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Comanche Peak Nuclear Power Plant, Units 3 & 4
COL Application

Part 3,

Environmental Report

Update Tracking Report

(Editorial Correction Version)

Revision 0

Revision History

Revision	Date	Update Description
0	03/31/2009	Original Issue Updated Chapters: Ch.1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 Incorporated responses to following RAIs: No. -

Chapter 1

Chapter 1 Tracking Report Revision List

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	Acronyms and Abbreviations	1-xv	Editorial correction	Change “MPT Main Power Transformer” to “MT Main Transformer”.	0
CTS-00462	Table 1.3-2	1.3-5	Match to NUREG 1555	Change section titles of 4.7, 4.8, 5.11 and 5.13.	0

ACRONYMS AND ABBREVIATIONS

MMbbl	million barrels
MMBtu	million Btu
MNES	Mitsubishi Nuclear Energy Systems Inc.
MOU	municipally-owned utility
MOV	motor operated valve
MOX	mixed oxide fuel
mph	miles per hour
~~MPT~~	~~Main Power Transformer~~ CTS-00615
MSDS	Materials Safety Data Sheets
msl	mean sea level
MSR	maximum steaming rate
MSW	municipal solid waste
MT	Main Transformer CTS-00615
MTU	metric tons of uranium
MW	megawatts
MW	monitoring wells
MWd	megawatt-days
MWd/MTU	megawatt–days per metric ton uranium
MWe	megawatts electrical
MWh	megawatt hour
MWS	makeup water system
MWt	megawatts thermal
NAAQS	National Ambient Air Quality Standards
NAPA	Natural Areas Preserve Association
NAP	National Academies Press

TABLE 1.3-2
ADDITIONAL SECTIONS IN THE CPNPP UNITS 3 AND 4 ER

Section / Title	Description	
1.3 - Methodology	CPNPP ER responsiveness to 10 CFR 51 Subparts 45, 50, 51 (a), and 52 and an explanation of additional sections	
2.9 - Existing Plant Parameters and Site Characteristics	CPNPP Units 1 and 2 site and plant parameters relevant to cumulative impacts of CPNPP Units 1 – 4	
3.9 - Construction Activities	Constructing activities conceptual discussion	
3.10 - Workforce Characterization	CPNPP Units 3 and 4 construction and operation workforce characterization	
4.7 - Cumulative Impacts ~~of Plant Construction (draft NUREG 1555)~~Related to Construction Activities	Cumulative impacts of CPNPP Units 3 and 4 construction activities	CTS-00462
4.8 - Non-~~R~~radiological Health Impacts During Construction	Non-radiological health impacts of CPNPP Units 3 and 4 construction	CTS-00462
5.11 - Cumulative Impacts ~~of Plant~~Related to Station Operations ~~(draft NUREG 1555)~~	Cumulative impacts of operating CPNPP Units 3 and 4	CTS-00462
5.12 - Impacts of Transportation Of Radioactive Materials	Transportation modes and radioactivity impacts	
5.13 - Non-~~R~~radiological Health Impacts During Operations	Non-radiological health impacts of CPNPP Units 3 and 4 operation	CTS-00462
10.5 - Cumulative Impacts	Cumulative impacts of CPNPP Units 1 – 4	

Chapter 2

Chapter 2 Tracking Report Revision List

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	Acronyms and Abbreviations	2-xlii	Editorial correction	Change "MPT Main Power Transformer" to "MT Main Transformer".	0
CTS-00611	2.1	2.1-1	Erratum	Change "624,067" to "653,320"; "61,115" to "62,306"; "39,875" to "39,987"; "37,976" to "41,564"; "29,184" to "29,689" to match 2006 US Census instead of 2005 US Census.	0
CTS-00611	2.1.1	2.1-2	Updated reference required to provide 2006 data not 2005 data	Change (US Census 2005) to (US Census 2006) notated as US Census Bureau. "American FactFinder – Texas By Place GCT Population Estimates." US Census Bureau, Washington, DC. Available URL: Http://factfinder:census.gov/servlet/home/en/official - estimates.html, Accessed July 24, 2008.	0
CTS-00459	2.3.1.1.5	2.3-4	Erratum	Change "384 ac" to "400 ac".	0
CTS-00455	2.3.3.3.5	2.3-61	Editorial correction	Delete "No" and add "Other than CPNPP Units 1 and 2,".	0
CTS-00648	2.3.1.1.6	2.3-4	Erratum	Change "0.25 ac" to "0.78 ac".	0

ACRONYMS AND ABBREVIATIONS

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MOX	mixed oxide fuel
mph	miles per hour
~~MPT~~	~~Main Power Transformer~~ CTS-00615
MSDS	Materials Safety Data Sheets
msl	mean sea level
MSR	maximum steaming rate
MSW	municipal solid waste
MT	Main Transformer CTS-00615
MTU	metric tons of uranium
MW	megawatts
MW	monitoring wells
MWd	megawatt-days
MWd/MTU	megawatt–days per metric ton uranium
MWe	megawatts electrical
MWh	megawatt hour
MWS	makeup water system
MWt	megawatts thermal
NAAQS	National Ambient Air Quality Standards
NAPA	Natural Areas Preserve Association
NAP	National Academies Press

2.1 STATION LOCATION

Luminant Generation Company LLC (Luminant) proposes to construct and operate two Mitsubishi Heavy Industries (MHI) US-APWR reactors (Units 3 and 4) at Luminant's CPNPP 7950-ac site located in rural Somervell and Hood counties, in north central Texas. Luminant is the applicant, owner, and operator of the new units. Current assets at this site include two Westinghouse 4-loop pressurized water reactor (PWR) units (CPNPP Units 1 and 2) and supporting infrastructures. The site plot plan is shown in Figure 2.1-1; regional and vicinity maps are shown as Figures 1.1-1, 1.1-2 and an aerial view as Figure 1.1-3.

The coordinates of the centers of the new reactors (Units 3 and 4) are:

LATITUDE AND LONGITUDE NAD83 (degrees/minutes/seconds)

	Latitude	Longitude
UNIT 3:	32° 18' 08.9" N	97° 47' 30.1" W
UNIT 4:	32° 18' 07.5" N	97° 47' 41.8" W

UNIVERSAL TRANSVERSE MERCATOR ZONE 14 NAD83 (Meters)

	Northing	Easting
UNIT3:	613759	3574606
UNIT4:	613453	3574559

The center point of the CPNPP Units 3 and 4 site is located at 613606N and 3574584E.

There are six population centers (as defined by 10 CFR 100.3) within 50 mi of the reactors: Fort Worth, population ~~624,067~~653,320; North Richland Hills, population ~~61,115~~62,306; Haltom City, population ~~39,875~~39,987; Mansfield, population ~~37,976~~41,564; Burleson, population ~~29,613~~31,660; ~~and~~ Cleburne, population ~~29,184~~29,689~~.~~; Watauga, population 23,685; Weatherford, population 24,630; and Benbrook with a puplation of 22,307. (US Census 2006) CTS-00611

The site is approximately 40 mi southwest of Fort Worth, Texas; 46 mi southwest of Haltom City; 32 mi west of Burleson; and 24 mi west of Cleburne. The nearest population center to the CPNPP site is Cleburne. The closest communities to the CPNPP center point are the cities of Glen Rose and Granbury. The site is 5.2 mi north of Glen Rose and 9.6 mi south of Granbury. Granbury is the largest city within a 10-mi radius of the CPNPP (USGS 2007 and US Census 200~~5~~6). CTS-00611

The property boundary of the CPNPP site encompasses approximately 7950 ac. The site is accessible by a rail spur, which connects to the Fort Worth and Western Railroad Company main line at Tolar, Texas, by a plant access road which connects to Farm to Market Road 56 (FM 56), and by County Road 213 (also known as Coates Road) that connects to Texas State Highway 144 (SH 144) (TXU 2007).

Squaw Creek Reservoir (SCR), located entirely within the site boundary, has an approximate pool elevation of 775 ft msl and is owned by the applicant (TWDB 2003). The reservoir does not provide access to the site.

2.1.1 REFERENCES

(USGS 2007) U.S. Geological Survey. 2007. “Texas.” State, Territories, Associated Areas of United States. Available URL: http://geonames.usgs.gov/domestic/download_data.htm (Accessed March 26, 2007).

(US Census 20056) U.S. Census Bureau. “American FactFinder - Population FinderTexas By Place GTC - Population Estimates.” U.S. Census Bureau, Washington, D.C. Available URL: http://factfinder.census.gov/servlet/SAFFPopulation?_submenuId=population_0&_sse=on, home/en/official_estimated.html(, Accessed January 17July 24, 2007)8. CTS-00611

(TWDB 2003) Volumetric Survey Report of Squaw Creek Reservoir, March 2003. Texas Water Development Board. http://www.twdb.state.tx.us/home/index.asp. Accessed November 2007.

(TXU 2007) Texas Generation Company LP. “Final Safety Analysis Report (FSAR)” Amendment 101. Comanche Peak Steam Electric Station. Glen Rose, Texas (February 1, 2007).

on both sides of the peninsula. Six outfalls are listed on the current CPNPP Texas Pollution Discharge Elimination System (TPDES) permit; however, there are currently discharges through only three of the six discharge points. There are separate stormwater outfalls that discharge separately from wastewater outfalls covered by the TPDES permit. The three active discharge points, Outfalls 001, 003, and 004, are active process discharges that flow into SCR. Subsection 2.3.3.3.1 discusses water quality information for active process discharges that flow into SCR. Construction of Units 3 and 4 is expected to result in permanent structures occupying about 275 ac west and northwest of CPNPP Units 1 and 2. An additional ~~384~~400 ac, located southwest of SCR Dam and due south of existing CPNPP Units 1 and 2 facilities, is expected to be disturbed for construction of a cooling tower blowdown treatment facility (BDTF) for CPNPP Units 3 and 4 (Figure 1.1-4). The grading and drainage plan for CPNPP Units 3 and 4 is provided in the CPNPP Units 3 and 4 FSAR Subsection 2.4.2. The site is graded such that runoff drains away from the safety-related structures via drainage channels or sheet flow and subsequently to SCR through catch basins or as unobstructed overland flow. | CTS-00459

2.3.1.1.6 Local Wetland Areas

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Cowardin, Carter, Golet, and LaRoe 1979). A wetland typically demonstrates the following three characteristic components (Mitsch and Gosselink 2000):

- Water, either at the surface or within the root zone.
- Unique soil conditions differing from adjacent uplands.
- Hydrophytic vegetation and the absence of flood-intolerant species.

Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands at the CPNPP site are dominated by macrophytic plants that include cattails, black willow, button bush, sedges, and grasses. The herbaceous layer is dominated by southern cattail and broadleaf cattail, along with Rooseveltweed, bushy bluestem, and spikerush. The tree and shrub layers are dominated by black willow, buttonbush, cottonwood, and salt cedar.

Littoral wetlands are found along the edges of lakes and reservoirs. Although a limited acreage of wetland was lost due to the impoundment of Squaw Creek to form SCR, numerous littoral wetlands have since established. Fifty-three littoral wetlands occur along the shores of SCR (Figure 2.4-2). These wetlands have a cumulative area of approximately 52.5 ac or 0.66 percent of the site. Dominant plant species and approximate acreage of each wetland were recorded.

Two areas of littoral wetlands currently exist at the mouth of intermittent streams along the northwest and southwest shorelines of the peninsula where the proposed cooling tower structures are to be located (Figure 2.4-2). The southwest wetland is approximately ~~0.25~~0.78 ac and has black willow, salt cedar, and Texas ash in the tree and shrub layers. The herbaceous layer comprises southern and broadleaf cattails, bushy bluestem, and Rooseveltweed. The Munsell soil matrix color is 2.5Y 3/1. The Munsell notation order is hue (2.5Y), value (3) and | CTS-00648

Wolf Hollow

Wolf Hollow is 720 MW natural gas fired, combined cycle power plant that employs two gas turbines. It is located approximately 3.5 mi northeast of CPNPP and supplies 350 MWe capacity to Exelon Generation Company, pursuant to a 20-year power purchase agreement, and 330 MWe to J. Aron & Company under a 5-year supply agreement. Wolf Hollow began operation in 2003 and is currently owned by a private investment partnership and operated by Flour-Mitsubishi (F-M) Operating Company. Wolf Hollow has approximately 30 employees.

DeCordova Steam Electric Station

DeCordova Steam Electric Station consists of a conventional gas/oil steam generating unit and four combustion turbines. The DeCordova plant gas/oil unit began operating in 1975, and the four combustion turbines went into operation in 1990 (TXU 2007a). DeCordova Steam Electric Station is currently used only during peak electrical demand.

2.3.3.3.5 Hazardous Waste Generators

~~No~~Other than CPNPP Units 1 and 2, pollutant sources with discharges to SCR that may interact with the CPNPP Units 3 and 4 site were identified within a 6-mi radius. One conditionally exempt small quantity generator (CESQG) was identified within a 6-mi radius of the CPNPP Unit 3 and 4 service water intake on Lake Granbury. DeCordova Power Plant is located approximately 1.56 mi upstream from the CPNPP service water intakes and is listed as a CESQG with no reported violations. CTS-00455

The EPA Envirofacts Data Warehouse list (EPA 2007b) was reviewed to determine how many registered hazardous waste generators/handlers exist within a 6-mi radius of the CPNPP Units 3 and 4 site proper and the service water intake and discharge structures on Lake Granbury (Figure 2.3-32). The Envirofacts Data Warehouse list reports 21 registered hazardous waste generators/handlers within the 6-mi radius. Of these 21 generators/handlers, 6 are listed as CESQG, 3 are listed as small-quantity generators (SQG), and the remaining 12 are listed as inactive. None of the facilities identified in the search had any reported violations nor were listed as large-quantity hazardous waste generators (LQG).

2.3.3.3.6 Plant Waste Water

Waste water from a nuclear power plant is primarily process waste and heated cooling water. Six outfalls are listed on the current CPNPP TPDES permit; however, drainage from the existing plant site is discharged through only three of the six discharge points (Figure 2.3-33). The three active discharge points (Outfalls 001, 003, and 004) are active process discharges that flow into SCR (EPA 2008). Table 2.3-52 provides water quality information for active process discharges that flow into SCR. Section 3.5 discussed the disposition of radioactive process waste from CPNPP Units 3 and 4. Section 3.6 discusses the disposition of nonradioactive process waste. Section 3.6 addresses plant waste water handling relative to American Water Works Association 1990 industry standards. The disposition of steam and heated cooling water are discussed in Section 3.3.

Chapter 3

Chapter 3 Tracking Report Revision List

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	Acronyms and Abbreviations	3-xix	Editorial correction	Change “MPT Main Power Transformer” to “MT Main Transformer”.	0
CTS-00452	3.3.1.1	3.3-2	Editorial correction	Change “average” to “estimated”.	0
CTS-00452	3.3.1.2	3.3-2	Editorial correction	Change “average” to “estimated”.	0
CTS-00452	3.3.1.3	3.3-3	Editorial correction	Change “average” to “estimated”.	0
CTS-00452	3.3.1.3	3.4-5	Editorial correction	Remove “monthly average”.	0
CTS-00660	3.4.2.1	3.4-6	Editorial correction	Add a sentence about passive screens of the intake system.	0
CTS-00495	Table 3.4-1	3.4-8	Editorial correction	Superscript the number to represent scientific notation as opposed to a whole number	0
CTS-00612	3.5.1.1.2	3.5-5	To reflect DCD terminology	Add “containment Vessel” before reactor so that it reads: containment vessel reactor coolant drain tank, and change the acronym (RCDT) to (CVDT)	0
CTS-00612	3.5.1.1.2	3.5-6	Erratum	Change the acronym (RCDT) to (CVDT)	0
CTS-00613	3.5.1.5	3.5-8	Editorial correction	Remove “gaseous or airborne” and add “liquid” after radioactive	0
CTS-00468	3.5.4	3.5-16	Erratum	Change “179 gpm” to “7 gpm”.	0
CTS-00614	3.5.4	3.5-16	Erratum	Change “119.79 gallons per hour (gal/hr)” to “approximately 2 gpm”.	0

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	3.7.1	3.7-1	Editorial correction	Change “CPNPP Units 3 and 4 Switching Station (CPNPP Units 3 and 4 Switching Station)” to “Plant Switching Station”.	0
CTS-00649	3.7.1	3.7-1	Editorial correction	Change “plant switching station” to “Plant Switching Station”.	0
CTS-00615	3.7.2	3.7-2	Editorial correction	Change “CPNPP Units 3 and 4 Switching Station” to “Plant Switching Station”.	0
CTS-00615	3.7.2	3.7-2	Editorial correction	Change “Main Power Transformer (MPT)” to “Main Transformer (MT)”.	0
CTS-00616	3.7.2	3.7-3	Editorial correction	Change “MPT” to “MT”	0
CTS-00615	3.7.2	3.7-3	Editorial correction	Change “CPNPP Units 3 and 4 Switching Station” to “Plant Switching Station”.	0
CTS-00617	3.9.4	3.9-11	Erratum	Change “four” to “five”.	0
CTS-00617	3.9.4	3.9-11	Erratum	Change “94” to “74”.	0
CTS-00617	3.9.4	3.9-11	Erratum	Change “50” to “37”.	0
CTS-00618	3.9.4.1.1	3.9-12	Erratum	1st paragraph Change “five” to “four”. Change “three” to “one”. Change “three” to “one”. Change “304” to “309”.	0
CTS-00618	3.9.4.1.2	3.9-12	Erratum	Change area dimensions from “167” to “180”, and from “321” to “355”	0
CTS-00618	3.9.4.1.2	3.9-12	Erratum	Change “three” to “four”.	0

ACRONYMS AND ABBREVIATIONS

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MMBtu	million Btu	
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MWd/MTU	megawatt–days per metric ton uranium	
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MWt	megawatts thermal	
NAAQS	National Ambient Air Quality Standards	
NAPA	Natural Areas Preserve Association	
NAP	National Academies Press	

environment. The MDCT process consumes water through evaporation, drift, and blowdown of the CWS tower basins. Makeup water from Lake Granbury is used to replace these losses. Flow rates are as shown in Figure 3.3-1 and are tabulated in Table 3.3-1. The blowdown from the CWS tower basins discharges back to Lake Granbury.

A more detailed description of the CWS, including ~~average~~estimated water consumption by plant operating mode, is presented in Section 3.4. CTS-00452

3.3.1.2 Essential Service Water System

As discussed in DCD Section 9.2, the essential service water system (ESWS) provides cooling water to remove the heat from the component cooling water system (CCWS), and the essential chiller units. The ESWS draws water from the intake basin and returns water to the ultimate heat sink (UHS) after passing through the CCW heat exchangers and the essential chiller units. The UHS is the source of water to the intake basin. The rejected heat is discharged to the UHS through the use of wet mechanical draft cooling towers. Flow rates are as shown in Figure 3.3-1 and are tabulated in Table 3.3-1.

The ESWS draws water from the essential service water intake basin and returns water to the UHS after passing through the CCW heat exchangers and the essential chiller units. The UHS is comprised of a set of wet mechanical draft cooling towers located over the essential service water intake basin (also known as the cooling tower basin). The cooling tower and its basin are part of the UHS, which provides the safety-related source of cooling for the normal essential components and removes reactor decay heat during and after an accident. The ESWS removes heat from the reactor coolant system (RCS) and associated systems/components using the CCWS as an intermediate. In other words, the ESWS cools the component cooling water, which in turn cools the RCS fluid. This arrangement provides an additional cooling loop between the radioactive fluid from the RCS and the environment to guard against direct environmental releases in the event of a primary to secondary side leak in the heat exchanger.

As discussed in DCD Subsection 9.2.1.2.1, the ESWS is arranged into four independent trains, each train consisting of one ESWS pump, one CCW heat exchanger, one essential chiller unit, strainers, piping, valves, and instrumentation.

Piping and isolation valves are provided around each CCW heat exchanger to facilitate back flushing of the heat exchanger when required. The heat from the reactor auxiliaries is removed in the CCW heat exchangers, and the heated service water flows to the cooling towers (UHS) via independent headers. Heated service water is cooled by the forced airflow in the cooling tower and returned to the ESWS intake basin.

A more detailed discussion of the ESWS, including ~~average~~estimated water consumption by month and by plant operating mode, is presented in Section 3.4. CTS-00452

3.3.1.3 Demineralized Water Treatment System

The demineralized water treatment system will supply CPNPP Units 1, 2, 3, and 4. The system receives water from on-site raw water storage tanks, which are filled from Lake Granbury and/or the Wheeler Branch municipal supply. The demineralized water treatment system processes this water to filter solids and remove ionic impurities. Discharge from the demineralized water treatment system is used for makeup water to the refueling water storage tank or the chemical and volume control system, as well as many smaller uses. Flow rates are shown in Figure 3.3-1 and tabulated in Table 3.3-1.

Additional information on the demineralized water treatment system, including ~~average~~estimated water consumption by plant operating mode, is presented in Section 3.4 and Section 3.6. | CTS-00452

3.3.1.4 Potable and Sanitary Water System

The objective of the potable and sanitary water system (PSWS) is to provide clean and potable water for domestic use and human consumption, and to collect site sanitary waste for treatment and discharge during normal operation and accidents. Potable and sanitary water is supplied by the Wheeler Branch municipal supply. Flow rates are shown in Figure 3.3-1 and tabulated in Table 3.3-1. The sanitary drainage system collects sanitary waste and carries the wastewater for processing to the treatment facility. The processed water is discharged to the Squaw Creek Reservoir.

The sanitary wastewater treatment system (SWWTS) is described in Section 3.6.

3.3.1.5 Fire Protection System

The fire protection system (FPS) provides water to points throughout the plant where wet system type fire suppression, e.g., sprinkler, deluge, etc., may be required. The FPS is designed to supply fire suppression water at a flow rate and pressure sufficient to satisfy the demand of any automatic sprinkler system plus 500 gallons per minute (gpm) for fire hoses for a minimum of 2 hours. Initial fill water for the FPS is provided by the Wheeler Branch municipal supply. Makeup water comes from the Intermediate Product Storage Tank. The Intermediate Product Storage Tank contains partially treated raw water or Wheeler Branch water, as discussed in Subsection 3.3.2.4.

3.3.2 WATER TREATMENT

This section describes the treatments needed for the plant water streams described in Subsection 3.3.1. A more detailed description of the treatment systems, including the frequency of treatment for each of the normal modes of operation, as well as the identification, quantities, and points of addition of the chemical additives, is provided in Section 3.6.

3.3.2.1 Circulating Water System

The CWS chemistry is controlled by the CWS chemical treatment system. Biocide, algaecide, pH adjuster, corrosion inhibitor, and silt dispersant are injected into the CWS by the chemical injection system to maintain a non-scale forming condition and to limit biological growth. The chemicals are fed by metering pumps. Chlorine concentration is measured by grab samples. Residual chlorine is measured to monitor the effectiveness. Chemical injection is interlocked with each circulating water pump to prevent chemical injection when the CWS pumps are not running.

Non-Essential and Essential Service Water Systems

The NESWS is in operation during the startup, power operation, and shutdown modes of plant operation. During each of these modes of operation, the NESWS requires makeup water from Lake Granbury via the CWS. The MWS must provide sufficient capacity to supply the NESWS with makeup for cooling tower losses due to evaporation, drift, and blowdown. The cooling tower losses provide the major discharge source to the atmosphere via evaporation. The blowdown system provides a discharge path to Lake Granbury via the CWS cooling tower basin.

The ESWS is in operation during all six modes of plant operation and requires makeup water from Lake Granbury. The MWS must provide sufficient capacity to supply the ESWS with makeup for UHS cooling tower losses due to evaporation, drift, and blowdown. Evaporation from the cooling tower to the atmosphere is the major consumptive water use. The blowdown operations provide a discharge to Lake Granbury. The amount of water supplied by the system from Lake Granbury along with the discharge quantities for each of the six modes is provided in Table 3.4-2.

Makeup Water System

During normal operation, Lake Granbury provides 31,341 gpm makeup to the CWS, and 274 gpm as makeup for the ESWS, for a total of 31,615 gpm per unit, plus 320 gpm to the raw water storage tanks, or a total of 63,500 gpm for both units. The estimated monthly ~~average~~ water need from Lake Granbury is 2.73 x 10^9 gallons (gal) to operate both CPNPP Units 3 and 4. Normal operation is at 100 percent power operation, which is at a maximum makeup demand; therefore, the maximum is approximated to be the same as the normal need. The minimum demand is during an outage when the only flow being pulled from Lake Granbury for that unit is the ESWS makeup (331 gpm per unit). The estimated monthly minimum water demand from Lake Granbury is 1.38 x 10^9 gal per unit. Therefore, the minimum demand occurs when one unit is in an outage and the other is in power operation. CTS-00452

During normal operation, Wheeler Branch supplies up to 300 gpm This water supply includes up to 50 gpm for daily potable water use for the entire site and from 0 to 250 gpm to the raw water storage tanks, which in turn supply water to the demineralized water system (DWS). The amount of water needed from Wheeler Branch is bounded by the maximum need of 300 gpm, with the estimated monthly maximum being 1.3 x 10^7 gal.

3.4.2 COMPONENT DESCRIPTIONS

CPNPP Units 3 and 4 are designed with a common intake structure that supplies the necessary raw water to the plant. The MWS consists of approximately 13 miles (mi) of 42-inch prestressed reinforced concrete piping, valves, and instrumentation. This system is described in Subsection 3.4.2.1.

CPNPP Units 3 and 4 are also designed with two discharge systems, one per unit. For each unit, approximately 13 mi of 42-inch piping runs to Lake Granbury. The discharge system is described in Subsection 3.4.2.2.

3.4.2.1 Intake System

The intake system is designed to provide the raw water requirements for the plant. The intake pumping station is located adjacent to the existing makeup pumping station for CPNPP Units 1 and 2. The intake pumping station is protected by passive screens, two per unit. The passive screens eliminate the need for traveling screens and fish return systems. The intake pumping station with respect to the water surface, bottom geometry, and shoreline is illustrated in Figures 3.4-2 and 3.4-3. CTS-00660

Five 50 percent pumps are located in the intake pumping station. These five pumps include two pumps that supply makeup to the CWS and NESWS, as well as the ESWS per unit, and one spare pump. The pump discharge lines and valves are arranged so that the spare pump can be aligned to either unit in the event that one of the pumps is not available. At any given time, no more than four pumps are operating, two per unit. The flow rates for these pumps vary based on system demand; however, during normal operating conditions, each of the operating pumps is designed to supply a maximum of 18,000 gpm, for a total of 36,000 gpm for each unit. The passive screening system consists of a traditional well-screen design and are spiral wound, wedge-shaped wire drum modules with a 6.5-foot (ft) diameter. Each module is 6 ft long and mounted in a tee arrangement such that each tee has 12 ft of screen drum, and is 16.33 ft long, with a total area of 245 square feet (ft^2) per tee. There are a total of four tees. This provides a total screen area of 490 ft^2 per unit, and twice that area, or a total of 980 ft^2 of screen area, for CPNPP Units 3 and 4. As noted in Subsection 3.4.2, the MWS consists of approximately 13 mi of 42-inch prestressed, reinforced concrete piping, valves, and instrumentation. The makeup water discharges into each CWS and UHS cooling tower basin via a 24-inch and a 6-inch-diameter carbon steel piping, respectively. Each 50 percent capacity vertical, wet-pit makeup water pump provides 16,350 gpm. The makeup water intake structure floor plan is shown in Figure 3.4-4.

The maximum velocity through clean screens is approximately 0.38 feet per second (fps) at a normal water level of 693 ft and 0.42 fps at a high water level of 712.8 ft. The maximum velocity through screens that are 15 percent clogged is 0.44 fps at a normal water level of 693 ft and 0.49 fps at a high water level of 712.8 ft. Historical water temperatures show the average temperature of Lake Granbury is approximately 62.13°F, as shown in Table 2.3-23, and rarely falls below freezing; therefore, there is not significant icing at the intake structure as the intake is below the frozen surface.

During each operational mode, the raw water requirements vary; therefore, the flow ratesalso vary. During power operation, the CWS, NESWS, and the ESWS require makeup water. Flow rates for all modes of operation are shown in Table 3.4-2.

3.4.2.2 Discharge

The primary purpose of the discharge system is to disperse cooling tower blowdown into Lake Granbury to limit the concentration of dissolved solids in the cooling water systems. For each unit, a 24-inch carbon steel blowdown pipe from each of the two CWS cooling tower basins is headered together to a 42-inch prestressed reinforced concrete pipe. The 42-inch piping runs approximately 13 mi to Lake Granbury where the water is discharged through diffusers. The 42-inch piping also receives blowdown water from the UHS basins via 4-inch piping. The physical layout and connection of the CWS cooling tower basins blowdown piping and UHS cooling tower

TABLE 3.4-1
HEAT TRANSFER TO THE ENVIRONMENT AND RELEASE IN LIQUID DISCHARGE

Modes of Operation	Total Heat Transferred ESWS+CWS Btu/hr	Heat Dissipated to Atmosphere by ESWS Btu/hr	Heat Released in Liquid Discharges by ESWS Btu/hr[(a)]	Heat Dissipated to Atmosphere by CWS Btu/hr	Heat Released in Liquid Discharges by CWS Btu/hr[(b)]	
Power Operation	103.40 x 10~~8~~^{8}	100.0 x 10~~6~~^{6}	2.62 x 10~~6~~^{6}	9,970 x 10~~6~~^{6}	267.6 x 10~~6~~^{6}	CTS-00495
Startup	659.7 x 10~~6~~^{6}	144.1 x 10~~6~~^{6}	3.71 x 10~~6~~^{6}	498.5 x 10~~6~~^{6}[(c)]	13.38 x 10~~6~~^{6}[(c)]	CTS-00495
Hot Standby	102.62 x 10~~6~~^{6}	100.0 x 10~~6~~^{6}	2.62 x 10~~6~~^{6}	NA	0	CTS-00495
Safe Shutdown	390.6 x 10~~6~~^{6}	390.6 x 10~~6~~^{6}	0[(d)]	NA	0	CTS-00495
Cooldown by CS/RHRS[(e)]	471.5 x 10~~6~~^{6}	459.1 x 10~~6~~^{6}	12.4 x 10~~6~~^{6}	NA	0	CTS-00495
Refueling (Full Core Offload)	120.6 x 10~~6~~^{6}	117.54 x 10~~6~~^{6}	3.04 x 10~~6~~^{6}	NA	0	CTS-00495
				NA	0	

a) ESWS heat released in blowdown discharge is based on ESW blowdown water temperature of 95°F, and lake water temperature of 47°F.

b) CWS heat released in blowdown discharge is based on CWS blowdown temperature of 88.5°F, and lake water temperature 47°F.

c) The startup mode is based on 5% of rated power condition. The 5 percent heat value is prorated from the heat value of rated power operation (normal operation).

d) ESW Blowdown control valve is closed during safe shutdown.

e) ESW cool down by CS/RHRS operation is based on all four ESW trains operating for duration of 4 hours.

contaminants. This stream is filtered and released through the discharge header to the monitor tank.

After processing, the waste is held in the monitor tank where a sample is taken, and if discharge standards are met, the waste is discharged to the Squaw Creek Reservoir (SCR). Any waste not meeting discharge requirements is transferred to the WHT for further processing.

3.5.1.1.1.3 Chemical Drain Subsystem Processing

The chemical drain subsystem consists of a chemical drain tank with pH adjustment, waste analysis features, and a chemical drain tank pump. A PFD for this subsystem is presented in DCD Figure 11.2-1, Sheet 2. A P&ID is presented in FSAR Section 11.2. This system is located in the A/B.

The chemical drain subsystem collects laboratory wastes and some of the decontamination solutions. To the greatest extent practicable, all decontamination solutions and process liquids are inherently free of hazardous materials and toxic substances. Use of these decontamination solutions and process liquids must not generate mixed waste. Additionally, laboratory wastes are collected for treatment and disposed in appropriate portable containers. Only small amounts of laboratory wastes, basically those associated with the cleaning of glassware and similar activities, are expected to be in the chemical drain subsystem. Any such wastes that do not contain significant quantities of chemical constituents may be transferred to the floor drain processing subsystem.

Dilute acids and bases, along with heavy metals, are captured by the chemical drain subsystem. When the tank is full, the contents are neutralized, sampled, and characterized. This content is then transferred to disposal containers (drums) for transfer to approved off-site processing facilities. Alternatively, absorbing agents are added to stabilize the waste for disposal.

3.5.1.1.1.4 Steam Generator Blowdown

The SGBD monitor measures the radiation level in the SGBD water after it is treated and before it is returned to the condenser. A sample from the SGBD mixed bed demineralizers is monitored for radiation. Normally, the treated SGBD water is not radioactive. In the event of significant primary-to-secondary system leakage due to a steam generator tube leak, the SGBD liquid may be contaminated with radioactive material. Detection of radiation above a predetermined setpoint automatically initiates an alarm in the main control room for operator actions, and automatically turns off the valve through which treated liquid is sent to the condenser. Plant personnel are required to manually sample the SGBD water for analysis. When it is confirmed that the liquid is contaminated, the liquid is routed to the LWMS for processing. A PFD is presented in DCD Figure 10.4.8-1, Sheets 1 and 2. A P&ID is presented in FSAR Section 10.2.

3.5.1.1.2 Reactor Coolant Drain System

The RCDS consists of a containment vessel reactor coolant drain tank (~~RCDT~~CVDT) and two pumps. The RCDS is inside the containment vessel (C/V). A PFD for this subsystem is presented in DCD Figure 11.2-1, Sheet 3. A P&ID is presented in FSAR Section 11.2. CTS-00612

The RCDS provides a collection system for reactor coolant depending on the operating condition of the plant, i.e., normal operation, other anticipated operations, and maintenance/refueling operations. Under normal plant operation, relatively small quantities of reactor-grade water are collected from many sources including the following locations:

- Reactor coolant pumps seal leakage.
- Excess letdown water.
- Leakage from reactor vessel R/V flanges.
- Reactor coolant loop drains.
- Leakage from valves inside the C/V.
- RCS vents and drains.
- Accumulator tank drains.
- Pressurizer relief tank drains.

This liquid drains to the ~~containment vessel reactor coolant drain tank (~~CVDT~~)~~. A nitrogen cover gas is maintained over the liquid in the tank to preserve the quality of the water (exposure to air would degrade the quality of the water) and to prevent the buildup of a flammable mixture from radiolytic decomposition of water. The water entering the tank can be at a relatively high temperature (up to 200°F); therefore, the tank is equipped with instrumentation to monitor the temperature. Prior to transferring the water to the chemical and volume control system (CVCS) holdup tank (HT) via one of two installed reactor coolant drain pumps, the water temperature is lowered to below 200°F by the addition of primary makeup water. The tank is generally maintained at a near constant level to minimize both the amount of gas sent to the gaseous waste management system (GWMS) and the amount of nitrogen cover gas required. In the event that the liquid collected in the ~~RCDT~~CVDT is either oxygenated or above specified radiation limits, it is sent to the LWMS WHT for processing. CTS-00612

During refueling, the reactor coolant drain pumps are used to drain water from the reactor cavity and the fuel transfer canal to the refueling water storage auxiliary tank (RWSAT). In this case, typically both pumps are used to speed up the transfer of water from these areas. In this mode, the water is transferred directly to the RWSAT without entering the CVDT. During maintenance or outages, any remaining gas is purged from the system to the GWMS using nitrogen.

3.5.1.2 Identification of Sources of Radioactive Liquid Waste Material

As explained in Subsection 3.5.1.1 above, the LWMS is broadly classified into the LWPS and the RCDS. The sources of liquid waste material for the LWPS are equipment drains and floor drains, detergent drains, chemical drains, and potentially SGBD. The sources of liquid waste material for the RCDS are:

3.5.1.4 Maximum Individual and Population Doses

The calculated maximum individual and population doses for normal plant operation are addressed in Section 5.4.

3.5.1.5 Components and Parameters Considered in the Benefit-Cost Balance

The LWMS is designed for use at any site. The design is flexible so that site-specific requirements such as preference of technologies, degree of automated operation, and radioactive liquid waste storage can be incorporated with minor modifications to the design.

RG 1.110 outlines compliance with 10 CFR 50, Appendix I numerical guidelines for off-site radiation doses as a result of ~~gaseous or airborne~~ radioactive liquid effluents during normal operations, including AOOs. The cost-benefit numerical analysis as required by 10 CFR 50, Appendix I, Section II, Paragraph D demonstrates that the addition of items of reasonably demonstrated technology does not provide a more favorable cost benefit. The LWMS provided in this design is considered to meet the numerical guides for dose design objectives. The site-specific cost-benefit analysis regarding population doses due to liquid effluents during normal plant operation is addressed in FSAR Section 11.2.3. CTS-00613

3.5.2 GASEOUS RADIOACTIVE WASTE MANAGEMENT AND EFFLUENT CONTROL SYSTEMS

The GWMS is designed to monitor, control, collect, process, handle, store, and dispose of gaseous radioactive waste generated as the result of normal operation, including AOOs, using the guidance of NUREG-0017 and RG 1.143 as it applies to the GWMS.

The GWMS is designed to process radioactive materials in the gaseous waste for release to the environment. The GWMS manages radioactive gases collected from the off-gas system, including charcoal delay beds, HTs and gas surge tanks (GSTs), and other tank vents containing radioactive materials. The gaseous wastes from the above sources are processed to reduce the quantity of radioactive material prior to release to the environment.

During normal operation, radioactive isotopes including xenon, krypton, and iodine are generated as fission products. A portion of these nuclides are present in the primary coolant due to fuel cladding defects. These nuclides are stripped out of the coolant in the volume control tank (VCT) and the HTs into the cover gas and form the input to the GWMS. Charcoal bed adsorbers are used to control and minimize the release of radioactive nuclides into the environment by delaying the release of the radioactive noble gases. The charcoal bed adsorbers contain activated charcoal that has been used extensively to remove radioactive iodine.

Subsystems and components of the GWMS are not shared between units. The GWMS is designed for individual unit operation, where CPNPP Unit 3 is separate from CPNPP Unit 4. The information provided below pertains to the GWMS for each unit.

units for up to ten years, will be provided. If only Class B and C wastes were to be stored in that facility, the facility could store the waste for a proportionally longer period of operation. This issue is also discussed in FSAR Section 11.4.2.3, Packaging, Storage, and Shipping.

3.5.4 CONFORMANCE TO REGULATORY GUIDE 1.112, REV 1

This section provides the information identified in Appendix B of the U.S. Nuclear Regulatory Commission (NRC) RG 1.112, Rev. 1, Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors. The information provided in this subsection is for each unit.

a. General

1. The maximum core thermal power evaluated for safety considerations in the SAR is 4451 megawatts thermal (MWt). DCD Section 10.1 contains additional system information.

2. The quantity of tritium released in liquid effluents is 1600 Ci/yr. The quantity of tritium released in gaseous effluents is 180 Ci/yr. DCD Sections 11.2 and 11.3 contain additional system information.

b. Primary System

1. The total mass of coolant in the primary system, excluding the pressurizer and primary coolant purification system, at full power is 646,000 pounds (lb).

2. The average primary system letdown rate to the primary coolant purification system is 180 gallons per minute (gpm.)

3. The average flow rate through the primary coolant purification system cation demineralizers is ~~179~~7 gpm. CTS-00468

4. The average shim bleed flow is ~~119.79 gallons per hour (gal/hr)~~approximately 2 gpm (2875 gallons per day [gpd]). DCD Sections 5.1 and 9.3 contain additional system information. CTS-00614

c. Secondary System

1. The system includes four steam generators.

   Each steam generator is a Model 91-TT-1 and is a vertical inverted U-tube recirculation-type heat exchanger. Steam is produced on the outer surface of the U-tubes, and the steam-water mixture from the tube bundle rises inside of the wrapper and reaches to the upper shell where individual moisture separators remove the entrained water from the steam. The separated water from the moisture separators is mixed with the feedwater to flow down the annulus between the wrapper and shell. The dry steam exits from the steam generator through the outlet nozzle that has a steam flow restrictor.

3.7 POWER TRANSMISSION SYSTEM

Regulated power transmission and distribution operations are handled through Oncor Electric Delivery Company (Oncor Electric Delivery). Oncor Electric Delivery is a regulated electric distribution and transmission business that provides reliable electricity delivery to consumers. Oncor Electric Delivery is responsible for operating, maintaining, building, dispatching, and marketing the electric transmission system from the generator bus bars through the distribution substations. Oncor Electric Delivery has an additional responsibility to provide a transmission system that supplies off-site power for startup and normal shutdown of nuclear reactors through the transmission switchyards. Oncor Electric Delivery is the transmission service provider (TSP) for Comanche Peak Nuclear Power Plant (CPNPP).

Oncor Electric Delivery is a member of the Electric Reliability Council of Texas (ERCOT). The ERCOT, which comprises members engaged in generation, transmission, distribution and marketing of electric energy in the state of Texas, is an independent not-for-profit corporation that is one of eight electric reliability regions in North America operating under the reliability and safety standards set by the North American Electric Reliability Council (NERC). The ERCOT is the independent system operator (ISO) that oversees all generation and transmission functions for its reliability region, which includes about 85 percent of the electrical load in Texas. The ERCOT region has an overall generating capacity of approximately 78,000 MW. The ERCOT, under the jurisdictional authority of the Public Utility Commission of Texas (PUC), is responsible, in part, for ensuring the adequacy and reliability of electricity across the state's main interconnected power grid. The ERCOT is not under the jurisdiction of the Federal Energy Regulatory Commission (FERC). Additional discussion of the grid structure and responsible parties is found in FSAR Section 8.2.

3.7.1 TRANSMISSION SYSTEM

Luminant plans to construct two new generating units, CPNPP Units 3 and 4, at the CPNPP site. The two existing units, CPNPP Units 1 and 2, are expected to remain in service when the new generating units reach commercial operation. (Oncor 2008)

FSAR Section 8.1 describes the interconnections between the plant on-site power system and a new Oncor Electric Delivery ~~CPNPP Units 3 and 4~~Plant Switching Station ~~(CPNPP Units 3 and 4 Switching Station)~~, less than one mile away, which will be constructed prior to fuel loading. The unit interface with the Oncor-controlled electrical systems is at the connection to the 345 kV overhead transmission tie line in the unit switchyards. FSAR Section 8.1 identifies the applicable electric power system design criteria and guidelines for CPNPP Units 3 and 4. CTS-00615

CPNPP Units 3 and 4 will have a dedicated switchyard, independent of CPNPP Units 1 and 2. The design for CPNPP Units 3 and 4 includes four unit switchyards, four transmission tie lines between the unit switchyards and the ~~p~~Plant ~~s~~Switching ~~s~~Station, and four transmission lines between the ~~p~~Plant ~~s~~Switching ~~s~~Station and remote substations. The interconnections with the ~~p~~Plant ~~s~~Switching ~~s~~Station are described further in FSAR Section 8.2. CTS-00649

Oncor Electric Delivery, as the TSP for CPNPP, owns and operates the transmission lines between the new switchyard and the ~~CPNPP Units 3 and 4~~Plant Switching Station. Luminant connects at a delivery voltage of 345 kV. CTS-00615

3.7.2 TRANSMISSION LINE CORRIDORS (RIGHTS-OF-WAY)

As indicated in Subsection 4.1.3.2.2, Oncor Electric Delivery selects the transmission and distribution line corridors, constructs the lines, and owns and operates the lines from the CPNPP site to various new and existing end users. As discussed in FSAR Section 8.2, the new ~~CPNPP Units 3 and 4~~Plant Switching Station will be constructed prior to fuel loading and will have four outgoing transmission circuits to remote switching stations. The rights-of-way (ROWs) for the below-listed transmission lines will be established and all four lines will be constructed prior to fuel loading. These ROWs will commence at the CPNPP property and continue toward the switching stations. The widths of the ROWs will be adequate for the planned transmission lines. Any existing ROWs will be utilized without compromising design bases criteria. CTS-00615

The new transmission circuits are listed below. (All lengths are estimated.) (Oncor 2008)

- A new 45-mile circuit within a new ROW (hereafter referred to as Whitney) utilizing Oncor Electric Delivery's Standard 345 kV double circuit lattice steel tower structure family between the ~~CPNPP Units 3 and 4~~Plant Switching Station and the Whitney 345 kV Switching Station. The exact routing of this new line will be determined during a transmission routing study. CTS-00615

- A new 22.4-mile circuit (hereafter referred to as Johnson) utilizing a vacant circuit position on an existing 345 kV double circuit lattice steel tower structure line between ~~CPNPP Units 3 and 4~~Plant Switching Station and the Johnson Switch 345 kV Switching Station. CTS-00615

- A new 17-mile circuit within a new ROW (hereafter referred to as DeCordova) utilizing Oncor Electric Delivery's Standard 345 kV double circuit lattice steel tower structure family between the ~~CPNPP Units 3 and 4~~Plant Switching Station and the DeCordova 345 kV Switching Station. The exact routing of this new line will be determined during a transmission routing study. CTS-00615

- A new 41.6-mile circuit (hereafter referred to as Parker) utilizing a vacant circuit position on an existing 345 kV double circuit lattice steel tower structure line between ~~CPNPP Units 3 and 4~~Plant Switching Station and the Parker 345 kV Switching Station. CTS-00615

In addition to the transmission lines listed above, a new 22.4-mile circuit (hereafter referred to as Johnson-Everman) will be constructed, utilizing a vacant circuit position on an existing 345 kV double circuit lattice steel tower structure line between Johnson Switch 345 kV Switching Station and the Everman 345/138 kV Switching Station. (Oncor 2008)

CPNPP Units 3 and 4 will be connected to the new ~~CPNPP Units 3 and 4~~Plant Switching Station, with four independent 345 kV transmission tie lines, two for CPNPP Unit 3 and two for CPNPP Unit 4, as listed below. (All lengths are estimated.) (Oncor 2008) CTS-00615

- A new 0.55-mile circuit on a new ROW provided by Luminant (hereafter referred to as Unit #4 Main Transformer (M~~P~~T)) between the ~~CPNPP Units 3 and 4~~Plant Switching Station and the CPNPP Unit #4 ~~Main Power Transformer (~~M~~P~~T~~)~~ Switchyard. CTS-00615

- A new 0.66-mile circuit on a new ROW provided by Luminant (hereafter referred to as Unit #4 RAT) between the ~~CPNPP Units 3 and 4~~Plant Switching Station and the CPNPP Unit #4 Reserve Auxiliary Transformer (RAT) Switchyard. CTS-00615

- A new 0.3-mile circuit on a new ROW provided by Luminant (hereafter referred to as Unit #3 M~~P~~T) between the ~~CPNPP Units 3 and 4~~Plant Switching Station and the CPNPP Unit #3 M~~P~~T Switchyard. CTS-00615 CTS-00616

- A new 0.42-mile circuit on a new ROW provided by Luminant (hereafter referred to as Unit #3 RAT) between the ~~CPNPP Units 3 and 4~~Plant Switching Station and the CPNPP Unit #3 RAT Switchyard. CTS-00615

The existing 345-kV and 138-kV transmission line ROWs and proposed 345-kV transmission line ROWs also are described in Subsection 2.2.2. The existing CPNPP 345-kV transmission ROWs are shown in Figure 3.7-1, as originally depicted in Section 3.9 of the CPNPP Units 1 and 2 Environmental Report (CPSES 1974). The proposed 345-kV transmission ROWs for CPNPP Units 3 and 4 are shown in Figure 1.1-5 and Figure 3.7-4.

Oncor Electric Delivery's typical ROW width is 160 feet, with the centerline typically in the center of the ROW. (Oncor 2008) Some ROWs are wider to accommodate additional facilities. (CPSES 1974) Actual ROW widths and areas will not be known until the final ROWs are determined. The design parameters of the proposed transmission lines are discussed in Subsection 3.7.3.

3.7.3 TRANSMISSION SYSTEM DESIGN PARAMETERS

3.7.3.1 Basic Electrical Design Parameters

Luminant plans to construct and operate two Mitsubishi Heavy Industries (MHI) U.S. Advanced Pressurized Water Reactor (US-APWR) units for CPNPP Units 3 and 4. The CPNPP Units 3 and 4 site has a rated output of approximately 3200 MWe (1600 MWe for each unit), less site loads. The off-site power system is designed and constructed with sufficient capacity and capability to assure that specified acceptable fuel design limits and conditions are not exceeded as a result of anticipated operational occurrences.

A 2515 American wire gauge (AWG) aluminum-clad steel reinforced (ACSR) 76/19 stranding conductor with horizontal phase spacing of 35 ft to 49.5 ft is required for 345-kV lines. The minimum ground clearance for maximum sag condition is 45 ft. The maximum operating temperatures of the line are 100°C (212°F) Normal and 120°C (248°F) Emergency. The span is based on loading. The tangent tower is designed for a 1200-ft wind span and a 1400-ft weight span at a 0-degree angle. Wind span is determined by the wind loading on half of the span leading into a tower plus the wind loading on half of the span leading away from a tower. Weight span is determined by the total weight loading of wire measured between the low points of the spans entering and leaving the tower. Typical spans are expected to be in the 1000-ft to 1100-ft range. The lines are designed to meet or exceed the requirements of the National Electrical Safety Code (NESC) and the American National Standards Institute (ANSI). The 345-kV line is designed to keep the electric field at the conductor surface significantly below corona inception.

- Installing the grounding grid.
- Forming the mud-mat concrete work surface.
- Reinforcing steel and civil, electrical, mechanical/piping embedded items (base mat module), and forming, concrete placement and curing.

The activities associated with the nuclear island foundations are safety-related and would be performed in accordance with applicable requirements under 10 CFR 50, Appendix B.

3.9.4 COL CONSTRUCTION ACTIVITIES

Major power plant construction of safety-related structures, systems, and components would begin after issuance of the COL by the NRC. Each US-APWR unit is a series of buildings and structures with systems installed within the structures. Power plants are constructed from the “bottom up,” with elevations remaining open until the major mechanical and electrical equipment and piping are placed on each elevation as the civil construction continues upward. The five major buildings in each power block, along with a brief description of finished elevation (above plant grade) are as follows:

- The Reactor Building has five main floors and rises approximately 230 ft above plant grade. The building contains the reactor vessel at its center and is founded on a common mat.

  The reactor building consists of the following five functional areas:

  - Containment facility and inner structure.
  - Safety system pumps and heat exchangers area.
  - Fuel handling area.
  - Main steam and feed water area.
  - Safety-related electrical area.

- The access building has four main floor elevations and rises approximately 45 ft above plant grade.
- The turbine building has ~~four~~five main floor elevations and rises approximately 162 ft above grade. CTS-00617
- The auxiliary building has four main floor elevations and rises approximately ~~94~~74 ft above grade. CTS-00617
- The power source building rises about ~~50~~37 ft above grade. CTS-00617

Much of the commodity installation would consist of the setting of prefabricated civil or structural, electrical, mechanical, and piping modules with field connections. The balance of the field installations consists of bulk commodity installation. The descriptions of major activities for the power block buildings construction are discussed in the following subsections.

3.9.4.1 Power Block Construction Descriptions

3.9.4.1.1 Reactor Building

The reactor building has the longest construction duration. The reactor building, which includes the reactor vessel as an integrated structure, is a steel and concrete structure with ~~three~~one floor elevations below plant grade, and ~~five~~four elevations above grade in an area approximately ~~304~~309 ft by 210 ft. The major activities associated with the reactor building construction following the base-mat foundation placement include: CTS-00618

- Erecting the reactor concrete containment vessel shell modules.
- Placing walls and slabs, and reactor pedestal.
- Installing the reactor vessel and pool modules.
- Setting the polar crane and setting the upper reactor building roof structure.

The mechanical, piping, heating, ventilation, and air conditioning systems (HVAC), and electrical installations would begin in the lower elevations and continue to the upper elevations, as is also the case with each of the other buildings.

3.9.4.1.2 Turbine Building

The turbine building is a concrete and steel structure with an area of approximately ~~167~~180 ft by ~~321~~355 ft. The turbine building has one floor below grade and ~~three~~four floor elevations above grade. The turbine building construction would begin with the pedestal base mat and buried circulating water piping installation. Installation of the pedestal columns, condenser modules, and pedestal deck would then proceed. The building exterior to the turbine pedestal would be erected, installation of the turbine building crane and the exterior walls and roof installation would then occur. The mechanical, piping, HVAC, and electrical installations would begin in the lower elevations and continue to the upper elevations. Construction would then proceed through the turbine and generator erection. CTS-00618

3.9.4.2 Other Facilities

Other facilities to be constructed include:

- The switchyard and installation of the main transformers.
- The administrative simulator and training facility buildings.
- The circulating water intake and discharge structures.

Chapter 4

Chapter 4 Tracking Report Revision List

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	Acronyms and Abbreviations	4-xvii	Editorial correction	Change “MPT Main Power Transformer” to “MT Main Transformer”.	0
CTS-00650	4.1.1.1	4.1-1	Erratum	Change “275 ac” to “675 ac”.	0
CTS-00650	4.1.1.1	4.1-1	Erratum	Add “the Blowdown Treatment Facility (BDTF) area,”	0
CTS-00459	4.1.1.1	4.1-1	Erratum	Change “384 ac” to “400 ac”.	0
CTS-00459	4.1.2	4.1-4	Erratum	Change “384 ac” to “400 ac”.	0
CTS-00459	4.2.1.1.5	4.2-3	Erratum	Change “384 ac” to “400 ac”.	0
CTS-00619	4.2.1.2	4.2-4	Editorial correction	Change “cooling water“ to “makeup water and blowdown”.	0
CTS-00620	4.2.1.4	4.2-5	Editorial correction	Change “cooling water” to “makeup water and blowdown system”.	0
CTS-00620	4.2.1.4.1	4.2-6	Editorial correction	Change “cooling water” to “makeup water and blowdown system”.	0
CTS-00621	4.2.1.4.1	4.2-6	Editorial correction	Change “cooling” to “makeup”.	0
CTS-00621	4.2.1.4.1	4.2-6	Editorial correction	Change “cooling water system” to “CWS and UHS”.	0
CTS-00622	4.2.2.1	4.2-9	Editorial correction	Change “cooling water system” and “raw water system” to “makeup water and blowdown system”, respectively.	0
CTS-00623	Table 4.2-1	4.2-14	Erratum	Change population count from “8186” to “6354” and average daily consumption from “0.383” to “0.362”.	0
CTS-00459	4.3.1	4.3-2	Erratum	Change “384 ac” to “400 ac”.	
CTS-00651	4.3.1	4.3-2	Update	Change acrages on page 4.3-2 of ER that describe area of soil disturbed during construction to agree with the new survey of the BDTF.	0

ACRONYMS AND ABBREVIATIONS

MMbbl	million barrels
MMBtu	million Btu
MNES	Mitsubishi Nuclear Energy Systems Inc.
MOU	municipally-owned utility
MOV	motor operated valve
MOX	mixed oxide fuel
mph	miles per hour
~~MPT~~	~~Main Power Transformer~~ CTS-00615
MSDS	Materials Safety Data Sheets
msl	mean sea level
MSR	maximum steaming rate
MSW	municipal solid waste
MT	Main Transformer CTS-00615
MTU	metric tons of uranium
MW	megawatts
MW	monitoring wells
MWd	megawatt-days
MWd/MTU	megawatt–days per metric ton uranium
MWe	megawatts electrical
MWh	megawatt hour
MWS	makeup water system
MWt	megawatts thermal
NAAQS	National Ambient Air Quality Standards
NAPA	Natural Areas Preserve Association
NAP	National Academies Press

4.1 LAND-USE IMPACTS

The following subsections describe the effects of site preparation and construction of the CPNPP site and the surrounding areas. Subsection 4.1.1 describes effects to the site and vicinity. Subsection 4.1.2 describes impacts to land use during construction of transmission lines. Subsection 4.1.3 describes effects to historic properties at the site and along water pipeline and transmission corridors. Section 4.2 describes potential impacts to water associated with construction activities including intake and discharge structures.

4.1.1 THE SITE AND VICINITY

The following subsections describe the effects of construction on land use within the site and vicinity.

4.1.1.1 The Site

The CPNPP generation units and support facilities are located on the 7950-ac CPNPP site located in Hood and Somervell counties, Texas. The site boundary encompasses the operating nuclear CPNPP Units 1 and 2, the proposed location for CPNPP Units 3 and 4, the support structures and facilities, and the entire SCR (Subsections 1.1.2 and 2.2.1.1). Plant structures are discussed in Section 3.1. Figure 4.1-1 shows the detailed site plot plan including construction laydown areas.

The total area to be disturbed is ~~275~~675 ac and includes permanent structures, the Blowdown Treatment Facility (BDTF) area, and construction laydown areas. Temporary construction laydown areas are portions of the site that are temporarily disturbed during construction. Although some laydown areas may also be used to support operations. Permanent structures are buildings, roads, walls, etc., expected to be built during the construction period and remain once construction is completed. Construction on the CPNPP site is scheduled to be completed as stated in Section 1.1. CTS-00650

Land use within the site boundary is detailed in Subsection 2.2.1.1 and can also be found in Table 2.2-1 and Figure 2.2-1. As stated in Subsection 4.2.1.1.4, approximately 123 ac are disturbed for construction of Units 3 and 4 while an additional 152 ac are disturbed for the cooling towers. The majority of the area where Units 3 and 4 are constructed has been previously disturbed. However, a large portion of the area where the cooling towers are constructed consists of undisturbed woodland and is expected to require clearing. Additional land disturbances are anticipated due to construction of some of the support buildings and refurbishment of existing and permanent roadways. Placement of a ~~Blowdown Treatment Facility (~~BDTF~~)~~ to support the CPNPP Units 3 and 4 operations is planned for an area southwest of the SCR Dam and due south of existing CPNPP Units 1 and 2 (Figure 1.1-4). Approximately ~~384~~400 ac is expected to be disturbed for construction of the BDTF. Disturbed acreage to support construction activities is reclaimed to grassland, native scrub-shrub, or native forest trees consistent with erosion control, traffic safety, and plant security needs. CTS-00650 CTS-00459

The land-use needs for construction include transportation, laydown areas, water, electric, and communication service lines, and disposal. Transportation is needed for moving building materials and equipment to and from the site. The shipment of construction material to the site is

There are several wetlands present within the vicinity. However, no construction activities are expected to occur on wetlands. No construction activities in the vicinity take place in a floodplain. These matters are discussed further in Subsections 4.2.1.6 and 4.3.1.

One city and eleven smaller towns and unincorporated communities are located within the vicinity of CPNPP and are discussed further in Subsection 2.2.1.2. Glen Rose and Granbury have zoning plans within their city limits. Because the construction is out of the nearest city limits, there are no zoning limitations affecting the site.

The construction workforce may accelerate housing development in the vicinity, causing some additional land to be developed. However, numerous housing developments are already planned or underway due to the population growth in the area and the construction workforce is expected to primarily use temporary housing, such as hotels, RV parks, mobile homes, and rental homes. It is possible that new RV or mobile home parks open to accommodate the construction workers. Such parks would be expected to be temporary and not affect the long-term land use in the vicinity.

The only construction impacts to land use in the vicinity of the CPNPP site are expected from the new transmission lines, the new water pipeline to Lake Granbury, and the increase in roadway traffic load and housing. No additional land is expected to be required for the CPNPP site. Transmission line corridors are discussed in Subsection 4.1.2. No other land-use changes in the vicinity are expected. While the impacts of the construction of the transmission line corridors are not known at this time, the overall effect of CPNPP Units 3 and 4 construction on land use in the vicinity of the site is expected to be SMALL based on minimal impacts to local transportation systems, pipelines, rivers, and recreational areas.

4.1.2 TRANSMISSION CORRIDORS AND OFF-SITE AREAS

As discussed in Subsection 4.1.1.1, a BDTF to support the CPNPP Units 3 and 4 operations is planned with approximately ~~384~~400 ac expected to be disturbed for the construction of this facility. CTS-00459

Additional water intake and discharge pipelines are expected to be constructed for CPNPP extending from the plant to Lake Granbury. The pipelines are expected to occupy an existing 50-ft ROW. However, during construction an area of up to 125 ft wide along the pipeline could be disturbed. The new pipelines are expected to parallel to the existing makeup and return water pipelines and are illustrated in Figure 1.1-4. The makeup pipeline is used to maintain the level in SCR and the return line was not used to support operation of CPNPP Units 1 and 2 and is not expected to be used in the future. Additional intake and discharge structures are expected to be placed to the northwest and adjacent to the existing intake and discharge structures on Lake Granbury. During construction of the intake and discharge structures, an additional amount of land disturbance is anticipated to occur. The disturbed land along the pipeline corridor consists mainly of grassland and scrub brush.

As discussed in Subsection 9.4.3.1, operating the proposed project requires expanding four electrical transmission lines that connect the proposed project to switching stations in the area, and expanding the connection between two switching stations located off-site. The transmission lines consist of five single and double 345-kV circuits that are owned, operated, and maintained

4.2.1.1.3 Construction Areas, Temporary Structures, and Parking Areas

Several laydown yards, temporary buildings, parking areas, and other related structures are expected to be created and utilized during construction activities. Potential erosion and sedimentation from the construction, and use of these areas and structures should be controlled using appropriate BMPs, as required by the SWP3. These controls may include material dunnage, vegetative buffer zones, silt fencing, and diversionary channels to sedimentation basins. Any effects that may occur from these activities would be temporary and are expected to be SMALL due to the implementation of appropriate stormwater BMPs.

4.2.1.1.4 Cooling Towers

Placement of cooling towers to support the CPNPP Units 3 and 4 plant operations are planned on a smaller peninsula located northwest of the proposed construction area of Units 3 and 4 (Figure 2.1-1). Approximately 152 ac is expected to be disturbed for construction of the cooling towers. Due to the location of cooling towers in a previously undisturbed area, the potential for increased sediment runoff from heavy earth-moving activities and loss of vegetative cover increases. Additionally, construction of a pipeline from the proposed cooling towers area to the power block area involves some disturbance of the existing area. Any effects that may occur from these activities would be temporary and are expected to be SMALL due to implementation of appropriate stormwater BMPs.

4.2.1.1.5 Blowdown Treatment Facility

Placement of a Blowdown Treatment Facility (BDTF) to support the CPNPP Units 3 and 4 operations is planned for an area southwest of SCR Dam and due south of existing CPNPP Units 1 and 2 (Figure 1.1-4). Approximately ~~384~~400 ac is expected to be disturbed for construction of the BDTF. Due to the location of the BDTF in a predominantly undisturbed area, the potential for increased sediment runoff from heavy earth-moving activities and loss of vegetative cover increases. Any effects that may occur from these activities would be temporary and are expected to be SMALL due to the implementation of appropriate stormwater BMPs. Additionally, any alteration of natural drainage features that may occur during construction of the BDTF will require appropriate USACE permits. For a description of the BDTF see Subsection 3.6.1.1. CTS-00459

4.2.1.1.6 Currently Undisturbed Areas

A majority of the areas proposed for additional power plant area construction are currently within previously disturbed areas. The cooling tower area and BDTF area are predominantly undisturbed, overgrown, and forested as are smaller areas within the CPNPP Units 3 and 4 power block. Clearing these areas may be required to support construction activities. Construction activities are expected to follow BMPs for soil and erosion control, as required by the site's SWP3 in accordance with the TPDES General Permit. Therefore, impacts to the currently undisturbed areas from construction activities are considered to be SMALL and would not warrant further mitigation.

4.2.1.1.7 Retention Ponds for Sediment Control

Surface water runoff and associated contaminants are expected to be addressed in the SWP3 and controlled using BMPs, which may include dunnage, vegetative buffer zones, silt fencing, and diversionary channels and sedimentation basins. Stormwater retention ponds for CPNPP Units 3 and 4 should be designed and constructed to accommodate surface water runoff and allow sediment-laden water from dewatering activities, if required, to pass through the ponds prior to discharge. Excavations should extend below the shallow perched water table by approximately 5 – 15 ft. Impacts from excavation dewatering activities are considered to be SMALL, due to low shallow/perched groundwater availability in the excavation area. Dewatering, if required, is expected to occur within a limited area for a reasonably short time frame. Dewatering efforts would be handled by use of sump pumps, if required. Construction activities follow BMPs for soil and erosion control, as required by the TPDES General Permit. Therefore, impacts to the local hydrology and wetlands from construction activities are expected to be SMALL and would not warrant further mitigation.

4.2.1.1.8 Off-site Construction

Installation of a raw water intake structure for CPNPP Units 3 and 4 is planned adjacent to the existing intake structure on Lake Granbury that currently supplies water to SCR. The intake structure is to have two 42-in pipelines each supplying water directly to the cooling towers for Units 3 and 4. Two additional gravity-drain 42-in blowdown discharge pipelines (one from Unit 3 and one from Unit 4) with multi-port diffusers are planned to be located approximately 600 ft upstream from DeCordova Bend Dam in the vicinity of the existing discharge pipe. The four pipelines associated with CPNPP Units 3 and 4 are expected to be placed in the existing pipeline right-of-way (ROW). Off-site hydraulic alterations from these installations and that of the additional intake and discharge structures are discussed in Subsection 4.2.1.2.

The existing road system is expected to adequately handle the construction traffic required for the CPNPP Units 3 and 4 facility, and no off-site road construction is expected. Therefore, no off-site hydrologic alterations from the construction of roads for CPNPP Units 3 and 4 are expected.

4.2.1.2 Hydrologic Alterations Due to Construction

Dredging activities to support construction of the ~~cooling water~~makeup water and blowdown system intake and discharge structures on Lake Granbury is anticipated. A temporary increase in turbidity could occur in Lake Granbury near the intake and discharge structures during construction and dredging activities. The additional turbidity from these construction activities is expected to be minimal, because the activities should be localized and short in duration. The need for installation of riprap, stemwalls, or other appropriate means to stabilize the banks of the lake during and following construction is not anticipated. BMPs are expected to be employed to minimize sediment runoff from disturbed areas above the shoreline. CTS-00619

Pipeline construction for both the intake and discharge structures is expected to be in the existing pipeline ROW. Temporary construction easement is expected to be provided adjacent to the existing ROW easement to support pipeline construction. This construction easement has been evaluated to identify potential impacts to wetland, ecological and cultural resources sensitive areas as well as potential impacts to existing water bodies, including Lake Granbury and SCR.

The source of construction water for concrete batch plant operations, concrete curing, and system startup is expected to be supplied from an on-site raw water storage supply from Somervell County Water District (SCWD), a future municipal water supplier or Lake Granbury. SCR was determined to be unsuitable for these uses due to salinity concentrations. Water for dust suppression and general clean up is expected to be withdrawn from SCR (Subsection 4.2.1.3).

Construction activities on Lake Granbury are expected to be conducted in compliance with Texas Commission on Environmental Quality (TCEQ) and the U.S. Army Corps of Engineers (USACE) permit requirements, and are not expected to affect long-term water quality.

Construction plans do not call for dewatering activities that could affect groundwater aquifer flow and quality. Groundwater should not be utilized to support construction. Therefore, there would be no impact to groundwater aquifer availability.

4.2.1.3 Water Source and Use Rates

Water for construction of CPNPP Units 3 and 4 is planned to be obtained from the SCWD via a pipeline from Wheeler Branch Reservoir, a future municipal water supplier, or Lake Granbury. A construction water intake structure is not anticipated on SCR. Also, potable water for domestic and sanitary needs is anticipated to be supplied from SCWD, with the existing on-site water supply wells completed in the Twin Mountains Formation being utilized as a backup emergency potable water supply, if required. Construction activities for the CPNPP Units 3 and 4 facilities are expected to require an estimated average and maximum potable/treated water amount of approximately 300 and 1300 gpm, respectively. An estimated average and maximum amount of water withdrawn from SCR for dust suppression and general clean-up during construction is 22 gpm and 44 gpm, respectively.

The maximum demand is anticipated to include system initial fills and flushes, concrete batch plant, crafts demand, fire protection (FP) test/fill and dust suppression. Concrete batch plant operation and concrete curing is expected to obtain water from the municipal supplier (SCWD and/or Lake Granbury) and water is expected to be withdrawn from SCR for dust suppression and general cleanup.

The recommended planning number for drinking water consumption for workers in hot climates is 3 gpd for each worker or approximately 5 – 7 oz every 15 – 20 min (NIOSH 1986). Based on the anticipated maximum construction worker population of 4300 people (Section 4.4), the potable water consumptive use is estimated at 12,900 gpd. The quantities of water obtained from Lake Granbury, SCR, the SCWD, and the Twin Mountains Formation are expected to have little effect on the availability of water for other users and are considered a SMALL impact.

4.2.1.4 Water Bodies Receiving Effluents

Construction is expected to result in permanent structures occupying about 275 ac of the site (Figure 2.1-1). Because the CPNPP Units 3 and 4 construction is located on a peninsula of SCR, this water body could potentially be affected by site construction activities and stormwater runoff. Additionally, because ~~cooling water~~makeup water and blowdown system intake and discharge structures for Units 3 and 4 are required on Lake Granbury, this water body could potentially be CTS-00620 affected by intake/discharge construction activities. The potential construction effects on SCR and Lake Granbury are expected to be temporary, and because of the volume and flow of the surface water bodies and the use of BMPs, the effects should dissipate rapidly. Therefore, the impact to surface water bodies is expected to be SMALL.

4.2.1.4.1 Intake and Discharge Structure

The ~~cooling water~~makeup water and blowdown system intake and discharge designs are described in Sections 3.3 and 3.4, including the estimated withdrawal of Lake Granbury water required for the CPNPP Units 3 and 4 plant operations, the maximum expected discharge flow rate and water temperature, and the estimated withdrawal of SCR water required for dust suppression and general construction cleanup. Section 4.3 provides a detailed discussion of the ecological impacts of construction of the intake structures, intake pipelines, and discharge pipelines. Impacts of water intake and discharge structures are presented in Section 5.3. CTS-00620

The intake and discharge structures for Units 3 and 4 plant operations are to be located approximately 7.13 mi north-northeast of the CPNPP site on Lake Granbury (Figure 4.2-2). Dredging may be required in the vicinity of the intake and discharge structures, and the appropriate TCEQ permits are expected to be acquired prior to commencing dredging activities. ~~Cooling water~~Makeup water and blowdown system is expected to be withdrawn by an intake structure located approximately 1.31 mi upstream from the DeCordova Bend Dam. The ~~cooling~~makeup water is pumped to the CPNPP Units 3 and 4 cooling system through pipelines, and the blowdown water from the ~~cooling water system~~CWS and UHS is discharged through separate pipelines back to Lake Granbury about 1.14 mi downstream from the intake structure. Emergency safe shutdown of the reactor does not rely on an external source of ~~cooling~~makeup water. CTS-00620 CTS-00621 CTS-00621

The cooling tower effluent is anticipated to be discharged from the outfall, located approximately 0.17 mi upstream from the DeCordova Bend Dam, through engineered diffusers designed to assure compliance with TPDES requirements and numerical limits imposed by the station's TPDES wastewater permit (TCEQ 2004). A temporary increase in turbidity could occur in Lake Granbury near the discharge structure during construction and dredging activities. The additional turbidity from these construction activities is expected to be minimal, because these activities are expected to be localized and of short duration. Details of the discharge system are presented in Subsections 5.2.1.6 and 5.3.2.

Effluent such as stormwater, road-dust-suppression water runoff, and other construction water uses are controlled using BMPs such as vegetative buffer zones or silt fences, and may be directed first to a settling basin prior to release into SCR, in accordance with the station's SWP3. Following construction activities, settling basin may be used as a final accumulation point for other wastewaters generated from plant start-up activities. See Subsection 4.2.2.2 for additional information regarding water bodies receiving construction effluents.

4.2.1.4.2 Undisturbed Areas

Runoff from undisturbed areas follows flow paths from those already established unless the runoff has the potential to affect construction areas or developed areas; then, additional steps should be taken to minimize the impact of stormwater runoff.

settling ponds prior to discharge to minimize this threat. TPDES limitations on physical and chemical parameters are met during construction activities, and the impacts to terrestrial and aquatic ecosystems are considered SMALL.

4.2.1.10 Construction Stormwater Control and Other Minimizing Actions

The impacts from stormwater runoff during construction are considered SMALL and should be effectively managed by development and implementation of a site-specific construction SWP3. The construction SWP3 is expected to address employee training and installation of soil erosion measures such as silt fences, straw bales, slope breakers, and other soil erosion prevention measures. The SWP3 also contains preventive maintenance procedures for construction equipment to prevent leaks and spills, procedures for storage of chemicals and waste materials, spill control practices, revegetation plans, procedures for regular inspections of soil erosion control measures, and procedures for visual inspections of discharges that could create an impact on water quality. Much of the proposed Units 3 and 4 site footprint is located within areas where construction was previously completed, and established stormwater drainage systems and roadways already exist.

The TCEQ requires construction projects that impact five ac or greater to obtain authorization under the TPDES General Permit prior to start of construction. The current TPDES permit (TCEQ 2003) requires BMPs for soil and erosion control, stabilization practices, structural controls, materials management, inspections, etc. In addition, the U.S. Environmental Protection Agency (EPA) has issued BMP guidance for soil and erosion control (EPA 2007), and for development of SWP3s. Because construction of Units 3 and 4 is estimated to require approximately 659 ac, coverage under the TPDES General Permit is required.

4.2.2 WATER-USE IMPACTS

This subsection is a discussion of water-use impacts that includes surface water and groundwater environments during the construction phase of the project. Measures to eliminate or reduce construction impacts are discussed in Subsection 4.2.1.10.

4.2.2.1 Construction Activities Potentially Impacting Water Use

Lake Granbury and SCR are the waters that could potentially be affected by construction activities. Descriptions of Lake Granbury and SCR, the shallow/perched groundwater, bedrock aquifers in the site vicinity including the Glen Rose Formation and the Twin Mountains Formation, and the CPNPP site are presented in Subsection 2.3.1.

Dredging for sediment removal is anticipated in the immediate area of the CPNPP Units 3 and 4 ~~cooling water~~makeup water and blowdown system intake and discharge prior to startup of the ~~raw water~~makeup water and blowdown system. A temporary increase in turbidity could occur in Lake Granbury near the Units 3 and 4 structures during dredging activities. Dredging operations are conducted in compliance with USACE and TCEQ requirements, and are not expected to affect long-term water quality. This temporary effect is considered SMALL and is not expected to have a significant impact on water use or water quality. CTS-00622

TABLE 4.2-1
LAKE GRANBURY MUNICIPAL WATER SYSTEMS

Public Water System	Use	Population Count	Average Daily Consumption
Oak Trail Shores	Municipal	~~8186~~6354	~~0.383~~0.362 Mgd
City of Granbury[(a)]	Municipal	See Note	See Note
Action Municipal Utility District[(a)]	Municipal	See Note	See Note
Johnson County Fresh Water Supply District No. 1[(a)]	Municipal	See Note	See Note
Johnson County Special Utilities District[(a)]	Municipal	See Note	See Note

CTS-00623

a) Treated Water Provided by the Lake Granbury Surface Water and Treatment System (SWATS)

Note: SWATS Total Population Count = 60,692, Total Average Daily Consumption = 5.360 million gallons per day (Mgd)

(TCEQ 2008)

- Excavating evaporation and water retention ponds.
- Pouring concrete foundations.
- Constructing buildings and other structures on the additional foundations.
- Leveling by grading or filling for additional parking lots and internal roadways.
- Paving roadways and parking lots.
- Grading and landscaping to permanently control erosion and runoff.

This section describes the potential impacts of the construction activities listed above on the ecological resources of the CPNPP site and vicinity within Somervell and Hood counties. No other major state or federal projects are planned in the vicinity of the CPNPP site (Section 2.8). Disturbance in the area would be directly related to construction activities for the proposed project. Scheduled activities are not expected to acquire a Limited Work Authorization (LWA). Construction of CPNPP Units 3 and 4 is scheduled for completion as shown in Table 1.1-1.

Except for the addition of permanent structures that affect a small percentage of the natural habitat available on the site, potential impacts associated with construction are expected to be temporary and minor. An estimated 275 ac in the core area of the site are expected to be affected by the construction of additional facilities including the new reactor units, switchyard, and cooling towers (Figure 4.3-1). In addition, construction of the proposed blowdown treatment facility occurs within an area of approximately ~~384~~400 ac (Figure 1.1-4). Accordingly, ~~659~~675 ac represent the maximum area of soil to be disturbed at any time during construction. When construction is complete, approximately 150 ac of the affected on-site acreage in the core area of the site approximately ~~179~~195 ac in the area of the blowdown treatment facility (or a total of ~~329~~345 ac) would contain permanent structures or other facilities, including paved parking lots. About 330 ac of temporarily altered areas not containing permanent structures and landscaping would be re-vegetated or otherwise restored to approximate a natural condition such as grassland and routinely maintained following construction. CTS-00651 CTS-00459 CTS-00651

A detailed and comprehensive description of the terrestrial environment at the CPNPP site is provided in Subsection 2.4.1. Terrestrial ecological effects from constructing additional reactor units and support facilities at CPNPP would be negligible to SMALL impacts. None are MODERATE or LARGE. These effects are subject to mitigation by generally accepted measures employed during construction or already in place at the site. Application of such measures is warranted at CPNPP Units 3 and 4. Mitigation beyond the application of these measures is not warranted.

4.3.1.1 Terrestrial Vegetation

Anticipated effects of construction at CPNPP for the proposed project would include temporary and long-term alteration and loss of vegetative cover, loss of wildlife habitat, increased erosion, and increased interaction between humans and wildlife. Approximately 101 ac of Ashe juniper forest, about three percent of the Ashe juniper habitat presently on the site; 17 ac of mixed hardwood forests, about three percent; and 28 ac of grassland, about four percent are located

Chapter 5

Chapter 5 Tracking Report Revision List

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	Acronyms and Abbreviations	5-xxii	Editorial correction	Change “MPT Main Power Transformer” to “MT Main Transformer”.	0
CTS-00624	5.1.3.1.4	5.1-5	Erratum	Change “one mi” to “two mi”.	0
CTS-00624	5.1.3.1.4	5.1-5	Editorial correction	Change “site boundary” to “property boundaries”.	0
CTS-00625	5.1.2	5.1-2	Erratum	Change number of 345-kV transmission lines from “five” to “four”.	0
CTS-00627	5.2.3.5	5.2-16	Editorial correction	Change the discussion regarding the cells and cubicles.	0
CTS-00628	Table 5.3-3	5.3-20	Editorial correction	Change the circulating water flow/tower and drift rate per tower numbers.	0
CTS-00629	Table 5.4-16	5.4-42	Erratum	Change “rad” to “person-rad”.	0

ACRONYMS AND ABBREVIATIONS

MMbbl	million barrels	
MMBtu	million Btu	
MNES	Mitsubishi Nuclear Energy Systems Inc.	
MOU	municipally-owned utility	
MOV	motor operated valve	
MOX	mixed oxide fuel	
mph	miles per hour	
~~MPT~~	~~Main Power Transformer~~	CTS-00615
MSDS	Materials Safety Data Sheets	
msl	mean sea level	
MSR	maximum steaming rate	
MSW	municipal solid waste	
MT	Main Transformer	CTS-00615
MTU	metric tons of uranium	
MW	megawatts	
MW	monitoring wells	
MWd	megawatt-days	
MWd/MTU	megawatt–days per metric ton uranium	
MWe	megawatts electrical	
MWh	megawatt hour	
MWS	makeup water system	
MWt	megawatts thermal	
NAAQS	National Ambient Air Quality Standards	
NAPA	Natural Areas Preserve Association	
NAP	National Academies Press	

fact that the existing reactors and domes (CPNPP Units 1 and 2) are visible from particular areas outside the CPNPP site, this view is obscured from the downtown areas of Glen Rose and Granbury in which the NRHP properties are consolidated. The relative distance of the historic properties from the CPNPP site makes noise concerns negligible; therefore, the operational effects of the CPNPP site upon NRHP properties within a 10-mi radius of the facility are expected to be SMALL and no mitigation is warranted.

5.1.3.1.4 Historic Cemeteries

One small historic cemetery, the Hopewell Cemetery (SV-C004), is located within the CPNPP site (Subsection 2.5.3). The Hopewell Cemetery is accessible, fenced for protection, and receives periodic general upkeep. The cemetery is located just over 980 ft from the proposed water pipeline route. This water pipeline route is located within a pre-existing transmission line ROW. Thus, indirect impacts from ROW maintenance remain the same. Vegetation surrounding the cemetery is consistently thick and obscures any visual corridors to on-site activity making visual impacts to the cemetery negligible. Noise impacts from continued operation of CPNPP Units 3 and 4 upon the Hopewell Cemetery are SMALL, so no mitigation is warranted. Three other nearby cemeteries, Unknown Cemetery (SV-CO26), Post Oak Cemetery (SV-001), and Milam Chapel Cemetery (SV-C002), are located outside the CPNPP site, but within ~~one~~two mi of the ~~site~~property boundar~~y~~ies. All three of these cemeteries are at least one mi from the on-site APE. Indirect effects related to the ongoing operation of facilities at the CPNPP site are not anticipated for the cemeteries because such factors are not sufficient to physically disturb burials and grave-markers or prevent visitor access. CTS-00624

5.1.3.1.5 Traditional Cultural Properties

No known Traditional Cultural Properties exist on CPNPP property. Comanche Peak, a geological feature north of the property, may have some significance to the Comanche Tribe. Squaw Creek just south of the property may also have special significance to the Comanche Tribe (Subsection 2.5.3.4). Because neither of these properties is within the on-site APE, they are not expected to be directly impacted by ongoing facility operations. The potential for indirect, visual/aesthetic impacts from proposed construction is not planned to exceed the impact of the current facilities within CPNPP property. A written response from the Comanche Tribe dated February 12, 2007 stated that the Comanche Tribe has no immediate concerns or issues regarding this project. In the event human remains or archeological items are discovered in the process of the project, the tribe requests project work cease and appropriate disposition occur between Luminant and relative Tribal Nations. Because of the distance separating the Traditional Cultural Properties from the on-site APE, indirect noise impact on Traditional Cultural Properties is expected to be SMALL and no mitigation is warranted.

5.1.3.2 Transmission Corridors and Off-Site Areas

Construction of Units 3 and 4 at CPNPP includes the construction of transmission lines and water intake and water discharge pipelines. This subsection describes the effects of plant operations on historic properties within the proposed transmission corridors and water pipeline ROWs. Oncor Electric Delivery selects the transmission and distribution line corridors, constructs the lines, and owns and operates the lines from the CPNPP site to various new and existing end users in north Texas. Final routes and designs have not been prepared to date but are being sensitivity of resident species is in Subsection 5.3.3.2.1. The locations of roads on the CPNPP site are illustrated in Figure 2.1-1.

5.1.1.2 The Vicinity

Land use in the vicinity of CPNPP is discussed in Subsection 2.2.1, acreages are shown in Table 2.2-1, and Figure 2.2-2 illustrates the land use in the vicinity of the site. The majority of operation workers are expected to reside in Somervell and Hood counties. The area is fairly rural, with utilities and amenities generally supplied by the cities and townships in the counties. It is likely that new employees who choose to settle near the CPNPP site purchase homes or acreage in the Granbury or Glen Rose areas. Given the extensive development of housing in the vicinity, the operation workers are expected to find residences in existing or planned developments and are not expected to result in further land use change. Housing impacts are discussed in Subsection 4.4.2.4. No new land is anticipated to be disturbed after the construction phase, and operational land-use effects are confined to the CPNPP site as well as the intake and discharge areas at Lake Granbury; therefore, operations at CPNPP are expected to have SMALL effects on forest, pasture, and farmland in the vicinity of the site. No mitigation is necessary. Geological features in the vicinity of CPNPP are discussed in FSAR Section 2.5.

The majority of the cooling tower plumes dissipate before leaving the site boundary, or resemble cumulus clouds when seen from a distance. The effects of cooling tower plumes and drift in the vicinity of CPNPP are evaluated and the results are discussed in Subsection 5.3.3.1.1. Discussion of salts on the sensitivity of resident species is in Subsection 5.3.3.2.1.

The location of roads in the vicinity of CPNPP are described in Subsection 2.5.2.2. Operation-related land-use effects involving social and economic impacts in the vicinity surrounding CPNPP are assessed in Section 5.8.

5.1.2 TRANSMISSION CORRIDORS AND OFF-SITE AREAS

Land use within and adjacent to the proposed transmission corridors is discussed in Subsection 2.2.2. The primary land use in the transmission corridors is grassland, as the corridors are cleared by the time plant operation begins. Figure 2.2-1 shows land use on the site and in the adjacent areas.

The operation of CPNPP Units 3 and 4 requires ~~five~~four 345-kV transmission lines. These lines are placed along existing ROWs with a width of 160 ft. The lines consist of a 45-mi line to Whitney Switching Station, a 17-mi line to DeCordova Switching Station, a 22-mi line to Johnson Switching Station, a 23-mi line from Johnson Switching Station to Everman Switching Station, and a 42-mi line to Parker Switching Station. The basic electrical and structural design parameters of the transmission system are described in Subsection 3.7.1. CTS-00625

The Texas General Land Office oversees land use in Texas. The proposed transmission corridors do not cross federal, state, or Native American tribal lands. The Parker line crosses Texas State Highway 377 (SH 377), SH 171, U.S. Highway 180 (US 180), and Interstate 20E (I-20E) in addition to a Ft. Worth and Western Railroad line in Hood County and a Union Pacific Railroad line in Parker County. The Johnson line crosses SH 144 and Farm to Market 4 (FM 4), while the Everman line crosses SH 171, I-35W, a Ft. Worth and Western Railroad line in Johnson

Discharges to Squaw Creek Reservoir

Wastewater generated from the floor and equipment drains, and nonradioactive laboratory wastewater, would be processed through a wastewater treatment system then discharged to SCR. Chemicals used in plant water treatment systems are discussed in Subsection 3.6.1. Plant discharges containing concentrations of these chemicals are treated in the wastewater treatment system. Materials used in the wastewater treatment system are compatible with the cooling water chemistry, and the chemicals used to control long-term corrosion and organic fouling. Treatment of the discharge is expected to reduce concentrations to levels that are within TPDES discharge limits and are environmentally acceptable. Sanitary wastes would be treated separately through a new or existing sewage treatment system and discharged to SCR. Stormwater is routed to holding ponds and then discharged to SCR. Additional wastewater discharge details are provided in Section 3.6. Because processed wastewater would be treated prior to discharge into SCR as needed to comply with TPDES wastewater discharge requirements, the impacts of residual chemicals on water quality are expected to be SMALL and do not warrant mitigation.

Low Level Radioactive Process Water Discharges

For Units 3 and 4, a liquid waste management system (LWMS) is designed to safely monitor, control, collect, process, handle, store, and dispose of liquid radioactive waste generated as a result of normal operation, including anticipated operational occurrences (AOOs). The AOOs are events in which the reactor plant conditions are disturbed beyond the normal operating range and are expected to occur one or more times during the lifetime of the plant. The LWMS is broadly classified into the liquid waste processing system (LWPS) and the reactor coolant drain system (RCDS). Additional information on the LWMS system is presented in Subsection 3.5.1.

Low-level radioactive wastewater meeting applicable discharge limits is expected to be discharged to SCR, with a possible diversion to a new evaporation pond. During normal operations, the release of liquid radioactive effluents to the environment would be such that the doses to individuals off-site are maintained within the limits of 10 CFR Part 20 and 10 CFR Part 50, Appendix I for pertinent thresholds. Information related to the process and discharge of low-level radioactive wastewater is presented in Subsection 3.5.1.

The LWMS and LWPS process and control the release of liquid radioactive effluents. Impacts from radioactive discharges are considered SMALL.

5.2.3.5 Impacts to Groundwater

The present use and future uses of groundwater are further discussed in Subsection 2.3.2.4. As discussed in Subsection 2.3.1.5.5, groundwater contours illustrate that shallow groundwater on the CPNPP Unit 3 and 4 site flows toward SCR and the SSI. Consequently, any plant impacts to groundwater are not anticipated to impact off-site groundwater.

There are two sources for radiological impacts to groundwater: (1) leaks from radioactive waste tanks, ponds, and piping, and (2) leaks from the spent fuel pool. To minimize the potential for contact of radioactive material with groundwater, ~~the Units 3 and 4 low-level radioactive liquid is stored in tanks located inside cubicles that are curbed and lined up to a wall height equivalent to~~ CTS-00627

~~one full tank volume of liquid for that tank~~the cells/cubicles housing tanks that contain significant quantities of radioactive material are lined with stainless steel to a height that is sufficient to hold the tank contents in the event of tank failure. This liner system acts as a barrier to minimize the contamination of the groundwater system, and to minimize decontamination in the event of an overflow or break. Overflow from tanks or standpipe is directed to a near-by sump. The sump has liquid level detection. At high liquid levels, the level switch automatically activates the sump pump to forward the liquid to the waste holding tank for processing. This design minimizes the potential for contamination of the facility and the environment, facilitates decommissioning, and minimizes the generation of radioactive waste. In addition, radiological groundwater sampling is currently conducted at CPNPP as part of the monitoring program for CPNPP Units 1 and 2. The radiological analyses of groundwater samples include tritium and radioactive gamma spectroscopy. Ponds are lined with clay and polyethylene liners to prevent leaching. CTS-00627

Non-radioactive contamination of groundwater may result from leaks of petroleum storage tanks or spills. Luminant is expected to develop, implement, and maintain an SWP3 and a Spill Prevention Control and Countermeasures Control (SPCC) plan for Units 3 and 4 that address (1) spill management and control for operations, (2) storage and management of chemicals, and (3) oil storage and management. Based upon the implementation of best management practices and low permeability soils, impact from Units 3 and 4 operations on groundwater are considered SMALL.

5.2.3.6 Regulatory Compliance

The TCEQ requires industrial facilities that discharge into waters of the United States to obtain a valid TPDES permit for wastewater discharges and secure coverage under a valid TPDES general permit for stormwater. The TPDES permit for CPNPP Units 1 and 2 is expected to be amended to include discharge from Units 3 and 4 to Lake Granbury and SCR. The TPDES permit specifies maximum discharge limits. In addition, federal/state regulations require the development of SPCC and SWP3 plans.

As mentioned in Subsection 5.2.1.8, there are no Native American lands within 50 mi of the CPNPP site based upon a review of the National Atlas.

5.2.4 REFERENCES

(BRA 2007) Brazos River Authority – Basin Summary Report 2007

(Brazos G 2006) Brazos G 2006 Regional Water Plan. Brazos G Regional Water Planning Group, January 2006.

(CORMIX 2008a) CORMIX Mixing Zone Applications. http://www.cormix.info/applications.php. Accessed February 10, 2008.

(CORMIX 2008b) Independent CORMIX Validation Studies. http://www.cormix.info/validations.php. Accessed February 10, 2008.

(CORMIX 2008c) CORMIX Mixing Zone Glossary. http://www.cormix.info/picgal/mixingz.php. Accessed February 10, 2008.

TABLE 5.3-3
COOLING TOWER AND CIRCULATING WATER DATA

Per Unit

Tower type	Back to back mechanical draft	
Number of banks	2	
Tower arrangement	parallel	
Tower height above plant grade	55.4 ft	
Tower dimensions	122 ft X 811ft	
Number of cells/tower	30	
Cell exit diameter	45.5 ft	
Heat dissipation rate per tower	1461 MW	
Air mass flow rate per tower	14,500 kg/sec	
Circulating water flow/tower	~~1,307,000~~1,317,720 gpm	CTS-00628
Drift rate per tower	~~12.9~~13.2 gpm	CTS-00628
Cooling water salt concentration	288 ppm	

TABLE 5.4-16
DIRECT RADIATION DOSE

	Location	Estimated Annual Dose	
Direct radiation from site	Maximum Individual at site boundary	8.76 mrad	
Background radiation	Population within 50 mi	1.4E+05 person-rad	CTS-00629

The total population within 50 mi of the CPNPP site projected to the year 2058 is 3,493,553 people.

Chapter 6

Chapter 6 Tracking Report Revision List

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	Acronyms and Abbreviations	6-xvi	Editorial correction	Change “MPT Main Power Transformer” to “MT Main Transformer”.	0
CTS-00630	6.3.1.1	6.3-2	Editorial correction	Change “SWS” to “ESWS”	0
CTS-00631	6.5.1	6.5-2	Editorial correction	Remove “nonradioactive”.	0
CTS-00631	6.5.1	6.5-2	Editorial correction	Change “service water” to “essential service water”	0

ACRONYMS AND ABBREVIATIONS

MMbbl	million barrels
MMBtu	million Btu
MNES	Mitsubishi Nuclear Energy Systems Inc.
MOU	municipally-owned utility
MOV	motor operated valve
MOX	mixed oxide fuel
mph	miles per hour
~~MPT~~	~~Main Power Transformer~~ CTS-00615
MSDS	Materials Safety Data Sheets
msl	mean sea level
MSR	maximum steaming rate
MSW	municipal solid waste
MT	Main Transformer CTS-00615
MTU	metric tons of uranium
MW	megawatts
MW	monitoring wells
MWd	megawatt-days
MWd/MTU	megawatt–days per metric ton uranium
MWe	megawatts electrical
MWh	megawatt hour
MWS	makeup water system
MWt	megawatts thermal
NAAQS	National Ambient Air Quality Standards
NAPA	Natural Areas Preserve Association
NAP	National Academies Press

6.3.1.1 Surfacewater

Luminant is required to conduct wastewater sampling and flow measurements in accordance with TPDES Permit Number WQ0001854000 (TCEQ 2004). Sampling data for a 3-year period are shown in Table 6.3-1, indicating the CPNPP discharge flow and water quality released into SCR from the CPNPP site. Data are shown for Monitoring Points 001, 003, and 004 (Figure 6.3-1). Monitoring Points 002, 005, and 104 have not received discharge wastewater during the operations of CPNPP Units 1 and 2. This TPDES permit is expected to be amended to include discharge from CPNPP Units 3 and 4 to Lake Granbury. Current design plans for CPNPP Units 3 and 4 show the circulation water system (CWS) and the essential service water system (ESWS) blowdown discharging to Lake Granbury, and the liquid low level radioactive and nonradioactive process waste waters, stormwater, and sanitary outflows discharging to SCR. Aquatic monitoring stations are shown on Figure 6.3-2. CTS-00630

The TCEQ was consulted to determine if any other parameters should be considered in the preapplication monitoring program. No other parameters were suggested other than those already being monitored. The TCEQ concurred with the approach used to determine the appropriate parameters that must be considered for the preapplication monitoring program.

Hydrological analysis requirements are specified in the TPDES permit for wastewater discharges from CPNPP Units 1 and 2 to SCR, which is a once-through cooling reservoir. The current TPDES permit does allow for discharge to Lake Granbury from the two operating units; however, this outfall has never been utilized but the option to use this outfall in the future is still available. The temperature at the discharge to SCR is monitored and limited by a daily maximum discharge temperature of 116°F, with a daily average of 113°F. This temperature limit is based on the daily average and the daily maximum of the combined CPNPP Units 1 and 2 discharge temperature and is calculated based on two hour increments. The temperature readings are monitored on a continuous basis. For discharge into Lake Granbury, the current TPDES permit has a daily maximum temperature and daily average temperature limit of 93°F as well as a TDS limit of 4000 milligrams per liter (mg/l). As stated above, this outfall (Outfall 005) has not been utilized during the operations of the existing units. Sampling requirements (including the type and frequency of data collected) for the existing outfalls under the current TPDES permit are presented in Table 6.6-1.

A bathymetric survey was conducted from April to May 2007 on Lake Granbury in the vicinity of the proposed cooling water system intake and discharge structures (Boss 2007). In addition, a bathymetric survey of SCR was also completed during the same time frame (Boss 2007a). Figure 2.3-12 shows the locations of waypoints on Lake Granbury that were used for temperature measurements, and Table 2.3-22 provides the measurement data. Figure 2.3-13 depicts the water depth obtained from the bathymetric survey. Figure 2.3-16 shows the locations of waypoints on SCR that were used for temperature measurements, and Table 2.3-24 provides the measurement data. Figure 2.3-17 depicts the water depth obtained from the bathymetric survey. On May 2, 2007, for Lake Granbury and April 17, 2007, for SCR, water temperatures were taken at the surface, then at 10-ft increments to a depth of 50 ft, where allowable, based on the total depth of the water at that location. The Lake Granbury data revealed that temperatures generally decrease by approximately 8.5°F to a depth of 50 ft. The SCR data revealed that the temperature did not vary substantially with increased depth except for around the discharge where the temperature decreased by approximately 5°F to a depth of 50 ft. Subsection 2.3.1.2.5

Makeup water for the proposed CPNPP Units 3 and 4 circulation water system and essential service water system is planned to be withdrawn from Lake Granbury. The CPNPP Units 3 and 4 ~~nonradioactive~~ circulating water system and essential service water system blowdown are returned to Lake Granbury. Some of the makeup water for CPNPP Units 1 and 2 is currently supplied from Lake Granbury to SCR by existing pipelines within an established ROW. The ROW would be temporarily expanded during construction of the additional pipelines for Units 3 and 4. Field reconnaissance along the ROW failed to reveal any important species or habitats, including wetlands. Several potential ROWs from the current water discharge to SCR to the proposed cooling tower locations for Units 3 and 4 were assessed in late 2007. As with the existing ROW there were no important species or habitats, including wetlands. CTS-00631 CTS-00631

Plants and wildlife found in less disturbed habitats on or near the CPNPP site commonly occur throughout north-central Texas. Subsections 4.3.2 and 5.3.3.2 discuss the impacts of construction and operation on terrestrial ecological resources. Also discussed are best management practices (BMPs) that might be implemented as needed to mitigate construction impacts. All of the impacts on terrestrial ecology and land use associated with construction on the CPNPP site are either negligible or SMALL, and do not warrant additional monitoring.

As discussed in Section 5.6, new electrical transmission circuitry supporting CPNPP Units 3 and 4 is constructed, owned, operated, and maintained by Oncor Electric Delivery Company LLC (Oncor), a separate company. Oncor proposes to expand five existing electrical transmission lines now connecting CPNPP to existing switching stations in the area (Figure 1.1-5). Three of the expansions are completed by installing new circuitry on existing structures. Two of the expansions may require constructing new towers on additional ROW. Once approved by the Public Utility Commission of Texas, the new ROWs would likely be subjected to further field evaluation designed to detect any fatal flaws not evident in the data collected to date.

After Oncor secures state approval, the new ROWs would be subjected to site-specific preconstruction investigations, possibly including but not limited to reconnaissance to ascertain the presence or absence of plant species of special concern and other important species and habitats defined in NUREG-1555 or as required by federal or state agency regulatory requirements.

With the exception of the 2009 golden-cheeked warbler survey discussed above and the possible exception of reconnaissance survey along the new transmission line ROWs, no additional preoperational or operational terrestrial ecological monitoring is planned unless the need for monitoring arises as a condition of a permit or other regulatory approval required to construct and operate CPNPP Units 3 and 4.

6.5.2 AQUATIC ECOLOGY

A limited preapplication field investigation designed to characterize aquatic vegetation, benthos, plankton, and fish communities in SCR and Lake Granbury was performed in 2007 and 2008. Subsection 2.4.2 describes this investigation, which was implemented to augment historical data for SCR, and its results. No protected species or critical habitats, as defined in NUREG-1555, have been located on or adjacent to CPNPP.

Chapter 7

Chapter 7 Tracking Report Revision List

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	Acronyms and Abbreviations	7-xvii	Editorial correction	Change “MPT Main Power Transformer” to “MT Main Transformer”.	0
CTS-00470	7.2	7.2-7	Erratum	Change “5.87 x 10^{-1}” to “1.15”.	0

ACRONYMS AND ABBREVIATIONS

MMbbl	million barrels
MMBtu	million Btu
MNES	Mitsubishi Nuclear Energy Systems Inc.
MOU	municipally-owned utility
MOV	motor operated valve
MOX	mixed oxide fuel
mph	miles per hour
~~MPT~~	~~Main Power Transformer~~ CTS-00615
MSDS	Materials Safety Data Sheets
msl	mean sea level
MSR	maximum steaming rate
MSW	municipal solid waste
MT	Main Transformer CTS-00615
MTU	metric tons of uranium
MW	megawatts
MW	monitoring wells
MWd	megawatt-days
MWd/MTU	megawatt–days per metric ton uranium
MWe	megawatts electrical
MWh	megawatt hour
MWS	makeup water system
MWt	megawatts thermal
NAAQS	National Ambient Air Quality Standards
NAPA	Natural Areas Preserve Association
NAP	National Academies Press

total dose risk value of 3.00×10^{-1} person-rem/RY is not bounded by the dose risk of 2.7×10^{-1} person-rem/RY calculated in Table 10a of the DC Applicant's ER (MHI 2007). However, the calculation in the DC Applicant’s ER (MHI 2007) does not account for Release Category RC5 because there is no release within 24 hr after the onset of core damage. If the dose risk value for RC5 is subtracted from the total dose risk value in Table 7.2-6 for the year 2006, the resulting total dose risk value is 1.52×10^{-1} person-rem/RY, which is bounded by 2.7×10^{-1} person-rem/RY. Other notable differences between the DC Applicant's analysis and the site-specific analysis are that the DC Applicant's analysis did not credit evacuation and sheltering and only considered the first 24 hours (hr) of the event. Radiological dose consequences and health effects associated with normal and anticipated operational releases are discussed in Subsection 5.4.3.

The CDF for internal events is 1.2×10^{-6}. This value is used in conjunction with the Applicant's ER (MHI 2007) to determine the total severe accident health effects, which include internal events, internal fire, internal flood, and low-power and shutdown (LPSD) events, as shown in Tables 7.2-12, 7.2-13, and 7.2-14. The health effects resulting from internal fire, internal flood, and LPSD events were determined using the ratio of the CDF values for these events and the CDF value for the internal events. The maximum dose risk from the three years of meteorological data is ~~5.87×10^{-1}~~1.15 person-rem/RY. The maximum numbers of early and latent fatalities per RY from the three years of meteorological data are 1.40×10^{-7} and 8.90×10^{-4}, respectively. Finally, the maximum dose for the water ingestion pathway from the three years of meteorological data is 6.25×10^{-2} person-rem/RY. CTS-00470

Additionally, the NRC's Safety Goal Policy Statement, issued in 1986, states that "the risk to an average individual in the vicinity of a nuclear power plant of prompt fatalities that might result from reactor accidents should not exceed one-tenth of one percent (0.1 percent) of the sum of prompt fatality risks resulting from other accidents to which members of the U.S. population are generally exposed" and that "the risk to the population in the area near a nuclear power plant of cancer fatalities that might result from nuclear power plant operation should not exceed one-tenth of one percent (0.1 percent) of the sum of cancer fatality risks resulting from all other causes." According to the Centers for Disease Control and Prevention (CDC), there were 39.7 deaths caused by accidents per 100,000 people in the year 2005. Also, there were 188.7 deaths caused by cancer per 100,000 people in the year 2005 (CDC 2008). These statistics mean that the cancer fatality risk from "all other causes" is 1.89×10^{-3}, and the prompt fatality risk from "other accidents" is 3.97×10^{-4}. One-tenth of one percent of each of these risks results in a value of 1.89×10^{-6} for cancer fatalities and 3.97×10^{-7} for prompt fatalities. As stated above, the maximum number of latent fatalities per RY from the three years of meteorological data is 8.90×10^{-4}. In order to obtain the appropriate risk number, the number of latent fatalities is divided by the calendar year 2056 population within 50 mi of the CPNPP site of 2,760,243. This results in a cancer fatality risk of 3.22×10^{-10}, which is well below the goal of 1.89×10^{-6}. Also as stated above, the maximum number of early fatalities per RY from the three years of meteorological data is 1.40×10^{-7}. In order to obtain the appropriate risk number, the number of early fatalities is divided by the calendar year 2056 population within two kilometers of the CPNPP site of 182, as provided in Table 2.5-1. The Safety Goal Policy Statement indicates that the population within one mile of the plant should be used, but here the population within two

Chapter 8

Chapter 8 Tracking Report Revision List

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	Acronyms and Abbreviations	8-xvi	Editorial correction	Change “MPT Main Power Transformer” to “MT Main Transformer”.	0

ACRONYMS AND ABBREVIATIONS

MMbbl	million barrels	
MMBtu	million Btu	
MNES	Mitsubishi Nuclear Energy Systems Inc.	
MOU	municipally-owned utility	
MOV	motor operated valve	
MOX	mixed oxide fuel	
mph	miles per hour	
~~MPT~~	~~Main Power Transformer~~	CTS-00615
MSDS	Materials Safety Data Sheets	
msl	mean sea level	
MSR	maximum steaming rate	
MSW	municipal solid waste	
MT	Main Transformer	CTS-00615
MTU	metric tons of uranium	
MW	megawatts	
MW	monitoring wells	
MWd	megawatt-days	
MWd/MTU	megawatt–days per metric ton uranium	
MWe	megawatts electrical	
MWh	megawatt hour	
MWS	makeup water system	
MWt	megawatts thermal	
NAAQS	National Ambient Air Quality Standards	
NAPA	Natural Areas Preserve Association	
NAP	National Academies Press	

Chapter 9

Chapter 9 Tracking Report Revision List

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	Acronyms and Abbreviations	9-xx	Editorial correction	Change “MPT Main Power Transformer” to “MT Main Transformer”.	0
CTS-00632	9.2	9.2-9	Erratum	Change “peak” to “units”.	0

ACRONYMS AND ABBREVIATIONS

MMbbl	million barrels	
MMBtu	million Btu	
MNES	Mitsubishi Nuclear Energy Systems Inc.	
MOU	municipally-owned utility	
MOV	motor operated valve	
MOX	mixed oxide fuel	
mph	miles per hour	
MPT	Main Power Transformer	CTS-00615
MSDS	Materials Safety Data Sheets	
msl	mean sea level	
MSR	maximum steaming rate	
MSW	municipal solid waste	
MT	Main Transformer	CTS-00615
MTU	metric tons of uranium	
MW	megawatts	
MW	monitoring wells	
MWd	megawatt-days	
MWd/MTU	megawatt–days per metric ton uranium	
MWe	megawatts electrical	
MWh	megawatt hour	
MWS	makeup water system	
MWt	megawatts thermal	
NAAQS	National Ambient Air Quality Standards	
NAPA	Natural Areas Preserve Association	
NAP	National Academies Press	

capacity equal to the proposed project. Even if suitable land with sufficient wind were available for development, energy produced by wind generators varies on an hourly, daily, weekly, seasonally, and annual basis. Because of this natural variability, wind generation cannot be effectively used for baseload power, and solutions to this variability are not expected within the project time frame.

Criterion 4 - No unusual environmental impacts or exceptional costs

A factor affecting the feasibility of this technology is that wind power, because of the large land requirements and other issues, is considered to have potential environmental impacts greater than those expected for the proposed CPNPP Units 3 and 4. The potential adverse impacts of wind power on water quality, air quality, human health, and waste management are expected to be SMALL. The potential adverse impacts on ecological resources, protected species, and cultural resources are expected to be MODERATE.

A potential MODERATE beneficial impact on socioeconomics would be expected. The leases for wind power may be on the order of $2000 – $5000 per turbine per year (GAO 2004), adding to the other salaries and economic activity associated with constructing and operating a wind farm.

The use of wind power would be expected to have a LARGE impact on land use, and by extension, on aesthetics. As discussed above, the Horse Hollow Wind Energy Center utilizes 47,000 ac of land to provide a generating capacity of 735 MW (FPL 2006). By extrapolation, and allowing for the wind power capacity factors, a wind power facility with a capacity equal to the proposed project could require on the order of 452,880 – 816,000 ac of land. Although some compatible land uses like agriculture could be practiced, a wind farm could preclude a number of land uses, particularly uses requiring aboveground structures that could interfere with, or disrupt, the windflow patterns driving the wind turbines.

Aesthetic concerns arise from the visibility of a large number of the tall aboveground towers and blades. The Horse Hollow Wind Energy Center has 421 turbines, each of which has towers that are approximately 262 feet (ft) tall with three blades (FPL 2007). A wind power project of capacity comparable to the proposed CPNPP ~~Peak~~Units 3 and 4 could have over 1830 of these types of towers. Aesthetic impacts would also exist from recreation and scenic value of ridge tops to the public that would be reduced by the presence of a very large wind farm. CTS-00632

Wind power production costs for conventionally sized facilities that are currently in operation generally range from $0.03 to $0.05 per kilowatt-hour (kWh) (BW 2005) based on equipment installation costs of $1000 to $2000 per kWh. Large-scale systems, greater than 100 MW, achieve the lowest cost when multiple units are installed at one location (IEC 2006).

Wind power is a contributor to the current total generation mix of energy in the ERCOT system, and Texas has more developed wind power energy than any other state. Based upon the evaluation criteria discussed above, wind power is not considered to be a reasonable energy alternative to the proposed project because wind power cannot provide baseload generating capacity and availability equal to the proposed CPNPP Units 3 and 4.

Chapter 10

Chapter 10 Tracking Report Revision List

Change ID No.	Section	Page	Reason for change	Change Summary	Rev. of T/R
CTS-00615	Acronyms and Abbreviations	10-xvi	Editorial correction	Change “MPT Main Power Transformer” to “MT Main Transformer”.	0
CTS-00459	10.1.1.1	10.1-1	Erratum	Change “200 ac” to “400 ac”.	0
CTS-00461	10.1.3.2.1	10.1-11	Editorial Correction	Remove “diesel generators”, and mention the auxiliary boiler as an air emission source.	0
CTS-00459	Table 10.1-1	10.1-14	Erratum	Change “200 ac” to “400 ac”.	0
CTS-00650	Table 10.1-1	10.1-14	Erratum	Change “659 ac” to “675 ac”.	0
CTS-00633	Table 10.1-1	10.1-14	Erratum	Change 4152 to indicate this is the fourth item in the table and the number cited is 152	0
CTS-00460	10.1	10.1-5	Erratum	Add text to show an additional 250 gpm will be provided for de-mineralized water, and change “fifty gpm” to “three hundred gpm”.	0
CTS-00505	10.1.3.2.2	10.1-12	Editorial correction	Remove “adds on impact”.	0
CTS-00505	10.1.3.2.2	10.1-12	Editorial correction	Remove “not”.	0
CTS-00634	10.4.1.2.1	10.4-3	Erratum	Change “4461” to “4466”.	0
CTS-00459	10.4.2.2.1	10.4-8	Erratum	Change “approximately 200 ac” to “400 ac”.	0
CTS-00506	Table 10.4-2	10.4-15	Erratum	Change alignment of “3180”.	0
CTS-00459	Table 10.4-4	10.4-20	Erratum	Change “384 ac” to “400 ac”.	0

ACRONYMS AND ABBREVIATIONS

MMbbl	million barrels
MMBtu	million Btu
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MOU	municipally-owned utility
MOV	motor operated valve
MOX	mixed oxide fuel
mph	miles per hour
~~MPT~~	~~Main Power Transformer~~ CTS-00615
MSDS	Materials Safety Data Sheets
msl	mean sea level
MSR	maximum steaming rate
MSW	municipal solid waste
MT	Main Transformer CTS-00615
MTU	metric tons of uranium
MW	megawatts
MW	monitoring wells
MWd	megawatt-days
MWd/MTU	megawatt–days per metric ton uranium
MWe	megawatts electrical
MWh	megawatt hour
MWS	makeup water system
MWt	megawatts thermal
NAAQS	National Ambient Air Quality Standards
NAPA	Natural Areas Preserve Association
NAP	National Academies Press

10.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

The following section describes unavoidable adverse environmental impacts for which mitigation measures are either considered impractical or do not exist. Because of the nature of the impacts and time frame involved, the analysis of unavoidable adverse impacts is divided into two sections: (1) construction impacts and (2) operational impacts.

Construction and operational impacts are evaluated in Chapter 4 and Chapter 5, respectively. The reader is referred to Chapters 4 and 5 for details as well as the justifications for conclusions presented in this Chapter.

Some mitigation measures for reducing construction-related impacts are also referred to as best management practices (BMPs). Project-specific BMPs are frequently implemented through permitting requirements, and plans and procedures developed for constructing or operating complex facilities. Project-specific BMPs supplement the mitigation measures described in this chapter and would be defined during the project implementation phase of the proposed units.

10.1.1 UNAVOIDABLE ADVERSE CONSTRUCTION IMPACTS

Impacts associated with construction of CPNPP Units 3 and 4 including pipeline and transmission corridors impacts, and measures and controls that could be implemented to reduce or eliminate such impacts are briefly summarized in Table 4.6-1. Potential mitigation measures available for reducing adverse construction impacts are summarized in Table 10.1-1. The following subsection describes the unavoidable adverse environmental and socioeconomic impacts.

10.1.1.1 Unavoidable Environmental Impacts

This subsection describes the principal unavoidable adverse environmental impacts potentially associated with constructing the two proposed nuclear power plants.

As noted in Subsection 2.2.1.1, approximately 3327.5 ac of the CPNPP site have been designated as open water, and another 1100.6 ac are designated as herbaceous/ grassland. Approximately 1064 ac within the CPNPP site are designated as prime farmland; however, this prime farmland is not utilized to grow crops. Some of this land is leased for cattle grazing. This prime farmland does not extend into areas that would be disturbed by construction and operation of CPNPP Units 3 and 4.

As described in Chapter 4, the principal unavoidable adverse environmental impacts of construction of the CPNPP Units 3 and 4, and the pipeline and transmission corridors would involve the following:

- The total number of acres of the CPNPP site is 7950 ac. Approximately 123 ac would be disturbed during construction of the CPNPP Units 3 and 4, 153 ac disturbed during construction of the cooling towers and approximately ~~200~~400 ac for the construction of the Blowdown Treatment Facility (BDTF). Details related to the BDTF are presented in Subsection 3.6.1.1. The impacts are considered to be relatively SMALL in terms of the entire size of the site. CTS-00459 would be treated as required to meet the wastewater discharge permit (TPDES) requirements prior to discharge.

Very LL radioactive effluents would be treated according to applicable regulatory standards before being discharged into SCR. The impacts of radioactive effluents discharged into this reservoir would also be reduced through a waste treatment prior to discharge.

Ecological

Operation of CPNPP Units 3 and 4, and the pipeline and transmission corridors continue to pose a relatively SMALL impact on individuals of various species. Revegetating and returning some of the land to a native state would result in a reduction of ecological impacts over time. A SMALL impact could result from bird collisions with the containment vessels, cooling towers, or transmission lines, and does not warrant mitigation.

Infrequent episodic loud noises related to plant operations and maintenance on the transmission corridor could result in a SMALL short-term disruption to wildlife.

Operation of the proposed cooling towers would result in relatively SMALL concentrations of salt deposition in the nearby vicinity of the cooling towers. The amount of salt deposition is expected to be below a level that harms leaves or other biota.

The effects of entrainment and impingement upon fish and aquatic organisms would constitute a SMALL impact on aquatic species. Water intakes and cooling towers are designed using BAT to minimizing impingement, which is a mitigating measure.

Incidental External Radiation Dose

Operational employees would be exposed to a relatively SMALL incidental external radiation dose. Such exposure can be reduced through careful monitoring, employee safety training programs, compliance with As Low As Reasonably Achievable (ALARA) program, and strict adherence to work procedures and applicable regulations.

Air Emissions

The cooling towers would emit a plume of water vapor and SMALL concentrations of chemical constituents to the atmosphere. The plume would result in a limited obstructed view of the sky, and could cause a shadowing effect on the ground that could have a SMALL to inconsequential effect on vegetation. ~~The facilities natural gas and diesel~~Operation of vehicles, auxiliary boilers and the testing and operation of the standby generators ~~would be occasionally operated and would~~ contribute a SMALL amount of greenhouse gases to the atmosphere. CTS-00461

Non-hazardous, Hazardous, and Radiological Waste

Operation of the CPNPP Units 3 and 4 would increase the volume of radioactive and nonradioactive wastes that are required to be disposed of by permitted disposal facilities or permitted landfills.

Non-hazardous waste would be handled in accordance with TCEQ regulations (e.g. permitted landfills, incineration) and would pose a SMALL impact on the environment. Hazardous RCRA waste would be handled in accordance with RCRA regulations and disposed of at a RCRA permitted waste facility. The impacts of non-hazardous and hazardous waste are considered to be relatively SMALL.

The two proposed CPNPP units would generate small amounts of LL radioactive and potentially very small amounts of mixed waste (waste containing both hazardous and radioactive constituents) that would need to be disposed of. Mixed waste would be stored on-site and disposed of at permitted mixed-waste disposal facilities according to applicable regulations. If mixed waste is properly managed (as done for CPNPP Units 1 and 2), the additional incremental risk of this waste is considered to pose a SMALL risk. In addition, very limited quantities (less than 1 cu yard) of mixed waste has been generated at CPNPP from the operations of CPNPP Units 1 and 2.

CPNPP Units 3 and 4 would generate high-level (HL) spent fuel waste during plant operation. Generation of HL radioactive spent fuel would need to be either reprocessed or isolated. Properly managed, the additional incremental risk of this waste is considered to pose a MODERATE but acceptable risk.

10.1.3.2.2 Socioeconomic

This subsection summarizes the socioeconomic impacts that would result from operation of the CPNPP Units 3 and 4. Some impacts such as growth induced effects may continue beyond the operational life of the CPNPP Units 3 and 4. Because of the smaller number of workers that would be required for operations as opposed to construction, the socioeconomic impacts are generally less intense but are sustained over a longer period of time when compared to that of construction.

As described in Subsection 5.8.1.1, the number of CPNPP work staff is estimated to total 1550 operation workers, with 1000 workers for CPNPP Units 1 and 2, and 550 workers for CPNPP Units 3 and 4, a relatively SMALL fraction of the total projected population of the region.

When compared to the overall hydrocarbon emission released in the local area, the operation of equipment and employee vehicles would release a relatively SMALL quantity of nonradioactive pollutants to the atmosphere and can be reduced through strict compliance with applicable air pollution control equipment. Visual impact ~~adds on impact~~ from the plant are SMALL and do not warrant mitigation. CTS-00505

Infrequent loud noises from plant operations and maintenance activities on the pipeline and transmission corridors might result in a SMALL change in ambient noise levels experienced by workers and local residents. Increased noise levels experienced by workers could be mitigated with noise protection equipment. Impacts on nearby residents can be reduced by staging loud intermittent activities during times when they would result in fewer disturbances.

An influx of operational workers would likely ~~not~~ have a SMALL short-term strain on the local school systems because construction workers and their families would relocate. The increase in CTS-00505

TABLE 10.1-1 (Sheet 1 of 8)
CONSTRUCTION-RELATED UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Category	Adverse Impact	Potential Actions to Mitigate Impacts	Unavoidable Adverse Impacts	
Land Use	Approximately 123 ac of the 7950-ac site would be disturbed during construction of the CPNPP Units 3 and 4, 152 ac disturbed during construction of the cooling towers, and approximately ~~200~~400 ac for the BDTF. Cleared or disturbed areas could present a relatively SMALL increased potential for erosion. Land would not be available for other uses. As much of this impact would continue into the operational phase, it would constitute a long-term irreversible and irretrievable (I&I) commitment of resources.	Clear only areas necessary for installation of the power plant/infrastructure. Enhance awareness of construction workers to environmental management practices. Have environmental/safety personnel supervise activities that can alter or harm the environment. Limit construction activities to the construction footprint. Apply BMPs for erosion controls and stabilization measures, such as those provided by applicable regulations and stormwater pollution prevention practices and procedures. Limit activities to actual construction site and access corridors. Locate soil stockpiles near the construction site. To the extent feasible, restore affected temporarily-used areas to approximately their native state. Revegetate affected temporary-use areas after completion of construction. Develop appropriate project-specific BMPs to reduce impacts. Comply with requirements of applicable federal, state, and local construction permits/approvals and local ordinances.	Approximately ~~659~~675 ac of the 7950-ac site would be occupied on a long-term I&I basis by the two proposed nuclear plants and associated infrastructure. Mitigation measures would allow some of this land, particularly with respect to the pipeline and transmission corridors, to be returned to its former state.	CTS-00650 CTS-00633 CTS-00459

returned to Lake Granbury is estimated to be 42,100 ac-ft/yr (depending on cooling tower cycles of concentration). The estimated annual consumptive water loss (water lost to cooling tower evaporation and drift) from Lake Granbury is estimated to be approximately 61,617 ac-ft/yr (Figure 2.3-30), which constitutes a relatively SMALL usage on existing water resources.

- Construction of a pipeline from Wheeler Branch would provide 50 gpm of potable water for use at CPNPP Units 3 and 4. An additional 250 gpm will be provided for de-mineralized water makeup and system flushing. ~~Fifty~~Three hundred gpm represents a relatively SMALL consumptive use of the local potable water supply. CTS-00460

- Blowdown water should meet Texas Pollution Discharge Elimination System (TPDES) permitted standards for discharge into the Lake Granbury and would constitute a relatively SMALL impact.

- Wastewater generation from the floor and equipment drains, stormwater, nonradioactive laboratory wastewater, auxiliary boiler blowdown, and sanitary wastes would meet TPDES permitted standards for wastewater effluents. The wastewater would also meet applicable regulatory Off-site Dose Calculation Manual (ODCM) limits for low level (LL) radioactive waste (radioactive drains, radioactive system leakage, radioactive laboratory drains, and radioactive wastewater) discharge into SCR. The environmental impact would be SMALL.

- Some TPDES permitted wastewater that would include wastewater from equipment drains is discharged into retention ponds. Small amounts of chemical constituents would evaporate into the air from these ponds. The environmental impact would be SMALL.

- A thermal plume created from cooling water blowdown would be discharged to the Lake Granbury. Summaries of the predicted thermal discharge plume analysis data are provided in Table 5.3-2. The impact would be SMALL because the discharge is unlikely to have any discernable effect on water quality or the aquatic biota.

- SMALL amounts of stormwater could drain into nearby water bodies. Routine/ maintenance activities at the site and along the pipeline and transmission corridors could result in the potential for SMALL episodic spills of petroleum or chemicals.

- Routine maintenance on the pipeline and transmission corridors could result in a SMALL adverse impact to aquatic and terrestrial species.

- Routine discharges to water in SCR and Lake Granbury could result in a SMALL adverse impact to aquatic biota.

- Water intakes and cooling towers are designed using best available technology (BAT) to minimizing impingement, which is a mitigating measure.

- A continued long-term disruption could occur of some herbaceous/grassland habitat, and disruption of some species near CPNPP Units 3 and 4. Some of this land may be returned to an unmanaged state once the construction phase is completed and the

TABLE 10.4-2
AVOIDED AIR POLLUTANT EMISSIONS[a]

Pollutant	Luminant Estimate of a 3180 MW Gas-Fired Plant[b] English Tons per Year (Tpy)	Luminant Estimate of a 3180 MW Coal-Fired Plant[b] English Tons per Year (Tpy)
SO_2	253	3933
NO_x	2676	2610
CO	1115	3625
CO_2	8,200,000	35,000,000
$PM_{2.5}$	142	18,886
PM_{10}	N/A	4344

CTS-00506

a) Assumes use of current standard air pollution mitigation technology.

b) Numbers based on information presented in Subsection 9.2.3.

TABLE 10.4-4 (Sheet 2 of 4)
SUMMARY OF PRINCIPAL BENEFITS AND COSTS FOR CONSTRUCTING AND OPERATING CPNPP UNITS 3 AND 4

Attribute	Benefits	Costs
Price Volatility	Dampens potential for price volatility.	N/A
Air Pollution	Provides major beneficial impact in terms of avoidance of fossil-fueled power plant air emissions.	Generates some minor amounts of air emissions during construction and some minor levels of radioactive air emissions during operations.
Aesthetics	Does not contribute to smog that significantly obscures the viewscape when compared to fossil-fueled plants.	Produces a relatively small steam and vapor plume that can obscure the viewscape.
Global Warming and Climate Change	Offers significant beneficial impact in terms of avoidance of greenhouse gases that may contribute to the greenhouse effect.	N/A
Dependence on Foreign Energy	Reduces dependence on foreign energy and vulnerability to energy disruptions.	N/A
Foreign Trade Deficit	Reduces foreign trade deficit.	N/A
Fossil Fuel Supplies	Offsets usage of finite fossil fuel supplies.	Consumes finite supplies of uranium.
Land and Land Use	Consumes less land than a comparably gas-fired plant and a comparable coal-fired plant.	The CPNPP Units 3 and 4 construction alters approximately 123 ac, 7950 ac existing CPNPP site and approximately ~~384~~400 ac are expected to be altered for the BDTF. 152 ac are altered for the cooling towers. No explanation of existing transmission corridor is expected.

CTS-00459

is considered a LARGE beneficial impact due to their influence on the local economy. By comparison, because the number of operational workers is small compared to the large regional population, the impact to the regional economy is SMALL and also beneficial.

10.4.1.2 Non-Monetary Benefits

The following subsections consider the non-monetary benefits including technical benefits from construction and operation of CPNPP.

10.4.1.2.1 Net Electrical Generating Benefits

Chapter 8 describes the need for power. As discussed in Chapter 8, there is a growing baseload demand and growing baseload supply shortfall within the Electric Reliability Council of Texas (ERCOT) region. Luminant is the owner and operator of the proposed project. Each turbine generator at CPNPP has a rated and design net output of approximately 1625 MWe for each unit with a NSSS power rating of 446~~1~~6 MWt (Section 3.2). Assuming an average capacity factor of 93 percent, the plant average annual electrical-energy generation over a three-year average is approximately 25,500,000 MWh. These units provide a benefit to ERCOT and Luminant by meeting the growing industrial, commercial, and residential baseload needs and increasing the reliability of electrical service. CTS-00634

10.4.1.2.2 Fuel Diversity, Dampened Price Volatility, and Enhanced Reliability

Energy diversity is an element fundamental to the objective of achieving a reliable and affordable electric power supply system. Achieving a balanced mix of electric generation technologies is crucial to the objectives of lowering the risk of future fuel disruptions, price fluctuations, and adverse consequences that result from changes in regulatory practices (EEI 2006). Recent history indicates that it is particularly risky to develop an over-reliance on any one energy source.

Maintaining fuel diversity is a matter of maintaining a balance of fuel mixes. Relying heavily on gas is a matter of choosing a more limited resource over more abundant fuels. The high natural gas prices and intense, recurring periods of price volatility experienced in recent years have been driven, at least in part, by demand for natural gas used in the electric generation sector. The large number of gas-fired electric plants built in the United States during the last decade has bolstered electric sector demand for natural gas. Natural gas plants have accounted for more than 90 percent of all new electric generating capacity added over the past five years. Natural gas has many desirable characteristics and should be part of the fuel mix, but "over-reliance on any one fuel source leaves consumers vulnerable to price spikes and supply disruptions" (NEI 2005).

The intense volatility in natural gas prices experienced in recent years is likely to continue and leave the ERCOT Market vulnerable. Nuclear plants provide forward price stability that is not available from generating plants fueled with natural gas. Although nuclear plants are capital-intensive to build, the operation costs are stable and dampen the volatility elsewhere in the electricity market (NEI 2005).

Measures to control adverse impacts related to operation are discussed in Section 5.10. Monetary costs associated with the design and implementation of these measures include such activities as training employees in environmental compliance and safety; treatment, storage, and disposal of any hazardous wastes generated; and acquisition and compliance with required operational permits and environmental requirements.

These estimates also include decommissioning, but due to the effect of discounting a cost that occurs over as much as 40 years into the future, decommissioning costs have relatively little effect on the levelized cost.

The previously cited studies also provide coal- and gas-fired generation costs for comparison with nuclear generation costs. One study (OECD 2005) showed nuclear costs competitive with those of natural gas and coal while the other studies showed nuclear costs exceeding cost estimates for gas and coal. One such study (MIT 2003) indicated that nuclear power is not economically competitive but suggested steps for the government to take to improve nuclear economic viability. Since the study was published, the government has undertaken these steps as follows:

- The U.S. government has endorsed nuclear energy as a viable carbon-free generation option.
- The Energy Policy Act of 2005 instituted a production tax credit for the first advanced reactors brought online in the United States.
- The DOE provides financial support to plants engaged in testing the NRC licensing processes for early site permits and combined operating licenses.

The recent government steps and incentives have negated the MIT study's conclusion that nuclear power is not economically competitive.

10.4.2.2 External Costs

This subsection describes the external (non-monetary) environmental and social costs of constructing and operating CPNPP. External costs are summarized in Table 10.4-3.

10.4.2.2.1 Land Use

Loss of habitat is one of the costs of constructing CPNPP Units 3 and 4. CPNPP generation units and support facilities are located on the 7950-ac CPNPP site located in Hood and Somervell counties. The site boundary encompasses the operating nuclear CPNPP Units 1 and 2, the proposed location for CPNPP Units 3 and 4, the support structures and facilities, and the entire SCR as described in Subsections 1.1.2 and 2.2.1.1. Approximately 123 ac of the 7950-ac site are expected to be disturbed for construction of Units 3 and 4 while 152 ac are expected to be disturbed for the cooling towers and approximately ~~200~~400 ac could be disturbed for construction of the Blowdown Treatment Facility (BDTF). A majority of this area was previously affected by prior construction activities for CPNPP Units 1 and 2. A large portion of the area where the cooling towers for the proposed project are planned to be constructed consists of undisturbed woodland that is expected to require clearing. Additional land disturbances are anticipated due to CTS-00459