From: Muir, Jessie
Sent: Thursday, November 12, 2009 9:41 AM
To: STPCOL
Subject: FW: Transmittal Letter U7-C-STP-NRC-090201
Attachments: U7-C-STP-NRC-090201 (2.3.1_5.2_5.4).pdf

From: Kiesling, Russell W [mailto:rwkiesling@STPEGS.COM]
Sent: Thursday, November 12, 2009 9:38 AM
To: Muniz, Adrian; Dyer, Linda; Wunder, George; Muir, Jessie; Lopas, Sarah; Tonacci, Mark; Eudy, Michael; Plisco, Loren; Anand, Raj; Foster, Rocky; Joseph, Stacy; Govan, Tekia; Tai, Tom
Subject: Transmittal Letter U7-C-STP-NRC-090201

Attached is a courtesy copy of the transmittal letter U7-C-STP-NRC-090201 which contains supplemental information for COLA Part 3, Environmental Report. This letter was signed on the 11th and will be in today's mailing. Please feel free to contact me if you have any questions.

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November 11, 2009
U7-C-STP-NRC-090201

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
Proposed Revision to Environmental Report

Attached are changes to the Combined License Application (COLA) Part 3, Environmental Report. These changes include supplemental information in sections 2.3.1, 5.2, and 5.4. These changes will be incorporated in the next regular revision of the COLA.

There are no commitments in this letter.

If you have any questions, please feel free to contact me at (361) 972-7206, or Russell W. Kiesling at (361)-972-4716

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

Executed on 11/11/2009

M A McBurnett

Mark McBurnett
Vice President, Oversight & Regulatory Affairs
South Texas Project, Units 3 & 4

rwk

Attachment 1: COLA Part 3 Section 2.3.1 Supplemental Text
Attachment 2: COLA Part 3 Section 5.2 Supplemental Text
Attachment 3: COLA Part 3 Section 5.4 Supplemental Text

STI: 32573285

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COLA Part 3 Section 2.3.1 - Supplemental Text

STPNOC makes the following revisions to the Environmental Report, which will be incorporated into the next routine update of the COLA.

ER Section 2.3.1.1.2.1

STPNOC adds the following new ER Section 2.3.1.1.2.1:

2.3.1.1.2.1 Seepage from the MCR

As discussed above, the existing 7000-acre MCR would provide cooling water for STP 3 & 4. The maximum operating level elevation of the MCR is 49 ft above MSL, imposing a hydraulic head of up to 20 ft above the reservoir floor. The capacity of the MCR at this elevation is approximately 202,600 acre-ft. The MCR embankment dike and associated features are designed to lower the hydraulic gradient across the embankment to the extent that the potentiometric levels of the soil layers in the site area stay below the ground surface. This is accomplished through the use of low permeability clay (compacted fill), relief wells, and sand drainage blankets. The relief well system consists of 770 wells that have been installed in the Upper Shallow Aquifer at the toe of the embankment around the reservoir to relieve excess hydrostatic pressure.

The purposes of MCR seepage controls provided by the relief wells are as follows (Reference 2.3.1-9):

- To minimize seepage through the embankment section and prevent detrimental discharge on downstream slopes.
- To minimize underseepage beneath the embankment and control its exit in order to prevent detrimental uplift and discharge at the downstream toe.
- To limit the maximum piezometric level at the relief well line to El. 27.0 MSL opposite the power block structures.

The 7000-acre MCR is unlined, allowing seepage of water from the MCR through the reservoir floor. This seepage acts as a local recharge source to the Shallow Aquifer at the site. During the design stage, total seepage from the MCR, based on a maximum operating water level of 49 feet above MSL, was estimated to be 3530 gpm, or approximately 5700 acre-ft/yr (Reference 2.3.1-9). Seepage discharge from the MCR has two flow paths: (a) part of the seepage is collected by the relief well system, which is installed in the sands of the Upper Shallow Aquifer, and is then discharged to surface waters; and (b) part of the seepage bypasses the relief wells and continues in the Upper Shallow Aquifer in a southeasterly direction to the Colorado River.

Approximately 68%, or 3850 acre-ft/yr, of the total expected MCR seepage would be discharged through the relief wells (Reference 2.3.1-9) and into surface waters. The distribution of relief well surface water discharge results in approximately 28% being returned to the Colorado River, 53% to Little Robbins Slough, 18% to the East Fork of Little Robbins Slough and <1% being returned to the West Branch of the Colorado River (Reference 2.3.1-42). These discharges were originally authorized under NPDES Permit No. TX0064947, and currently are authorized under TPDES Permit No. WQ0001908000.

The remaining 32% (approximately 1850 acre-ft/yr) would move into the Upper Shallow Aquifer and migrate to the southeast, discharging at the Colorado River. Groundwater flow is discussed further in Section 2.3.1.2.3.4. STPNOC periodically monitors the potentiometric head and flow rates at the MCR relief wells to assist in controlling the potentiometric head and seepage within the dike structure. The water level within the MCR during the operation of STP 3 & 4 would remain within the original design levels (49 feet above MSL). Therefore, because the seepage rate is affected by the water level of the MCR and the MCR water level with STP 3 & 4 would remain within original design levels, the addition of STP 3 & 4 would have an insignificant impact on the current MCR seepage rate.

Water quality at the site is discussed in Section 2.3.3, including surface water quality and groundwater quality in Sections 2.3.3.1 and 2.3.3.2, respectively. The quality of the seepage water from the MCR is regulated by controlling the quality of the water entering the MCR from the operating units and the overall quality of water in the MCR itself. Additionally, the environmental impacts due to operation of STP 3 & 4 on water quality at the site is discussed in Section 5.2.3, including the environmental impacts to surface water quality and groundwater quality in Sections 5.2.3.1 and 5.2.3.2, respectively.

ER Section 2.3.1.2.3.3

Because the information is incorporated into the new ER Section 2.3.1.1.2.1, STPNOC deletes the third and fourth paragraphs of ER Section 2.3.1.2.3.3, as follows:

~~The 7000-acre MCR is unlined and may act as a local recharge source to the Shallow Aquifer at the site. The normal maximum operating level elevation is 49 ft above MSL, imposing a hydraulic head of up to 20 ft above ground surface. The capacity of the MCR at this elevation is approximately 202,600 acre-ft. The MCR embankment dike and associated features are designed to lower the hydraulic gradient across the embankment to the extent that the potentiometric levels of the soil layers in the site area stay below the ground surface. This is accomplished through the use of low permeability clay (compacted fill), relief wells, and sand drainage blankets. Discharge to the environment from the MCR occurs from seepage through the reservoir floor to the groundwater.~~

~~Groundwater flow from the MCR is intercepted in part by the relief well system, installed into the sands of the Upper Shallow Aquifer, around the perimeter of the MCR. Groundwater is discharged from the passive relief wells and collected in toe and drainage ditches around the periphery of the MCR embankment and then discharged to surface water features at various locations. Seepage discharge from the MCR is composed of two parts: (a) seepage that is collected and discharged through approximately 770 relief wells that have been installed in the Upper Shallow Aquifer at the toe of the embankment around the reservoir to relieve excess hydrostatic pressure and (b) seepage through the Upper Shallow Aquifer that bypasses the relief wells and continues down gradient. During the design stage, total seepage of the MCR was estimated to be 3530 gpm, or approximately 5700 acre-ft/yr. Of this value, approximately 68%, or 3850 acre-ft/yr, would be discharged through the relief wells (Reference 2.3.1-9). STPNOC periodically monitors the potentiometric head and flow rates at the MCR relief wells to assist in controlling the potentiometric head and seepage within the dike structure.~~

~~The purpose of MCR seepage controls are as follows (Reference 2.3.1-9):~~

- ~~To minimize seepage through the embankment section and prevent detrimental discharge on downstream slopes.~~
- ~~To minimize underseepage beneath the embankment and control its exit in order to prevent detrimental uplift and discharge at the downstream toe.~~
- ~~To limit the maximum piezometric level at the relief well line to El. 27.0 MSL opposite the power block structures.~~

<u>ER Section 2.3.1.3</u>

STPNOC adds the following reference:

2.3.1-42. Response to Wastewater Discharge Permit Renewal, NPDES Permit # TX0064947. Houston Lighting and Power to USEPA Letter Correspondence. May 21, 1993.

COLA Part 3 Section 5.2 - Supplemental Text

STPNOC makes the following revisions to the Environmental Report, which will be incorporated into the next routine update of the COLA.

ER Section 5.2.3.1

STPNOC modifies ER Section 5.2.3.1 as follows:

5.2.3.1 ~~Chemical Impacts~~Surface Water Quality

Mechanical draft cooling towers, such as the ones proposed for the STP 3 & 4 UHS, remove waste heat by allowing water to evaporate to the atmosphere. The water lost to evaporation must be replaced continuously with makeup water to prevent the accumulation of solids and solid scale formation. To prevent buildup of these solids, a small portion of the circulating water with elevated levels of solids is drained or blown down, and cooling tower water chemistry must be maintained with anti-scaling compounds and corrosion inhibitors.

Similarly, because conditions in cooling towers are conducive to the growth of fouling bacteria and algae, a biocide must be added to the system. This is normally a chlorine or bromine-based compound, but occasionally, hydrogen peroxide or ozone is used. Table 3.6-1 lists water treatment chemicals currently used for STP 1 & 2 and that would likely be used in STP 3 & 4.

Water drawn from the Colorado River is expected to require limited treatment to prevent biofouling in the makeup intake structure and makeup water piping. Additional water treatment would take place in the cooling tower basins, and would include the addition of biocides, anti-scaling compounds, and dispersants. Sodium hypochlorite and sodium bromide are used to control biological growth in the existing circulating water system and would likely be used in the new system as well.

TPDES Permit No. WQ0001908000, issued in 2005 (Reference 5.2-9), regulates the outfalls that discharge to the MCR, which assures that necessary treatment and monitoring for nonradioactive contaminants occurs before discharge to the MCR. The permit limits total residual chlorine (0.05 milligrams per liter daily maximum) from any single generating unit for more than two hours per day unless longer periods are required for macroinvertebrate control. ~~Discharge from the MCR may not exceed 12.5% of the flow of the Colorado River at the discharge point.~~ Processed wastewater discharged from STP 3 & 4 facilities to the MCR would be similar to that currently discharged under the STP 1 & 2 TPDES permit. STPNOC would submit the necessary applications to TCEQ for permitting the proposed STP 3 & 4 discharges to the MCR.

The existing TPDES permit states that discharges from the MCR may not exceed 12.5% of the flow of the Colorado River at the discharge point. Additionally, discharges are not permitted when the river flow is less than 800 cfs.

As discussed in Section 2.3.1.1.2.1, the 7000-acre MCR is unlined, allowing seepage of water from the MCR through the reservoir floor. During the design stage, total seepage from the MCR, based on a maximum operating water level of 49 feet above MSL, was estimated to be 3530 gpm, or approximately 5700 acre-ft/yr. Seepage discharge from the MCR has two flow paths: (a) part of the seepage is collected by the relief well system, which is installed in the sands of the Upper Shallow Aquifer, and is then discharged to surface waters; and (b) part of the seepage bypasses the relief wells and continues in the Upper Shallow Aquifer in a southeasterly direction to the Colorado River. In addition to these two seepage flow paths, water can be discharged from the MCR through blowdown to the Colorado River.

Discharge from the MCR cannot occur when the Colorado River is less than 800 cfs and cannot exceed 12.5% of the river flow (Reference 5.2-9). As discussed in Subsection 2.3.2, there is currently no routine discharge from the MCR to the Colorado River. STP 1 & 2 has discharged water from the MCR to the Colorado River once, in 1997. Projections of the MCR water quality and additional demands upriver could necessitate the use of the STP permitted reservoir blowdown system to maintain water quality by 2010. MCR water quality is currently maintained by selective pumping during high river flow conditions (>1200 cfs) (Reference 5.2-10). If upstream demands increase, the availability of water at a flow greater than 1200 cfs could be reduced.

During normal operation, water in the MCR evaporates, causing an increase in constituents in the MCR, such as total dissolved solids (TDS). Blowdown from the MCR to the Colorado River would occur as necessary to maintain the MCR water quality at an average of 3000 micro-Siemens per centimeter (µS/cm) (Reference 5.2-4). This conductivity measurement is a good indicator for the TDS levels in the MCR. The current TPDES permit (Reference 5.2-10) allows an average MCR discharge rate of 144 MGD with a daily maximum of 200 MGD. The permit pH range for water discharged from the MCR is between 6.0 and 9.0 standard units. The water temperature daily average limit is 95°F with a daily maximum of 97°F. The total residual chlorine daily maximum is 0.05 milligrams per liter (mg/L) (Reference 5.2-10). Limits on outfall concentrations, rates, and schedules for STP 3 & 4 operational discharges to the MCR would be determined through the TPDES permitting process. STPNOC would submit the new or modified permit provisions to the NRC when they become available.

The maximum calculated duration of continuous blowdown to the Colorado River for two-unit operation is 88 days and for four-unit operation is 73 days. These results are based on simulations using the historical flow record of the Colorado River. In the year with the maximum duration of continuous blowdown, the annual diversion limit is reached earlier in the year for the four-unit scenario because of the higher consumption, as compared with the two-unit scenario. When the annual limit is reached, no further makeup to the MCR is allowed in that year according to the diversion rules and as a result, blowdown is not permitted either (except under extreme rainfall events). Therefore, the four-unit scenario shows a shorter duration of continuous blowdown. Blowdown occurrences are governed by the operating rules of the MCR that depend on the dynamic relationships of multiple parameters including water level, conductivity and temperature in the MCR, and the flow of the Colorado River.

The MCR is routinely monitored for constituents other than TDS, such as metals and salts, to determine effectiveness of the water treatment program to minimize biofouling and condenser scaling and corrosion. Surface water quality data for metals and salts for two rounds of samples collected from the MCR in 2006 are presented in Table 2.3.3-3. These low concentrations of metals and salts indicate the high quality of the water contained in the MCR and reflect the source term for water leaving the MCR. Current water quality at the site is discussed in Section 2.3.3 and surface water quality is specifically discussed in Section 2.3.3.1. As discussed above, discharges to the MCR for STP 3 & 4 water treatment would be comparable to STP 1 & 2 with the use of biocides and anti-scalants. Because STP 3 & 4 are not anticipated to regenerate ion exchange resin, STP 3 & 4 would actually discharge less chemicals to the MCR than currently discharged from STP 1 & 2. Due to the additional reservoir makeup required to offset evaporation and the limited amount of discharge from STP 3 & 4, the concentrations of chemicals and other constituents in the MCR water would be expected to increase only slightly, if at all. Existing constituents in the MCR are comparable to the state drinking water standards, except for aluminum and arsenic which are not attributed to plant operation and introduced from ground and surface water sources. Therefore, the impacts to water quality in the MCR due to addition of STP 3 & 4 are expected to be SMALL. Similarly, impacts to other surface water bodies which directly or indirectly receive water from the MCR also would be SMALL.

The MCR water budget and water quality model is set up to simulate the operation of all four units (existing STP 1 & 2 and proposed STP 3 & 4) at the STP site. The simulation uses historical Colorado River flows as well as projected flows accounting for the proposed Lower Colorado River Authority/San Antonio Water System diversions to evaluate the incremental impact on water and aquatic resources from the addition of proposed STP 3 & 4 under anticipated changes in the water supplies of the Lower Colorado River Basin. Based on modeling to evaluate the impacts of adding STP 3 & 4 to the MCR system, the amount of TDS would increase slightly. Using historical Colorado River flows, the mean TDS was calculated to increase from 2,178.5 mg/L to 3,076.8 mg/L, and using the proposed Lower Colorado River Authority/San Antonio Water System diversions, the mean TDS was calculated to increase from 2,256.0 mg/L to 3,838.8 mg/L (Reference 5.2-13). However, the number of days of blowdown required to maintain acceptable levels of TDS would change by less than 1% (Reference 5.2-13). The reach of the Colorado River associated with MCR blowdown is within the tidal influence of the Gulf of Mexico. River TDS varies significantly from practically freshwater to saltwater in this area. Additionally, any blowdown to the Colorado River is limited to less than 12.5% of the river flow and to only when river flow is greater than 800 cubic feet per second, so the TDS would be within the range normally seen for this reach of the river. Therefore, impacts to the Colorado River from TDS would be SMALL.

As discussed in Subsection 2.3.3, during 2004 Segment 1401 of the Colorado River (the reach of the river associated with STP) was listed as fully supporting aquatic life, contact recreation, and general use (Reference 5.2-11). As indicated in Reference 5.2-12, Segment 1401 was added to the list of impaired waters due to the presence of bacteria. The STP 1 & 2 wastewater treatment facility currently discharges treated water to the MCR where it is diluted by water of the MCR and reused. The waste water from current STP 1 & 2 facilities does not discharge directly to the Colorado River.

Impacts of chemicals in the proposed MCR blowdown on the Colorado River water quality would be SMALL and would not warrant mitigation. STPNOC would submit the necessary permit applications to TCEQ for review for a modified or new TPDES permit for STP 3 & 4 facility discharges to the MCR and from the MCR to the Colorado River. TCEQ would evaluate potential effects of STP 3 & 4 on the MCR water quality and the Colorado River water quality and determine if adjustments are necessary to the current TPDES permitted 001 outfall limits. STPNOC would monitor the MCR water quality on a regular basis in conjunction with the MCR water level to determine if and when blowdown is necessary. STPNOC would continue to monitor flow of the Colorado River prior to withdrawing surface water and discharging water to the Colorado River.

Tritium produced in the STP 1 & 2 reactor coolant systems is released via liquid discharges to the MCR. Tritium is a radioactive isotope of hydrogen and is a part of the water molecule. Although radioactive effluents are treated to remove impurities by the Liquid Waste Processing System (LWPS) prior to discharge, tritium cannot be removed because it is chemically part of the water molecule. Since tritium is part of the water it does not concentrate in the environment and is only diluted when it comes in contact with off-site water.

Sampling for radionuclides in water at the site is performed as part of the site's Radiological Environmental Monitoring Program (REMP). Surface water quality data for radionuclides from sampling in 2005 are presented in Table 2.3.3-4 and tritium concentrations in surface water, including the MCR, from 1995-2005 are presented in Table 2.3.3-5. STP 1 & 2 discharge about 2000 Curies (Ci) of tritium to the MCR annually. The tritium concentration in the MCR has been relatively constant for many years, and well below the EPA drinking water standard for tritium of 20,000 pCi/L and the NRC reporting limit of 30,000 pCi/L under the REMP.

STP 3 & 4 may add an additional 16 Ci each year to the MCR from tritium. This much lower value is due to the difference in the reactor design and water chemistry for STP 3 & 4 compared to STP 1 & 2. Consequently, the concentration of tritium in the MCR may increase, but the average increase would be less than 1%. Year to year fluctuations in precipitation, reservoir makeup, evaporation rate, and STP 1 & 2 release rates would have a greater effect on tritium concentration than any contributions from STP 3 & 4.

Table 12.2-22 of the FSAR indicates the average annual release concentration of tritium to the MCR from the operation of STP 3 & 4 would be 8.38 pCi/L. Historically, the highest concentrations of tritium reported in the MCR for the operation of STP 1 & 2 are at MCR Blowdown #216 and are approximately 10,000 pCi/L (See Table 2.3.3-5). Overall monitoring of surface water from Table 2.3.3-5 averages approximately 6,000 pCi/L. Based on these values, the additional input of an average of 8.38 pCi/L from STP 3 & 4 would not significantly increase the tritium concentrations in the MCR, and would be well below the EPA drinking water standard. Hence, any discharge to the groundwater or to an offsite body of water like the Colorado River would be safe even before dilution. Therefore, the impact of tritium in the MCR or discharged to the Colorado River would be SMALL.

As discussed in Section 2.3.1.1.2.1, approximately 68%, or 3850 acre-ft/yr, of the total expected MCR seepage would be discharged through the relief wells and into surface waters. The distribution of relief well surface water discharge results in approximately 28% being returned to the Colorado River, 53% to Little Robbins Slough, 18% to the East Fork of Little Robbins Slough and <1% being returned to the West Branch of the Colorado River. Because the levels of tritium in the MCR are below the EPA drinking water standard, the impact of tritium in discharges to the Colorado River, Little Robbins Slough, the East Fork of Little Robbins Slough, and the West Branch of the Colorado River from the relief wells would be SMALL.

The remaining 32%, or 1850 acre-ft/yr, of the total expected MCR seepage would move into the Upper Shallow Aquifer and migrate to the southeast, discharging at the Colorado River. The discharge point of groundwater from the Upper Shallow Aquifer to the Colorado River is over 4,000 feet from the MCR. At a travel time of 40 feet/yr, groundwater would not reach surface water discharge points for approximately 100 years. The half-life for tritium is 12.3 years, meaning that during the 100 year travel time, the tritium concentrations in groundwater would decay over 8 half lives resulting in a concentration of less than 1% of the original concentration seeping from the MCR. If the initial groundwater concentration of tritium is 10,000 pCi/L, the concentration upon arrival at surface water discharge points without taking dilution over time and distance into consideration would be less than 100 pCi/L, which is well below the EPA drinking water standard of 20,000 pCi/L. Therefore, the impact on surface water from the Upper Shallow Aquifer discharge would be SMALL.

ER Section 5.2.3.2

STPNOC modifies ER Section 5.2.3.2 as follows:

5.2.3.2 ~~References~~Groundwater Quality

The shallow aquifer zone in this area contains water of marginal to poor quality. Results of chemical analyses taken before STP 1 & 2 operation indicated that this water was objectionable for potable use because of total hardness, chlorides, metals, and TDS. For these reasons, potable water, and water for other plant uses, is obtained from the deep aquifer.

As part of the REMP, groundwater quality is monitored from Upper Shallow Aquifer wells within 6 miles of the site. Results of the analyses are presented in Section 2.3.3. Surface water quality data for metals and salts for two rounds of samples collected from the MCR in 2006 are presented in Table 2.3.3-3. The low quantities of metals and salts reflect the high quality of water present in the MCR and reflect the source term for groundwater seepage to the Upper Shallow Aquifer. Section 5.2.3.1 discusses the environmental impacts of TDS and other constituents in the MCR due to the addition of STP 3 & 4 and concludes that those impacts are SMALL. Because the source of any TDS or other constituents in groundwater is from the MCR, the environmental impacts of the TDS or other constituents in the groundwater would also be SMALL.

In addition, the quality of water discharged to the MCR and the quality of the water discharged from the MCR are currently maintained to meet TCEQ-permitted levels, and would continue to be maintained with the addition of STP 3 & 4. Additionally, as discussed in Section 5.2.3.1, the quality of the water in the MCR is and would remain high, and would not adversely impact biota if consumed. Given the high quality of the MCR water, any discharge from the MCR to the groundwater would not result in significant impacts to groundwater. As stated in Section 2.3.1.1.2, there would be no significant changes in the design of the MCR for the addition of STP 3 & 4 and there would be insignificant changes in the seepage rates from the MCR due to the addition of STP 3 & 4. In addition, UFSAR 2.4.13.4, Monitoring or Safeguard Requirements, indicates that Upper Shallow Aquifer groundwater levels are monitored periodically through piezometers installed appropriately around the site. Significant changes in water levels or basic groundwater flow patterns would be evaluated to determine if additional monitoring of groundwater would be required. Groundwater quality data from the piezometers can also be evaluated to determine if any additional monitoring frequencies or new monitoring well points need to be established. Therefore, impacts to the Upper Shallow Aquifer as a result of the operation of STP Units 3 & 4 would be SMALL.

As discussed above in Section 5.2.3.1, tritium contributed to the MCR by STP 3 & 4 is expected to increase the tritium concentration by less than 1%. Currently, almost half of the tritium is removed from the reservoir annually. Tritium in the MCR is also diluted by reservoir makeup water diverted from the Colorado River and direct rainfall. Tritium concentrations also decrease due to radioactive decay. For these reasons, the environmental impacts of tritium in the MCR and in other surface waters from the operation of STP 3 & 4 are SMALL because the tritium levels are below the EPA drinking water standard for tritium of 20,000 pCi/L and the NRC reporting limit of 30,000 pCi/L under the REMP. Any discharge offsite via the above pathways to surface waters or groundwater would also remain below established limits and would continue to be confirmed per the REMP. Therefore, impacts of four-unit operation on the shallow aquifer would be SMALL.

Furthermore, the results of radionuclide analyses for 2005 are presented in Table 2.3.3-9 with tritium being the only constituent reported above detection levels (260 pCi/L) at 1,600 pCi/L. The location of the well with the detectable tritium concentrations is located adjacent to the MCR and 3.8 miles south of STP 1 & 2. In 2006, groundwater from 16 wells in the Upper Shallow Aquifer was analyzed quarterly for tritium. The analytical results are summarized in Table 2.3.3-10. The only well reporting tritium above the detection limit of 300 pCi/L was piezometer well number 435-02, located 700 feet west of the MCR embankment and 2.9 miles southwest of STP 1&2. Detected tritium concentrations ranged from 309 to 593 pCi/L, well below the EPA drinking water standard of 20,000 pCi/L. (Note that the detection level varies based on the background and the size of the sample).

Table 12.2-22 of the FSAR indicates the average annual release concentration of tritium to the MCR from the operation of STP 3 & 4 would be 8.38 pCi/L. Historically, the highest concentrations of tritium reported in the MCR for the operation of STP 1 & 2 are at MCR Blowdown #216 and are approximately 10,000 pCi/L (Table 2.3.3-5). Overall monitoring of surface water from Table 2.3.3-5 averages approximately 6,000 pCi/L. Based on these values, the additional input of an average of 8.38 pCi/L from STP 3 & 4 would not significantly increase the tritium concentrations in the MCR.

As discussed in Section 2.3.1.1.2.1, discharge to the environment from the MCR occurs from seepage through the reservoir floor to the groundwater. Groundwater flow from the MCR is intercepted in part by the relief well system, installed into sands of the Upper Shallow Aquifer. Groundwater is discharged from the passive relief wells and collected in toe and drainage ditches around the periphery of the MCR embankment and then discharged to surface water.

As described in Section 2.3.1.1.2.1, a portion of the seepage from the MCR would not be captured by the relief well system (approximately 32%). The ODCM model for the site has been prepared utilizing well data that suggests migration of groundwater seeping from the MCR into the Shallow Aquifer travels at approximately 40 ft/yr. The nearest offsite well used for watering livestock is located 1,400 feet from the reservoir. Conservatively assuming the flow is directly to this well, groundwater would not reach this well for 35 years. The half-life for tritium is 12.3 years, meaning that during the 35 year travel time, the tritium concentrations in groundwater would decay 2.8 half lives or to approximately 16 percent of the original concentration seeping from the MCR. If the initial groundwater concentration of tritium is 10,000 pCi/L, the concentration upon arrival at the offsite well would be approximately 1,600 pCi/L without taking dilution over time and distance into consideration. The tritium concentration is still well below the EPA drinking water standard for tritium of 20,000 pCi/L. Therefore, the impact on users of the well water from the Upper Shallow Aquifer would be SMALL.

The shallow aquifer is separated from the deep aquifer by more than 150 feet of predominantly clay sediments which effectively seal the deep aquifer from reservoir seepage. Therefore, there would be no environmental impacts to the deep aquifer from tritium produced by operation of STP 3 & 4.

5.2.3.3 References

5.2-1 TCEQ (Texas Commission on Environmental Quality) 2007. Letter from Kelly Holligan (TCEQ) to R. A. Gangluff (STP Nuclear Operating Company) Re: Cooling Water Intake Structures Phase II Rules; South Texas Project Electric Generating Station; TPDES Permit No. WQ0001908000, June 27, 2007.

5.2-2 Operating Permit, STP Nuclear Operating Company, Historical User Permit No. OP-04122805, Coastal Plains Groundwater Conservation District, March 2005.

5.2-3 LCRA (Lower Colorado River Authority), Water Management Plan for the Lower Colorado River Basin, May 2003.

5.2-4 STPNOC (South Texas Project Nuclear Operating Company), 2006. Amended and Restated Contract by and between the Lower Colorado River Authority and STPNOC. Effective as of January 1, 2006.

5.2-5 USGS (U.S. Geological Survey) Water Year 2006 Report, Colorado River, USGS Station 08162500 near Bay City, Texas, April 24, 2007.

5.2-6 Holligan (Karen Visnovsky Holligan), 7Q10 Flows. E-mail from Karen Visnovsky Holligan (TCEQ) to Bridget Twigg (TtNUS) June 13, 2007.

5.2-7 CPGCD (Coastal Plains Groundwater Conservation District), Rules of the Coastal Plains Groundwater Conservation District, adopted May 25, 2004.

5.2-8 "Groundwater and Wells," Fletcher G. Driscoll, 2nd Edition, Johnson Filtration Systems Inc., St. Paul, Minnesota, 1989.

5.2-9 TCEQ, STP Nuclear Operating Company, TPDES Permit No. 001908000 Renewal. July 21, 2005.

5.2-10 STPNOC (South Texas Project Nuclear Operating Company), South Texas Project Electric Generating Station Certificate of Adjudication 14-5437, May 1, 2005, Rev. 1.

5.2-11 TCEQ 2004 Texas Water Quality Inventory and 303(d), April 14, 2007.

5.2-12 TCEQ 2006 Texas Water Quality Inventory and 303(d), April 27, 2007.

5.2-13 NRC (Nuclear Regulatory Commission) 2009. Response to RAI 05.02-05, U7-C-STP-NRC-090091 (ML092150963). July 30, 2009.

COLA Part 3 Section 5.4 - Supplemental Text

STPNOC makes the following revisions to the Environmental Report, which will be incorporated into the next routine update of the COLA.

ER Section 5.4.1

STPNOC modifies ER Section 5.4.1 as follows:

5.4.1 Exposure Pathways

Radioactive liquids and gases would be discharged to the environment during normal operation of STP 3 & 4. The released quantities have been estimated in Tables 3.5-1 (liquids) and 3.5-2 (gases). The impact of these releases and any direct radiation to individuals, population groups, and biota in the vicinity of the new units was evaluated by considering the most important pathways from the release to the receptors of interest. The major pathways are those that could yield the highest radiological doses for a given receptor. The relative importance of a pathway is based on the type and amount of radioactivity released, the environmental transport mechanism, and the consumption or usage factors of the receptor.

The exposure pathways considered and the analytical methods used to estimate doses to the maximally exposed individual (MEI) and to the population surrounding the new units are based on NRC Regulatory Guide 1.109, “Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50,” Appendix I (Rev.1, October 1977) (Reference 5.4-1) and NRC Regulatory Guide (RG) 1.111, “Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors,” (Revision 1, July 1977) (Reference 5.4-2). An MEI is a member of the public located to receive the maximum possible calculated dose. The annual dose to each nearby receptor indicated in Section 2.7, corresponding to those in Table B4-6 (Reference 5.4-14) from the estimated new unit releases was calculated, and the maximum of those was denoted the MEI. The use of the MEI allows comparisons with established dose criteria to the public.

As discussed in Section 3.5.2, the Liquid Waste Management System (LWMS) is designed to segregate, collect, store, and process potentially radioactive liquids generated during various modes of plant operation: startup, normal operation, hot standby, shutdown, and refueling. This system is designed such that it may be operated to maximize the recycling of water within the plant, which would minimize the releases of liquid to the environment. The equipment utilized by the STP 3 & 4 LWMS is a more extensive and more efficient version of the LWMS that is presently utilized in STP 1 & 2. FSAR Table 12.2-22 provides the concentrations of radionuclides that would be discharged to the MCR annually as a result of the operation of STP 3 & 4.

Because STP 3 & 4 would discharge to the MCR currently being used by STP 1 & 2, the radioactive liquid discharges from STP 1 & 2 must also be considered in determining the total radionuclides in the MCR. Radioactivity discharged in liquid effluents from STP 1 & 2 has decreased since 1992 due to the installation of additional filter-demineralizers to augment the installed liquid waste processing system demineralizers. Other than tritium, which is addressed in Section 5.2.3, the majority of radioactivity released in liquid effluents is comprised of fission and activation products. The primary long lived nuclide released from STP 1 & 2 has consistently been Co-60 with a 5.27 year half life.

Co-60 had been measured previously in the MCR sediment. During the recent five year period from 2003 to 2007, only 14 out of 29 sediment samples collected contained detectable Co-60. The recent five year average concentration for positive samples has declined to 72 pCi/kg. For comparison, the most restrictive NRC detection sensitivity for radioactive material in sediment is 150 pCi/kg. Improvements in operating practices and liquid waste processing over many years of operation coupled with radioactive decay have resulted in no detectable Co-60 in the six MCR sediment samples taken in 2007 (Reference 5.4-15).

Earlier monitoring attempts to measure Co-58 and Co-60 in the MCR water and bottom sediments has shown that cobalt behaves as a particle and precipitates out of the water column and concentrates in the sediments at the bottom of the reservoir. Hence, cobalt has never been detected in MCR water. The only radionuclide currently detected in the MCR water fraction is tritium.

Cs-137 is the most common nuclide detected in the MCR environment. Cs-137 exists in both the on site and off site environment due to nuclear weapons testing. Cs-137 is routinely found in soil, sediment, and some biological samples taken both on and off site at concentrations similar to or larger than those measured in MCR samples. This limits Cs-137 measurement as a tool for evaluating the impact of plant releases on the MCR environment. As a consequence, Co-60 has been monitored as a generalized indicator of radionuclide behavior in the MCR for over twenty years. In 2007, Cs-137 was measured in one MCR bottom sediment sample. However, Cs-137 was present in the environment before the operation of STP 1 & 2 and the sample concentrations were approximately equal to pre-operational values. The Cs-137 measured in the MCR does not suggest an increase due to plant operation (Reference 5.4-15).

Of the STP 1 & 2 effluents measured in the MCR only tritium, Co-60, and Cs-137 have been routinely detected. Other than tritium, the highest concentrations have consistently been measured in sediment. Of the nuclides that concentrate in the sediment, only Co-60 appears to be plant related. As mentioned previously, the Cs-137 measurements fall within the range measured for world wide fallout from nuclear weapons testing in the early 1960's.

Radioactive decay and a reduction of radioactive effluents to the reservoir have resulted in no detection of nuclides in biological samples taken in the MCR after 1992. Since the anticipated combined annual release rates for Co-58 and Co-60 for STP 1, 2, 3, and 4 would be less than the STP 1 & 2 combined annual release rates shortly after 1992, these radionuclides are not anticipated to be measurable in biological samples during future four unit operation.

STP 3 & 4 would contribute small amounts of fission and activation products to the MCR as shown in FSAR Table 12.2-22. After tritium, Co-60 is the largest single activity released annually by STP 1 & 2 and that may be released by STP 3 & 4. The maximum anticipated Co-60 release rate due to STP 3 & 4 operation based on a conservative calculation of source terms and removal efficiencies is 0.031 Ci per year. The STP 1 & 2 Co-60 discharges from 2003 to 2007 averaged about 0.013 Ci per year. If no further reductions are made in the STP 1 & 2 release rates, a total of 0.044 Ci could be added to the reservoir each year with all four plants operating. The equilibrium concentration of a radionuclide in bottom sediment can be estimated assuming the reservoir has approximately 7000 acres of exposed bottom surface and that all radioactive material released to the reservoir mixes in the top six inches of bottom sediment. The corresponding equilibrium concentration for Co-60 in the reservoir sediment would be less than the typical detection capability of the environmental monitoring program for Co-60 in sediment of 40 pCi/kg (Reference 5.4-15).

Other radioactive material to be released by STP 3 & 4, when combined with the current STP 1 & 2 releases, is also anticipated to be undetectable in the sediment. This conclusion is supported by experience in the latter half of the 1990s when the releases from STP 1 & 2 were larger than those anticipated from the future releases from all four units. There is no evidence of accumulation above environmental detection levels for any nuclide during that period. Hence, even with four plants operating, the average equilibrium concentrations of radioactive materials in the reservoir sediments are anticipated to remain less than detectable. Additionally, no exposure pathway currently exists from reservoir sediment to people; i.e., the radioactive particles in the sediment are not soluble and therefore would not be carried into the groundwater. Even if people were directly exposed to the MCR sediment, no dose or health effect could be measured with radioactive material below environmental detection levels. Therefore, the impacts of radionuclides in the sediment would be SMALL.

Of the nuclides discharged besides tritium, Co-60 represents the most activity for a single nuclide and should continue to be the predominant nuclide with STP 3 & 4 operation. Measurements have proven that cobalt added to the MCR does not remain in the water at concentrations exceeding the detection capability of the environmental monitoring program, typically about 2 pCi/liter as listed in Table 3 of the 2007 Annual Environmental Operating Report for surface water (Reference 5.4-15). The average diluted concentration during discharge to the MCR of Co-60 or other radionuclides is less than the 10 CFR 20 limits and would be diluted further by discharge into an off site body of water like the Colorado River. Consequently, any discharges of Co-60 or any other radionuclides from the MCR to the groundwater or surface water would not exceed 10 CFR 20 regulatory limits and therefore, radiological impacts to the groundwater and offsite surface water bodies, such as Little Robbins Slough, the Colorado River, and their associated tributaries would be SMALL.

Annual radiological monitoring of water and sediment in the MCR would continue. Section 6.2 describes the Radiological Environmental Monitoring Program and how it would be sufficient to monitor the radionuclides discharged to the MCR and subsequently to the groundwater and surface water as a result of the operation of all four units.
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Based on the low concentrations of radionuclides detected in the historical monitoring of the water and sediment in the MCR, the expected minimal radionuclide contributions discharged to the MCR as a result of the addition of STP 3 & 4, and the fact that the radionuclide concentrations in the water of the MCR would be less than the limits in 10 CFR 20, impacts to the water and sediments in the MCR, and from discharges from the MCR to groundwater and surface water, would be SMALL.

ER Section 5.4.6

STPNOC adds the following reference:

5.4-15 "2007 Annual Environmental Operating Report," South Texas Project Electric Generating Station, April 30, 2008.