ft bgs)	(ft)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)	(ft)	(ft msl)
Shallow Aquifer - Upper Zone																													
OW-308 U	47.1	46	31.80	7.78	24.02	6.46	25.34	7.46	24.34	7.41	24.39	7.17	24.63	7.07	24.73	7.72	24.08	6.36	25.44	7.30	24.50	7.50	24.30	8.09	23.71	8.40	23.40	8.23	23.57
OW-332 U	46.1	45	32.10	8.01	24.09	6.57	25.53	7.46	24.64	7.39	24.71	6.25	25.85	7.09	25.01	8.05	24.05	6.50	25.60	7.40	24.70	7.65	24.45	8.43	23.67	8.60	23.50	8.60	23.50
OW-348 U	39.1	38	32.28	8.09	24.19	6.52	25.76	7.71	24.57	7.66	24.62	7.34	24.94	7.25	25.03	7.95	24.33	6.34	25.94	7.50	24.78	7.78	24.50	8.42	23.86	8.79	23.49	8.56	23.72
OW-349 U	46.1	45	31.29	7.28	24.01	5.62	25.47	6.97	24.32	6.91	24.38	6.56	24.73	6.50	24.79	7.19	24.10	5.62	25.67	6.70	24.59	6.98	24.31	7.61	23.68	7.97	23.32	7.75	23.54
OW-408 U	43.1	42	33.57	9.71	23.86	8.30	25.27	9.13	24.44	9.08	24.49	8.95	24.62	8.94	24.63	9.47	24.10	8.19	25.38	8.10	27.47	9.28	24.29	9.81	23.76	10.23	23.34	10.12	23.45
OW-420 U	49.1	48	33.79	9.98	23.81	8.42	25.37	9.32	24.47	9.26	24.53	9.08	24.71	8.99	24.80	9.59	24.20	8.23	25.56	8.20	27.59	9.45	24.34	10.15	23.64	10.46	23.31	10.33	23.46
OW-438 U	41	40	32.18	8.45	23.73	6.55	25.63	7.21	24.97	7.14	25.04	7.17	25.01	7.00	25.18	7.97	24.21	6.32	25.86	7.40	24.78	7.55	24.63	8.54	23.64	8.98	23.20	8.88	23.30
OW-910 U	36.1	35	32.32	9.11	23.21	7.57	24.75	8.30	24.02	8.23	24.09	8.10	24.22	8.00	24.32	8.49	23.83	7.53	24.79	8.40	23.92	8.50	23.82	9.29	23.03	9.52	22.80	9.41	22.91
OW-928 U	39.6	38.5	31.69	8.18	23.51	6.21	25.48	6.85	24.84	6.72	24.97	6.69	25.00	6.59	25.10	7.33	24.36	6.09	25.60	6.95	24.74	7.22	24.47	8.31	23.38	8.64	23.05	8.52	23.17
OW-929 U	60.1	59	38.71	12.92	25.79	11.33	27.38	11.68	27.03	11.75	26.96	11.77	26.94	11.81	26.90	13.17	25.54	11.22	27.49	12.15	26.56	12.20	26.51	13.73	24.98	14.73	23.98	14.19	24.52
OW-930 U	36.1	35	27.33	7.92	19.41	5.79	21.54	7.05	20.28	6.98	20.35	6.45	20.88	7.31	20.02	7.97	19.36	6.09	21.24	7.10	20.23	8.05	19.28	8.62	18.71	8.39	18.94	8.35	18.98
OW-931 U	36	35	32.10	9.82	22.28	8.81	23.29	9.43	22.67	9.34	22.76	9.19	22.91	9.25	22.85	9.33	22.77	9.00	23.10	9.30	22.80	9.60	22.50	10.14	21.96	10.13	21.97	10.00	22.10
OW-932 U	39.6	38.5	32.83	8.52	24.31	7.03	25.80	8.04	24.79	7.96	24.87	7.77	25.06	7.68	25.15	8.27	24.56	6.94	25.89	7.90	24.93	8.20	24.63	8.76	24.07	9.04	23.79	8.83	24.00
OW-933 U	37.1	36	30.62	6.44	24.18	4.97	25.65	5.95	24.67	5.91	24.71	5.57	25.05	5.50	25.12	5.87	24.75	4.61	26.01	5.40	25.22	5.80	24.82	6.42	24.20	6.78	23.84	6.60	24.02
OW-934 U	41.1	40	30.39	10.22	20.17	9.54	20.85	10.04	20.35	10.08	20.31	9.91	20.48	10.00	20.39	10.36	20.03	9.56	20.83	10.00	20.39	10.15	20.24	10.60	19.79	10.55	19.84	10.55	19.84
Shallow Aquifer - Lower Zone																													
OW-308 L	97.1	96	31.78	16.08	15.70	15.08	16.70	14.91	16.87	14.67	17.11	14.21	17.57	14.32	17.46	14.30	17.48	12.95	18.83	13.40	18.38	13.60	18.18	14.20	17.58	14.60	17.18	14.80	16.98
OW-332 L (1)	103.2	102.1	31.85	15.22	16.63																								
OW-332 L (R)	103.1	102	32.08					15.29	16.79	15.05	17.03	14.59	17.49	14.71	17.37	14.68	17.40	13.32	18.76	13.80	18.28	13.95	18.13	14.58	17.50	14.99	17.09	15.17	16.91
OW-348 L	79.1	78.2	31.86	16.16	15.70	15.08	16.78	14.94	16.92	14.71	17.15	14.29	17.57	14.40	17.46	14.36	17.50	13.05	18.81	13.50	18.36	13.65	18.21	14.25	17.61	14.67	17.19	14.87	16.99
OW-349 L	81.1	80	31.03	15.22	15.81	14.19	16.84	14.02	17.01	13.80	17.23	13.35	17.68	13.48	17.55	13.42	17.61	12.05	18.98	12.50	18.53	12.72	18.31	13.32	17.71	13.74	17.29	13.94	17.09
OW-408 L	81.3	80.2	33.76	18.05	15.71	17.05	16.71	16.86	16.90	16.64	17.12	16.20	17.56	16.32	17.44	16.28	17.48	14.96	18.80	15.40	18.36	15.58	18.18	16.17	17.59	16.58	17.18	16.77	16.99
OW-438 L	104.1	103	31.57	15.85	15.72	14.96	16.61	14.75	16.82	14.49	17.08	14.02	17.55	14.12	17.45	14.10	17.47	12.79	18.78	13.20	18.37	13.40	18.17	13.98	17.59	14.37	17.20	14.55	17.02
OW-910 L	92.1	91	32.48	16.62	15.86	16.22	16.26	15.77	16.71	15.59	16.89	15.27	17.21	15.22	17.26	15.13	17.35	14.49	17.99	14.45	18.03	14.50	17.98	14.76	17.72	14.99	17.49	15.17	17.31
OW-928 L	121.1	120	31.56	15.75	15.81	15.00	16.56	14.75	16.81	14.50	17.06	14.03	17.53	14.13	17.43	14.06	17.50	12.90	18.66	13.25	18.31	13.35	18.21	13.90	17.66	14.25	17.31	14.41	17.15
OW-929 L	98.1	97	38.63	23.47	15.16	22.41	16.22	22.26	16.37	22.00	16.63	21.51	17.12	21.70	16.93	21.67	16.96	20.18	18.45	20.75	17.88	20.95	17.68	21.63	17.00	22.04	16.59	22.21	16.42
OW-930 L	106.5	105	27.98	14.90	13.08	13.41	14.57	13.35	14.63	13.21	14.77	12.81	15.17	13.09	14.89	12.99	14.99	11.63	16.35	12.20	15.78	12.50	15.48	12.94	15.04	13.34	14.64	13.54	14.44
OW-932 L	79.6	78.5	32.79	17.23	15.56	16.01	16.78	15.90	16.89	15.73	17.06	15.35	17.44	15.48	17.31	15.38	17.41	14.14	18.65	14.55	18.24	14.75	18.04	15.27	17.52	15.70	17.09	15.91	16.88
OW-933 L	87.1	86	30.45	14.60	15.85	13.37	17.08	13.29	17.16	13.11	17.34	12.71	17.74	12.84	17.61	12.72	17.73	11.42	19.03	11.85	18.60	12.05	18.40	12.61	17.84	13.07	17.38	13.30	17.15
OW-934 L	100	99	30.94	17.07	13.87	15.83	15.11	15.73	15.21	15.51	15.43	15.09	15.85	15.33	15.61	15.23	15.71	13.78	17.16	14.40	16.54	14.65	16.29	15.23	15.71	15.63	15.31	15.82	15.12

(1) OW-332 L replaced by well OW-332 L ® in February 2007 prior to the February 2007 monthly water level measurement.

(2) August 2007 readings for OW-408U and ow-420u ARE QUESTIONABLE DUE TO POSSIBLE MISREADING "9" AS "6."

Question 02.03-10

QUESTION:

Address inconsistency in ER text with respect to hydraulic conductivities presented in Figure 2.3.1–32.

Full Text (Supporting Information):

Section 2.3.1.2.3.6 of the ER states: "Figure 2.3.1–32 included the grain size derived hydraulic conductivity with aquifer pumping test and slug test derived hydraulic conductivity. Comparison of the boxplots suggests that, although the grain size derived hydraulic conductivity is in the range of regional hydraulic conductivity, it is above the STP aquifer test ranges. Comparison of geometric means indicates the grain size derived hydraulic conductivity is within the range of the STP aquifer test results." Reconcile the last two sentences with the data and boxplots presented in Figure 2.3.1–32.

RESPONSE:

As shown in ER Figure 2.3.1-32, the box plot of the grain size hydraulic conductivity range is comparable to the low range in values of the slug test hydraulic conductivity box plot. The upper range of the grain size hydraulic conductivity values falls within the lower range of both the regional and STP aquifer pumping test hydraulic conductivity values but below their respective box plot values. The geometric mean of the grain size hydraulic conductivity is below the geometric means determined from the other cited sources of hydraulic conductivity data.

CANDIDATE COLA REVISION:

The third paragraph of ER Subsection 2.3.1.2.3.6 "Geotechnical Properties" will be revised as follows:

> Permeability or hydraulic conductivity of sands can be estimated using the D_{10} grain size using the Hazen formula (Reference 2.3.1-29). This formula is based on empirical studies for the design of sand filters for drinking water. The formula was developed for use in well-sorted sand, and application to poorer-sorted materials would result in over-prediction of permeability. Figure 2.3.1-32 included the grain size derived hydraulic conductivity with aquifer pumping test and slug test derived hydraulic conductivity. Comparison of the box plots suggests that, ~~although~~ the grain size derived hydraulic conductivity is within the range of the slug test ~~regional~~ hydraulic conductivity values but, ~~it~~ is ~~above~~ below that of the regional and STP aquifer pumping test values ~~ranges~~. Comparison of geometric means indicates the grain size derived hydraulic conductivity is ~~within the range of the STP aquifer test results~~ below the geometric means determined from the other cited sources of hydraulic conductivity.

Question 02.03-13

QUESTION:

Provide a clarification on the role of production wells related to groundwater pathway and impact on the deep aquifer.

Full Text (Supporting Information):

Midway through the last paragraph of Section 2.3.1.2.5.1 the ER states, "Potentiometric surface maps for the Deep Aquifer indicate that groundwater flow beneath the site is moving toward the site production wells, thus precluding the potential for offsite migration in the unlikely event that effluent passes through the clay layer. These factors suggest that there is no credible offsite release pathway for the Deep Aquifer." Provide the technical basis for the latter statement because it introduces consistency issues between the site safety and environmental reviews, for example, (1) questions on the operational protocols for each of the production wells (e.g., for how long can they be offline, what rates do they pump when online), (2) the question that if they are instrumental to protection of the surrounding Deep Aquifer resource (and if so, are they safety related facilities if an accident occurs?), and (3) issues with regard to groundwater pathway that should be addressed in the SSAR.

RESPONSE:

Environmental Report (ER) Subsection 2.3.1.2.5.1 provides a brief summary of the evaluation described in the Final Safety Analysis Report (FSAR) Section 2.4S.13, Accidental Release of Radioactive Liquid Effluents in Ground and Surface Waters. In the FSAR, potential pathways were identified for the Shallow Aquifer (5 pathways, 2 selected and 3 rejected) and the Deep Aquifer (1 rejected pathway). As stated in ER Subsection 2.3.1.2.5, the likelihood of an accidental liquid effluent release to groundwater is remote due to the multiple levels of protection in the liquid radwaste system. These design components would mitigate any potential release from the building tanks to the subsurface environment.

In the event a release occurs, the Shallow Aquifer would be the hydrogeologic unit impacted. Excavation for the foundations of the deep structures associated with the construction of Units 3 & 4 is planned to depths of about 100 feet below existing site grade, within the Shallow Aquifer. The Shallow Aquifer extends to depths ranging from about 120 feet to 150 feet, where the top of the Deep Aquifer confining layer is encountered (ER Figures 2.3.1-26 and 2.3.1-35). The Shallow Aquifer is in direct contact with the excavation backfill material surrounding the building structures, including the radwaste building - the postulated release point of contaminants to groundwater. The Deep Aquifer is separated from the Shallow Aquifer by a regional confining layer comprised of an approximately 100- to 150-foot thick sequence of clay and silt layers that would impede movement of contaminants between the aquifers.

A postulated release of liquids from the radwaste building to the backfill would impact the Shallow Aquifer. A downward hydraulic head and hydraulic connectivity between the upper and lower zones of the Shallow Aquifer would result in vertical migration downward through the backfill to the Lower Shallow Aquifer. The Lower Shallow Aquifer has an east to southeast flow direction. Likely discharge points would be a well located east of the site boundary, approximately 9,000 ft from STP Units 3 & 4, or the Colorado River alluvium where the river channel has incised into the Lower Shallow Aquifer, approximately 17,800 ft from STP Units 3 & 4 (FSAR 2.4S.13). In preparing FSAR Sections 2.4S.12 and 2.4S.13, the Deep Aquifer was ruled out as a likely pathway for an offsite release for the following reasons:

- A release of contaminants would be in an aqueous form from the radwaste building to the excavation backfill. The aqueous contaminants would follow the path of least resistance, which are the permeable sand layers within the Shallow Aquifer that are in communication with the backfill.
- The Deep Aquifer is separated from the Shallow Aquifer by a regional aquitard that consists of a 100- to 150-foot thick sequence of clay and silt layers. Laboratory tests of similar, shallower clay materials at the site have hydraulic conductivity values between 10^{-6} to 10^{-8} cm/sec (Table 2.3.1-18).
- An aquifer pumping test conducted on January 27, 1975 at STP Deep Aquifer production well No. 5 had a reported pumping rate of 600 gpm for three days of testing and showed no hydraulic response at a Shallow Aquifer observation well located approximately 75 feet from the pumping well; however, significant responses were recorded in Deep Aquifer piezometers located at distances of 75 to 462 feet from the test well (Woodward-Clyde Consultants, 1975). Based on the results of this pumping test, it is concluded that there is no significant groundwater movement from the Shallow to the Deep Aquifer, and consequently it is unlikely that contamination would infiltrate into the Deep Aquifer from surface activities at STP.

The above reasons indicate that the downward migration of contaminants from the Shallow Aquifer to the Deep Aquifer is not a credible scenario.

In ER Subsection 2.3.1.2.5, the potential for contaminants to migrate to the Deep Aquifer is discussed. In the unlikely event contamination reaches the Deep Aquifer, the pumping effects of the site production wells and the creation of overlapping cones of depressions result in an effective capture zone that would intercept contaminant infiltration into the Deep Aquifer. Should these wells cease to operate, the water levels in the Deep Aquifer are expected to rebound to static conditions, and this capture could be compromised.

Because the production wells have been in operation for many years, the true static groundwater flow direction of the Deep Aquifer at the site is not definitively known. One plausible natural gradient may be southeasterly across the STP site towards the Gulf coast as discussed in ER Subsection 2.3.1.2.3.4 and illustrated by ER Figure 2.3.1-22. Figures 2.3.1-21 and 2.3.1-22 also indicate that STP is on a localized hydrogeologic high, with groundwater flow in the Deep Aquifer at the north portion of the site flowing to the west toward Tres Palacios Bay and Creek, an apparent regional hydrogeologic sink. Earlier STP Units 1 & 2 site studies by Woodward-

Clyde (1975) documented a northwest gradient of 4.5 feet per mile in the Deep Aquifer during pre-test static water level monitoring conducted in early January 1975.

ER Table 2.3.1-14, which summarizes hydraulic testing in wells with screen tops deeper than 250 feet, indicates hydraulic conductivities that range from 212 to 717 gpd/ft^2 (most range between 350 and 525 gpd/ft^2). These values represent Deep Aquifer hydrogeologic parameters, and are similar to those reported for the Lower Shallow Aquifer (Table 2.3.1-23). As a result, comparable travel times to the Lower Shallow Aquifer were assumed for the Deep Aquifer. Should contaminants above applicable limits reach the Deep Aquifer, a site groundwater remediation system using the site production wells or installation of new wells would be implemented prior to offsite migration.

CANDIDATE COLA REVISION:

Changes to Subsection 2.3.1.2.5.1 of the ER text will be made based upon this response. The last paragraph of the subsection will be modified as follows:

> The Deep Aquifer is the least likely hydrogeologic unit to be impacted by an accidental liquid effluent release. A release of contaminants would follow the path of least resistance, which is the permeable sand layers within the Shallow Aquifer. The Deep Aquifer is separated from the Shallow Aquifer by a 100 to 150 ft thick clay and silt layer with low permeability. In the event that contaminants reach the Deep Aquifer, the potentiometric ~~Potentiometric~~ surface maps for the Deep Aquifer indicate that groundwater flow beneath the site is moving toward the site production wells, thus precluding the potential for offsite migration. ~~in the unlikely event that effluent passes through the clay layer.~~ These factors suggest that there is no credible offsite release pathway for the Deep Aquifer.

REFERENCE:

Woodward-Clyde Consultants, July 9, 1975, *Deep Aquifer Ground-Water Evaluation and Pump Test Results – South Texas Project, for Brown & Root, Inc., Houston, Texas*; Woodward-Clyde Consultants, Consulting Engineers and Geologists, Oakland California, 24 p.

Question 02.03-14

QUESTION:

Provide a description of the STP groundwater monitoring program.

Full Text (Supporting Information):

The ER states in Subsection 2.3.1.2.6 (2nd paragraph) "As part of detailed engineering for STP 3 & 4, the current STP groundwater monitoring programs will be evaluated with respect to the addition of STP 3 & 4 to determine if any modification to the existing program is required to adequately monitor plant effects on the groundwater."

Provide a description of the anticipated STP groundwater monitoring program changes that may be considered and rationale that would be used to make the determination to incorporate Units 3 and 4 effects. If a finalized plan is not available, then provide statements of the purpose and objective, as well as, an explanation of how they will be met.

RESPONSE:

The final groundwater monitoring program will address groundwater quality and groundwater levels beneath the STP plant area (Units 1 through 4). This program is addressed in Section 6 of the ER, and includes monitoring for specific groundwater quality parameters, water levels, the wells in the network, and a monitoring schedule.

Although addressed briefly in Subsection 2.3.1.2.6 of the Environmental Report (ER), Subsection 2.4S.12.4 of the FSAR provides the following information on the groundwater monitoring program for Units 3 & 4. The FSAR Subsection is presented below.

> "Groundwater level monitoring in the STP 3 & 4 area is currently being implemented through the use of the groundwater observation wells installed in 2006 for the site subsurface investigation and through the periodic review of water levels from selected wells in the vicinity of the site.
>
> Some of the existing STP 3 & 4 area observation wells will be taken out of service prior to construction activities due to anticipated earth moving and construction requirements. Prior to construction activities, the observation well monitoring network will be evaluated in the detailed design to determine groundwater data gaps and needs created by the abandonment of existing wells.
>
> As part of the detailed design for STP 3 & 4, the current STP groundwater monitoring programs will be evaluated with respect to the addition of STP 3 & 4 to determine if any modification of the existing programs is required to

adequately monitor plant effects on the groundwater. Considerations to revise the site groundwater monitoring program will include the following components:

- Deep Aquifer - Periodic water level measurements in deep observation wells and geochemical sampling and analysis of production wells would detect changes in the Deep Aquifer that may impact groundwater supply availability or the accident release analysis.

- Shallow Aquifer - Periodic water level measurements in the Upper and Lower zone observation wells and collection of geochemical samples and analysis will be performed in selected observation wells. The water level monitoring program objective is to detect changes in flow patterns in the Shallow Aquifer that might impact accident analysis and would track temporal trends in groundwater levels that might impact structural stability. The geochemical monitoring would detect changes in groundwater geochemistry that would be deleterious to plant structures and subsurface components.

- Subsidence Monitoring - The current plant subsidence monitoring program will be expanded to include STP 3 & 4.

- Operational Accident Monitoring - In the unlikely event of an operational accident, site observation wells in the Shallow and Deep Aquifers and onsite groundwater production wells in the Deep Aquifer would be sampled for radionuclides associated with the plant. Additional monitoring locations may be added if onsite monitoring indicates the potential for offsite exposure.

Groundwater level measurements in the Deep and Shallow Aquifers would be collected starting during construction and after plant startup. Selection of observation wells to be included in the program will be made prior to the start of operation based on well condition, position relative to plant site and other observation wells (provide optimal spatial distribution for potentiometric map preparation and vertical hydraulic gradient assessment), and long-term viability of the observation well (likelihood well will survive construction).

Geochemical sampling and analysis in the Deep and Shallow Aquifers would be performed during construction and after startup. Analysis will include field parameters (pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen), major cations, major anions, total dissolved solids, and silica. Sampling would be performed in site production wells, any new production wells installed to support STP 3 & 4 operation, and selected observation wells in the Shallow Aquifer. Observation wells would be selected during detailed design.

Additional near-surface subsidence monuments would be installed around STP 3 & 4 structures. The onsite subsidence monitoring frequency would increase during construction and after startup.

Operational accident monitoring would be triggered in the unlikely event of a release of liquid effluent from the plant. Quarterly groundwater samples would be collected from site production wells and downgradient Shallow Aquifer observation wells. Selection of downgradient observation wells would be based on flow directions determined from the most recent groundwater level measurements. Safeguards will be used to minimize the potential of adverse impacts to the groundwater by construction and operation of the new units. These safeguards would include the use of lined containment structures around storage tanks (where appropriate), hazardous materials storage areas, emergency cleanup procedures to capture and remove surface contaminants, and other measures deemed necessary to prevent or minimize adverse impacts to the groundwater beneath the STP 3 & 4 site."

The frequency of water level measurements would correspond to site activities. Construction dewatering may require frequent readings (quarterly or less) while plant start up could range from monthly to quarterly measurements, and early plant operation progressing from quarterly, semi-annual to annual readings. Long term plant operation water level measurements would be determined based a review of trends in groundwater levels. Hydrologic chemical sampling is discussed in Section 6 of the ER.

CANDIDATE COLA REVISION:

ER Subsection 2.3.1.2.6 is affected by this RAI response. The final sentence of the second paragraph will be edited as shown in highlight below.

As part of the detailed engineering for STP 3 & 4, the ~~current STP~~ groundwater monitoring programs described in Section 6 and Subsection 2.4S.12.4 of the FSAR will be evaluated ~~with respect to the addition of STP 3 & 4~~ to determine if ~~any~~ modification of the existing programs is required to adequately monitor plant effects on the groundwater.

Question 02.04.02-04

QUESTION:

Describe the saltwater wedge at the RMPF (~NMM 8 on the Colorado River).

Full Text (Supporting Information):

The discussion in Section 2.4.2 is based on sampling efforts in the Colorado River prior to the diversion channel's construction in 1993 opening access to East Matagorda Bay. Describe the current conditions affecting the saltwater wedge at the RMPF. Include channel characteristics (cross–sectional area), seasonal variations and influence of pumping at the RMPF in relation to saltwater moving up the Colorado River.

RESPONSE:

As discussed in the response to RAI 2.3-5, historical data from the Lower Colorado River Authority monitoring station at Selkirk Island on the Lower Colorado River for the period from October 1982 through December 1992 was used to evaluate pre-diversion conditions conducive to salt water intrusion (a true "saltwater wedge," with fresh water overlying sea water never occurs) in the vicinity of STP. The Selkirk Island monitoring location was chosen because it is the closest permanent monitoring location to the STP site. Salinity data was not collected by the LCRA. Total dissolved solids and chlorides were either not collected or not collected at varying depths or with enough frequency for use in the data evaluation. Therefore, historical specific conductivity readings were used as indicators of subsurface salt water intrusion.

The pre-1993 LCRA data indicated that a base flow of 1,000 cubic feet per second (cfs) or less in the lower Colorado River was associated with subsurface salt water intrusion in the vicinity of Selkirk Island, and thus the STP site. However, there were anomalies and inconsistencies in the LCRA data. There were occasions when higher flows were associated with sub-surface salt water intrusion and, conversely, occasions when lower flows were not associated with salt water intrusion. These inconsistencies could be due to differences in tidal amplitude, wind speed/wind direction, low salinity conditions in the upper reaches of Matagorda Bay, or some other unknown factor.

With regard to seasonal variation, data collected prior to 1993 showed no clear-cut trends. Salt water intrusion appeared to be as prevalent in summer as winter, notwithstanding historical trends in precipitation and river flows.

To update information on salt water intrusion, STPNOC commissioned a one-year (2007-2008) study of fish populations in the lower Colorado River that included measurements of salinity in reaches of the river up- and downstream of the STP site. These salinity measurements and associated river flows are included in the response to RAI 2.3-5. A comparison of measured

salinities to flows suggests that subsurface saltwater intrusion occurs adjacent to the site when river flows are below 1,000 to 1,200 cfs. The findings of the 2007-2008 study with regard a threshold flow (above which saltwater intrusion does not occur) suggest that construction of the diversion channel in 1993 has had little or no effect on the degree and frequency of salt water intrusion.

Although it would be unwise to draw any inferences about seasonal variation based on 12 months of data, there were seasonal differences in salt water intrusion over the 2007-2008 period. There was little or no evidence of salt water intrusion in the summer of 2007, a period of unusually high rainfall in the region. Bottom salinities ranged from 17 to 19 parts per thousand from late October 2007 until mid-December 2007. Bottom salinities were generally low from January 2008 through April 2008. Bottom salinity in May 2008 was approximately 19 parts per thousand.

STP currently operates the RMPF to obtain surface water of sufficient quality (less than 2100 µS/cm) when the river flow has been 1200 cfs. or greater for 2 to 3 days to purge brackish water from the intake area. The STP water permit restricts pumping to 55% of the flow over the 300 cfs min through flow requirements.

A study of the freshwater inflow to Matagorda Bay and the potential impact on the salinity of Colorado River Segment 1401 is currently being performed by the LCRA. The results of the study should be available in approximately October 2008.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 02.04.02-05

QUESTION:

Discuss the uncertainties in evaluating the aquatic resources from past to current studies.

Full Text (Supporting Information):

The discussion in Section 2.4.2 is based on sampling efforts in the Colorado River prior to the diversion channel's construction in 1993 opening access to East Matagorda Bay. Discuss uncertainties with evaluation of aquatic communities (e.g., phytoplankton, zooplankton, ichthyoplankton) that exist currently in the Colorado River based on studies from 1974.

RESPONSE:

STPNOC commissioned studies of Colorado River aquatic communities in 2007 to update information on biota collected in the 1970s and 1980s. These studies were completed in spring 2008. A draft report was issued in early June 2008, and contains text that will be added to the Environmental Report. Doing so will require a small re-organization of the document, however.

CANDIDATE COLA REVISION:

The document is currently organized as follows:

2.4.2.1.2 Colorado River
2.4.2.1.2.1 Aquatic Communities of Colorado River

We intend to reorganize as follows, and add the following (gray-scale) text as new Section 2.4.2.1.2.2

2.4.2.1.2 Colorado River (same text as before)
2.4.2.1.2.1 Studies of Aquatic Communities in the Colorado River, 1973-1984 (same text as before)
2.4.2.1.2.2 Studies of Fish and Macroinvertebrates in the Colorado River, 2007-2008

STPNOC completed in May 2008 a one-year study of fish and invertebrates in a nine-mile reach of the lower Colorado River extending from the ICWW north to the FM 521 bridge, which is approximately 1.5 miles east of the STPEGS facility. Sampling for fish and invertebrates was conducted monthly from June 2007 to May 2008. The nine-mile-long reach of river was divided into three segments, each 3 miles in length. Segment A extended from the ICWW to NMM 3; Segment B extended from NMM 3 to NMM 6, and Segment C extended from NMM 6 to NMM 9. The STPEGS facilities included the RMPF located adjacent to NMM 8 and the blowdown structure located adjacent to NMM 6, both located in Segment C (ENSR 2008).

Fish and macroinvertebrates were collected using gill nets, hoop nets, trawls, and bag seines. Salinity, dissolved oxygen, and temperature were measured at navigational mile markers to help define where and how these influences affect the aquatic community within the river. The final report provides a summary of the data, and an evaluation of spatial and temporal patterns of species richness and diversity, relative abundance, and fish and macroinvertebrate size relationships. Similarity of species assemblages in 1974 and present were estimated; conclusions are summarized below (ENSR 2008).

Overall species richness, diversity and evenness reported in 1974 based on trawl data indicated a moderately diverse species community in the lower river. Current estimates of all three measures are higher than in 1974, suggesting increased diversity over the intervening period. Likewise, the 1983-84 trawl and seine data indicated overall lower species richness, diversity, and evenness relative to the present data (ENSR 2008).

Using Jaccard coefficients of similarity, comparison of applicable months and gears from the 2007-08 data with samples collected during 1974 resulted in a value of 0.44, suggesting reasonable similarity between these two communities. Comparison of applicable months from the 2007-08 data to the 1983-84 samples resulted in a coefficient value of 0.19, suggesting a relatively low similarity for these communities. Comparison of data from river segment C in 2008 with 1974 and 1983-84 trawl data for a similar river segment resulted in values of 0.36 and 0.37, respectively, suggesting a moderate level of similarity between historical and present communities. Comparison of data for bag seine samples from applicable months during 2007-08 with 1983-84 seine data resulted in coefficient values of only 0.07 and 0.11, suggesting low similarity between historic and present day communities in shallow waters accessible to seines. When 2007-08 bag seine data for segment C was compared to 1983-84 data from the same segment, Jaccard coefficient values increased to 0.31 and 0.33, suggesting moderate community similarity. Overall, present data indicate a more diverse faunal community than that represented by historic data in the lower Colorado River (ENSR 2008).

The number and assortment of fish and invertebrates collected during the study indicate that this portion of the lower Colorado River supports a diverse assemblage of aquatic fauna. The regular occurrence of both fresh and saltwater species, the range of macroinvertebrate and finfish fauna, and the sheer number of species captured among various sampling gears and river reaches provide evidence of a dynamic ecosystem. There was a moderate level of similarity between the current 2007-08 faunal communities and the historic communities (1974 and 1983-84) (ENSR 2008).

The lower Colorado River showed high flows from late June until early August 2007 during a period of unusually high rainfall that included more than 10 inches of rain in June and 24 inches of rain in July. The mean flow rate was 15,590 cubic feet per second (cfs) in July; the maximum flow rate was 37,900 cfs. Low flows, those at or below 1,000 cfs, were recorded during the October-December 2007 period and again during the March-May 2008 period. Comparisons of flow rates and catch rates for all gear types indicated an inverse relationship between flow rate and catch rate. Periods of high flow were associated with low catch rates, while periods of low

flows were associated with higher catch rates. Results may have been affected by flow-related changes in sampling efficiency, however.

Question 02.04.02-06

QUESTION:

In Table 2.4–2, what land area does the column, "STP Site", include?

Full Text (Supporting Information):

In Table 2.4–2, what does the column, "STP Site", encompass in area? Is it Matagorda County or the site boundary? Does it include the Colorado River?

RESPONSE:

The column in ER Table 2.4-2 entitled "STP Site" is meant to indicate those species listed in Matagorda County, including the Colorado River. Note that both banks of the lower Colorado River (last 50 miles or so, before it empties into Matagorda Bay) are in Matagorda County.

The table as currently labeled may be somewhat misleading, as it may suggest that the entire STP site has been surveyed for T&E species.

CANDIDATE COLA REVISION:

The table will be modified as follows:

Table 2.4-2 Protected Species in Texas Counties Containing the STP Site and Transmission Lines

Common Name	Scientific Name	Federal Status [1]	State Status [1]	~~STP Site~~ Matagorda County	Counties Crossed by Transmission Lines

Question 02.04.02-07

QUESTION:

Provide correspondence with U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, and U.S. Army Corps of Engineers that has occurred since September 20, 2007.

Full Text (Supporting Information):

Based on discussions at the site audit, discussions between STPNOC and Federal and state resource agencies are continuing concerning aquatic resources. Provide recent correspondence.

RESPONSE:

STPNOC has not corresponded with the U.S. Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NOAA-NMFS) since September 20, 2007. STPNOC routinely seeks advice and guidance from agency biologists, particularly from Texas Parks and Wildlife Department, but on an informal basis and at the staff level. STPNOC has generally relied on informal contacts and agency websites for information on sensitive species and habitats since January 23, 2007, when STPNOC originally wrote these agencies and provided them with results of threatened and endangered species surveys of the project area conducted in December 2006.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 02.04.02-08

QUESTION:

Discuss the different classifications of wetlands on the STP site and the acreages associated with each.

Full Text (Supporting Information):

In various sections of the ER, different acreages of wetlands are stated. For example, wetland acreage discussions on page 2.4–1 ("7600 acres of various types of wetlands…"), 2.4–7 (list of bullets in Section 2.4.2.1.1), and 4.1–4 ("…110 manmade and 3.9 non–jurisdictional wetlands…") appear to be different. Also, provide clarification on the appropriate units for each discussion (e.g., acre or acre/ft).

RESPONSE:

The associated text/tables/bullets have been modified to be more consistent among subsections, thus clarified to eliminate the differences.

All units are currently in "acres."

CANDIDATE COLA REVISION:

Subsections 2.4-1, 2.4.2, 4.1.1.1, and 4.3.2.1 will be revised as shown below.

Page 2.4-1:

Current land use at the ~~approximate 12,220-acre~~ STP site is discussed in Section 2.2 and shown in Figure 2.2-1. ~~Approximately 65 acres of the STP site consist of generating facilities, buildings, parking areas, a switchyard, and transmission line corridors associated with STP 1 & 2 (Subsection 2.2.1.1). Based on National Wetland Inventory coverage, there are approximately 7,600 acres of various types of wetlands within the STP boundary. These include 7,068 acres of lake habitat (including the Main Cooling Reservoir [MCR] and Essential Cooling Pond), 369 acres of freshwater emergent wetland, 119 acres of freshwater forested/shrub wetland, 25 acres of freshwater pond, and 10 acres of riverine wetlands. The dominant feature of the STP property is the approximately 7000-acre MCR (Reference 2.4-2), which occupies most of the lower two-thirds of the site.~~ The 12,220-acre STP site includes land developed for industrial use, farmland, undeveloped land, and natural and man-made wetlands. The existing plant and plant facilities, including the NTF, operations area, support facilities, and transmission right-of-ways occupy approximately 65 acres, while the MCR makes up an additional 7000 acres. Another approximate 1700 acres remain as natural lowland habitat. The remaining portion of the STP site is undeveloped land, some of which, located to the east of the MCR, is leased for cattle grazing.

Page 2.4-7:

Several sloughs, drainage areas, wetlands, and impoundments occur on or near the site, including:

- Little Robbins Slough, which drains into a coastal marsh north of Matagorda Bay
- Drainage areas associated with two unnamed sloughs
- Main Cooling Reservoir (approximately 7000 acres)
- Essential Cooling Pond (47 acres)
- Kelly Lake (34 acres) and the slough that feeds it

Page 4.1-4:

Approximately 114 acres ~~(110 manmade and 3.9 non-jurisdictional)~~ of ~~both~~ non-jurisdictional and man-made wetlands can be found on the STP site (Figure 2.4-3). The man-made wetlands totaling 110 acres (Reference 4.1-1) are located approximately 1800 feet north of the essential cooling pond. These wetlands would not be disturbed by construction activities. Non-jurisdictional wetland areas (a total of 12, equaling 3.9 acres) are found ~~primarily~~ on the STP site approximately 5000 feet southwest of STP 2, and approximately 500 feet northwest of the main cooling reservoir berm. One wetland (wetland No. 001), 0.165 acre in size, is located in the cooling tower footprint and will have to be filled.

Page 4.2-2:

Another STP site surface water feature associated with STP 1 & 2 operations is the ~~388~~ 47 acre Essential Cooling Pond (Reference 4.2-2).

Page 4.3-4:

- ~~MCR (7,000 acres)~~
- ~~Kelly Lake (34.4 acres) and the slough that feeds it~~
- ~~Little Robbins Slough, which drains into a coastal marsh north of Matagorda Bay~~
- ~~Drainage areas associated with two unnamed sloughs~~
- ~~West branch of the Colorado River~~

- Little Robbins Slough, which drains into a coastal marsh north of Matagorda Bay
- Drainage areas associated with two unnamed sloughs
- Main Cooling Reservoir (7000 acres)
- Essential Cooling Pond (47 acres)
- Kelly Lake (34 acres) and the slough that feeds it

Numerous drainage ditches are also likely to be disturbed by construction activities.

Question 02.04.02-09

QUESTION:

What requirements are there for Segment 1401 of the Colorado River associated with listing of the region as "impaired waters due to the presence of bacteria"?

Full Text (Supporting Information):

Discuss the relationship between the state's designation of the water quality for Segment 1401 of the Colorado River in the vicinity of the plant and the aquatic resources found during recent monitoring efforts.

RESPONSE:

As noted in subsection 2.4.2.5 of the Environmental Report:

> "The TCEQ is required, under Section 303(d) of the Clean Water Act, to identify waterbodies for which effluent limitations are not stringent enough to satisfy water quality standards (Reference 2.4-62). Every two years, in even-numbered years, TCEQ publishes a "Texas Water Quality Inventory and 303(d) List" that identifies streams and impoundments that are impaired for one or more pollutants and therefore do not meet one or more water quality standards. Segment 1401 of the Colorado River (Tidal), to which the MCR occasionally discharges, did not appear on the 2004 list of impaired waters. Segment 1401 does appear on the 2006 list, however, as not meeting the state water quality standard for bacteria (Reference 2.4-62). The bacterium *Enterococcus*, which is found in the intestinal tracts of humans and farm animals, was present in unacceptably high concentrations. TCEQ reported that a "non-point source – Agriculture" was the source of the impairment."

The ER was submitted to the NRC in January 2008. On March 19, 2008, the Texas Commission on Environmental Quality (TCEQ) published the (draft) 2008 303(d) list. Segment 1401 again appeared on the (draft) 2008 303(d) list as not meeting the state standard for bacteria (*Enterococcus*).

Notwithstanding the fact that Segment 1401 (Colorado River Tidal) has, since 2006, been identified by TCEQ as impaired with respect to bacteria levels, it remains classified by TCEQ as suitable for Contact Recreation and has been given the "High" aquatic use designation. Waters in this category are expected to support "highly diverse" aquatic habitats, high species diversity and species richness, and at least some sensitive species. Surveys of fish and macroinvertebrates carried out in 2007-2008 showed generally higher measures of species richness and diversity than were observed during pre-operational surveys in the early 1970s and during operational studies in the 1980s. No state or federally listed species were collected during the 2007-2008 study. Unacceptably high levels of bacteria in Segment 1401 of the Colorado River (adjacent to

the STP site), which are clearly unrelated to STP operations, appear to have had no effect on fish populations in the lower Colorado River.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 02.04.02-10

QUESTION:

Provide information on the application for the Coastal Consistency Determination for Units 3 & 4.

Full Text (Supporting Information):

In a letter from Greg Gibson to NRC on February 28, 2008 concerning Responses to Environmental Report Site Audit Comments (Docket #: 52–012 and 52–013), it was stated that STPNOC was working with the Texas General Land Office (GLO) to be in compliance with the Texas Coastal Management Program. Provide correspondence and consistency determination documentation with GLO concerning natural resources.

RESPONSE:

STPNOC (Greg Gibson) wrote Mr. Benjamin Rhame (Secretary of the Texas Coastal Coordination Council, which has responsibility for overseeing the Texas Coastal Management Program) on April 22, 2008 to certify that the proposed activity, construction and operation of STP Units 3 and 4, complies with the state of Texas's approved Coastal Management Program (CMP) and will be conducted in a manner consistent with that program. Included with the letter were a (1) copy of the combined operating license application (COLA) submitted to the NRC, (2) a detailed description of the proposed activity, (3) a list of all federal, state, and local permits or authorizations subject to the TCMP and required by the proposed activity, (4) an assessment of potential impacts of the proposed activity on Coastal Natural Resource Areas, (5) an evaluation of the project demonstrating that its effects are consistent with the goals of the CMP, and (6) an evaluation of the project demonstrating that its effects are consistent with the policies of the CMP.

On June 9, 2008, the Coastal Coordination Council (Tammy S. Brooks, Consistency Review Coordinator) responded with a letter stating that the project had been reviewed, no unavoidable adverse impacts had been found, and the project is therefore consistent with the goals and policies of the Coastal Management Program.

CANDIDATE COLA REVISIONS:

Section 1.2.1, page 1.2-2 should be revised as follows:

- "The Federal Coastal Zone Management Act of 1972" (16USC1451-1456) - "The Federal Coastal Zone Management Act" imposes requirements on applicants for a federal license to conduct an activity that could affect a state's coastal zone. The Act requires the applicant to certify to the licensing agency that the proposed

activity would be consistent with the state's federally approved coastal zone management program. STPNOC will certify to the NRC that the proposed project is consistent with Texas' federally approved Coastal Zone Management Plan. The Texas Coastal Coordination Council, which oversees the Texas Coastal Management Program (CMP), has determined that the project is consistent with the goals and policies of the CMP.

Table 1.2-1 (item 1.4) should be revised as follows:

1.4	**NOAA, Texas Coastal Coordination Council (CCC)**	Coastal Zone Management Act, Texas Coastal Management Plan implemented through CCC	Consistency review	NRC license, any individual Section 404 permit and associated Section 401 certification.	~~To be submitted after COL application.~~ Complete

Section 2.2.1.1, next-to-last-paragraph, should be revised as follows:

The STP property is located almost entirely within the Texas Coastal Management Program Coastal Management Zone (Figure 2.2-1). NOAA approved the Texas Coastal Management Program in 1996 to promote the development of uniform goals and policies to guide decision-making by all entities regulating or managing natural resource use within the Texas coastal area (Reference 2.2-3 and 2.2-4). The Coastal Zone Management Act Federal consistency certification ~~will be submitted during the licensing process~~ was submitted to the Texas Coastal Coordination Council in April 2008. The Coastal Coordination Council subsequently reviewed the project, found that there were no unavoidable adverse impacts, and made the determination that the project was consistent with the goals and policies of the Texas Coastal Management Program.

Question 02.05-01

QUESTION:

Provide an electronic copy of the Socioeconomics "Validation Package".

Full Text (Supporting Information):

It is the staff's understanding that every statement of fact in the socioeconomics section in the ER has been traced back to a source in a document described as the "Validation Package," and that this document is contained in electronic format on a single CD.

RESPONSE:

Validation packages are available on-site for NRC review.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 02.05-03

QUESTION:

Provide an estimate of transient population employment in the fishing industry.

Full Text (Supporting Information):

Based on local interviews, the staff has learned that there may be significant numbers of non–resident individuals in the area, especially near Palacios. Provide an estimate of the number of migrant seasonal workers in the 50 mile area around the proposed site and specifically in the Palacios area. Identify which industries employ these workers and discuss how this population affects the overall transient population discussion.

RESPONSE:

Seasonal agricultural workers make up a portion of the transient population in the 50-mile radius. The U.S. Department of Agriculture does not keep counts of migrant workers, but does report the number of farms employing migrant labor, by county. Farms in the following Texas counties that fall wholly or partially within the 50-mile radius employed migrant labor in 2002: Brazoria (20 farms), Calhoun (2), Colorado (29), Fort Bend (3), Jackson (1), Lavaca (11), Matagorda (72), and Wharton (40) (USDA 2004).

Local officials were also interviewed regarding migrant populations in the area. The Director of the Matagorda Health Department stated that there may be some migrant workers on area farms, but he did not believe that there was a large population.

Contacts with local officials and industry leaders revealed that the Vietnamese workers in the fishing and shrimping industry are residents of the area. This statement is reinforced by the fact that the block group surrounding Palacios (ER Figure 2.5.4-18) is 29.1% Asian. In the past, there was a large population of Hispanic workers that would obtain temporary green cards to work in the fishing industry surrounding Palacios seasonally. However, recent changes in immigration have decreased this seasonal worker population significantly, and the seafood industry no longer employs a large migrant population.

In summary, while the fishing industry does employ a large number of minorities (approximately 40-45% are Hispanic and approximately 40-45% are Vietnamese), these individuals are residents, and there is not known to be a large migrant population in the Palacios area.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

REFERENCE:

USDA (U.S. Department of Agriculture) 2004. Texas State and County Data, 2002 Census of Agriculture, Volume 1, Geographic Area Series, Part 43A, AC-02-A-43A, National Agricultural Statistics Service. June.

Question 02.05-08

QUESTION:

Provide a discussion of distinctive (e.g., minority, ethnic, religious) communities that exist in the area of the STP plant.

Full Text (Supporting Information):

The ER does not mention any distinctive communities. However, staff interviews identified at least a Vietnamese community in Palacios and the possibility of Hispanic communities. Provide a discussion of distinctive (e.g., minority, ethnic, religious) communities that exist in the area of the STP plant.

RESPONSE:

Various community agencies and individuals within minority communities were contacted to gain information about distinctive communities in the area. The only distinctive community identified through interviews was the Vietnamese community surrounding Palacios. A Vietnamese community leader that was contacted stated that approximately 50 percent of the Vietnamese population in Matagorda County make their living shrimping, but that the catch is mostly sold for profit (rather than for personal use). Approximately 40 percent of the population is employed on the docks in other trades (e.g., welders). The contact also stated that a lot of the people within the Vietnamese community have small gardens, but did not think they depended on these gardens for the majority of their food needs.

Some Hispanic populations are located in Matagorda County, within the cities of Bay City and Palacios. All other Hispanic block groups are located approximately 25 miles or more from STP (ER Figure 2.5-20). Matagorda County's Hispanic population is approximately the same as the State of Texas' (31.3% compared with 32.0%). One Hispanic community leader was interviewed and stated that he was not aware of subsistence living activities in the area.

While other minority categories were identified within the 50-mile radius (black and other), no other "distinctive" communities were identified.

CANDIDATE COLA REVISION:

Subsection 2.5.4.4 Potential for Disproportionate Impacts, should be inserted into Section 2.5.4. The following text should be inserted. [Note – This text is used for the responses to RAIs 2.5-8, 2.5-9, and 4.4-19]

2.5.4.4 Potential for Disproportionate Impacts

In September 2007, STPNOC contacted local government officials, the staff of social welfare agencies, and members of minority communities concerning unusual resource dependencies or practices that could result in potentially disproportionate impacts to minority and low-income populations making them uniquely vulnerable to impacts from proposed STP construction and operations activities. Many agencies had no information concerning activities and health issues of minority populations. Successful interviews were conducted with the Matagorda County Hospital District, the Matagorda County Health Department, the Matagorda County Extension Service, the United Way of Matagorda County, the Texas Parks and Wildlife Department, the Salvation Army Food Pantry, and the United Way of Brazoria County. In addition, the pastor of a predominantly Hispanic church and a Vietnamese community leader were interviewed to gain insight into these minority communities.

No agency reported dependencies or practices, as subsistence agriculture, hunting, or fishing, through which the populations could be disproportionately adversely affected by the construction project. No unique customs or practices, pre-existing health issues, or other vulnerabilities were identified through interviews.

The only distinctive community identified in the area includes a large Vietnamese population surrounding the city of Palacios. According to a local Vietnamese community leader, approximately 50 percent of the Vietnamese population in Matagorda County make their living shrimping, but the catch is mostly sold for profit (rather than for personal use). Approximately 40 percent of the population is employed on the docks in other trades (e.g., welders). The contact also stated that a lot of the people within the Vietnamese community have small gardens, but did not think they depended on these gardens for the majority of their food needs.

Health statistics issued by the Texas Department of State Health Services (TDSHS) were reviewed to determine if pre-existing health conditions may make local minority or low-income populations more susceptible to negative impacts from construction and operation of new units at the STP site. Overall, the Matagorda County health statistics indicated that the county population is in better health than Texas as a whole. The percentage of infants born with low birth weights was lower and fertility rates were higher than Texas rates. A greater percentage of deaths from cardiovascular disease and cancer were recorded in 2004 for Matagorda County, but the county also contains a higher percentage of elderly individuals than the State of Texas. There was a smaller percentage of deaths from all other causes in Matagorda County (TDSHS 2007). The percentage of cases of communicable diseases was lower in Matagorda County than Texas, with the exception of Hepatitis A (TDSHS 2007), possibly due to increased consumption of raw seafood in the area.

While health statistics by race or income are not available for Matagorda County, overall county statistics indicate that there are no pre-existing health conditions in the area that would cause disproportionately high and adverse impacts to minority or low-income populations in the vicinity of the STP site.

Question 02.05-09

QUESTION:

Discuss contacts made with minority and low–income populations and state whether they identified any environmental concerns about STP Units 3 & 4.

Full Text (Supporting Information):

Provide documentation of any outreach to minority and low–income populations attempted regarding the proposed site, including any organizations contacted. Summarize comments of any organizations contacted by the applicant that locate and assess uniquely vulnerable minority and low–income communities located on or near the proposed station site. Describe unique customs or practices and health or other vulnerabilities that were described in those contacts. If none were described, so state.

RESPONSE:

In September 2007, STPNOC contacted local government officials, the staff of social welfare agencies, and members of minority communities concerning unusual resource dependencies or practices that could result in potentially disproportionate impacts to minority and low-income populations making them uniquely vulnerable to impacts from proposed STP construction and operations activities. Many agencies had no information concerning activities and health issues of minority populations. Successful interviews were conducted with the Matagorda County Hospital District, the Matagorda County Health Department, the Matagorda County Extension Service, the United Way of Matagorda County, the Texas Parks and Wildlife Department, the Salvation Army Food Pantry, and the United Way of Brazoria County. In addition, the pastor of a predominantly Hispanic church and a Vietnamese community leader were interviewed to gain insight into these minority communities.

No agency reported dependencies or practices, such as subsistence agriculture, hunting, or fishing, through which the populations could be disproportionately adversely affected by the construction project. A representative from the Matagorda County Health Department reported that people in the area do garden for recreational reasons or may sell fresh produce or oysters roadside to subsidize their income. A significant amount of recreational fishing takes place in the area as well. The representative also stated that there is not a large population of migrant workers that move through the area.

The pastor of a predominantly Hispanic church was interviewed and agreed with previous statements concerning subsistence living. The pastor stated that many people have gardens, but do not depend on these gardens for the majority of their food needs.

A leader within the Vietnamese community stated that approximately 50 percent of the Vietnamese population in Matagorda County make their living shrimping, but that the catch is mostly sold for profit (rather than for personal use). Another 40 percent of the Vietnamese population is employed on the docks in other trades (e.g., welders). He also stated that many in the community have small gardens, but did not think that people depended on these gardens for the majority of their food needs. I asked how the expansion of STP was viewed by the Vietnamese community, and the interviewee responded that he had heard no negative comments regarding plant expansion, and that the expansion is viewed in a positive light because it will create jobs in the area. Many in the Vietnamese community plan on searching for jobs at STP if and when construction commences.

In summary, no unique customs or practices, pre-existing health issues, or other vulnerabilities were identified through interviews.

Candidate COLA Revision:

Subsection 2.5.4.4 Potential for Disproportionate Impacts, should be inserted into Section 2.5.4. The following text should be inserted. [Note – This text is used for the responses to RAIs 2.5-8, 2.5-9, and 4.4-19]

2.5.4.4 Potential for Disproportionate Impacts

In September 2007, STPNOC contacted local government officials, the staff of social welfare agencies, and members of minority communities concerning unusual resource dependencies or practices that could result in potentially disproportionate impacts to minority and low-income populations making them uniquely vulnerable to impacts from proposed STP construction and operations activities. Many agencies had no information concerning activities and health issues of minority populations. Successful interviews were conducted with the Matagorda County Hospital District, the Matagorda County Health Department, the Matagorda County Extension Service, the United Way of Matagorda County, the Texas Parks and Wildlife Department, the Salvation Army Food Pantry, and the United Way of Brazoria County. In addition, the pastor of a predominantly Hispanic church and a Vietnamese community leader were interviewed to gain insight into these minority communities.

No agency reported dependencies or practices, as subsistence agriculture, hunting, or fishing, through which the populations could be disproportionately adversely affected by the construction project. No unique customs or practices, pre-existing health issues, or other vulnerabilities were identified through interviews.

The only distinctive community identified in the area includes a large Vietnamese population surrounding the city of Palacios. According to a local Vietnamese community leader, approximately 50 percent of the Vietnamese population in Matagorda County make their living shrimping, but the catch is mostly sold for profit (rather than for personal use). Approximately 40 percent of the population is employed on the docks in other trades (e.g., welders). The contact also stated that a lot of the people within the Vietnamese community have small gardens, but did not think they depended on these gardens for the majority of their food needs.

Health statistics issued by the Texas Department of State Health Services (TDSHS) were reviewed to determine if pre-existing health conditions may make local minority or low-income populations more susceptible to negative impacts from construction and operation of new units at the STP site. Overall, the Matagorda County health statistics indicated that the county population is in better health than Texas as a whole. The percentage of infants born with low birth weights was lower and fertility rates were higher than Texas rates. A greater percentage of deaths from cardiovascular disease and cancer were recorded in 2004 for Matagorda County, but the county also contains a higher percentage of elderly individuals than the State of Texas. There was a smaller percentage of deaths from all other causes in Matagorda County (TDSHS 2007). The percentage of cases of communicable diseases was lower in Matagorda County than Texas, with the exception of Hepatitis A (TDSHS 2007), possibly due to increased consumption of raw seafood in the area.

While health statistics by race or income are not available for Matagorda County, overall county statistics indicate that there are no pre-existing health conditions in the area that would cause disproportionately high and adverse impacts to minority or low-income populations in the vicinity of the STP site.

Question 02.05-10

QUESTION:

What is the projected use of outdoor recreational facilities near STP?

Full Text (Supporting Information):

Are there any universities that conduct studies of parks along the Colorado river? Has the state or any of the universities done surveys or other studies? Are there any fishing tournaments or other competitions on the Colorado River that could be affected by the proposed plant? Are there any professional outriggers such as kayak tours on the river?

RESPONSE:

According to the National Recreation and Park Association (NRPA), there are six universities with an interest in recreation and leisure services in the state of Texas. These universities are Texas Tech University, Texas A&M University, Texas State University (TSU), Baylor University, Stephen F. Austin State University, and University of North Texas. Of those six universities, three are accredited by the NRPA: Texas A&M University, Southwest Texas State University, and University of North Texas (NRPA May 2008). After consultation with these universities, none indicated that a recreational study has been performed on the Colorado River; however, Texas State University has performed a study for the River Systems Institute of TSU and the National Wildlife Federation to measure the local economic impacts associated with current activities (recreational fishing, hunting and wildlife observation), amenities, and ecological systems dependent on freshwater inflows in the major bays and estuaries of the Texas Gulf Coast, but this study did not include part of the Colorado River (TSU May 2008). In 1998, TPWD commissioned a study analyzing recreational needs, called the Texas Outdoors: A Vision for the Future. In this report, TPWD acknowledges that recreation demands will increase and that there is a lack of basic information about users and nonusers of parks (TPWD 1998). In February 2000, Texas Parks and Wildlife contracted with Texas Tech University to produce a study of conservation and outdoor recreation issues in Texas that would establish the foundation for the Department's future planning efforts. One of the conclusions reached from the aforementioned study is that there is a need to provide more local and state parks (TPWD 2001).

A Programmatic Environmental Impact Statement (PEIS) performed by the U.S. Army Corps of Engineers (USACE) and the Lower Colorado River Authority (LCRA) in 2005 assessed potential direct and cumulative impacts resulting from the implementation of the potential USACE and other entities' projects on the human and natural environment. The PEIS found that recreational activities important to the rural counties include hunting, fishing, and wildlife viewing opportunities marketed by private landowners. White-tailed deer, exotic game, migratory game birds, upland game birds, migratory waterfowl, and small game are regularly hunted in the region and provide seasonal recreation opportunities to leaseholders as well as an

important source of income to landowners. The open waters of Matagorda Bay and their associated barrier islands, marshes and coastal prairies also provide opportunities for recreation including camping, hiking, bicycling, surfing, swimming, beach combing, bird watching, nature study, fishing, a passenger ferry, on-island shuttle, and scheduled tours. Public use data was collected for three public beaches in Matagorda County during the 2002 National Health Protection Survey of Beaches (EPA 2003). Palacios Beach is a one-mile beach open to Tres Palacios Bay and has less than 100 visitors a day with less than 10% of visitors entering the water. Two beaches, Matagorda and Sargent, open to the Gulf of Mexico. Matagorda Beach is 10 miles long, and generally receives less than 100 visitors per day except during peak season weekdays and off season holidays and during peak season holidays. Sargent Beach is five miles long, and generally receives less than 100 visitors per day except during peak holidays and peak season weekends (LCRA 2005).

The Texas Redfish Tournament Series is an annual series of five one-day tournaments along the Texas coast, each located at a different venue, one of which is the Port of Bay City (TRTS May 2008). According to the point of contact for the tournament, the Colorado River has been used during this tournament, though any water body is within the rules. Since any water body can be used while competing in this tournament, it is unlikely that the fishing tournament will be affected by construction and operation of STP 3 & 4.There are not any other fishing tournaments that specifically use the Colorado River.

Two local outriggers provide guided tours along the Colorado River, the Freebird Kayak and Canoe Adventures and Day on the Bay Services (Arnold 2008). Also, at the Matagorda County Birding and Nature Center and Matagorda Bay Nature Park, kayaks and canoes can directly access the Colorado River for usage.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

REFERENCES:

Arnold 2008. Re. Outriggers on the Colorado River. Phone conversation with R. Henderson (TtNUS). Day on the Bay Services, Matagorda, TX, May 28.

BU 2008. Re. Recreational Study on the Colorado River. Phone conversation with R. Henderson (TtNUS). Baylor University, Waco, TX, May 28.

LCRA 2005. Lower Colorado River Authority, Programmatic Environmental Impact Statement. Available online at http://www.lcra.org/parks/developed_parks/matagorda.html, accessed June 6, 2008.

LCRA 2008. Lower Colorado River Authority, Matagorda Bay Nature Park. Available online at http://www.lcra.org/parks/developed_parks/matagorda.html, accessed May 28.

MCBNC 2008. Matagorda County Birding & Nature center, available online at http://www.mcbnc.org/index.html, accessed May 28.

NRPA May 2008. National Recreation and Park Association, Colleges and Programs with a Program or Interest in Recreation, Parks, and Leisure Services. Available online at http://www.nrpa.org/content/default.aspx?documentId=1190, accessed May 27, 2008.

SAC 2008. Re. Recreational Study on the Colorado River. Phone conversation with R. Henderson (TtNUS). San Antonio College, San Antonio, TX, May 28.

SFAU 2008. Re. Recreational Study on the Colorado River. Phone conversation with R. Henderson (TtNUS). Stephen F. Austin University, Nacogdoches, TX, May 28.

Simmons 2008. Re. Fishing Tournaments on the Colorado River. Phone conversation with R. Henderson (TtNUS). Texas Redfish Tournament, TX, May 28.

TAMU 2008. Re. Recreational Study on the Colorado River. Phone conversation with R. Henderson (TtNUS). Texas A&M University, College Station, TX, May 28.

TPWD 1998. Texas Outdoors: A vision for the Future: A report for the Texas parks and Wildlife Department. Available online at http://www.tpwd.state.tx.us/publications/nonpwdpubs/media/tx_outdoors_vision_for_future.pdf, accessed May 28, 2008.

TPWD 2001. Texas Parks and Wildlife Department. *Texas Parks and Wildlife for the 21st Century*, available online at http://www.tpwd.state.tx.us/publications/nonpwdpubs/media/tpwd_21st_century.pdf, accessed April 17, 2008.

TRTS May 2008. Texas Redfish Tournament Series. Available online at www.sportfishermen.com/tournaments/info/5049/, accessed May 27, 2008.

TSU May 2008. Coast and freshwater Inflows: River Systems Institute: Texas State University. Available online at http://www.rivers.txstate.edu/projects/coast.html, accessed May 28, 2008.

TSU 2008. Re. Recreational Study on the Colorado River. Phone conversation with R. Henderson (TtNUS). Texas State University, Austin, TX, May 28.

TTU 2008. Re. Recreational Study on the Colorado River. Phone conversation with R. Henderson (TtNUS). Texas Tech University, Lubbock, TX, May 28.

UNT 2008. Re. Recreational Study on the Colorado River. Phone conversation with R. Henderson (TtNUS). University of North Texas, Denton, TX, May 28.

Question 02.05-27

QUESTION:

List private schools within 50 miles of STP, including specific details of each.

Full Text (Supporting Information):

List private schools within 50 miles of STP, providing names, locations, teacher-student ratios, and enrollment.

RESPONSE:

The private school discussion encompasses Matagorda, Brazoria, Jackson, Wharton, and Calhoun Counties because they are the counties primarily within the 50-mile radius. There are fourteen private schools located within the 50-mile radius, one in Matagorda County, ten in Brazoria County, two in Wharton County, one in Calhoun County, and none in Jackson County. In total, 2,039 students attend private schools within these counties. Each school is summarized below.

Private School	Location	Grade Levels	Enrollment	Student/ Teacher Ratio
Matagorda County				
Holy Cross School	Bay City	pK-6	133	12.4
Brazoria County				
Brazosport Christian School	Lake Jackson	pK-12	293	9.7
Carden-Jackson School	Pearland	pK-8	118	8.7
Columbia Christian School	West Columbia	pK-12	88	8.6
Hope Christian Learning Center	Pearland	8-12	7	7.0
Living Stones Christian School	Alvin	K-12	207	9.7
Montessori School of DT	Pearland	pK-1	63	12.7
Our Lady Queen of Peace Catholic School	Richwood	pK-8	311	9.5
Pearland Heritage Christian Academy	Monaville	K-7	26	6.5
St. Helen Catholic School	Pearland	K-8	249	17.2
Sweeny Christian School	Sweeny	pK-5	67	10.5
Jackson County				
None				
Wharton County				
Presbyterian Preschool	El Campo	pK-K	56	17.8
St. Philip Catholic School	El Campo	pK-8	354	21.6

Calhoun County				
Our Lady of the Gulf Catholic School	Port Lavaca	K-8	67	NA[1]

[1] This information is not available.

Source: NCES 2008. "Search for Private Schools." Available at http://nces.ed.gov/surveys/pss/privateschoolsearch/, accessed May 27, 2008.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 02.06-01

QUESTION:

Provide a summary of the past and expected surface settlements and how future settlements may impact surface water drainages, a description of various dewatering options, and relative settlements expected for each dewatering option.

Full Text (Supporting Information):

Section 2.6.1.1 of the ER states "Surface settlement (as a result of facility construction) could temporarily affect surface water drainage... This is supported by experience with STP 1&2 and..." The ER further states "...the potential for minimal settlement is possible , but the expected magnitude of settlement is considered manageable ..." Provide a summary of past and expected surface settlements and how future settlements may impact surface water drainages, a description of various dewatering options, and relative settlements expected for each dewatering option.

RESPONSE:

There are two aquifer zones separated by an aquiclude in the STP site area. The shallow aquifer will be impacted temporarily by construction dewatering. The deep aquifer below the aquiclude is beneath the influence of construction activities but is subject to regional irrigation and other pumping activities described in Section 2.4S.12 of the FSAR. Subsidence is due primarily to pumping of petroleum from subsurface reservoirs and/or production of groundwater either as water supply or construction dewatering.

Construction dewatering is planned for the top 100 ft of the subsurface which nominally consists of a 50/50 ratio of unconsolidated sand and clay. This ratio may vary locally. The water contained in the clay strata will drain slowly, while the water in the sand sections will drain more quickly. Subsidence occurs when the water in the clay, which fills the interstices between the clay particles to provide support for the overlying sediments, is removed and the clays become more compact.

The estimate of settlement due to construction dewatering (2.5S.1.2.6.5) of the shallow aquifer is approximately 0.5 inches or 0.05 ft.

Subsidence monitoring related to construction and operation of Units 1 & 2 at STP (in Subsection 2.5.1.2.9.6.1.2 "Matagorda County and STPEGS Site Area Subsidence" of STPEGS UFSAR, Rev 13) through 1993 shows a subsidence rate of less than 0.1 inch to about 0.2 inch per year. Construction dewatering is anticipated to last a maximum of 4 years, so the total settlement expected for construction dewatering for Units 3 and 4 ranges between 0.4 inch to 0.8 inch.

It is not expected that construction dewatering and any potential subsidence will have an impact on nearby surface waters. The construction area is approximately 20 acres within the STP site and remote from natural streams, although a drainage ditch is presently flowing across the property at the northern edge of the power block. This ditch will be relocated as part of excavation construction for the power block area.

Dewatering options are discussed in FSAR 2.4S.12, and include dewatering wells, slurry trenches, grout curtains, sheet piles, cut-off walls, infiltration trenches, and injection wells. In all cases, the impacted aquifer will be the water table and shallow aquifer to a depth of about 100 ft. The settlement resulting from any of these construction dewatering options is expected to be small due to the relatively short period dewatering will be required, and the potential for the clay in the shallow sediments to remain moist. Settlement is the response to removal of water in the clay beneath the surface. As the water slowing drains from the clay, the clay particles become compacted, resulting in settlement.

Settlement due to construction dewatering is not expected to alter stream flow or change the gradient of the ground surface.

CANDIDATE COLA REVISION:

The following changes will be incorporated into the second bullet under the first paragraph of ER Subsection 2.6.1.2

> Temporary dewatering of foundation excavations may impact water levels in the water table aquifer. Based on experience during the construction of STP 1 & 2 (FSAR 2.5S.1), these impacts are not anticipated to be significant, and these activities will be monitored and mitigation measures or other appropriate corrective measures will be considered as appropriate. Anticipated subsidence as a result of construction dewatering amounts to 0.4 inch to 0.8 inch for the four years of construction. This amount is not sufficient to adversely impact surface water drainage.

Question 03.04.01-01

QUESTION:

Provide a citation for the estimated cooling tower noise level of about 57 dBA.

Full Text (Supporting Information):

ER Section 2.7.7 discusses noise at the STP site but does not address potential cooling tower noise. ER Section 5.3.3.2.2 (page 5.3–28) states a noise level for the cooling tower of 57 dBA at 200 ft. However, no citation or supporting analysis is provided for the noise level estimate.

RESPONSE:

The information is contained in a response to a Request for Information submitted to Bechtel. The information is contained in a data sheet titled "UHS Concepts and Feasibility Evaluation for STP Units 3 and 4", document number 25293-501-M0R-00001, Rev. 0, Attachment 2. RFI responses were not cited in the ER and the Bechtel document is proprietary. The document indicates that cooling tower information was provided by the vendor. A reference to the source of the noise level information can be added to the text.

CANDIDATE COLA REVISION:

Section 5.3.3.2.2 will be revised as shown below.

Noise from the operation of each cooling tower would be approximately 57 dBA at 200 feet from the tower, according to vendor supplied data.

Question 03.05-01

QUESTION:

Provide explanations and calculations, as appropriate, of the inputs to the LADTAP, GASPAR, and construction worker dose calculation. One acceptable way to respond to this RAI would be to provide the calculation packages.

Full Text (Supporting Information):

ESRP 3.5, Section III, states in "when ER precedes the SER, the following analysis should be performed ... reviewer should calculate the quantity of radioactive materials released annually in effluents ... use the parameters and calculational techniques described in NUREG–0016... If the applicant has provided a source term that is consistent with these parameters and calculational techniques ... the reviewer should accept it and should not perform a separate calculation." Provide the source term calculations and the associated input and output files.

RESPONSE:

Based on the data presented in the ABWR DCD, Environmental Report (ER) Section 3.5 shows the isotopic activity releases for liquid and gaseous effluents. LADTAP and GASPAR were not used in preparing this section because this section does not contain any doses. ER Section 5.4 uses these computer programs to calculate effluent doses, and the input parameters and methodology are discussed in that section. STPNOC has previously provided the NRC with the input files associated with Section 5.4.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 04.01.03-01

QUESTION:

Provide the plant procedure for inadvertent discovery of archaeological remains.

Full Text (Supporting Information):

During construction or operation of the plant archaeological deposits may be encountered. During the site audit, STP staff indicated that there would be a procedure that would identify steps to be taken if there is an inadvertent discovery. Provide a copy of the procedure.

RESPONSE:

STPNOC transmitted a copy of Addendum #5 to Procedure No. 0PGP03-ZO-0025 (Unanticipated Discovery of Cultural Resources), to the NRC by letter number ABR-AE-08000042 dated June 9, 2008, to fulfill a commitment described in STP letters ABR-AE-07000010 (November 8, 2007) and ABR-AE-08-000021 (February 12, 2008).

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 04.02-06

QUESTION:

Describe the analytical process used to determine impacts to surface water hydrology would be SMALL.

Full Text (Supporting Information):

Provide a description of the analytical process and basis used to conclude that the impact of construction on surface water hydrology would be SMALL.

RESPONSE:

The evaluation of the hydrologic impact performed included the current ER Section 4.2 and the following:

Construction Activity	Impacts	Reason
Drainage ditches/swale relocation	SMALL	Man made. Ditches/swales are currently in areas previously disturbed would be relocated as necessary to areas also previously disturbed or STP would create additional ditches in areas previously disturbed to facilitate runoff in the areas proposed for the new facilities
Soil removal/grading for new facilities, general construction activities	SMALL	State and Federal Permit requirements are in place to minimize the potential impact to surface water primarily from runoff. Without compliance with these permits potential impacts could be SMALL to LARGE. Spoils will be relocated to existing spoil areas resulting in no change of use and allowing the site to take advantage of the existing site facilities and procedures.
Dewatering Activities.	SMALL	STP and its contractors will develop a Dewatering Plan for the proposed action. Based on the site's geology, it appears that there is a surficial clay layer at the site that could prevent the dewatering of the STP site's streams and drainage features. The sands of the upper aquifer were not encountered during drilling operations at the site until depths of 15 to 30 feet below ground surface and the potentiometric surface of the shallow aquifer was 5 to 10 feet below ground surface. Therefore the pumping of the shallow aquifer during dewatering operations would be unlikely to impact surficial drainage at the site due

		to the potentiometric head and the amount of clay encountered in the soil at the surface. However, there is a possibility that this could occur. Therefore, during the dewatering process for the new construction, surface water could be monitored in the vicinity of the excavation to determine if dewatering is impacting surface water at the site. The construction of curtain walls could help reduce the area of potential impact. The aforementioned Dewatering Plan will consider the use of slurry walls, or sheet piles, or other curtain wall options to reduce not only the amount of water removed but also limit the extent of dewatering.
Water disposal during dewatering activities	SMALL	It has yet to be determined how STP will dispose of water from the dewatering activities for STP 3 & 4 construction. The decision will be made on water disposal once a construction contractor and dewatering contractor have been contracted for the project and a determination made as to a preferred disposal option. The options could include the following or a combination of the following: 1) water could be decanted to the MCR after pumping to a retention pond. This would not result in impacts to site surface water drainage features. 2) Pump to retention pond(s) then discharge under TPDES Permit to site surface water body (ies). This could impact existing ecologic communities as a result of raising the water levels of the receiving water bodies. However, the water could be released to multiple site drainage features reducing potential impacts to any one site drainage feature. 3) Pump the water to a ditch or retention pond(s) and allow the water to evaporate or seep back to the shallow aquifer once the necessary permits have been acquired. This would not cause impact to surface water features, but could cause impact shallow aquifer through a potential change in groundwater water quality. The water could be injected into an aquifer for disposal once the necessary permits have been acquired. 4) The water pumped for disposal could be maintained in a retention pond(s) and the water used to augment the water in current site water bodies during periods of low rainfall and drought to support existing ecological communities. If not needed, the water could be added to the MCR and/or slowly released to

		site drainage features. With the exception of the first alternative, all of the possible options would require permits from the state to accomplish.
Wetlands	SMALL	There are no confirmed jurisdictional wetlands on the STP site. However, the proposed construction activities would destroy 0.165 acres of non-jurisdictional wetlands. The U.S. Corps of Engineers (COE) has been contacted by STPNOC to determine whether the COE agrees with their evaluation. To date there has been no response from the COE. Mitigation could, therefore, be required by the COE for the loss of the 0.165 acre wetland.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 04.03.02-02

QUESTION:

Provide specific examples of activities that will reduce impacts to aquatic resources associated with the Erosion and Sediment Control Plan and Storm Water Management Plan.

Full Text (Supporting Information):

ER Section 4.3.2 references compliance with the state's Erosion and Sediment Control Plan and Storm Water Management Plan. These plans include options or examples of activities to minimize impacts to aquatic resources. Provide a description of the options and examples that can be used at the STP site.

RESPONSE:

STP would use TCEQ-recommended best construction management practices [TCEQ 2003; TCEQ 2008, Part III(F)(2)] to control erosion and limit the amount of soil and sediment-laden water entering project-area wetlands, stream drainages, and the Colorado River. Specific best construction management measures and their locations on the construction site have not been identified at this time, pending completion of design activities. Erosion control and stabilization practices could include, but would not be limited to: mulching, geotextiles, sod stabilization, flow diversion and velocity dissipation devices, vegetative buffer strips, and establishment of temporary or permanent vegetation. Sediment controls could include silt fences, vegetative buffer strips, and sedimentation basins, as appropriate, and as dictated by site conditions.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

REFERENCES:

TCEQ (Texas Commission on Environmental Quality). 2003. Description of BMPs. August 21.

TCEQ (Texas Commission on Environmental Quality). 2008. General Permit to Discharge Wastes, TPDES General Permit No. TXR150000. Issued February 15, 2008 by Texas Commission on Environmental Quality, Austin, Texas.

Question 04.03.02-03

QUESTION:

What are the impacts from construction activities on aquatic resources associated with surface water and drainage ditches?

Full Text (Supporting Information):

ER Section 4.3.1 and 4.3.2 did not discuss the rapid bioassessment study of the identified construction impact areas. What are the potential impacts to the aquatic resources based on the results of more recent evaluations? What characteristics of the relocated drainage ditches will allow for introduction of aquatic resources found in the ditch that will be filled during construction of reactor facilities for Units 3 and 4?

RESPONSE:

The rapid bioassessment study is discussed in Section 4.3.2.1:

> "In May 2007, STPNOC commissioned a rapid bioassessment of the 1500-meter-long drainage ditch that crosses the area slated for construction (Reference 4.3-15). The bioassessment was intended to characterize the water quality and fish community of the ditch before its relocation, supporting the assessment of construction impacts. Fish collections from the STP ditch system were dominated by mosquitofish, sunfish (largemouth bass and three common Lepomids), sailfin molly, and sheepshead minnow. Most of these common species tend to be tolerant of salinity and temperature fluctuations, and are ubiquitous in coastal wetlands along the Gulf Coast (see Subsection 2.4.2)."

Fish and other aquatic organisms in the drainage ditch that is slated to be relocated/filled will either be killed or move into the Little Robbins Slough system. The likelihood of survival will decrease from west to east, as distance from Little Robbins Slough will be the main determinant in a given organism's survival. Fish, being more mobile, will be more likely to disperse into Little Robbins Slough than benthic organisms.

The new ditch will be hydrologically connected to Little Robbins Slough and will be colonized in the same manner is the original ditch, by upstream movement during periods of high water.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 04.03.02-04

QUESTION:

Provide information and figures describing the proposed locations of various construction project areas and activities and describe associated impacts to aquatic resources.

Full Text (Supporting Information):

Clarify the location of construction activities and sites associated with wetlands and other water resources. Clarify if the locations given in ER Rev. 1 for the laydown yard and soils piles (both from construction activities and dredging) are still the current plans. Provide information on the location of these areas if they have changed from ER Rev. 1, and provide information on the associated impacts from construction in these locations.

RESPONSE:

Changes in the locations of various construction activities (spoil piles, laydown yards, buildings, etc.) have occurred since ER Rev.1. The map showing these construction sites (ER Figure 3.9S-1) will be changed accordingly. Text has been altered in Section 4.3.1 and is indicated below. No changes are necessary in 4.3.2.

CANDIDATE COLA REVISION:

4.3.1.1 The Site and Vicinity

Impacts of construction on land use are discussed in Subsection 4.1.1. Construction of STP 3 & 4, as discussed in Section 3.9S, will result in approximately 244~~770~~ acres being disturbed during the construction phase due to construction of new facilities and a new heavy haul road (see Figure 3.9S-1). Approximately 71 of these 244 acres are existing facilities and the Main Cooling Reservoir. At the conclusion of the construction activity, any temporarily disturbed soil will be graded, landscaped to match the surrounding area, and revegetated (see Subsection 3.1.2). Clearing methods, disposal of construction waste, and methods for control of erosion, runoff, and siltation are discussed in Subsection 3.9S.2.

4.3.1.1.1 Wetlands

The status of twelve wetlands within or near the construction footprint (including laydown and spoil areas) was assessed by ENSR in 2006/2007 (Reference 4.3-1). ENSR used U.S. Army Corps of Engineers 1987 wetland delineation criteria to classify the sites, based on environmental parameters such as hydrology, soils, and vegetation, as well as history of land use. Given that the twelve wetlands were not directly connected to waters of the United States, and did not fall within the 100-year

floodplain, there was no historic evidence that the wetlands existed before site construction, and that ENSR classified these wetlands as isolated, all wetlands were

classified as non-jurisdictional. One of these wetlands (Wetland No. 001 – Reference 4.3-1), which is ~~0.165~~ 0.17 acre in size, is located in the ~~cooling tower~~ construction footprint and will have to be filled. ~~This is less than 5% of the total wetland acreage (3.9 acres) within the construction footprint and temporary laydown and spoil areas.~~ These remaining 11 sites are not within the construction footprint and will receive no direct or indirect impacts of construction. ~~will be avoided during the construction phase, thus limiting direct impacts~~ (see Figure 3.9S-1).

Several surface water and storm water drainage ditches are likely to be impacted and/or filled during construction. The east-west drainage ditch (Figure 2.4-3) in the power block footprint is approximately 8 to 10 feet wide, and approximately 4 to 5 feet deep, although the water is normally restricted to a more narrow channel (approximately 2 to 4 feet wide) approximately 1 to 2 feet deep. This ditch has several perpendicular ditches draining into it from the industrial land between the ditch and the berm. Portions of the ditch margins are mowed to the water level, other portions are vegetated with small shrubs (primarily sea myrtle) and semiaquatic grasses/rushes. This ditch will be relocated 650–700 feet north of its present position, just north of the new power block, and should impact only approximately 7 acres of scrub/shrub habitat and less than 0.5 acres of maintained/disturbed land.

The east-west drainage ditch that crosses the proposed construction area is hydrologically connected to Little Robbins Slough (Figure 2.4-1). This slough was relocated to its present location during STP 1 & 2 construction in the late 1970s to replace the drainage function of the original slough that was filled to create the MCR (Reference 4.3-2). It flows south past the western edge of the Main Cooling Reservoir towards the marsh. STP is committed to employing best construction management practices (see Subsection 3.9S.2) to reduce the amount of construction-area erosion and limit the sediment entering the site drainages, such as Little Robbins Slough, thus minimizing downstream sedimentation effects on flora and fauna. Aside from Little Robbins Slough, other storm water and surface water ditches created on historically upland habitat were routinely maintained and thus were not considered jurisdictional waters (Reference 4.3-1).

4.3.1.1.2 & 4.3.1.1.3 unchanged for this RAI

4.3.1.2 Summary

In summary, construction will result in the loss of approximately 170 acres of some common habitats for local wildlife, although the impacts cannot be quantitatively assessed because population data for species on and near the STP site are not available. ~~However, approximately 244 800 acres of the construction impacted areas (borrow and spoil, parking, etc.) will be available as wildlife habitat when construction is complete, and relatively similar open habitats will remain on site and are present offsite.~~ Construction activities should not reduce local biodiversity or impact threatened or endangered species. Potential impacts of construction noise and bird collisions during construction should be negligible. Therefore, construction-related impacts to terrestrial resources are considered SMALL.

Question 04.04-19

QUESTION:

Provide information on any pre–existing health conditions among minority and low–income populations that could result in disproportionate adverse health impacts.

Full Text (Supporting Information):

Discuss in detail pathways where any environmental (including socioeconomic) impact during construction may interact with cultural or economic facts that may result in disproportionate environmental impacts on minority and low–income populations. None in the natural system were found to be adverse in the ER, but only a summary of agency comments was reported. No information was supplied on potential pre–existing health conditions among minority and low–income communities, although the Texas Department of Health keeps fairly extensive local statistics on the health status of the population. Identify what other sources in the minority community and literature were used.

RESPONSE:

Health conditions among minority and low-income populations in Matagorda County are not specifically captured by the Texas Department of State Health Services (TDSHS). Therefore, county-specific information was reviewed to determine if health issues of local populations as a whole (regardless of race or income) differ from those in the state of Texas. Assuming that populations within Matagorda County would be the most affected by STP operations, 2004 Matagorda County health statistics from the TDSHS were researched to determine if health issues of populations within the county differ significantly from those of the state of Texas. Natality statistics indicated that the percentage of low birth weights in Matagorda County was less than that of the state of Texas. In addition, a greater percentage of individuals received prenatal care in Matagorda County than statewide. The fertility rate of Matagorda County was also slightly higher than the state's rate.

Mortality rates from all causes for Matagorda County were slightly higher than that of Texas', as were deaths from cardiovascular disease and cancer. However, Matagorda County's population is older than that of Texas', with 12.7% of the County population being over 65, compared with 9.8% of Texas'. The median age for Matagorda County is 34.8, while Texas' is 32.3. Deaths from chronic lower respiratory disease, diabetes, accidents, homicide, and suicide were lower than the state's percentage, as were infant and fetal deaths.

Cases of communicable diseases (tuberculosis, sexually transmitted diseases, AIDS, and chicken pox) were significantly lower than the state percentage. However, the percentage of cases of Hepatitis A in Matagorda County was greater than that of the state of Texas, possibly due to increased consumption of raw seafood in the area.

In summary, Matagorda County natality and fertility statistics do not indicate increased health issues associated with the population of Matagorda County. While death rates in Matagorda County from cardiovascular disease and cancer are higher than that of Texas, the County's population is older. Death rates from other causes are lower than the state's. Rates of communicable diseases in Matagorda County were also lower than the state's, with the exception of Hepatitis A.

While health conditions were not broken down by race or income for Matagorda County, overall county statistics do not indicate pre-existing health conditions that would cause disproportionately high or adverse impacts to minority or low-income populations.

CANDIDATE COLA REVISION:

Subsection 2.5.4.4 Potential for Disproportionate Impacts, should be inserted into Section 2.5.4. These following text should be inserted. [Note – This text is used for the responses to RAIs 2.5-8, 2.5-9, and 4.4-19]

2.5.4.4 Potential for Disproportionate Impacts

In September 2007, STPNOC contacted local government officials, the staff of social welfare agencies, and members of minority communities concerning unusual resource dependencies or practices that could result in potentially disproportionate impacts to minority and low-income populations making them uniquely vulnerable to impacts from proposed STP construction and operations activities. Many agencies had no information concerning activities and health issues of minority populations. Successful interviews were conducted with the Matagorda County Hospital District, the Matagorda County Health Department, the Matagorda County Extension Service, the United Way of Matagorda County, the Texas Parks and Wildlife Department, the Salvation Army Food Pantry, and the United Way of Brazoria County. In addition, the pastor of a predominantly Hispanic church and a Vietnamese community leader were interviewed to gain insight into these minority communities.

No agency reported dependencies or practices, as subsistence agriculture, hunting, or fishing, through which the populations could be disproportionately adversely affected by the construction project. No unique customs or practices, pre-existing health issues, or other vulnerabilities were identified through interviews.

The only distinctive community identified in the area includes a large Vietnamese population surrounding the city of Palacios. According to a local Vietnamese community leader, approximately 50 percent of the Vietnamese population in Matagorda County make their living shrimping, but the catch is mostly sold for profit (rather than for personal use). Approximately 40 percent of the population is employed on the docks in other trades (e.g., welders). The contact also stated that a lot of the people within the Vietnamese community have small gardens, but did not think they depended on these gardens for the majority of their food needs.

Health statistics issued by the Texas Department of State Health Services (TDSHS) were reviewed to determine if pre-existing health conditions may make local minority or low-income populations more susceptible to negative impacts from construction and operation of new units at

the STP site. Overall, the Matagorda County health statistics indicated that the county population is in better health than Texas as a whole. The percentage of infants born with low birth weights was lower and fertility rates were higher than Texas rates. A greater percentage of deaths from cardiovascular disease and cancer were recorded in 2004 for Matagorda County, but the county also contains a higher percentage of elderly individuals than the State of Texas. There was a smaller percentage of deaths from all other causes in Matagorda County (TDSHS 2007). The percentage of cases of communicable diseases was lower in Matagorda County than Texas, with the exception of Hepatitis A (TDSHS 2007), possibly due to increased consumption of raw seafood in the area.

While health statistics by race or income are not available for Matagorda County, overall county statistics indicate that there are no pre-existing health conditions in the area that would cause disproportionately high and adverse impacts to minority or low-income populations in the vicinity of the STP site.

Question 04.05-01

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

QUESTION:

Discuss rationale for comparing construction worker doses to 40 CFR 190 criteria.

Full Text (Supporting Information):

In Table 4.5–19 of the ER, STP compares the construction worker public dose to 40 CFR Part 190 criteria. 40 CFR 190 applies to doses at the site boundary, not at the Unit 4 construction site which is inside the site boundary. Therefore, the comparison of worker annual dose to 40 CFR 190 criteria in Table 4.5–19 does not appear to be appropriate. Discuss the rationale for this comparison.

RESPONSE:

40 CFR 190 specifies dose limits for any "member of the public," which it defines as "any individual that can receive a radiation dose in the general environment, whether he may or may not also be exposed to radiation in an occupation associated with a nuclear fuel cycle." Environmental Report (ER) Table 4.5-16 demonstrates that the construction worker doses meet the occupational dose criteria of 10 CFR 20. The public dose criteria of 40 CFR 190 is more restrictive than those for occupational exposure in 10 CFR 20. The rationale behind presenting in Table 4.5-19 the comparison of construction worker doses to the public dose criteria of 40 CFR 190 is to demonstrate that the doses to the workers are so low that they meet even the more restrictive public dose criteria. Furthermore, given that the workers meet the public dose criteria, they may not need to be classified as radiation workers.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 04.05-02

QUESTION:

Discuss rationale for comparing construction worker doses to 10 CFR 50 Appendix I criteria.

Full Text (Supporting Information):

In Table 4.5–18 of the ER, STP compares offsite public doses due to liquid effluents from Unit 3 to 10 CFR 50, Appendix I design objectives. However, this table also compares onsite worker doses due to Unit 3 gaseous effluents to the Appendix I design criteria. Because Appendix I applies to members of the public located in an unrestricted area, this comparison does not appear to be appropriate. Discuss the rationale for this comparison.

RESPONSE:

10 CFR 50, Appendix I specifies dose criteria for individuals in unrestricted areas. The dose criteria of 10 CFR 50, Appendix I are more stringent than those for occupational exposure in 10 CFR 20. Environmental Report (ER) Table 4.5-16 demonstrates that the construction worker doses meet the occupational dose criteria of 10 CFR 20. The rationale behind the comparison of construction worker doses to the unrestricted area dose criteria of 10 CFR 50, Appendix I, is to demonstrate that the worker doses not only meet the occupational dose criteria but are also comparable to those of individuals in unrestricted areas.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 04.05-03

QUESTION:

What was the thought process for using Units 1 & 2 Annual Effluent Report data for 2005 to calculate air pathway doses to construction workers?

Full Text (Supporting Information)

The GASPAR analyses provided by STPNOC contained four input files. File "GASPSTP1.dat" appears to be the input file for modeling existing units 1 & 2 effluents. In the ER, Table 4.5–1 lists Maximum Annual Gaseous Effluents from STP 1 & 2, for years 2002 through 2006. The maximums listed in the last column of Table 4.5–1 appear to be consistent when compared to the annual Effluent Reports on hand. However, annual releases for 2005 were the midpoint of the 5–year review period, from a total curie release standpoint. Provide the rationale for using the 2005 data used to calculate worker doses rather than the year with maximum curie release.

Table 4.5–1 lists the maximum annual releases of gaseous effluents; how is this information used in the context of the 2005 data?

RESPONSE:

Environmental Report (ER) Table 4.5-1 shows the activity releases from the existing units for years 2002 through 2006 as well as the maximum values over the five-year period. These activity releases from the annual effluent reports are presented for information only; these activity releases are not used in GASPAR to calculate doses to the construction workers from the existing units. ER Table 4.5-10 shows doses to the maximally exposed member of the public from the existing units for years 2002 through 2006 as well as the maximum values over the five-year period. These doses are also obtained from the annual effluent reports. The doses to the construction workers from the existing units are estimated by adjusting the maximum doses to the public over the five-year period, as explained in ER Subsection 4.5.4.2.

The GASPAR input files were used to calculate doses to members of the public in ER Section 5.4. Specifically, the input files were used to calculate the gaseous effluent doses to the maximally exposed individual from the existing units, as shown in ER Table 5.4-8. The activity releases for year 2005 were used as representative values. The 2006 annual effluent report shows that the total body dose to members of the public for years 2002 to 2006 varies from a low of 0.006 in 2003 to a high of 0.022 mrem in 2004. The dose for 2005 is shown as 0.017 mrem, which is the second highest dose during the period.

ER Table 5.4-8, which reports the total site dose from all units, indicates that the gaseous effluent doses from Units 1 and 2 are about 1% of those from Units 3 and 4 for total body and less than 1% for other organs. The contributions from the existing units are based on 2005 source terms. However, even if the higher 2004 source terms were utilized, it is expected that

the calculated doses would increase roughly by the ratio of 0.022 mrem to 0.017 mrem, the doses for years 2004 and 2005, respectively, as presented in the 2006 effluent report. Even with such an increase, the contribution to the site dose from Units 1 and 2 would still be negligible compared to the doses from Units 3 and 4.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 04.06-01

QUESTION:

Describe the planned control program to mitigate construction-related impacts to aquatic ecosystems from suspended sediments.

Full Text (Supporting Information):

During conference calls between the applicant and staff occurring since the site audit, the applicant indicated that changes to ER Rev. 1 include new information on diversion of water from dewatering areas for the reactor foundation. Confirm the planned control program for addressing impacts to benthic communities from excess water during construction. The discussion should encompass all diverted waters from construction activity.

RESPONSE:

As noted in ER Rev 1, STPNOC has not yet determined how water generated during dewatering operations would be disposed. Water removed from the excavation could be (1) injected back into the Chicot Aquifer, (2) pumped into ditches that would allow infiltration to the shallow portion of the Chicot Aquifer, (3) pumped to a natural depression or excavated area (settling pond) and subsequently discharged under a TPDES permit to an existing surface water body, or (4) pumped from a settling pond back to the MCR. Before disposing of water produced by dewatering operations, STPNOC would secure the necessary permit(s) from the responsible Texas regulatory agency or agencies. At present, pumping into the MCR appears to be the most viable and environmentally sensitive solution.

Only one of the disposal options, pumping water from dewatering operations into site ditches, has potential for impacting benthic communities. On-site ditches provide some marginal habitat for benthic organisms. Any benthic organisms present would be hardy species adapted to extreme fluctuations in (stormwater) flow and temperature extremes, and would probably be able to any survive any periods of high flow associated with dewatering activities. Given that no unique, sensitive, or special-status aquatic species are present, there appears to be no compelling reason to implement control programs to mitigate impacts to benthic communities. But the question of impacts to benthic communities would be academic if water were pumped to the MCR, as is contemplated.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 05.03.02-03

QUESTION:

What is the impact of outfall 001 and discharge from the MCR on managed species included in the Fisheries Management Plans for the Gulf of Mexico?

Full Text (Supporting Information):

Initial information on sampling the Colorado River in 2007 demonstrate that the species associated with essential fish habitat identified in the Fisheries Management Plans for the Gulf of Mexico are being found in the vicinity of the outfall 001 on the Colorado River. What level of impact to the species (and their life stages) is likely to be experienced by those species in the vicinity of outfall 001? What characteristics of the essential fish habitat (e.g., river substrate) are likely to be impacted by discharges from the MCR?

RESPONSE:

Essential fish habitats in the lower Colorado River near Outfall 001 include estuarine water column and estuarine mud and sand bottoms (unvegetated estuarine benthic habitats). Managed species that are considered important with respect to this ER include brown shrimp, white shrimp, and red drum. STPNOC's TPDES permit requires that the blowdown flow not exceed 12.5% of the river flow, which means discharge will be diluted by at least a factor of 8. STPNOC does not anticipate any changes in the effluent limits for Outfall 001. Under the terms of the expected permit, chemicals concentrations in the discharge will be lower than thresholds for the protection of all aquatic life, including species managed under Fisheries Management Plans (FMP). Scouring of the river bottom from the discharge would be limited to a few feet downstream of each port and would have no significant adverse impacts on EFH for any species managed under the FMPs. All of the species managed under the FMPs are highly mobile and are easily able to avoid the small area that will be affected by scour.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 05.03.03.01-02

QUESTION:

Provide consistent values for cooling tower drift deposition at the Unit 3&4 switchyard.

Full Text (Supporting Information):

ER Section 5.3.3.1.3 (2nd sentence, last paragraph, page 5–24) states a maximum summer deposition rate and an annual average deposition rate for the Unit 3&4 switchyard. These rates do not appear to be consistent. Reconcile whether the annual average is correct if the summer rate is correct.

RESPONSE:

The values presented in Section 5.3.3.1 for the maximum summer deposition and maximum annual deposition were verified against the output of the SACTI code and are the correct values predicted by the SACTI code. However, as indicated by the comment, the annual predictions for salt deposition are less than the sum of the individual seasons. This is true for all of the annual salt deposition predictions and annual water deposition predictions at all locations. The annual predictions for the salt and water deposition will be replaced by summing each of the seasonal SACTI code predictions. This will provide consistent salt and water deposition rates. The values presented in Section 5.3.3.1 are based on SACTI predictions using a site layout that is being revised to reflect a change in the design and location of the Ultimate Heat Sink. When this design change is complete, the SACTI model will be re-run to ascertain any changes to salt and water deposition predictions and reflected in a subsequent revision of the COLA ER. The proposed text revision below is presented to demonstrate how the text would have been revised had there not been a design change.

CANDIDATE COLA REVISION:

The last paragraph on Page 5.3-24 (Revision 1) will be revised as follows:

The electrical switchyard for STP 3 & 4 is located approximately 1100 feet to the northeast of the proposed location of the cooling towers. A maximum predicted salt deposition of 0.90 pounds per acre per month would be expected at this location during the summer season ~~0.19~~ and 0.62 pounds per acre per month annually. The electrical switchyard for STP 1 & 2 is located approximately 2300 feet to the east of the proposed location of the cooling towers. The salt deposition at this location will be 0.12 pounds per acre per month in the summer season and 0.073 pounds per acre per month annually.

Question 05.03.04-03

QUESTION:

Provide documentation of any correspondence with the Texas Department of State Health Services in support of the evaluation of thermophillic microorganisms in the vicinity of the discharge from the MCR into the Colorado River.

Full Text (Supporting Information):

Has the Texas Department of State Health Services been contacted concerning the incidence of thermophilic microorganisms in Texas and within Segment 1401 of the Colorado River?

RESPONSE:

Mr. Jeff Taylor, Manager-Epidemiology and Disease Surveillance Unit, Texas Department of State Health Services, was contacted on 7/16/07 to discuss any thermophillic outbreaks, specifically *Naegleria* caused primary amebic meningoencephalitis (PAM), in the vicinity of STP 3 & 4. He stated that outbreaks are rare and that none have occurred in the last 10 years in the vicinity of STP.

The CDC issued a report in the Morbidity and Mortality Weekly Report (MMWR May 30, 2008) discussing an increase in PAM cases in 2007. Two cases occurred in Texas, resulting in the death of both individuals. Both cases were traced to a lake in central Texas and were not linked to the Colorado River.

In order to update the 7/16/2007 response, Mr. Taylor was contacted on 6/24/2008. He confirmed the two cases reported in the MMWR and stated that there have been less than 10 cases in Texas during the last ten years, including the two cases in 2007. For a large portion of the 90s, Texas reported no cases. He also reconfirmed that there have been no reported cases in the vicinity of STP.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 05.03.04-04

QUESTION:

How does the state's designation of Segment 1401 of the Colorado River as "impaired" relate to the impact evaluation?

Full Text (Supporting Information):

ER Section 2.4.2.5 states that TCEQ designated Segment 1401 of the Colorado River as "not meeting the state water quality standard for bacteria". Wastewater from the operations of Units 1 and 2 are currently discharged in the MCR and the same plan is proposed for Units 3 and 4. Describe how outfall 001 will be monitored to ensure that discharges from the MCR are compliant with the state's concern for the increase of bacteria in the vicinity of the plant.

RESPONSE:

The Texas Pollutant Discharge Elimination System (TPDES) permit for STP, issued July 21, 2005, contained a requirement for testing the Outfall 001 effluent for a suite of pollutants/constituents, including fecal coliform bacteria, "for a minimum of four separate sampling events which are a minimum of one week apart." Analytical testing was to commence immediately after permit issuance. There have been no discharges from Outfall 001, however, thus there has been no need for testing.

Note that the plant's sanitary sewage is treated and disinfected (with chlorine), so plant outfalls that discharge to the Main Cooling Reservoir (MCR) are not introducing bacterial organisms to the MCR that might ultimately be transferred to the Colorado River via reservoir blowdown (Outfall 001). Further, as discussed in the Environmental Report, the MCR has not been blown down to the Colorado River since some system testing was carried out in 1997.

When a new (or amended/expanded) TPDES permit is issued for the new units, analytical testing of a range of constituents, including fecal coliform bacteria, in plant effluents will almost certainly be required. Regardless of the constituents selected for measurement by the Texas Commission on Environmental Quality (TCEQ), wastewater discharged at Outfall 001 will be sampled and analyzed in accordance with the requirements of the TPDES permit. STPNOC anticipates no changes to the limits on existing sanitary internal outfalls during the permit renewal process. Continued chlorination of these internal outfalls (particularly Outfall 401, which receives sanitary wastes) will ensure that STP does not contribute to ambient levels of fecal coliform and *Enterococcus* bacteria in the Colorado River.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 05.04.01-01

QUESTION:

What source term was used for the LADTAP input file "LADTROB2.DAT"?

Full Text (Supporting Information):

In the LADTAP analyses provided by STPNOC, LADTROB2.DAT indicates that the source term is taken from DCD Table 12.2–22 and dilution factors listed in the ODCM were applied. For example, Table 12.2–22 of the DCD states that 118 MBq/y of I–131 is the annual average liquid release and the corresponding dilution factor for Little Robbins Slough is listed as 8.56E–06 (from Table B4–1, page B4–25 of ODCM Rev 14). In this example, the product of these values (1.01E–03 MBq/y) does not appear to be consistent with the value listed in the input file (2.87E–03 MBq/y). This applies to all radionuclides listed in LADTROB2.DAT source term. Instead, the input file appears to rely upon the release values from FSAR Table 12.2–22. Provide the basis for the values used in the LADTAP analyses.

RESPONSE:

Initial analyses for all of the LADTAP input source terms, including LADTROB2.DAT, were based on Table 12.2-22 of the DCD. After the initial analysis, the annual average liquid releases were revised by GE based on use of the GALE computer code (email Julie Leong, GE Infra Energy to David Wagner, Bechtel, 8/21/07, results documented in GEBE-2007-0016) and are presented in ER Table 3.5-1. Those revised values are also in FSAR Table 12.2-22, except that Ag-110m and Sb-124 are given in ER Table 3.5-1 and not in FSAR Table 12.2-22. Ag-110m (nuclides with zero source term such as Sb-124 were not included in the input file) was included in the LADTAP input files including LADTROB2.DAT.

The header line preceding the source terms in all of the LADTAP input files, including LADTROB2.DAT, was not revised from the initial analyses and incorrectly notes that the source terms are based on DCD Table 12.2-22. That header line is not used by the code for any calculations; and as described in the previous paragraph, the analysis is based on revised source terms from ER Table 3.5-1. ER Subsection 5.4.1 incorrectly attributes liquid release source terms to DCD Table 12.2-22. ER Table 5.4-1 correctly references ER Table 3.5-1 for liquid pathway source terms.

CANDIDATE COLA REVISION:

ER Subsection 5.4.1 references DCD Table 12.2-22. The correct reference should be ER Table 3.5-1. FSAR Table 12.2-22 will be revised to include the following values in a future revision: 4.44E+01 MBq/yr of Ag-110m and 0.00E+00 MBq/yr of Sb-124.

Question 05.04.01-02

QUESTION:

Why does the ABWR DCD table 12.2–22 not match the FSAR table 12.2–22?

Full Text (Supporting Information):

The quantities of radionuclides listed in the ABWR DCD Table 12.2–22 and the FSAR Table 12.2–22 are not consistent. The lists of radionuclides between the two tables differ – ABWR DCD does not have Nd–147 and FSAR does not have Ag–110m and Sb–124. Provide the basis for the set of radionuclides used in the analyses.

RESPONSE:

All normal radiological release liquid pathway analyses were initially based on Table 12.2-22 of the DCD. After the initial analysis, the annual average liquid releases were revised by GE based on use of the GALE computer code (email Julie Leong, GE Infra Energy to David Wagner, Bechtel, 8/21/07, results documented in GEBE-2007-0016); the revised values are given in ER Table 3.5-1. Those revised values are also given in FSAR Table 12.2-22, except that Ag-110m and Sb-124 are included in ER Table 3.5-1 and not in FSAR Table 12.2-22. Nd-147 is included in both ER Table 3.5-1 and FSAR Table 12.2-22. All nuclides in ER Table 3.5-1, including Ag-110m and Nd-147 (nuclides with zero source term such as Sb-124 were not included in the input file), were included in the analyses. See also response to ER RAI 5.4.1-1.

CANDIDATE COLA REVISION:

FSAR Table 12.2-22 will be revised to include the following values in a future revision: 4.44E+01 MBq/yr of Ag-110m and 0.00E+00 MBq/yr of Sb-124.

Question 05.04.01-03

QUESTION:

What is the basis and where did the source term for LADTROB2.DAT come from?

Full Text (Supporting Information):

In the LADTAP analyses provided by STPNOC, LADTROB2.DAT indicates that the source term is taken from DCD Table 12.2–22. The source term appears to be based on the FSAR Table 12.2–22 which lists 53 radionuclides, however, the input file only lists 36. Provide the basis for the set of radionuclides used in the analyses.

RESPONSE:

All normal radiological release liquid pathway analyses were initially based on Table 12.2-22 of the DCD. After the initial analysis, the annual average liquid releases were revised by GE based on use of the GALE computer code (email Julie Leong, GE Infra Energy to David Wagner, Bechtel, 8/21/07, results documented in GEBE-2007-0016); the revised values are given in ER Table 3.5-1 Rev1 January 15, 2008. Those revised values are also given in FSAR Table 12.2-22, Rev1 January, 2008 except that Ag-110m and Sb-124 are included in ER Table 3.5-1 and not in FSAR Table 12.2-22.

ER Table 3.5-1 lists 55 nuclides. That table shows that 9 (C-14, Co-56, Co-57, Rb-89, Y-90, Rh-103m, Rh-106, Sb-124, and La-140) of those 55 nuclides have an annual release (to the main cooling reservoir) of zero. The fractions of an additional 9 nuclides (I-132, I-134, Mn-56, Sr-92, Y-92, Cs-134, Cs-136, Cs-137, and Cs-138) that reach the Little Robbins Slough Area (see ODCM Table B4-1) are zero. Those 18 nuclides were not included in LADTROB2.DAT because LADTAP requires non-zero source terms

The additional nuclide which is included in ER Table 3.5-1 and is not in the LADTAP input files, including LADTROB2.DAT, is Np-239. That nuclide was inadvertently left out of the LADTAP input files used to simulate the normal radiation liquid pathway discharge impacts. Supplemental LADTAP runs were performed which included the Np-239 source term; the results of those runs show that the contribution of Np-239 to the liquid pathway doses is negligible. No numerical dose results presented in the COLA change as a result of including Np-239. See also responses to RAIs 5.4.1-1 and 5.4.1-2.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 05.04.01-04

QUESTION:

Where did the source term for LADTROB2.DAT come from?

Full Text (Supporting Information):

In the LADTAP analyses provided by STPNOC, LADTROB2.DAT indicates that the source term is taken from DCD Table 12.2–22. Table 12.2–22 does not list Nd–147, but neodymium–147 is in the input file. Provide the basis for the set of radionuclides used in the analyses.

RESPONSE:

All normal radiological release liquid pathway analyses, including the source term for LADTROB2.DAT, were initially based on Table 12.2-22 of the DCD. After the initial analysis, the annual average liquid releases were revised by GE based on use of the GALE computer code (email Julie Leong, GE Infra Energy to David Wagner, Bechtel, 8/21/07, results documented in GEBE-2007-0016); the revised values are given in ER Table 3.5-1 Rev1 January 15, 2008. Nd-147 is included in ER Table 3.5-1 and in the LADTAP input files, including LADTROB2.DAT.

ER Table 3.5-1 lists 55 nuclides. That table shows that 9 (C-14, Co-56, Co-57, Rb-89, Y-90, Rh-103m, Rh-106, Sb-124, and La-140) of those 55 nuclides have an annual release (to the main cooling reservoir) of zero. The fractions of an additional 9 nuclides (I-132, I-134, Mn-56, Sr-92, Y-92, Cs-134, Cs-136, Cs-137, and Cs-138) that reach the Little Robbins Slough Area (see ODCM Table B4-1) are zero. Those 18 nuclides were not included in LADTROB2.DAT because LADTAP requires non-zero source terms.

The additional nuclide which is included in ER Table 3.5-1 and is not in the LADTAP input files, including LADTROB2.DAT, is Np-239. That nuclide was inadvertently left out of the LADTAP input files used to simulate the normal radiation liquid pathway discharge impacts. Supplemental LADTAP runs were performed which included the Np-239 source term; the results of those runs show that the contribution of Np-239 to the liquid pathway doses is negligible. No numerical dose results presented in the COLA change as a result of including Np-239. See also responses to RAIs 5.4.1-1, 5.4.1-2 and 5.4.1-3.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 05.04.04-01

QUESTION:

What effect will raising the MCR level by 2 feet, have on the migration of radionuclides from MCR to Little Robbins Slough?

Full Text (Supporting Information):
After the water level is raised, will the "Radionuclide fractions Reaching Offsite Bodies of Water" listed in the ODCM (Table B4–1) change? If they are expected to change, would analysis of impacts from the 2 proposed ABWRs need to be reanalyzed using revised values in Table B4–1 in the ODCM?

RESPONSE:

The present ODCM calculation (Table B4-1) of radionuclide fractions reaching offsite waters is conservative. It is not expected that the values in Table B4-1 will be revised for the 2 proposed ABWRs.

The ODCM analysis is conservative because it is based on a main cooling reservoir (MCR) volume of 150,000 acre-feet. The volume at normal cooling reservoir elevation of 49 feet MSL is 202,700 acre-feet; which will support four unit operation. The liquid pathway dose analyses of ER Sub-section 5.4 for the contributions from both the new STP Units 3 and 4 and the existing STP units 1 & 2, assume the lower volume inherent in the ODCM calculation. Therefore, the additional water in the reservoir at proposed 4-unit reservoir operation vs the ODCM assumption would decrease the concentration of water exiting the reservoir, including that reaching Little Robbins Slough, relative to the ER/ODCM analysis.

The pathway to Little Robbins Slough is through relief well flow. The relief well flows were estimated during the reservoir design stage to be approximately 68% of the total reservoir seepage of 5700 acre-feet per year (the remainder of the seepage going to the Colorado River), or ~3850 acre-feet per year. The 2 foot increase in MCR elevation from 47 (STP 1 & 2 procedure limit) to 49 feet MSL would result in an increase in pressure head of as much as 6% ([49 feet – 15 feet] vs. [47 feet – 15 feet]); the pressure head is calculated relative to the minimum site ground level elevation of 15 feet MSL. This small increase in pressure head, and thus seepage, is much less than the conservatism built into the calculation of MCR radionuclide concentration described in the previous paragraph. In any case, the reservoir was designed for 4-unit operation and since the ODCM seepage analysis assumes design stage estimates, the liquid discharge flow to Little Robbins Slough used in the ER is valid.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 05.10-01

QUESTION:

Indicate which actions to limit adverse impacts during operation are commitments.

Full Text (Supporting Information):

A number of actions are identified in the table "Summary of Potentially Adverse Impacts of Operation" with respect to limiting impacts on direct physical impacts (5.8.1) and socioeconomic impacts (5.8.2). Which of these potential actions are actually commitments by the applicant, as opposed to potential actions that could be taken by unspecified parties?

RESPONSE:

Table 5.10-1 summarizes the potential adverse environmental impacts which may result from operation of STP 3 & 4 and proposes possible mitigation measures to be implemented. The actions and mitigation measures should not be considered commitments, but as options to be considered if the need arises. It would be premature to possibly preempt the best management option for the circumstances at the time.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 05.10-02

QUESTION:

Explain the difference regarding the potential impact significance for water quality impacts found in Table 5.10-1 and the determination stated in the text of Section 5.2.3.

Full Text (Supporting Information):

Section 5.2.3.1 states, "Impacts of chemicals in the proposed MCR blowdown on the Colorado River water quality would be SMALL and would not warrant mitigation." Table 5.10-1 shows the water quality impacts would be SMALL to MODERATE. Explain the difference between the potential impact significance presented in Table 5.10-1 and Section 5.2.3.1 for water quality and mitigation.

RESPONSE:

The designation of impact significance is inconsistent between the two sections.

CANDIDATE COLA REVISION:

Table 5.10-1 will be corrected as shown to be consistent with the impacts significance given in Subsection 5.2.3, SMALL.

5.2.3 Water Quality Impacts	Potential water quality impacts to the Colorado River from discharges from the main cooling reservoir, which would receive and dilute all STP 3 & 4 water and wastewater discharges. Discharges to the Colorado River are anticipated to be needed when water quality deteriorates in the main cooling reservoir. Discharge limits would be established by TCEQ.	S~~M~~	Obtain Texas Pollution Discharge Elimination System (TPDES) permit and comply with its discharge limits and monitoring requirements.

Question 05.10-03

QUESTION:

Explain the difference in the planned control program information for the discharge system and the description of temperature limits for TPDES Permit No. WQ0001908000.

Full Text (Supporting Information):

Sections 5.2.3.1 and 5.3.2.2.1 state that the TPDES permit (No. WQ0001908000) allows a daily average discharge temperature of 95°F and daily maximum discharge temperature of 97°F. Section 5.3.2 of Table 5.10-1 states that "...discharges would be 95° or less." Explain the difference in the discharge temperature information.

RESPONSE:

The characterization of the discharge with regard to discharge temperature limits is inconsistent between the two sections.

CANDIDATE COLA REVISION:

Table 5.10-1 will be corrected as shown to be consistent with Subsection 5.3.2.2.1.

5.3.2 Discharge System	The addition of STP 3 & 4 is expected to increase the frequency of blowdown from the Main Cooling Reservoir to the Colorado River. [2]	S	Obtain TPDES permit and comply with its discharge limits and monitoring requirements. The main cooling reservoir would be operated such that discharges would not be made when the river flow is less than 800 cubic feet per second (cfs) and the volume would not exceed 12.5% of river flow, allowing a dilution of the

			already diluted STP 3 & 4 cooling system effluent of at least 8. ~~Also, per state water quality standards the discharges would be 95°F or less.~~

Question 07.02-01

QUESTION:

Provide MACCS2 input and output files for MACCS2 calculations that include calculations of early fatalities for an average individual within 1 mile of Units 3&4.

Full Text (Supporting Information):

The Commission has established safety goals for nuclear power plants (51 FR 30028, August 1986). These goals include an average individual early fatality risk and a goal population risk of latent cancers. The staff has used the safety goal insights to put severe accident impacts into context. The MACCS2 code is used to provide estimates of early fatalities and latent cancers for comparison with the Commission's safety goals. STPNOC provided MACCS2 input and output files for Units 3 & 4. However, the MACCS2 calculations associated with those files do not include evaluation of the average individual early fatalities. Provide the MACCS2 code with the early fatality calculations enabled and provide the input and output files for these analyses.

RESPONSE:

The CD accompanying this response contains MACCS2 input (Early, Chronic, Met, Site, and Atmospheric) and output files. The parameters and output results are reflected in ER Section 7.2 (Rev01 1/5/08), Tables 7.2-1 and 2. An additional input parameter, 360^0 average risk of early fatality for 0-1 mile (TYPE4NUMBER=1), was turned on for these files. The additional output results are given under the heading, *AVERAGE INDIVIDUAL RISK*. The methodology used to produce the individual 0-1 mile early fatality risk in ER Table 7.2-2 is described in the response to RAI 7.2-8.

The 360^0 average 0-1 mile early fatality risk is approximately 3 times greater than the site specific 0-1 mile early fatality risk shown in ER Table 7.2-2 (see STP vs NRC EARLY RISKS.XLS, included in RAI721.ZIP). This difference is because the 0-1 mile residents at STP are toward the east; the wind blows towards the east less frequently than it does towards the north, south, or west. In either case, the prompt fatality risk is many orders of magnitude less than the NRC Safety Goal (see ER Table 7.2-2).

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 07.02-02

QUESTION:

Provide a description of each severe accident scenario and release category.

Full Text (Supporting Information):

The MACCS2 files submitted by STPNOC identify severe accident scenarios using an alphabetic character string. Provide a cross-walk between the alphabetical character string and the accident or release scenario being evaluated

RESPONSE:

Release categories are denoted Case 1 – Case 9 in DCD Table 19E.3-6. Each of those categories is represented by one or more accident sequences, denoted by character strings. The accident sequences and associated string designations are described in DCD Section 19E.2.2. The major accident categories are denoted by the first four characters of the sequence strings and are:

1. LCLP: loss of all core cooling with vessel failure occurring at low pressure
2. LCHP: loss of all core cooling with vessel failure occurring at high pressure
3. SBRC: station blackout with RCIC (reactor core isolation cooling) operating for 8 hours
4. LBLC: large break LOCA with loss of all core cooling

The 5th and 6th characters represent mitigating features which are assumed to operate during the sequence:

1. PF: passive flooder system
2. FS: firewater system spray function
3. PS: passive flooder and drywell spray both operate

The 7th character represents the mode of release of fission products from the containment to the environment:

1. R: overpressure protection relief rupture disk opens
2. D: drywell head fails before the rupture disk opens
3. P: leakage through movable penetrations in the drywell
4. E: early structural failure of the containment for cases which result in the failure of the vessel at high pressure.

The last character represents the magnitude of the release:

1. N: negligible, noble gas < 100%, volatiles < 0.1%
2. L: low, noble gas < 100%, volatiles < 1%
3. M: medium, noble gas < 100%, volatiles < 10%
4. H: high, noble gas < 100%, volatiles > 10%

DF100 is an example of another character string and represents a scrubbing process decontamination factor of 100.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 07.02-03

QUESTION:

Provide source terms, core damage frequencies and severe accident consequences by release category. Separate the consequences for the air and water pathways.

Full Text (Supporting Information):

Section 7.2.1 of the ER provides risk information in the aggregate. In performing its independent evaluation, the staff considers both core damage frequency and consequences by release category and pathway. Table 7.2–1 presents risks, not core damage frequency and consequence and combines population dose risk from the air and water pathways. In addition to providing the disaggregated risk information, provide the accident isotopic source terms and release fractions for each release category.

RESPONSE:

Source terms are a combination of core inventory and nuclide release fractions. The core inventory was supplied by GE (attachment to BEGE-205R) and is given below:

STP ABWR CORE INVENTORY

Nuclide Name	Core Inventory (Bq/MWt)	Nuclide Name	Core Inventory (Bq/MWt)	Nuclide Name	Core Inventory (Bq/MWt)	Nuclide Name	Core Inventory (Bq/MWt)
CO-58	3.52E+12	ZR-95	1.64E+15	TE-131M	1.38E+14	LA-141	1.64E+15
CO-60	2.12E+10	ZR-97	1.68E+15	TE-132	1.40E+15	LA-142	1.61E+15
KR-85	1.12E+13	NB-95	1.63E+15	I-131	9.73E+14	CE-141	1.63E+15
KR-85M	2.49E+14	MO-99	1.85E+15	I-132	1.42E+15	CE-143	1.54E+15
KR-87	4.78E+14	TC-99M	1.60E+15	I-133	2.04E+15	CE-144	1.31E+15
KR-88	6.77E+14	RU-103	1.57E+15	I-134	2.24E+15	PR-143	1.52E+15
RB-86	1.74E+12	RU-105	1.11E+15	I-135	1.92E+15	ND-147	6.69E+14
SR-89	9.14E+14	RU-106	5.57E+14	XE-133	2.05E+15	NP-239	2.26E+16
SR-90	9.56E+13	RH-105	9.34E+14	XE-135	2.65E+14	PU-238	5.87E+12
SR-91	1.17E+15	SB-127	8.45E+13	CS-134	1.98E+14	PU-239	5.06E+11
SR-92	1.25E+15	SB-129	2.99E+14	CS-136	4.36E+13	PU-240	8.32E+11
Y-90	1.03E+14	TE-127	8.34E+13	CS-137	1.23E+14	PU-241	2.00E+14
Y-91	1.19E+15	TE-127M	1.26E+13	BA-139	1.83E+15	AM-241	1.63E+11
Y-92	1.25E+15	TE-129	2.81E+14	BA-140	1.76E+15	CM-242	1.19E+14
Y-93	1.45E+15	TE-129M	7.63E+13	LA-140	1.86E+15	CM-244	2.72E+12

The core inventory is given on a per MWt basis; STP 3 & 4 would be operated at 3926 MWt .

Release fractions for each release category were taken from Table 19E.3-6 of the ABWR DCD and are given below for each release category by nuclide group. Core damage frequencies are also included:

STP ABWR CORE DAMAGE FREQUENCY AND RELEASE FRACTIONS BY RELEASE CATEGORY

		Nuclide Group Release Fraction		
Release Category	Core Damage Frequency	Noble	I	Cs
NCL	1.34E-7	0.044	2.30E-05	2.30E-05
CASE1	2.08E-8	1	1.50E-07	1.30E-05
CASE2	<1.E-10 (taken as 1.E-10)	1	5.00E-06	5.00E-06
CASE3	<1.E-10 (taken as 1.E-10)	1	2.80E-04	2.20E-03
CASE4	<1.E-10 (taken as 1.E-10)	1	1.60E-03	1.60E-03
CASE5	<1.E-10 (taken as 1.E-10)	1	6.00E-03	5.30E-04
CASE6	<1.E-10 (taken as 1.E-10)	1	3.10E-02	7.70E-02
CASE7	3.91E-10	1	8.90E-02	9.90E-02
CASE8	4.05E-10	1	1.90E-01	2.50E-01
CASE9	1.70E-10	1	3.70E-01	3.60E-01

As noted in Table 19E.3-6, the releases for the nuclide groups not included above are negligible.

The MACCS2 severe accident dose-consequences to the 50-mile population from all airborne pathways, including drinking the water, was calculated for each of three years of annual hourly meteorological data. Note that the dose consequence analysis conservatively assumes that ALL water within 50 miles of the site is drinkable (MACCS2 site file Watershed Index of 1 for all directions and distances to 50 miles).

The maximum dose-risk year from all pathways is 2000. The maximum water ingestion dose-risk year is 1997. The all pathways (water + air), water ingestion, and air pathways dose-risks for each of the three years of meteorology are presented by source term category in the following table.

All Pathways and Water Ingestion Severe Accident Dose-Consequences

Year of Meteorological Data/ Source Term Category	All Pathways Dose-Consequence (person-rem)	Water Ingestion Dose-Consequence (person-rem)	Air Pathway Dose-Consequence (person-rem)
1997			
NCL	1.89E+04	3.59E+01	1.89E+04
Case 1	1.06E+04	2.03E+01	1.06E+04
Case 2	4.84E+03	7.80E+00	4.83E+03
Case 3	3.60E+05	3.43E+03	3.57E+05
Case 4	2.36E+05	2.50E+03	2.34E+05
Case 5	1.13E+05	8.27E+02	1.12E+05
Case 6	9.28E+05	1.20E+05	8.08E+05
Case 7	1.01E+06	1.54E+05	8.56E+05
Case 8	1.46E+06	4.07E+05	1.05E+06
Case 9	1.63E+06	5.62E+05	1.07E+06
1999			
NCL	2.01E+04	3.05E+01	2.01E+04
Case 1	1.14E+04	1.73E+01	1.14E+04
Case 2	5.20E+03	6.66E+00	5.19E+03
Case 3	3.33E+05	2.91E+03	3.30E+05
Case 4	2.00E+05	2.13E+03	1.98E+05
Case 5	1.02E+05	7.06E+02	1.01E+05
Case 6	8.16E+05	1.02E+05	7.14E+05
Case 7	8.98E+05	1.31E+05	7.67E+05
Case 8	1.31E+06	3.55E+05	9.55E+05
Case 9	1.44E+06	4.77E+05	9.63E+05
2000			
NCL	1.98E+04	2.81E+01	1.98E+04
Case 1	1.11E+04	1.59E+01	1.11E+04
Case 2	5.00E+03	6.13E+00	4.99E+03
Case 3	3.77E+05	2.69E+03	3.74E+05
Case 4	2.53E+05	1.96E+03	2.51E+05
Case 5	1.20E+05	6.50E+02	1.19E+05
Case 6	9.59E+05	9.42E+04	8.65E+05
Case 7	1.04E+06	1.21E+05	9.19E+05
Case 8	1.48E+06	3.18E+05	1.16E+06
Case 9	1.59E+06	4.40E+05	1.15E+06

Dose risk for each release category is calculated by multiplying the release category dose consequence by the release category core damage frequency.

CANDIDATE COLA REVISION:

Add above information to ER Subsections 7.2.2.1 and 7.2.2.2.

Question 07.02-04

QUESTION:

Provide a discussion of the risks associated with external initiating events.

Full Text (Supporting Information):

Section 7.2.2.1 of the ER states that the risk estimates in Table 7.2–1 are only for internally initiated events. Risks associated with external initiating events need to be described for completeness. Provide estimates of Core Damage Frequencies for external event and a comparison with the CDFs for internally initiated events.

RESPONSE:

The risks from external initiating events are described in FSAR Section 19.4. It is noted there that the ABWR DCD seismic and fire protection analyses bound the risks for the proposed Units 3 and 4 at STP. That section also states that the CDF from external flooding is very small (not quantified).

STP site-specific design basis wind and tornado are described in FSAR Section 3.3. Both the site specific design basis wind and tornado are within the design bases of the ABWR DCD. DCD section 19.4 notes an extremely small total core damage frequency due to tornado-initiated events. It also says that since such events are predicted to be such small contributors to CDF, a more detailed analysis is not warranted (i.e., the CDF is not quantified). Straight line winds are not specifically analyzed in the DCD because they are not important contributors to an ABWR's CDF.

ABWR DCD Section 19.4.3 describes a seismic margin analysis. The High Confidence Low Probability of Failure (HCLPF) analysis concludes that the ABWR design will withstand an earthquake of at least twice the design safe shutdown earthquake (SSE), and achieve safe shutdown without damage to the reactor core.

ABWR DCD Section 19.4.4 describes a Fire Induced Vulnerability Evaluation which assesses the vulnerability of an ABWR to fires within the plant. The NRC agreed that such an evaluation was appropriate. Five fire scenarios were investigated; bounding core damage frequencies (not presented) were determined to be acceptable.

CANDIDATE COLA REVISION:

Reference external contributors and associated small risks with DCD section references in ER Section 7.2.1.

Question 07.02-05

QUESTION:

Describe how evacuation was modeled in MACCS2.

Full Text (Supporting Information):

Section 7.2.2.1 states that 95% of the 50 mile population was assumed to evacuate following declaration of a general emergency. Provide the evacuation assumptions that were used in the model. How were evacuation parameters estimated? Where were the "evacuees" assumed to go?

RESPONSE:

The second sentence of ER Section 7.2.2.1 contains a typo and should read, "The analysis assumed that 95% of the *10-mile* population was evacuated following declaration of a general emergency." People that do not evacuate remain at their residences and are exposed as if they are going about their normal activities.

All evacuees move radially outward to the border of the 10-mile Emergency Planning Zone (EPZ). Declaration of general emergency is a function of the accident sequence. This declaration is made at a time of TL-TLL hours after accident initiation (MACCS2 parameter OALARM); sequence specific values of TL and TLL are given in ABWR DCD rev4 Table 19E.3-6, p. 19E.3-9.

Site specific evacuation parameters are taken from "Evacuation Time Estimates for the South Texas Project Electric Generating Station Plume Exposure Pathway Emergency Planning Zone", December 1994 (ETE). The evacuees are conservatively assumed to not take shelter for 2 hours, the ETE time until 95% of the 10-mile population begins evacuating. The evacuation speed is taken from the ETE adverse conditions (summer weekend, adverse weather, flooding) evacuation time of 190 minutes; allowing for the 2 hour time until shelter and a maximum evacuation distance of 10 miles, a conservative ETE speed of 3.83 meters per second [10 miles/ (190 – 120) min] is found. That speed is extrapolated to a year 2060 equivalent by assuming that all routes are saturated and the time for evacuation of the slowest evacuee is proportional to the ETE speed (3.83 m/s) divided by the ratio of the 10-mile population projected to 2060 to that of the ETE (8834/6295); the resulting evacuation speed, 2.73 m/s, was used in the severe accident risk analysis. All evacuations are to 10 miles from the release, at which point the evacuees are assumed to be no longer exposed to the release plumes (MACCS2 early phase). The evacuees are assumed to be at their residences after the early phase (MACCS2 chronic phase), subject to relocation if exposure limits are exceeded.

Subsequent to the ER analysis described above, a new STP evacuation time study, "South Texas Project, Development of Evacuation Time Estimates", September, 2007 (2007 ETE), was completed. A sensitivity analysis was performed to determine the effect that this later study would have on the severe accident impact risks. A 2007 ETE evacuation time of 4 hours and 20 minutes (winter mid-week mid-day rain) was chosen. This time represents severe conditions and evacuation of 95% of the EPZ population. The 2007 ETE 10-mile population was taken as the sum of residents and transients (2875 + 3577 = 6452). All other parameters were assumed unchanged from the earlier study. The 2060 evacuation speed, analogous to that calculated in the previous paragraph, is [{10 miles/ (260 – 120) min} * (6452/ 8834) =] 1.40 m/s, approximately half of the speed calculated based on the 1994 ETE report.

The severe accident risks were then recalculated using the MACCS2 code with the baseline evacuation speed of 2.73 m/s replaced by 1.40 m/s. Risks were essentially unchanged, with maximum differences between the two cases no more than 1%. Accordingly, the ER analysis remains valid.

CANDIDATE COLA REVISION:

The second sentence of ER Sub-section 7.2.2.1 contains a typo and should be replaced by, "The analysis assumed that 95% of the *10-mile* population was evacuated following declaration of a general emergency. People that do not evacuate remain at their residences and are exposed as if they are going about their normal activities."

Question 07.02-06

QUESTION:

Provide a list of major surface water users within 50 mi of STP Units 3 & 4, especially public water supplies.

Full Text (Supporting Information):

The MACCS2 code estimates a water ingestion dose based on user input. Section 2.3.2.1 includes a partial list of surface water users, but not all; it does not include surface water users within the Tres Palacios River Basin. For MACCS2 analysis, the surface water pathway is an extension of the air pathway, and therefore is not constrained to a single watershed. Provide the basis for not considering all of the appropriate surface water users or an update of the analysis.

RESPONSE:

The MACCS2 surface water pathway analysis is not constrained to a single watershed, but instead considers all water within 50-miles of the STP Units 3 & 4 site. The MACCS2 surface water model is described in Volume 1 of the MACCS2 User's Guide, NUREG/CR-6613. The calculations assume that the 50-miles surrounding the site is divided between land (land fractions in MACCS2 site file) and water. Parameters are included in the Chronic module input file which describe the fraction of deposited material on land which makes its way to water via runoff; the model directly calculates the amount of material depositing directly on the water. A parameter is included which relates the fraction of material which reaches the water which is consumed by humans. The parameters chosen were those from MACCS Sample Problem A. The conservative assumption was made that ALL water within 50-miles of the Units 3 & 4 site is drinkable. Therefore, surface water users within the Tres Palacios River Basin are addressed.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 07.02-07

QUESTION:

Revise the discussion of the groundwater pathway risks for STP Units 3 & 4 to support the conclusion in the last sentence of ER Section 7.2.2.3.

Full Text (Supporting Information):

ER Sub-section 7.2.2.3 discusses the groundwater pathway. However, the discussion does not appear to support the conclusion in the last sentence of the section. The first paragraph of the section is not related to either severe accidents or STP Units 3 & 4. The second paragraph is not related to STP Units 3 & 4. The discussion in the third paragraph does not support the conclusion in the final sentence of the paragraph. Doses are not related to core damage frequency. Provide an update to the section to discuss groundwater pathway risk.

RESPONSE:

NUREG-1437 evaluated the groundwater pathway dose, based on the analysis in NUREG-0440, the Liquid Pathway Generic Study (LPGS) (Reference 7.2-8). NUREG-0440 analyzed a core meltdown that is assumed to contaminate groundwater that subsequently contaminates surface water. NUREG-1437 compares STP 1 & 2 groundwater pathway severe accident doses to the results of NUREG-0440; the STP 1 & 2 results are shown to be very much less than the LPGS value.

ER section 2.3.1.2 (and Figures 2.3.1-23 and 24) describes the groundwater flow path from the STP site. Shallow aquifer water flows towards discharge points at a livestock well and towards the Colorado River. The deep aquifer is separated from the shallow aquifer by a 100-150 foot thick clay and silt layer. Groundwater in the deep aquifer flows toward site production wells, thus precluding the potential for offsite migration. Therefore the basis of the LPGS analysis for STP, that the flow is toward surface water and not toward a drinking water well used by humans, is substantiated.

NUREG-1437 concludes that the risk from groundwater releases is a small fraction of that from atmospheric releases for sites such as STP.

CANDIDATE COLA REVISION:

ER Subsection 7.2.2.3 will be replaced with the following text:

"Radioactivity released during a severe accident could enter the groundwater. ER section 2.3.1.2 (and Figures 2.3.1-23 and 24) describes the groundwater flow path from the STP site. Shallow aquifer water flows towards discharge points at a livestock well and towards the Colorado River.

The deep aquifer is separated from the shallow aquifer by a 100-150 foot thick clay and silt layer. Groundwater in the deep aquifer flows toward site production wells, thus precluding the potential for offsite migration. Due to the separation of shallow and deep layers and the deep aquifer flow directions, the latter layer does not affect potential offsite migration impacts.

NUREG-1437 evaluated the groundwater pathway dose, based on the analysis in NUREG-0440, the Liquid Pathway Generic Study (LPGS) (Reference 7.2-8). NUREG-0440 analyzed a core meltdown that is assumed to contaminate groundwater that subsequently contaminates surface water. NUREG-1437 compares STP 1 & 2 groundwater pathway severe accident doses to the results of NUREG-0440; the STP 1 & 2 results are shown to be very much less than the LPGS value. NUREG-1437 concludes that the risk from groundwater releases is a small fraction of that from atmospheric releases for sites such as STP.

The proposed location for STP 3 & 4 has the same groundwater characteristics as the location for STP 1 & 2. The severe accident frequency for the ABWR (1.5×10^{-7} per reactor year) is lower than that of STP 1 & 2 (1×10^{-5} per reactor year). Furthermore, the ABWR has containment features which would mitigate and even prevent a core meltdown from escaping the primary containment. These features include: the containment having inert gas, a high density basaltic concrete below the vessel (corium shield), and fusible plug valves that would allow the lower drywell to flood from the suppression pool. Therefore, the risks from the STP 3 & 4 groundwater pathway would not only be less than from the air pathways, but would be less than from the existing units."

Question 07.02-08

QUESTION:

Describe how the average individual risk listed in ER Section 7.2.3 was determined.

Full Text (Supporting Information):

Section 7.2.3 and Table 7.2–1 present an average individual risk for comparison with the Commission's safety goal. Average individual risk can be calculated using early fatality estimates generated by the MACCS2 code. However, the MACCS2 analyst did not configure the input files to enable the output to report the appropriate early fatality estimates, and as a result, the output files do not contain the detail necessary for comparison.

RESPONSE:

The MACCS2 Early module input file was configured so that the code calculated the population weighted fatality risk (input parameter TYPE8NUMBER) for 0 to 1 mile from the site. The population weighted risk is the total (sum of individual) risk of early fatality divided by the total population in the 0 to 1 mile ring around the site. The calculation takes into account both the site-specific wind rose and the population distribution. This site-specific population weighted risk is the average individual early fatality risk from 0 to 1 mile presented in ER Section 7.2.

See response to RAI 7.2-1 for further information on this topic.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 07.02-09

QUESTION:

Discuss ABWR DCD COL action items and open items related to severe accidents and how the action and open items will be addressed.

Full Text (Supporting Information):

Section 7.2 of the ER does not address COL action items and open items related to severe accidents that are listed in Section 19.9 of the ABWR DCD, Revision 4. These items need to be acknowledged and addressed.

RESPONSE:

Section 19.9 of the ABWR DCD, Revision 4, describes action items to be completed by the COL applicant. Most of those items involve development of procedures, personnel training or testing of equipment. Such items will be developed and implemented prior to fuel loading.

Section 19.9 of the STP 3 & 4 FSAR acknowledges and addresses the COL action items identified in Section 19.9 of the ABWR DCD, Revision 4.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 07.03-01

QUESTION:

Discuss the process for ensuring that SAMAs related to operating procedure and administrative controls will be evaluated prior to plant startup.

Full Text (Supporting Information):

Section 7.3.3 presents a discussion leading to the conclusion that SAMAs associated with administrative changes are likely not to be cost beneficial. However, the last paragraph of the section states that evaluation of specific administrative controls will occur when the Units 3 & 4 design is finalized. How will completion of that evaluation be tracked?

RESPONSE:

Operating procedures and administrative controls for STP 3 & 4 are not yet developed. Prior to plant startup, such procedures and controls will be evaluated. It is not known at this time which specific administrative controls will be evaluated as SAMAs. Tracking completion of action items, such as SAMA evaluations of STP 3 & 4 administrative controls, could be by such means as an action tracking program or a schedule entry. By either method, a due date for the completion of the item and a responsible individual or organization will be assigned to perform the action.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 08.00-01

QUESTION:

Clarify ownership of STP Units 3 & 4.

Full Text (Supporting Information):

Section 8.0 and throughout the ER, various names are given for the same owners of Units 3 & 4 (e.g. CPS, City of San Antonio, CPS–Energy). Clarify NRG LP 3 & 4 are separate entities owned by NRG Energy. Verify these titles throughout other chapters.

RESPONSE:

Although the owners of STP Units 3 & 4 are mentioned throughout the STP COLA, the ownership entities and their relationship are described in detail primarily in three places: Section 1.2, General Information, of COLA Part 1 and Subsections 1.1.2.1, The Applicant and Owners, and 8.1.1, Project Description and Owners, of COLA Part 3 (Environmental Report). To reflect recent changes in the ownership arrangement, the changes below are proposed. Due to other pending changes to COLA Part 1, final wording may be altered for consistency.

CANDIDATE COLA REVISION:

COLA Part 1 Section 1.2:

The first two paragraphs will be revised as follows:

The applicants for STP 3 & 4 are NRG South Texas 3 LLC, NRG South Texas 4 LLC, CPS Energy, and STPNOC as described in the requested license actions above. The required general information for the applicants is provided below ~~separated by applicant~~.

NRG South Texas 3 LLC and NRG South Texas 4 LLC

NRG South Texas 3 LLC and NRG South Texas 4 LLC operate in the state of Texas and will be indirectly ~~wholly owned subsidiaries of~~ majority-owned and controlled by NRG Energy, Inc. (NRG Energy), which has a controlling interest in ~~NRG Energy, Inc. (NRG Energy)~~ Nuclear Innovation North America LLC (NINA)~~, which is expected to be a wholly owned subsidiary of NRG Holdings, Inc. following a planned restructuring~~. Through its wholly owned subsidiaries, NINA will own 100% of NRG South Texas 3 LLC and NRG South Texas 4 LLC. NINA itself is a joint venture currently owned 88% by NRG Energy and 12% by Toshiba America Nuclear Energy Corporation (Toshiba America Nuclear). Toshiba America Nuclear Energy Corporation is a wholly owned subsidiary of Toshiba America, Inc., a Delaware corporation, which is a wholly owned subsidiary of Toshiba Corporation, a Japanese corporation.

The ~~existing~~ ownership structure of these companies is reflected in Figure 1.2-1 ~~and the ownership structure planned at the time a COL would be issued is reflected in Figure 1.2-2~~. Because Toshiba America Nuclear is only a minority (12%), non-controlling investor in an intermediate holding company in the corporate ownership chain of the NRG licensees, further detailed corporate information is not provided regarding the various direct, intermediate, and ultimate parent companies of the Toshiba America Nuclear.

Figure 1.2-1 will be revised as shown:

and Figure 1.2-2 will be deleted.

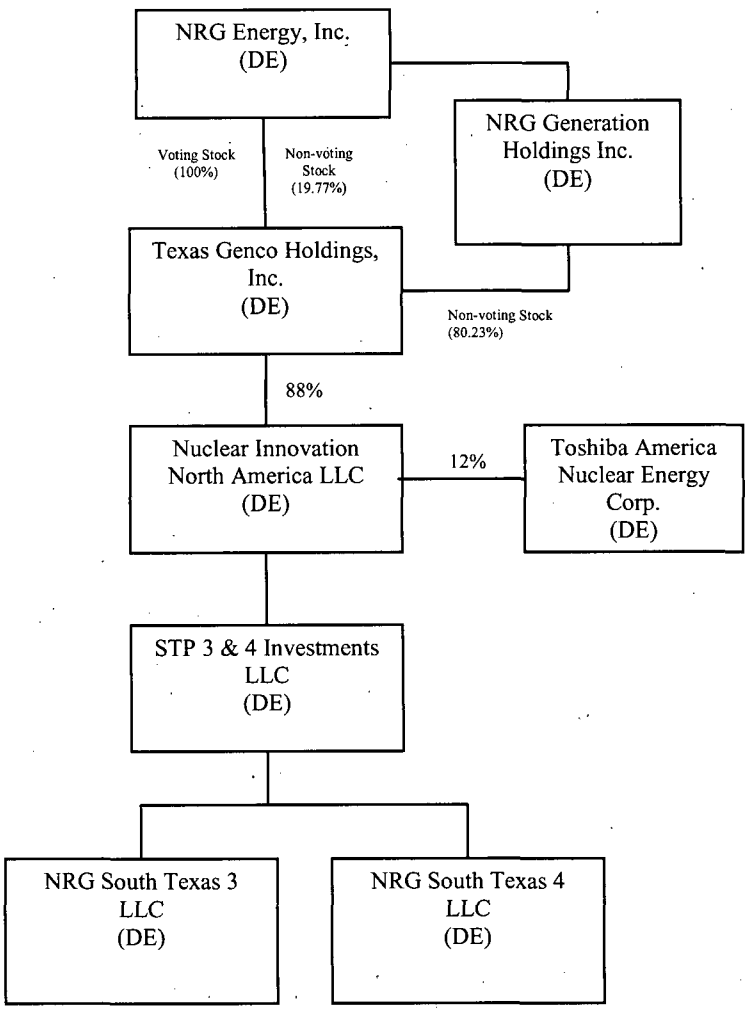

Figure 1.2-1 NRG Energy Corporate Structure

The first paragraph of COLA Part 3 Subsection 1.1.2.1 will be revised as follows:

NRG South Texas LP (44% ownership), City Public Service Board of San Antonio, Texas (~~CPS or~~ CPS Energy) (40% ownership), and the City of Austin, Texas (16% ownership) are the owners of the STP 1 & 2 site and facilities. STPNOC is the licensed operator of STP 1 & 2, with control of STP 1 & 2 and the authority to act as the agent applying for a COL for the STP site. ~~At this time, it is planned that~~ STP 3 will be owned by NRG South Texas 3 ~~LP~~ LLC and CPS Energy, and ~~that~~ STP 4 will be owned by NRG South Texas 4 ~~LP~~ LLC and CPS Energy. Pursuant to existing agreements, the NRG entities and CPS Energy would each own 50% of each unit. If plans regarding the ownership percentages change, this application will be updated accordingly. The proposed units would be baseload merchant generator plants. NRG South Texas 3 ~~LP~~ LLC and NRG South Texas 4 ~~LP~~ LLC intend to sell their shares of the power from STP 3 & 4 on the wholesale market. CPS Energy may either use its share of STP 3 & 4 to supply the needs of its service area and/or sell the power on the wholesale market.

The first two paragraphs of COLA Part 3 Subsection 8.1.1 will be revised as follows:

South Texas Project Unit 3 will be owned by NRG South Texas 3 ~~LP~~ LLC and the City of San Antonio, Texas, acting by and through the City Public Service Board (~~CPS or~~ CPS Energy). South Texas Project Unit 4 will be owned by NRG South Texas 4 ~~LP~~ LLC and CPS Energy. Once licensed and built, STP 3 & 4 will be operated by STP Nuclear Operating Company. STP 3 & 4 each utilizes the GE Advanced Boiling Water Reactor (ABWR) light water reactor design rated at approximately 1370 MWe (gross). Initial commercial operation for STP 3 & 4 is expected to be June 2015 and July 2016, respectively.

NRG South Texas 3 ~~LP~~ LLC and NRG South Texas 4 ~~LP~~ LLC are ~~wholly owned subsidiaries of~~ indirectly majority-owned an controlled by NRG Energy, Inc. (NRG Energy). In this discussion, "NRG" is used when referring to NRG Energy, the parent, or to one of the NRG South Texas ~~LPs~~ LLCs. Further detail regarding the ownership of the NRG South Texas LLCs is provided in Part 1 of the COLA. NRG is a wholesale power generation company, primarily engaged in the ownership and operation of power generation facilities and the sale of energy, capacity and related products in the United States and internationally. NRG has a diverse portfolio of electric generation facilities in terms of geography, fuel type, and dispatch levels. NRG does not meet the definition of an electric utility in 10 CFR 50.2. NRG is a merchant generator that will sell its share of the electricity generated at STP 3 & 4 to the wholesale market in bilateral transactions with wholesale purchasers of electric power and at market prices. As such, NRG does not have a specific service area in the traditional sense of prederegulation utilities. The area of Texas that is served by the Electric Reliability Council of Texas (ERCOT) is the area in which NRG intends to sell its power.

Throughout the remainder of the COLA, references to the owners of STP Units 3 & 4 will be to NRG Energy (or NRG) and CPS Energy (or CPS). Presentation of ownership entities will be made consistent with that described above in a future COLA revision. At that time, the information in COLA Part 1 Table 1.2-1 will be revised and updated for the entities shown in the revised Figure 1.2-1.

Question 09.03.02-01

QUESTION

Provide the documentation that supports the statements and conclusions used in Section 9.3 on terrestrial resources at the Limestone site.

Full Text (Supporting Information):

Section 9.3.2.1.4 of the ER states that the impacts to terrestrial resources at the Limestone site "would be similar to those at the proposed STP site." During the alternative site visit, staff was told by NRG representatives that the STP Units 3 & 4 would likely be constructed on the Freestone County portion of the facility, as opposed to Limestone County where the coal plant is located. It is not clear if the evaluation of the Limestone site in the ER was for the region in Limestone or Freestone County. Clarify the description of the site as to the specific area evaluated. Based on the use of readily available information (e.g., GIS layers describing the habitats and vegetation of Texas or national land cover datasets), and assuming the same footprint as the STP site, respond to the following associated requests: (1) Identify any forested habitats or wooded bottomlands in the area where the plant would be constructed. (2) What proportion or acreage of the proposed site comprises farmland, rangeland, and industrial activities? (3) Identify any wetlands on the site that could be impacted by construction activities. (4) Identify the size and extent of the wetlands.

RESPONSE

The Limestone site, as noted in Section 9.3.3.1, encompasses portions of Freestone, Limestone, and Leon counties. A likely location for a plant on the site is in the eastern half of the site perimeter, which is located almost entirely in Freestone County.
The evaluation for the Limestone Site encompassed Limestone, Freestone, and Leon counties. As noted in Section 9.3.3.1.4,

> Most of the undeveloped portion of the site is land managed for agriculture and livestock although some of the proposed plant site is existing industrial land, the Limestone Generating Station. The area surrounding this proposed site consists of open cropland and pasture habitats interspersed with wooded bottomlands and forested patches, multiple limestone mining sites, lignite mining sites, and Lake Limestone to the south. Animal species that occur on the Limestone Site are those typically found in similar habitats in the Post Oak Savannah region of Texas.

In response to the Request for Information, STPNOC re-visited Google Earth imagery of the site. The Freestone County portion of the Limestone Site includes a landfill and limestone mining area at the boundary between Freestone and Limestone County. The eastern portion of the site is

primarily rangeland interspersed with forested patches and multiple limestone mining sites, and Lake Limestone is to the south (beyond the site boundary).

The remainder of the request is answered below, using the five sub-categories of information requested.

1. *Identify any forested habitats or wooded bottomlands in the area where the plant would be constructed.*
   If located in the Freestone County portion of the site, the STP Units 3 & 4 would likely be located near the landfill and limestone mining area rather than the undeveloped pasture and woody patches in order to minimize environmental impact (Google Earth 2008). If this location is selected there would be little or no impact to forested habitats or wooded bottomlands.
2. *What proportion or acreage of the proposed site comprises farmland, rangeland, and industrial activities?*
   Approximately 45% of the Limestone Alternative Site is occupied by industrial uses, including the Limestone site in Limestone County, as well as the developed land immediately east of the Limestone plant, located in Freestone County.
   Undeveloped land comprises the remainder of the site. Based on a review of Google Earth imagery, approximately 45% of the undeveloped land is forested upland. Less than ten percent (10%) appears to be cropland.
3. *Identify any wetlands on the site that could be impacted by construction activities.*
   Google Earth imagery indicates that there are no wetlands within the site boundaries. Additionally, reviews of available GIS data from the U.S. Geological Survey (USGS) and the Texas Parks and Wildlife Department show that the area is primarily forested uplands (USGS 2008, TPWD 2008).
4. *Identify the size and extent of the wetlands.*
   No wetlands were identified within the boundaries of the Limestone Site.

CANDIDATE COLA REVISION:

The second sentence of section 9.3.3.1 will be changed as follows:

The site is located at the junction of ~~in eastern~~ Limestone ~~County~~, ~~at its junction with~~ Freestone and Leon counties, about 2.5 miles southeast of Farrar and 8 miles north of Jewett (Reference 9.3-11).

REFERENCES

Google Earth 2008. Available at www.googleearth.com, search terms Freestone County, TX. Accessed June 12, 2003.

TPWD 2008. Texas Parks and Wildlife Department, *Vegetation Types of Texas 1984.* Available at: http://www.tpwd.state.tx.us/landwater/land/maps/gis/map_downloads/map_gallery/bio/. Accessed June 13, 2008.

USGS 2008. U.S. Geological Society, *Map Studio* 2008. Available at: http://gisdata.usgs.net/website/Map%5FStudio/viewer.php. Accessed June 13, 2008

Question 09.03.02-04

QUESTION:

Please describe potential impacts to threatened or endangered species and their habitats as a result of construction and operation at each of the three alternative sites.

Full Text (Supporting Information):

An up-to-date summary of the potential presence of threatened or endangered species in the terrestrial or aquatic environment at the three alternative sites is required to evaluate the potential impact of construction and operations on related terrestrial and aquatic habitats.

RESPONSE:

The potential impacts to threatened or endangered species and their habitats as a result of construction and operation at each of the three alternative sites have been described in the ER Section 9.3.3. As discussed in Section 9.3.3, a review of readily available information did not reveal potential impacts to threatened or endangered species or critical habitat.
The tables below provide an up-to-date summary of the potential presence of threatened or endangered species in the terrestrial or aquatic environment at the county level for the three alternative sites. The information provided below was obtained from the Texas Parks & Wildlife Department.

Protected Species in Counties Containing the Limestone Site Facility and Transmission Lines (Freestone County, Limestone County and Leon County) (TPWD 2008a)

Common Name	Scientific Name	Federal Status	State Status
Amphibians			
Houston Toad	*Bufo houstonensis*	E	E
Birds			
American Peregrine Falcon	*Falco peregrinus anatum*	DL	E
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	T
Bachman's Sparrow	*Aimophila aestivalis*		T
Bald Eagle	*Haliaeetus leucocephalus*	DL	T
Interior Least Tern	*Sterna antillarum athalassos*	E	E

Protected Species in Counties Containing the Limestone Site Facility and Transmission Lines (Freestone County, Limestone County and Leon County) (TPWD 2008a)			
Common Name	**Scientific Name**	**Federal Status**	**State Status**
Peregrine Falcon	*Falco peregrinus*	DL	ET
Piping Plover	*Charadrius melodus*	T	T
White-faced Ibis	*Plegadis chihi*		T
Whooping Crane	*Grus americana*	E	E
Wood Stork	*Mycteria americana*		T
Fishes			
Smalleye shiner	*Notropis buccula*	C	
Mammals			
Red wolf	*Canis rufus*	E	E
Louisiana black bear	*Ursus americanus luteolus*	T	T
Reptiles			
Alligator snapping turtle	*Macrochelys temminckii*		T
Texas horned lizard	*Phrynosoma cornutum*		T
Timber/Canebrake rattlesnake	*Crotalus horridus*		T
Plants			
Large-fruited sand-verbena	*Abronia macrocarpa*	E	E
Navasota ladies'-tresses	*Spiranthes parksii*	E	E
E = Endangered; T = Threatened; C = Candidate; DL = Delisted; Blank = Not listed.			

Protected Species in Henderson County Containing the Malakoff Site Facilities and Transmission Lines (TPWD 2008a)			
Common Name	**Scientific Name**	**Federal Status**	**State Status**
Birds			
American Peregrine Falcon	*Falco peregrinus anatum*	DL	E
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	T
Bachman's Sparrow	*Aimophila aestivalis*		T
Bald Eagle	*Haliaeetus leucocephalus*	DL	T
Interior Least Tern	*Sterna antillarum athalassos*	E	E
Peregrine Falcon	*Falco peregrinus*	DL	E
Piping Plover	*Charadrius melodus*	T	T
Whooping Crane	*Grus americana*	E	E
Wood Stork	*Mycteria americana*		T
Mammals			
Black bear	*Ursus americanus*		T
Red wolf	*Canis rufus*	E	E
Reptiles			
Alligator snapping turtle	*Macrochelys temminckii*		T
Northern scarlet snake	*Cemophora coccinea copei*		T
Texas horned lizard	*Phrynosoma cornutum*		T
Timber/Canebrake rattlesnake	*Crotalus horridus*		T
E = Endangered; T = Threatened; C = Candidate; DL = Delisted; Blank = Not listed.			

Protected Species in Austin County Containing the Allen's Creek Site Facilities (TPWD 2008a)			
Common Name	**Scientific Name**	**Federal Status**	**State Status**
Amphibians			
Houston Toad	*Bufo houstonensis*	E	E
Birds			
American Peregrine Falcon	*Falco peregrinus anatum*	DL	E
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	T
Attwater's Greater Prairie-Chicken	*Tympanuchus cupido attwateri*	E	E
Bald Eagle	*Haliaeetus leucocephalus*	DL	T
Interior Least Tern	*Sterna antillarum athalassos*	E	E
Peregrine Falcon	*Falco peregrinus*	DL	E
White-tailed Hawk	*Buteo albicaudatus*		T
Whooping Crane	*Grus americana*	E	E
Wood Stork	*Mycteria americana*		T
Mammals			
Louisiana black bear	*Ursus americanus luteolus*	T	T
Red wolf	*Canis rufus*	E	E
Reptiles			
Alligator snapping turtle	*Macrochelys temminckii*		T
Smooth green snake	*Liochlorophis vernalis*		T
Texas horned lizard	*Phrynosoma cornutum*		T
Timber/Canebrake rattlesnake	*Crotalus horridus*		T
E = Endangered; T = Threatened; C = Candidate; DL = Delisted; Blank = Not listed.			

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

REFERENCES:

TPWD 2008a. Texas Parks and Wildlife Department, Annotated County Lists of Rare Species. Available at http://gis.tpwd.state.tx.us/TpwEndangeredSpecies/DesktopDefault.aspx. Accessed May 30, 2008.

Question 09.03.03-01

QUESTION:

Describe the process used to quantify the impact statement for aquatic resources at the Limestone site and provide the documentation that supports the statements and conclusions used in Section 9.3.

Full Text (Supporting Information):

Section 9.3.3.1.5 states that the aquatic resources at the Limestone site "would be SMALL to MODERATE, and greater than those at the proposed STP site." Describe the process used to quantify the impact statement for aquatic resources at the Limestone site. Describe the differences between the Limestone site and the STP site that justify rating the aquatic resource impacts differently.

RESPONSE:

As noted in Section 9.3.3.1.5:

> Water for closed loop cooling would likely come from Lake Limestone, a 12,553 acre impoundment reservoir located on the Navasota River. Short term impacts to aquatic resources in the lake would likely occur from construction of intake structures. Construction and operation of discharge and intake structures would also have an impact on lake and river aquatic resources.
> Using impact categories as outlined in NUREG-1437, impacts to aquatic resources at the Limestone site would be SMALL to MODERATE, and greater than those at the proposed STP site, since potential consumption for operation may affect aquatic ecology.

The impact descriptions for the Limestone Site are based on the impact analysis in NUREG-1437:

> SMALL--For the issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
> MODERATE--For the issue, environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
> LARGE--For the issue, environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Construction and operation of the proposed STP Units 3 & 4 at the Limestone site would require development of a water resource, which could be from Lake Limestone, other surface waters, or from existing groundwater sources. Acquiring water from these surface sources would require construction of intake and discharge structures, as well as a pipeline to carry the water to the

plant site. Because it is expected that there would be a short-term construction impact to the aquatic resources, it was determined that the SMALL to MODERATE designation best described the short-term destabilization and potential alteration of the aquatic environment. In contrast, the proposed STP Site has a developed water resource: the cooling pond was originally developed to provide water for four units. Additionally, construction activities at "the Reservoir Makeup Pumping Facility (RMPF) and Spillway and Blowdown Facilities (includes spillway discharge channel and blowdown pipeline) would be limited to installing new pumps in the existing bays at the RMPF." Construction impacts are described in detail in Section 4.3.2 of the ER. As noted there, "no important aquatic species are expected to be affected. Impacts to aquatic communities from construction would be SMALL and temporary, and would not warrant mitigation."

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 09.03.03-02

Question:

QUESTION:

Describe the process used to quantify the impact statement for aquatic resources at the Allens Creek site and provide the documentation that supports the statements and conclusions used in Section 9.3.

Full Text (Supporting Information):

Section 9.3.3.2.5 states that the aquatic resources at the Allen's Creek site "would be SMALL, similar to those at the proposed STP site." The section states that intake and discharge structures could cause short–term adverse effects to the proposed lake's aquatic environment. Provide information about the aquatic resources in the Brazos River/Allen's Creek watershed. Is the statement about "short–term adverse effects" associated with construction or operation? If the phrase concerns operation, how is that impact considered to be short–term over the operational period for the proposed plant? Describe the process used to quantify the impact statement for aquatic resources at the Allen's Creek site and the water resources used to supply the proposed lake.

RESPONSE:

The impact descriptions for the Allen's Creek site are based on the impact analysis in NUREG-1437:

> SMALL--For the issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
> MODERATE--For the issue, environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
> LARGE--For the issue, environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Construction and operation of the proposed STP Units 3 & 4 at the Allen's Creek site would require development of a water resource as required by Texas law.

As noted in section 9.3.3.2.3 and 9.3.3.2.5, STPNOC assumed that sufficient ground water is available for the construction and operation of the proposed STP Units 3 & 4, although ground water resources would need to be developed. Additionally, it was noted that water could be available from the Allen's Creek reservoir once it was constructed. STPNOC did not assume

that it would build the reservoir. Instead, it assumed that the reservoir would be constructed by third parties (the City of Houston and the Brazos River Authority).
STPNOC assessed the environmental impacts of building the site on the shores of the proposed reservoir. The proposed reservoir is a 168,000 acre feet off-channel reservoir. The project will impound water available from the Allen's Creek watershed, as well as water diverted and pumped from the Brazos River during periods of flow in excess of downstream needs. The location for the proposed Allen's Creek Reservoir lies directly above the confluence of Allen's Creek and the Brazos River. A spillway from the reservoir will continue the flow from Allen's Creek into the Brazos River. Once the reservoir is completed, the impacts to the lake from construction of an intake and pumping system (as described in Section 4.3.2) would not noticeably alter the lake's ecosystem.

The construction of a cooling water intake and discharge structure was assumed for the facility sited at Allen's Creek. The design of the intake structure would comply with the requirements of Section 316(b) of the Clean Water Act, thereby reducing the potential impacts of entrainment and impingement to sensitive species. The design of the new discharge system would also comply with the requirements of Section 316(b) of the Clean Water Act thereby reducing the potential impacts of increased thermal discharge temperatures on sensitive species. STPNOC thus concluded that the impact of construction and operation on aquatic resources would be SMALL.

The following description of the Allen's Creek project and affected watershed is provided from the Texas Water Development Board's assessment of the project, available at http://www.twdb.state.tx.us/rwpg/main-docs/2006RWPindex.asp.

> Allen's Creek is a third-order intermittent tributary of the lower Brazos River in southern Austin County, Texas. From its headwaters in Sealy, Allen's Creek flows south-southeast and enters the Brazos River 10 km downstream. Year round water flow to the lower portions of Allen's Creek is maintained by effluent discharge from the City of Wallis wastewater treatment facility. The proposed reservoir site is located immediately upstream of the FM 1458 road crossing, approximately 900 m above the Allen's Creek confluence with the Brazos River.
> The headwaters of the Brazos River originate in New Mexico. The river meanders eastward across Texas then southeast into the Gulf of Mexico. Several flood control dams and water supply reservoirs are located along the upper reaches of the watershed partially regulating the natural discharge regime. Situated between Austin and Fort Bend counties (29°40'N and 96°01'W), [the watershed] is located in the Western Gulf Coastal Plain physiographic region and drains approximately 72,000 km2. Rangeland and crop production dominates the land use of the lower Brazos River watershed.
> The Allen's Creek Reservoir site is located on Allen's Creek, a tributary to the Brazos River in Austin County. The site was originally permitted by Houston Lighting and Power as a cooling water reservoir for a proposed nuclear power plant. The site was later jointly purchased by the Brazos River Authority and the City of Houston. A water right permit has been issued for this project to the Texas Water Development Board, Brazos River Authority (BRA) and the City of Houston for use of 99,650 acre-feet per year for municipal, industrial and irrigation purposes. The water is permitted for inter-basin

transfer to the San Jacinto and San Jacinto-Brazos basins. 70% of the permit (69,750 acre-feet per year) is owned by the City of Houston, and 30% of the permit (29,900 acre-feet per year) is owned by the BRA. The maximum dam height is 53-feet, and the conservation storage is approximately 145,500 acre-feet at an elevation of 121.0 feet mean sea level.

The phrase "short term environmental impacts" relates to the potential effects of construction. Construction of the intake structure in the proposed Allen's Creek Reservoir would result in short-term impacts such as silting. These effects would clear once construction was completed, and would be mitigated by management practices during construction. It is not assumed that there would be additional or long term impacts to the aquatic resources from operation of the facility.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 09.03.03-03

QUESTION:

Describe the process used to quantify the impact statement for aquatic resources at the Malakoff site and provide the documentation that supports the statements and conclusions used in Section 9.3.

Full Text (Supporting Information):

Section 9.3.3.3.5 states that the aquatic resources at the Malakoff site "would be SMALL, similar to those at the proposed STP site." There is no information about the aquatic resources at the "reservoirs or rivers adjacent to the site that would be used for the proposed plant. Is the statement about "short-term adverse effects" associated with construction or operation? If the phrase concerns operation, how is that impact considered to be short-term over the operational period for the proposed plant? Describe the process used to quantify the impact statement for aquatic resources at the Malakoff site.

RESPONSE:

The impact descriptions for the Malakoff site are based on the impact analysis in NUREG-1437:

> SMALL--For the issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
> MODERATE--For the issue, environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
> LARGE--For the issue, environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Withdrawal water for the proposed plant would come from Lake Palestine on the Neches River located to the east of the site. As noted in ER Section 9.3.3.3.5, discharge from the facility would likely be to Walnut Creek, which is part of the Trinity River watershed. The process used to quantify the impact statement for the aquatic resources took into account the effect of water withdrawal on species known to occur at Lake Palestine. The process also took into account the impact of discharge to Walnut Creek on fish species occurring in the Trinity River watershed.

The phrase "short term environmental impacts" relates to the potential effects of construction. Construction of the intake structure at the proposed Malakoff site would result in short-term impacts such as silting. These effects would clear once construction was completed, and would be mitigated by management practices during construction. It is not assumed that there would be additional or long term impacts to the aquatic resources from operation of the facility.

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

Question 09.03-05

QUESTION:

Who are the current owners of the Allens Creek and Malakoff alternative sites?

Full Text (Supporting Information):

Who are the current owner of the portions of the Allens Creek and Malakoff alternative sties upon which new nuclear units could potentially be sited?

RESPONSE:

The current owner of the Allens Creek and Malakoff alternative sites is Texas Genco Services, LP, and indirect wholly owned subsidiary of NRG Energy, Inc (NRG 2008).

CANDIDATE COLA REVISION:

No COLA revision is required as a result of this response.

REFERENCES:

NRG 2008. NRG Energy, Inc., *E-mail Correspondence from Eddy Daniels re: Ownership of Malakoff and Allens Creek Sites*. June 16, 2008.

Question 09.03-06

QUESTION:

Reconcile conflicting socioeconomic impact levels for the Limestone site.

Full Text (Supporting Information):

ER Section 9.3.3: "Impacts to socioeconomic issues at the Limestone, site will be SMALL, with potential MODERATE beneficial impacts. These impacts are somewhat less than those at the proposed site." Detailed impacts were described in this section as generally similar to impacts at the STP site, some of which (e.g. traffic impacts on roads, housing) were described as MODERATE to LARGE at the STP site. Explain the differences between the sites that justify the different impacts.

RESPONSE:

The impact descriptions for the Limestone site are based on the impact analysis in NUREG-1437:

> SMALL--For the issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
> MODERATE--For the issue, environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
> LARGE--For the issue, environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The principal difference in the impact assessment between the Limestone site and the STP site is geographical. The STP site is near the Gulf of Mexico. This coastal location reduces the opportunities for additional transportation infrastructure and housing alternatives available near the STP site. As noted in Section 4.4.2.2.4 of the ER, the impacts on the 2-lane roads leading to and from the STP site will be MODERATE to LARGE, since additional traffic will result in stress on the existing roadways as well as traffic congestion for which mitigation will be required. The overall socioeconomic impact at the STP site is described as SMALL to MODERATE in section 9.3.3.4.6.

The Limestone site is inland and has the benefit of 360 degrees of transportation infrastructure and housing alternatives available to the site. The Limestone site is also a developed industrial site situated within a network of interstate highways and state roads that provide better options for mitigation of additional traffic flows (TXDOT 2007, TXDOT 2007a). This transportation network allows the workforce to live and commute within the fifty-mile radius of the Limestone site. Additionally, the conclusion about socioeconomic impacts at the Limestone site was a broad-based summary of the conclusions identified in section 9.3.3.1.6; the conclusion that

overall socioeconomic impacts are SMALL to MODERATE is identical to the conclusion about the STP site.

CANDIDATE COLA REVISION:

The text of section 9.3.3.3.6 will be changed as follows:

The predicted socioeconomic impacts of construction and operation at the Limestone site are summarized below, using the general descriptions of construction impacts outlined in section 4.4 and 5.8 of this ER:

- The population distribution near the site is low with typical rural characteristics. Some population increase with the construction and operation of the plant is possible, but it is likely that much of the work force will come from within the region. As noted in section 4.4.2.1, STPNOC assumed a population increase for Matagorda County due to construction at the STP site. However, for the Limestone site, nearby population centers such as Waco and Austin would likely absorb much of the new population impacts. It is expected that adverse impacts related to a construction labor force at the Limestone site will be MODERATE. During operation it is expected that the impacts on population distribution will be SMALL. ~~Impacts of increased population will be similar to those at the proposed STP site.~~
- Physical impacts as a result of construction and operation would be SMALL, similar to those at the ~~proposed~~ STP site.
- Economic impacts of construction and operation would be similar to those described in Chapters 4 and 5 of this ER. Wages and increased taxes will likely have a SMALL to LARGE beneficial impact, and be similar to those at the proposed STP site.
- Impacts to transportation will be similar to those at the ~~proposed~~ STP site. STPNOC predicted MODERATE to LARGE impacts at the STP site, and it is expected that impacts would be similar in the area immediately around the site. However, the availability of alternate routes to the Limestone site will minimize the impact of increased traffic into and out of the area. As a result, the overall impact on transportation routes to the site is expected to be generally MODERATE. During operation the impacts are expected to be SMALL, except during outages where transportation impacts will be MODERATE
- Impacts on aesthetics and recreation will be similar to those at the STP site. Construction of cooling towers may increase the aesthetic impact of the plant at the Limestone site.
- Impacts on housing from the construction labor force are expected to be ~~similar to~~ less than those at the ~~proposed~~ STP site. Although STPNOC predicted MODERATE to LARGE impacts from housing in Matagorda County, it assumes that increased housing demands at the Limestone site will be met by nearby population centers such as Waco and Austin. STPNOC assumed that new housing would be constructed in Freestone County to accommodate some of the

work force population. As a result, the impacts on housing from the construction labor force at the Limestone site are considered MODERATE.

- Impacts to public services and educational systems are expected to be similar to those at the ~~proposed~~ STP site. STPNOC considered the impacts MODERATE to LARGE for the STP site; it anticipated that the increase in school populations would be absorbed by larger school districts in Waco and Austin. Some local school districts in Freestone and Limestone counties may experience some pressure as a result of increased student population during plant construction and operation. However, STPNOC predicts that an increase in school population will result in MODERATE impacts.

Impacts to socioeconomic issues at the Limestone site will be SMALL to MODERATE, with potential MODERATE beneficial impacts. Generally, these impacts are similar to those at the STP site, although some adverse impacts (such as population, housing, and transportation) may be moderated at Limestone by the site's proximity to more populated areas such as Waco and Austin, Texas. ~~These impacts are somewhat less than those at the STP site~~.
ANALYSIS.

REFERENCES:

TXDOT 2007. Texas Department of Transportation, *E-mail communication from Julie Pollard: Urban Traffic Counts for Waco, TX and Limestone County.* June 26, 2007, with attachments.

TXDOT 2007a. Texas Department of Transportation, *E-mail communication from Julie Pollard: Urban Traffic Counts for Anderson, Freestone, and Leon Counties.* June 26, 2007, with attachments

Question 09.03-07

QUESTION:

Reconcile conflicting socioeconomic impact levels for the Allen's Creek site.

Full Text (Supporting Information):

ER Section 9.3.3: "Impacts to socioeconomic issues at the Allen's Creek site will be SMALL, with potential MODERATE beneficial impacts, and MODERATE effects in Austin County, where the influx of workers could strain services. These impacts are similar or greater than those impacts predicted for the proposed site. Detailed impacts were described in this section as generally similar to impacts at the STP site, some of which (e.g. traffic impacts on roads, housing) were described as MODERATE to LARGE at the STP site. Explain the differences between the sites that justify the different impacts.

RESPONSE:

The impact descriptions for the Allens Creek site are based on the impact analysis in NUREG-1437:

> SMALL--For the issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
> MODERATE--For the issue, environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
> LARGE--For the issue, environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The principal difference in the impact assessment between the Allens Creek site and the STP site is geographical. The STP site is near the Gulf of Mexico. This coastal location reduces the opportunities for additional transportation infrastructure and housing alternatives available near the STP site. As noted in Section 4.4.2.2.4 of the ER, the impacts on the 2-lane road leading to and from the site will be MODERATE to LARGE, since additional traffic will result in stress on the existing roadways as well as traffic congestion for which mitigation will be required. The overall socioeconomic impact at the proposed site is described as SMALL to MODERATE in section 9.3.3.4.6.

The transportation impacts at the Allen's Creek site would be somewhat less because the Allen's Creek Site is situated on State Road 36, which is the main thoroughfare between the small towns of Wallis and Sealy. Further, the Allens Creek site is near Houston Texas, and its suburbs. It has the benefit of transportation infrastructure and housing alternatives available to the site. This transportation network allows the workforce to live and commute within the fifty-mile radius of the Allens Creek site (TXDOT 2007, TXDOT 2007a). With implementation of the same

mitigation practices proposed for the STP site, it was anticipated that the impact of construction on transportation would be generally MODERATE. Additionally, the conclusion about overall socioeconomic impacts at the Allens Creek site was a broad-based summary of the conclusions identified in section 9.3.3.2.6; the conclusion that socioeconomic impacts are SMALL to MODERATE is identical to the conclusion about the proposed site.

CANDIDATE COLA REVISION:

The text in section 9.3.3.2.6 will be changed as follows:

- The population distribution near the site is low with typical rural characteristics. Some population increase with the construction and operation of the plant is possible, but it is likely that much of the work force will come from within the region. As noted in section 4.4.2.1, STPNOC assumed a population increase for Matagorda County due to construction at the STP site. However, for the Allens Creek site, nearby population centers such as Houston and its suburbs would likely absorb much of the new population impacts. It is expected that adverse impacts related to population growth from construction of the facility at the Allens Creek site will be MODERATE. Impacts of increased population will be similar to those at the proposed STP site.
- Physical impacts as a result of construction and operation would be SMALL, similar to those at the proposed STP site.
- Economic impacts of construction and operation would be similar to those described in Chapters 4 and 5 of this ER. Wages and increased taxes will likely have a SMALL to LARGE beneficial impact, and be similar to those at the proposed STP site.
- Impacts to transportation will be similar to those at the proposed STP site. STPNOC predicted MODERATE to LARGE impacts at the STP site, and it is expected that impacts would be similar in the area immediately around the site. However, the availability of alternate routes to the Allens Creek site will minimize the impact of increased traffic into and out of the area. As a result, the overall impact on transportation routes to the site is expected to be generally MODERATE. During operation the impacts are expected to be SMALL, except during outages where transportation impacts will be MODERATE.
- Impacts on aesthetics and recreation will be similar to those at the STP site. Construction of cooling towers may increase the aesthetic impact of the plant at the Allens Creek site.
- Impacts on housing from the construction labor force are expected to be similar to less than those at the proposed STP site. Although STPNOC predicted MODERATE to LARGE impacts from housing in Matagorda County, it assumes that increased housing demands at the Allens Creek site will be met by nearby population centers such as Houston and its suburbs. STPNOC assumed that some new housing would be constructed in Austin County to accommodate a portion of the work force population. As a result, the impacts on housing from the construction labor force at the Allens Creek site are considered MODERATE.

- Impacts to public services and educational systems are expected to be similar to those at the proposed STP site. STPNOC considered the impacts MODERATE to LARGE for the STP site; it anticipated that the increase in school populations at Allens Creek would be absorbed by larger school districts within the area. Some local school districts in Austin County may experience some pressure as a result of increased student population during plant construction and operation. However, STPNOC predicts that an increase in school population will result in MODERATE impacts.

Impacts to socioeconomic issues at the Allens Creek site will be SMALL to MODERATE, with potential ~~MODERATE~~ beneficial impacts. These impacts are somewhat less than those at the STP site.

REFERENCES:

TXDOT 2007. Texas Department of Transportation, *E-mail communication from Julie Pollard: Traffic Counts for Fort Bend County.* June 26, 2007, with attachments.

TXDOT 2007a. Texas Department of Transportation, *E-mail communication from Julie Pollard: Traffic Counts for Waller, Austin, and Wharton Counties.* June 26, 2007, with attachments.

Question 09.03-08

QUESTION:

Reconcile conflicting socioeconomic impact levels for the Malakoff site.

Full Text (Supporting Information):

ER Section 9.3.3: "It is expected that socioeconomic impacts would be SMALL to MODERATE, similar to those at the proposed STP site, since an influx of construction workers could temporarily adversely affect resources in Henderson County. However, MODERATE, beneficial impacts may also occur as a result of increased taxes and jobs in the county." Detailed impacts were described in this section as generally similar to impacts at the STP site, some of which (e.g. traffic impacts on roads, housing) were described as MODERATE to LARGE at the STP site. Explain the differences between the sites that justify the different impacts.

RESPONSE:

The impact descriptions for the Malakoff site are based on the impact analysis in NUREG-1437:

> SMALL--For the issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
> MODERATE--For the issue, environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
> LARGE--For the issue, environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The principal difference in the impact assessment between the Malakoff site and the STP site is geographical. The STP site is near the Gulf of Mexico. This coastal location reduces the opportunities for additional transportation infrastructure and housing alternatives near the STP site. As noted in Section 4.4.2.2.4 of the ER, the impacts on the 2-lane roads leading to and from the site will be MODERATE to LARGE, since additional traffic will result in stress on the existing roadways as well as traffic congestion for which mitigation will be required. The overall socioeconomic impact at the proposed site is described as SMALL to MODERATE in section 9.3.3.4.6.

The transportation impacts at the Malakoff site would be somewhat less because the Malakoff site is near Dallas, Texas and has the benefit of transportation infrastructure and housing alternatives available to the site. The Malakoff site is also within a network of roads that, while rural in nature, provide better options for mitigation of additional traffic flows. This transportation network allows the workforce to live and commute within the fifty-mile radius of the Malakoff site (TXDOT 2007, TXDOT 2007a). Additionally, the conclusion about overall socioeconomic impacts at the Malakoff site was a broad-based summary of the conclusions

identified in section 9.3.3.3.6; the conclusion that socioeconomic impacts are SMALL to MODERATE is identical to the conclusion about the proposed site.

CANDIDATE COLA REVISION:

The text of section 9.3.3.3.6 will be changed as follows:

The predicted socioeconomic impacts of construction and operation at the Malakoff site are summarized below, using the general descriptions of construction impacts outlined in sections 4.4 and 5.8 of this ER:

- The population distribution near the site is low with typical rural characteristics. Some population increase with the construction and operation of the plant is possible, but it is likely that much of the work force will come from within the region. As noted in section 4.4.2.1, STPNOC assumed a population increase for Matagorda County due to construction at the STP site. However, for the Malakoff site, nearby population centers such as Dallas and its suburbs would likely absorb much of the new population impacts. It is expected that adverse impacts related to a construction labor force at the Malakoff site will be MODERATE. During operation it is expected that the impacts on population distribution will be SMALL. ~~Impacts of increased population will be similar to those at the proposed STP site.~~
- Physical impacts as a result of construction and operation would be SMALL, similar to those at the proposed STP site.
- Economic impacts of construction and operation would be similar to those described in Chapters 4 and 5 of this ER. Wages and increased taxes in the area will likely have a SMALL to LARGE beneficial impact, and be similar to those predicted at the proposed STP site.
- Impacts to transportation will be similar to those at the proposed STP site. STPNOC predicted MODERATE to LARGE impacts at the STP site, and it is expected that impacts would be similar in the area immediately around the site. However, the availability of alternate routes to the Malakoff site will minimize the impact of increased traffic into and out of the area. As a result, the overall impact on transportation routes to the site is expected to be generally MODERATE. During operation the impacts are expected to be SMALL, except during outages where transportation impacts will be MODERATE.
- Impacts on aesthetics and recreation will be similar to those at the STP site. Construction of cooling towers may increase the aesthetic impact of the plant at the Malakoff site.
- Impacts on housing from the construction labor force are expected to be ~~similar to~~ less than those at the proposed STP site. Although STPNOC predicted MODERATE to LARGE impacts from housing in Matagorda County, it assumes that increased housing demands at the Malakoff site will generally be met by nearby population centers such as Dallas and its suburbs. STPNOC assumed that new housing would be constructed in Henderson County to accommodate some of the work force population. As a result, the impacts on housing from the construction labor force at the Malakoff site are considered MODERATE.

- Impacts to public services and educational systems are expected to be similar to those at the proposed STP site. STPNOC considered the impacts MODERATE to LARGE for the STP site; it anticipated that the increase in school populations would be absorbed by larger school districts within the area. Some local school districts may experience some pressure as a result of increased student population during plant construction and operation. However, STPNOC considers that an increase in school population will result in MODERATE impacts.

Impacts to socioeconomic issues at the Malakoff site will be SMALL to MODERATE, with potential ~~MODERATE~~ SMALL to LARGE beneficial impacts. Generally, these impacts are similar to those at the STP site, although some impacts (such as population, housing, and transportation) may be moderated at Malakoff by the site's proximity to more populated areas such as Dallas, Texas and its suburbs.

REFERENCES:

TXDOT 2007. Texas Department of Transportation, *E-mail communication from Julie Pollard: Urban Traffic Counts for Henderson County*. June 26, 2007, with attachments.

TXDOT 2007a. Texas Department of Transportation, *E-mail communication from Julie Pollard: Urban Traffic Counts for Navarro County*. June 26, 2007, with attachments.