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Group Vice President

U. S. Nuclear Regulatory Commission
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SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
ENVIRONMENTAL PROTECTION PLAN
ANNUAL ENVIRONMENTAL OPERATING REPORT FOR 1995

Gentlemen:

Pursuant to Section 5.4.1 of the Environmental Protection Plan (Appendix B to CPSES Unit 1 and Unit 2 Facility Operating License Nos. NPF-87 and NPF-89, respectively), TU Electric hereby submits the CPSES 1995 Annual Environmental Operating Report in the attachments to this letter.

If you have any question, please contact Richard S. Berk at (214) 812-8952.

Sincerely,

C. L. Terry

C. L. Terry

By: Roger D. Walker
Roger D. Walker
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RSB/
Attachments

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Resident Inspectors

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TU ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

UNITS 1 & 2

1995

ANNUAL ENVIRONMENTAL OPERATING REPORT

(NONRADIOLOGICAL)

FACILITY OPERATING LICENSE NOS. NPF-87 & -89

I. INTRODUCTION

This report describes implementation of the Environmental Protection Plan (EPP) for the calender year 1995 as required by Appendix B to Facility Operating License Nos. NPF-87 & 89 for Units 1 & 2.

During 1995, the CPSES Nonradiological Environmental Monitoring Program was effective in implementing and monitoring all CPSES's environmental regulatory commitments. Program effectiveness was substantiated by environmental audits conducted in 1995 by in-house compliance visits by Environmental Services (TU Services) and compliance evaluations conducted by CPSES Nuclear Overview Department.

In addition to routine environmental monitoring to meet existing CPSES environmental permit requirements, some noteworthy environmental projects were accomplished. For example:

1. On September 29, 1995, CPSES submitted to the EPA Regional Administrator (correspondence TXX-95255) the facility 316(b) Demonstration Report as required by item M., Part II, page 15, of the site's National Pollutant Discharge Elimination System (NPDES) Permit. Biological field activities were completed in 1994 and results were compiled in 1995. This demonstration was completed by a team of highly qualified fisheries biologists, from Foster Wheeler Environmental Corporation and the University of North Texas, with over 50 years combined fisheries experience, including numerous other 316(b) demonstrations. Briefly, the report concludes that the location, design, construction and capacity of the Comanche Peak Steam Electric Station cooling water system intake structure reflects the Best Available Technology for Squaw Creek Reservoir, given the low rate of impingement and entrainment measured, especially game fishes. An Executive Summary of this report is included as Attachment 2.

2. During 1995 CPSES spread topsoil and revegetated approximately 10 acres of the site peninsula that were disturbed during construction activities. The commitment to revegetate these areas was identified in the CPSES Environmental Report- Operating License Stage (ER- OL, Amend. 1, response to staff question 75) and Final Environmental Statement (Section 4.3.1). Work has commenced on revegetating the old construction parking lot (approx. 22 acres) which will be complete in 1996. In addition, 270 poplar trees were planted through-out the site area. These trees were planted to aid in dewatering some areas where shallow groundwater is proximate to

landfills and lined ponds, as well as to enhance site landscaping and wildlife.

3. In April 1995 CPSES completed construction of a shallow groundwater interceptor and diversion trench to minimize lateral groundwater intrusion into Landfill #1. This landfill was a construction landfill that had been closed in 1992 in accordance with the Texas Natural Resource Conservation Commission (TNRCC) closure requirements. The landfill was classified as a Resource Conservation & Recovery Act (RCRA) landfill, consequently, the water collected in the landfill had to be removed and transported off-site for disposal as hazardous waste. In 1995 this waste source alone constituted about 89% of all hazardous waste generated company wide. The trench (approx. 30ft. deep x 800ft. long) has been effective in diverting groundwater away from the landfill and was a key component in the CPSES Hazardous Waste Minimization Program.

II. SCOPE

Section 5.4.1 of the EPP requires that CPSES submit to the NRC an Annual Environmental Operating Report that shall address the following environmental protection activities:

A. Summaries and analyses of the results of the environmental protection activities required by Section 4.2 of the EPP, including a comparison with related preoperational studies, operational controls (as appropriate), and previous nonradiological environmental monitoring reports, and an assessment of the observed impacts of plant operation on the environment. If harmful effects or evidence of trends toward irreversible damage to the environment are observed, a detailed analysis of the data and a proposed course of mitigating action is required. Section 4.2 of the EPP pertains to results from:

   1. Groundwater levels and station water use monitoring.
   2. Water treatment facility outages impact assessment and reporting.

B. The report shall also include:

   1. A list of EPP noncompliances and the associated corrective actions.
   2. A list of all changes in station design and operation, tests, and experiments made in accordance with Subsection 3.1 of the EPP which involved a potentially significant unreviewed environmental question.

3. A list of nonroutine reports submitted in accordance with Subsection 5.4.2 of the EPP.
4. A summary list of National Pollutant Discharge Elimination System (NPDES) permit - related reports relative to matters identified in Subsection 2.1 of the EPP which were submitted to the EPA Region VI during the report period. Subsection 2.1 of the EPP pertains to aquatic matters that are addressed by the effluent limitations, monitoring requirements and the Section 316(b) demonstration requirement (effects of intake structure on aquatic biota during operation) contained in the EPA NPDES station wastewater discharge permit.

III. RESULTS OF ACTIVITIES

A. As required by Subsection 4.2 of the EPP, the following are summaries and analyses of the environmental protection activities during 1995. Based on the results of these activities, there were no observed adverse environmental impacts resulting from plant operation during 1995.

1. Groundwater Pumpage

As indicated in Table 1, groundwater pumpage during 1995 averaged 42.3 gals./min. (gpm) or 22,252,504 total gallons withdrawn for the year. This withdrawal rate represents a 4% decrease from the 1994 average rate of 44.2 gpm. Groundwater withdrawal was highest in January at 55.9 gpm and lowest in December with an average withdrawal rate of 25.3 gpm. Through-out the year withdrawal rates trended downward as a result of extensive efforts to locate and repair leaks and encourage site personnel to report leaky faucets and other restroom fixture units. Notices were posted on CPSES's "Employees' On-Line Video Information System" (CPTV) to solicit site personnel assistance for potable water leak reporting and water conservation to aid CPSES in meeting it's established goal for groundwater withdrawal of 30 gpm or less. In addition, a significant underground potable water distribution line leak (approximately 10 gpm) was discovered and isolated in September. Subsequent to the above activities, withdrawal rates decreased to approximately 25 gpm and remained at this rate from October through December.

Groundwater withdrawn during 1995 was used primarily for potable and sanitary purposes with only a very small amount used as make-up to the plant fire protection system. No groundwater was used to supplement the

station's Surface Water Treatment System.

The average annual pumpage rate of 42.3 gpm for 1995 represents 33% of the predicted operational pumpage (127 gpm) identified in Section 3.3 of the Station's Environmental Report-Operational License Stage. This rate also represents approximately 27% of the actual average withdrawal rate (158 gpm) reported in the Station's Final Environmental Statement - Operating License Stage (Section 5.3.1.2) for the period 1975 to May 1979.

The combined annual rate for all recorded preoperational groundwater pumpage averaged 68.8 gpm, while the average operational pumpage for the period 1990 through 1995 was 34.8 gpm. Therefore, the average operational rates are 49% less than the groundwater pumpage during the preoperational period. Figure 1 illustrates the annual fluctuation of groundwater withdrawal over the entire preoperational and operational period.

2. Groundwater Levels

As indicated in Table 2, the groundwater level in the on-site observation well OB-3 (intersection of Highway 56 and the Plant Access Road) fluctuated during 1995 from a high level in May of 538.5 ft. Mean Sea Level (MSL) to a low level in September of 534.0 ft. MSL. Overall, the water level in OB-3 at the end of the reporting period (535.7 ft. MSL) was the same as the level recorded at the beginning of the reporting period.

The groundwater level in observation well OB-4 (Squaw Creek Park) fluctuated during 1995 from a high level in June of 579.6 ft. MSL to a low level in January and October of 577.3 ft. MSL. Overall, the water level in OB-4 at the end of the reporting period was 0.6 ft (0.2m) higher than at the beginning of the reporting period.

The 1995 annual average groundwater levels in well OB-3 and OB-4 were 536.3 ft. MSL and 578.3 ft. MSL, respectively. These average levels demonstrated an increase of 1.4 ft. (0.43m) for OB-3 and 0.4 ft. (0.12m) for OB-4 from the respective average 1994 levels (Figure 2).

3. Surface Water Treatment System Operation

The station's Water Treatment System processed 184,200,000 total gallons (350 gpm) of surface water during 1995 for plant process use. There were no outages during 1995 that required reporting in accordance with Section 4.2.2 of the EPP.

The following is a summary list of monthly surface water usage:

MONTH	SURFACE WATER PROCESSED, GALS.
JANUARY	14,393,100
FEBRUARY	11,584,700
MARCH	15,095,700
APRIL	12,724,600
MAY	12,727,500
JUNE	13,683,900
JULY	16,324,500
AUGUST	18,127,400
SEPTEMBER	17,338,800
OCTOBER	17,108,700
NOVEMBER	17,531,600
DECEMBER	17,558,600
TOTAL	184,200,000

B. EPP Noncompliance and Corrective Actions-Subsection 5.4.1(1)

There were no noncompliances with the requirements of the EPP during the reporting period.

C. Changes In Station Design or Operation, Tests, and Experiments Made In Accordance With Subsection 3.1 Which Involved A Potentially Significant Unreviewed Environmental Question

There were no changes in station design or operation, nor tests or experiments conducted during the reporting period that are reportable under this subsection.

D. Nonroutine Reports Submitted In Accordance With Subsection 5.4.2

There were no nonroutine reports submitted under this subsection.

E. NPDES Permit-Related Reports Relative To Matters Identified In Subsection 2.1.

Routine monthly Discharge Monitoring Reports (DMR) for all wastewater outfalls were submitted to the EPA and TNRCC for each month during 1995. The following is a summary list of correspondence (DMRs and related documents) submitted to the EPA.

MONTH MONITORED	LOG NUMBER/DATE
JANUARY	TXX-95052 / 2-25-95
FEBRUARY	TXX-95084 / 3-25-95
MARCH	TXX-95213 / 4-25-95
APRIL	TXX-95145 / 5-25-95
MAY	TXX-95162 / 6-25-95
JUNE	TXX-95188 / 7-25-95 TXX-95156 / 6-2-95(notification of reverse osmosis biocide use-Bulab 6013)
JULY	TXX-95219 / 8-25-95
AUGUST	TXX-95246 / 9-25-95
SEPTEMBER	TXX-95266 / 10-25-95 TXX-95255 / 9-29-95(316b Study submittal)
OCTOBER	TXX-95285 / 11-22-95
NOVEMBER	TXX-95309 / 12-21-95
DECEMBER	TXX-96014 / 1-25-96

There were eleven (11) NPDES wastewater discharge permit noncompliances in 1995; however there were no TNRCC wastewater permit noncompliances. The NPDES noncompliances are described below.

1. All eleven (11) NPDES permit noncompliances in 1995 resulted from exceeding the sewage treatment plant effluent chlorine limits. The chlorine limits imposed by the NPDES permit for this outfall is 1.0 mg/l, minimum and 4.0 mg/l, maximum and chlorine must be monitored five (5) times per week. These limits were first imposed in the NPDES permit in November 1994 upon renewal of this permit. The TNRCC wastewater discharge permit has no reportable chlorine limits. Chlorine limit noncompliances began with three in May followed by two in June and six in August.

   Corrective measures to address these chlorine limit noncompliances, as well as the antiquated condition of the existing sewage treatment plant equipment, will include the replacement of the entire system. A Scope of Work for this project has been bid and a contract will be awarded in May 1996. Current plans include the use of ultraviolet disinfection equipment instead of chlorination.

   There was one (1) on-site spill during 1995 that was reported in accordance with the TNRCC's 24-hr. notification requirements. This spill occurred on May 29,1995 and involved the release of 9.4 gallons of hydroxyethylidene diphosphonic acid (HEDP) near the circulating water intake structure. The spill resulted from a fitting failure on the associated chemical feed pump. The contaminated soil that resulted from this spill was removed for disposal.

FIGURE 1
SUMMARY OF GROUNDWATER PUMPAGE
1975 THROUGH 1995 (GPM)

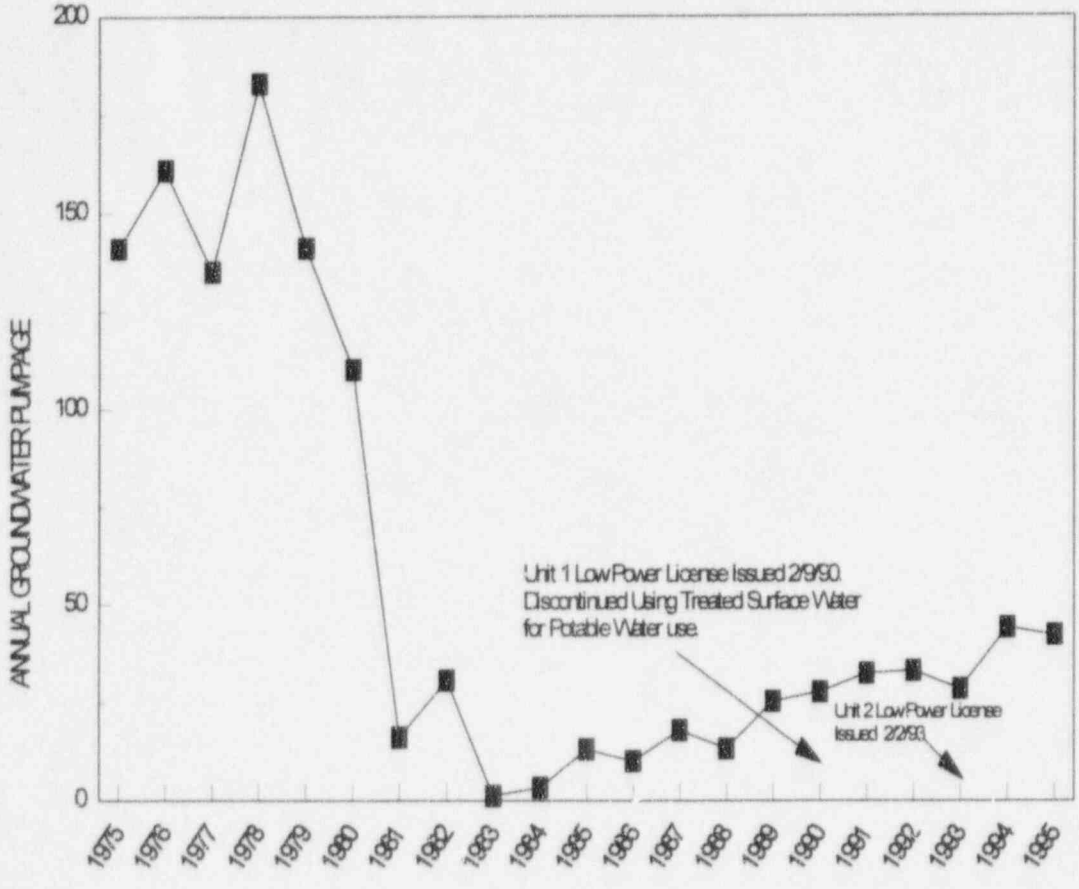

FIGURE 2
ANNUAL AVERAGE GROUNDWATER LEVEL

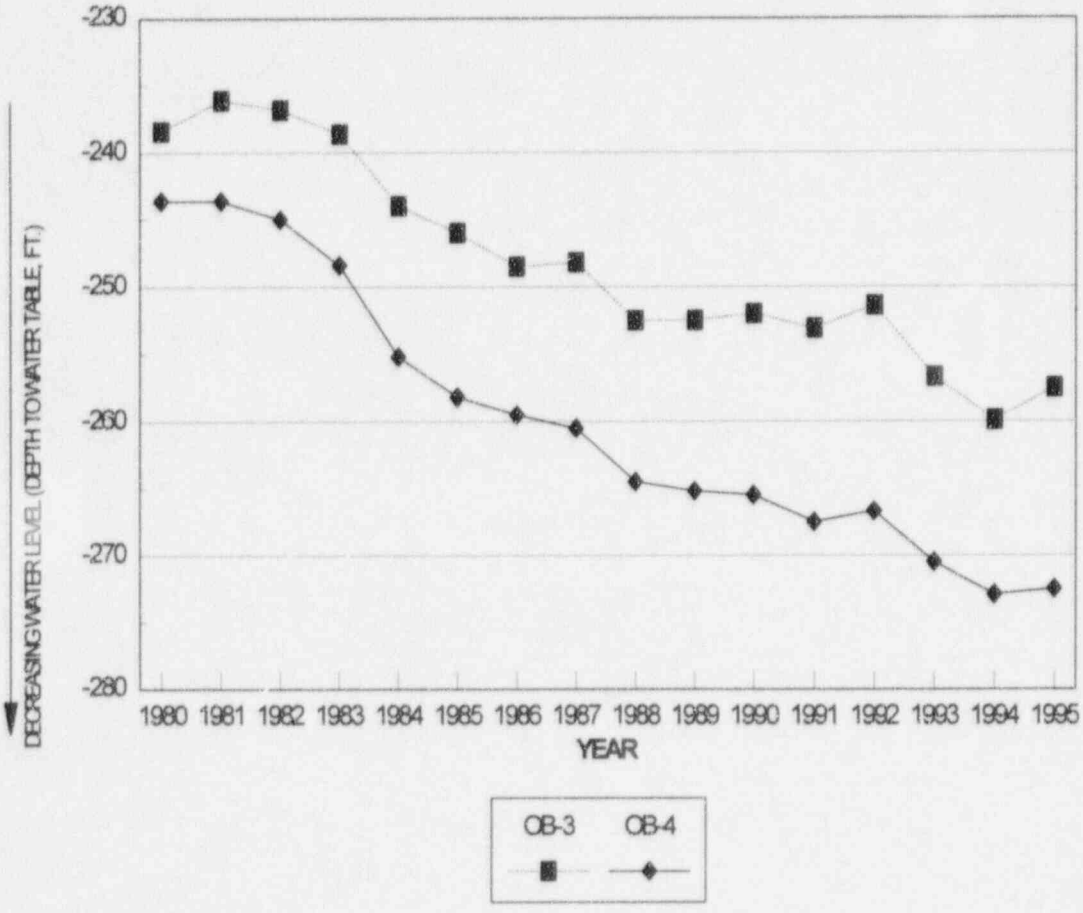

TABLE 1

SUMMARY OF GROUNDWATER PUMPAGE
For 1995

MONTH	PLANT WELL 1		PLANT WELL 2		NOSF WELL 1		NOSF WELL 2		TOTALS		NO. OF DAYS BETWEEN READINGS
	Total Gals.	Avg. Gals. Per Min.	Total Gals.	Avg. Gals. Per Min.	Total Gals.	Avg. Gals. Per Min.	Total Gals.	Avg. Gals. Per Min.	Total Gals.	Avg. Gals. Per Min.	
January	2,198,300	49.25	400	0.01	125,000	2.80	171,600	3.84	2,495,300	55.90	31
February	1,943,629	48.21	0	0.00	84,100	2.09	92,600	2.30	2,120,329	52.59	28
March	2,151,875	48.21	0	0.00	59,400	1.33	55,500	1.24	2,266,775	50.78	31
April	2,221,000	51.41	0	0.00	36,700	0.85	52,900	1.22	2,310,600	53.49	30
May	2,106,700	47.19	0	0.00	56,300	1.26	55,400	1.24	2,218,400	49.70	31
June	2,035,500	47.12	1,300	0.03	44,300	1.03	47,200	1.09	2,128,300	49.27	30
July	1,986,700	44.50	0	0.00	161,200	3.61	109,100	2.44	2,257,000	50.56	31
August	1,359,800	30.46	0	0.00	89,500	2.00	77,100	1.73	1,526,400	34.19	31
September	1,337,700	30.97	0	0.00	92,900	2.15	82,200	1.90	1,512,800	35.02	30
October	992,200	22.23	4,100	0.09	67,900	1.52	76,400	1.71	1,140,600	25.55	31
November	1,033,400	23.92	0	0.00	55,700	1.29	56,900	1.32	1,146,000	26.53	30
December	1,019,600	22.84	0	0.00	37,300	0.84	73,100	1.64	1,130,000	25.31	31
TOTAL	20,386,404	38.79	5,800	0.01	910,300	1.73	950,000	1.81	22,252,504	42.34	365

TABLE 2
1995 SUMMARY OF GROUNDWATER
LEVELS IN OBSERVATION WELLS

MONTH	WELL OB-3 (G-3)		WELL OB-4 (G-4)	
	DEPTH (1)	MSL (2)	DEPTH (1)	MSL (2)
January (3)	258.1	535.7	273.5	577.3
February (3)	257.5	536.3	272.6	578.2
March (3)	256.6	537.2	272.1	578.7
April (3)	255.5	538.3	271.8	579.0
May (3)	255.3	538.5	271.4	579.4
June (3)	255.7	538.1	271.2	579.6
July (3)	257.4	536.4	271.8	579.0
August (3)	258.5	535.3	272.7	578.1
September (3)	259.8	534.0	273.1	577.7
October (3)	259.2	534.6	273.5	577.3
November (3)	258.5	535.3	273.3	577.5
December	258.1	535.7	272.9	577.9

ANNUAL GROUNDWATER LEVEL CHANGE FOR 1995:

Well OB-3: 258.1 ft. - 258.1 ft. = 0.0 ft. = 0.0m
Well OB-4: 273.5 ft. - 272.9 ft. = (+) 0.6 ft. = (+) 0.2 m (Increase)

NOTES:

(1) Depth to water table (ft.)
(2) Water table elevation (ft.) Mean Sea Level (MSL)
(3) Levels represent average levels based on weekly readings taken when previous month pumpage exceeds 30 gpm.

COMANCHE PEAK STEAM ELECTRIC STATION
316(b) DEMONSTRATION

EXECUTIVE SUMMARY

This 316(b) Demonstration has been prepared in compliance with the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) permit for Texas Utilities Electric Company's Comanche Peak Steam Electric Station (CPSES). The 316(b) Demonstration became a requirement of NPDES permits for power plants in 1972, with promulgation of the Clean Water Act (P.L. 92-500) amendments to the Federal Water Pollution Control Act. The amendments included Sections 316(a) and 316(b) relating to power plant circulating water system (CWS) impacts due to thermal discharge (316(a)) and/or cooling water intake (316(b)). As a requirement of the CPSES NPDES permit, following the completion and commercial start-up of Unit 2, this 316(b) Demonstration was prepared for the evaluation of impacts to the fish community of Squaw Creek Reservoir from entrainment and impingement due to the operation of the CPSES CWS. Entrainment refers to the withdrawal of fish eggs and larvae, too small to be retained by the traveling screens, directly into the CWS. [These withdrawal rates were estimated based on number of eggs, larvae and juveniles captured in sampling nets.] Juvenile and adult fish too large to be entrained through the 3/8 inch mesh traveling screens, but incapable of resisting the intake current, are retained against those screens and eventually washed off with debris into a sump. This is referred to as impingement.

Station Description

The CPSES is located near Glen Rose, TX and is owned and operated by Texas Utilities Electric Company (TUEC), Dallas, TX. The CPSES consists of two nuclear pressurized water reactors identified as Units 1 and 2. Maximum generating capacity of each unit is rated at 1150 MWe or 2300 MWe combined. CPSES Unit 1 was declared ready for commercial operation on August 13, 1990 and Unit 2 was declared ready for commercial operation on August 3, 1993. The plant is designed with a once-through CWS which provides non-contact cooling water for the condensers and heat exchangers for both units. The source of cooling water for the CWS is Squaw Creek Reservoir (SCR), an impoundment of Squaw Creek, which was completed in February 1977 and filled in May 1977. SCR is owned and maintained by TUEC. Both Unit 1 and 2 are serviced by a common CWS intake structure located on the shoreline of the SCR. The intake structure is located in an excavated recess of the SCR shoreline and consists of eight CWS pumps (four per unit) and twelve traveling screens (six per unit). The intake structure extends down to a depth of approximately fifty feet. At full operating capacity, the CWS withdrawals a volume equivalent to 6.4 % of the volume of SCR on a daily basis. Non-contact cooling water is discharged via a common outfall located across the peninsula from the CPSES intake. Approach velocity of water across the trash racks of the CWS intake averages 13.02

cm/sec (0.427 ft/sec) which is safely below the maximum guidance value of 15.2 cm/sec (0.5 ft/sec) recommended by the USEPA for minimizing impingement at steam electric stations.

Fish Communities of Squaw Creek Reservoir

SCR is a 1,306 hectare impoundment of Squaw Creek, formed by an earth and rock fill dam completed in February, 1977. The primary purpose of SCR is to provide a constant and reliable supply of non-contact cooling water for the CPSES CWS. It has, however, a good gamefish population, and is used extensively by anglers. Baseline studies, which employed multiple sampling techniques, documented up to twenty five species of fish in SCR. In general, the fish community can be classified into predatory species which include recreationally important species and forage species which support species higher in the aquatic food chain. Forage species include threadfin shad (*Dorosoma petenense*), inland silverside (*Menidia beryllina*), bluegill sunfish (*Lepomis macrochirus*) and gizzard shad (*Dorosoma cepedianum*). Predatory species include largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), white bass (*Morone chrysops*), smallmouth bass (*Micropterus dolomieui*) and hybrid striped bass (*Morone saxatilis* x *chrysops*). In addition to the fish populations present in Squaw Creek, the Texas Parks and Wildlife Department supplement the fish populations of SCR with stockings of game fish and forage fish species. Periodic stocking of select species has gone on since 1979. A qualitative creel survey of SCR fishermen revealed the most popular gamefish was the largemouth bass.

Selection of Representative Important Species (RIS) for this 316(b) Demonstration was based upon trophic guilds (ecological roles) in the SCR food chain; recreational importance as a game fish; representativeness of the SCR fish community; and susceptibility to entrainment and impingement by the CPSES CWS. Identified RIS were largemouth bass, channel catfish, white bass, bluegill sunfish, gizzard shad, inland silverside, threadfin shad and freshwater drum.

Impingement

Impingement sampling was conducted over a one year period from October 1993 through October 1994. A sampling basket was fabricated and inserted into the common debris sump in order to collect fish washed off the travelling screens. Impingement sampling was performed at weekly intervals from October 1993 through March 1994, and at two week intervals from April 1994 through August 1994. Weekly sampling resumed from September 1994 through October 1994. Sampling events were divided into equal twelve hour intervals (day/night). Fish were identified to species, weighed (grams), measured (total length), and subsampled if large numbers of any species were encountered. Impingement was estimated for daily, weekly, monthly, annual and seasonal periods.

An estimated 262,498 fish, representing thirteen species, were impinged by the CPSES CWS during this period. Threadfin shad accounted for 96 % (251,269 fish) of the annual impingement

total. Greatest impingement of this species occurred during the summer months. Game fish including largemouth bass, white bass, channel catfish and white crappie, accounted for less than one percent (combined) of the total annual impingement. Most game fish were young-of-the-year or juveniles. No hybrid striped bass were impinged during the monitoring program. Largemouth bass impingement was estimated to be about 900 fish per year, most of which were classified as juveniles. Compared to the overall total, largemouth bass accounted for only 0.35 % of all fish impinged. Results of the impingement monitoring program reveal that, like most other power plants of similar design and location, forage species such as threadfin shad dominate impingement losses due to their abundance in the local water body; their pelagic habit (open water existence); their tendency to move in large schools (i.e., exposure of large numbers of individuals to impingement at one time) and their increased risk of impingement at elevated temperatures (i.e., reduced physiological condition at high temperatures). Results of the SCR waterbody studies revealed that threadfin shad was one of the most abundant forage species present. Given the low number of game fish impinged on an annual basis, and the abundance and high reproductive capacity of threadfin shad, the total impingement numbers are not considered significant nor to be creating an unacceptable impact on the gamefish community of SCR.

Entrainment

Field sampling of ichthyoplankton directly upstream of the trash racks of Unit 1 and 2 was conducted for the period of April through August, 1994. Sampling apparatus consisted of triplicate, boat mounted nets towed in front of the trash racks at weekly intervals. Ichthyoplankton samples were returned to the laboratory and fish eggs, larvae, and in two cases (*Dorosoma* and *Lepomis*) juveniles were identified to the lowest practical taxon (genus for most taxa). The entrainment estimate, for conservative purposes, utilized data on all species and life stages captured in the net. Therefore the "juvenile" component of the total loss (entrainment plus impingement) for *Dorosoma* and *Lepomis* juveniles represents an overestimate of impact on their populations. Numbers of specific taxa were converted to mean densities (No./m^3) in SCR at the intake area. Daily, weekly, monthly, annual and seasonal estimates for entrainment of taxa identified were calculated based upon actual and maximum operating conditions of the CWS. Taxa collected during ichthyoplankton sampling included *Lepomis* (sunfish), *Dorosoma* (shads), *Morone* (white bass), *Menidia* (inland silverside), *Pomoxis* (crappies), *Aplodinotus* (f.w. drum) and the family Centrarchidae (sunfish and bass family).

Based on operation of both Unit 1 and 2 at full capacity, and assuming 100% mortality of eggs and larvae through the CWS, 30 million eggs/larvae were estimated to have been entrained by Unit 1, and 17 million by Unit 2 in 1994. The genus predicted to be entrained in the greatest number from the egg to juvenile stage is *Aplodinotus* (f.w. drum). Unit 1 was estimated to entrain 8.3 million *Aplodinotus* eggs/larvae, and Unit 2 was estimated to entrain 7.1 million *Aplodinotus* eggs/larvae. The second most abundant genus entrained was *Lepomis* (sunfish).

Unit 1 was estimated to entrain over 7.0 million larvae, and Unit 2 was estimated to entrain 3.5 million larvae of this genus. This difference is believed to be due to the circulation patterns in front of the intake structure. Combined, these two genera accounted for 50% of the eggs and larvae entrained by both units. The ratio of estimated numbers of ichthyoplankton entrained to the average fecundities (i.e., numbers of eggs/female produced) of the respective taxa provided a simple but relevant way to evaluate the relative impact on the population of these species in SCR. Summing these quotients results in an estimated loss of potential (or "equivalent") adults in the range of 1500 fish (all taxa combined). The genus *Dorosoma* (threadfin and gizzard shad) accounted for over half of the loss. Game fish losses attributable to entrainment were found to be minimal.

Conclusions

Based upon the results of the above field studies, the following conclusions regarding the impact of entrainment and impingement relative to the location, design, operation and capacity of the CPSES CWS were drawn:

- The CWS is located on an excavated recess of the SCR shoreline. Compared to the abundance of coves throughout SCR, the intake recess lacks the habitat complexity (i.e., submerged structure and cover) and littoral areas deemed more suitable to productive fish habitat. Thus, the location of the CPSES CWS appears to minimize the potential for risks of fish (especially game fish) being impinged or entrained;

- Under full CWS operation (eight CWS pumps), the average approach velocity across the entire intake structure was 13.02 cm/sec (0.427 ft/sec), which is below the USEPA guidance value of 0.5 ft/sec. Design options or modifications to the intake structure may arguably reduce impingement, but not necessarily survival of the dominant species impinged (shad). Such options were considered to be of little benefit to SCR gamefish populations given their low representation in both impingement and entrainment;

- Operation of the CPSES CWS was considered to have little effect given the characteristics of the CWS design and location. The operation of the CWS during impingement and entrainment monitoring was considered to be reflective of the normal operating conditions for the system in future operation. The monitoring revealed that 262,498 fish were impinged (96% of which were threadfin shad and less than 1 % were gamefish) and 1500 adult fish "equivalents" (all species combined) were estimated to have been entrained. Based upon these data, current operation of the CWS appears to minimize impacts to gamefish populations in SCR;

- Capacity of the CPSES CWS under full operation is equivalent to approximately 6.4 % (daily) of SCR. This capacity was judged to represent a "low impact potential intake".

Reduction in capacity of CWS can usually reduce entrainment (and sometimes impingement) losses, however, in evaluating best available technology (BAT) in the case of the CPSES, the low number of total fish (and especially game fish) entrained and impinged does not justify reducing the capacity of the CWS.

Given the low impact of the CPSES on game fish populations in SCR; the relatively low numbers of fish lost via entrainment; and limitation of impingement largely to forage species; the location, design, capacity and operation of the CPSES CWS intake structure appears to reflect the best technology available for minimizing adverse environmental impact to the fisheries of SCR.