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		REV. 1
		PAGE NO. 1 of 29
Title: Estimated Annual Dose Due to Normal Liquid Effluents		Client: MNES
		Project: TXUT-001

Item	Cover Sheet Items	Yes	No
1	Does this calculation contain any open assumptions that require confirmation? If **YES**, identify the assumptions. **Assumptions** _____	☐	☒
2	Does this calculation serve as an "Alternate Calculation"? If **YES**, identify the design verified calculation. **Design Verified Calculation No.** _____	☐	☒
3	Does this calculation supersede an existing calculation? If **YES**, identify the superseded calculation. **Superseded Calculation No.** _____	☐	☒

Scope of Revision:

Revision 1 of this calculation addresses a change in the liquid effluent release of a single isotope, Yttrium-93. The reason for the change is a typographical error in ANSI/ANS-18.1-1999 which impacts the source term reported in US-APWR DCD Table 11.2-10. The release rate of Y-93 is changed from 2.90E-4 to 3.10E-4 Ci/yr.

Revision Impact on Results:

There is no impact of this revision on the results reported in Section 2.0 of this calculation.

Study Calculation	☐	**Final Calculation**	☒
Safety-Related	☐	**Non-Safety Related**	☒

(Print Name and Sign)

Originator: Joanne G. Morris Joanne G Morris	**Date:** 9/21/09
Design Verifier: Nathan Jackson Nathan Jackson	**Date:** 9/21/09
Approver: Marvin Morris Marvin Morris	**Date:** 9/22/09

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CALCULATION REVISION STATUS

REVISION	DATE	DESCRIPTION
0	5/20/2008	Initial Issue
1	9/22/09	Incorporates revised Y-93 release rate and updated references.

PAGE REVISION STATUS

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3	0		
4 - 5	1		
6 - 7	0		
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APPENDIX REVISION STATUS

APPENDIX NO.	PAGE NO.	REVISION NO.	APPENDIX NO.	PAGE NO.	REVISION NO.
Appendix 1	All Pages	1	Appendix 9	All Pages	0
Appendix 2	All Pages	1	Appendix 10	All Pages	0
Appendix 3	All Pages	0	Appendix 11	All Pages	0
Appendix 4	All Pages	0	Appendix 12	All Pages	0
Appendix 5	All Pages	0	Appendix 13	All Pages	0
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1.0 Purpose and Background

The purpose of this calculation is to determine the offsite doses that would result from normal releases through the liquid pathway for a US-APWR located on the Comanche Peak Nuclear Power Plant (CPNPP) site. The results of this calculation will be used to support the Combined Operating License (COL) application for CPNPP Units 3 and 4. As such, the guidance of NUREG 1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" [Reference 3.3] and Regulatory Guide 1.206, "Combined License Applications For Nuclear Power Plants (LWR Edition)" [Reference 3.7] will be applied.

As required by NUREG 1555, Section 5.4, "Radiological Impacts of Normal Operation" and Regulatory Guide 1.206, Section C.I.12.3, "Dose Assessment", this calculation will provide the bases, models, and assumptions for the estimated annual whole body dose and maximum organ dose to a member of the public from normal liquid effluent. Acceptance criteria for analyzing the radiological impacts of normal operations are based on the relevant requirements of 10 CFR 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents" [Reference 3.5] and 10 CFR 20.1301(d), "Radiation Dose Limits for Individual Members of the Public" [Reference 3.8]. NUREG-0543, "Methods for Demonstrating LWR Compliance with the EPA Uranium Fuel Cycle Standard (40 CFR Part 190)" [Reference 3.9] provides guidance for meeting the 10 CFR 20.1301(d) requirement for compliance with 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations" [Reference 3.6]. The acceptance criteria of these regulations that are relevant to doses resulting from liquid effluents released during normal operations are given in Section 5.1 of this calculation.

This calculation is performed using the LADTAP II computer program [References 3.1 and 3.2], which is also used by the U.S. Nuclear Regulatory Commission for this type of evaluation. The computer program, LADTAP II, "A Computer Program for Calculating Radiation Exposure to Man From Routine Release of Nuclear Reactor Liquid Effluents," implements the guidance provided in Regulatory Guide 1.109, "Calculation of Annual Does to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I" [Reference 3.4] and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents From Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I" [Reference 3.10]. Refer to Reference 3.2 for the Computer Program Documentation Package for the LADTAP II program.

Revision 1 of this calculation addresses a change in the liquid effluent release of a single isotope, Yttrium-93. The reason for the change is a typographical error in ANSI/ANS-18.1-1999 which impacts the source term reported in US-APWR DCD Table 11.2-10. The release rate of Y-93 changed from 2.90E-4 to 3.10E-4 Ci/yr [Reference 3.26].

2.0 Summary of Results and Conclusions

The offsite doses that would result from normal liquid effluents from a US-APWR located on the Comanche Peak site are summarized below. As noted in Section 7, Case 1, which considers the minimum discharge from Squaw Creek Reservoir to Squaw Creek, produces the most limiting individual doses. Case 1 results are compared with regulatory limits for the maximally exposed individual. Case 2 considers the proposed increased discharge from Squaw Creek Reservoir to Squaw Creek when four units are operational. Since the increased releases and lower dilution result in higher downstream population doses, Case 2 results are reported for population doses.

Revision 1 of this calculation revises the annual average release rate of the nuclide Yttrium-93 (Y-93) based on a new value reported in Reference 3-26. This change had no impact on the results of this calculation given below. Revised LADTAP II output files are given in Appendices 1 and 2.

Table 2-1
10 CFR 50 Appendix I Comparison
Estimated Maximum Individual Dose from Liquid Effluents (mrem/yr, per unit)

Dose	Appendix I Objective	CPNPP Unit 3 or 4 Assessment
Total Body		
Shoreline Use		1.30E-03
Water Ingestion		6.39E-03
Fish Ingestion		8.83E-01
Irrigated Foods		8.91E-03
Total	**3**	**9.00E-01**[a]
Maximum Organ		
Shoreline Use		7.25E-03
Water Ingestion		4.51E-03
Fish Ingestion		1.26E+00
Irrigated Foods		1.04E-02
Total	**10**	**1.28E+00**[b]

a. an adult receives the maximum individual total body dose
b. a teenager receives the maximum individual organ dose which is to the liver

Table 2-2
10 CFR 20.1301 Comparison
Estimated Maximum Individual Dose from Liquid Effluents (mrem/yr, per unit)

Dose	10 CFR 20.1301 Objective	CPNPP Unit 3 or 4 Assessment
Total Body	-	9.00E-01[a]
Thyroid Dose	-	1.52E-01
TEDE	100	9.05E-01[b]
Dose in any hour (mrem/hr)	2	1.03E-04

a. an adult receives the maximum individual total body dose
b. the total effective dose equivalent (TEDE) is approximated by the sum of the whole body dose and 3% of the thyroid dose [Reference 3.16]

Table 2-3
Dose Equivalent from Liquid Effluents
to Any Member of the Public (mrem/yr, per site)

Dose	40 CFR 190 Requirements	CPNPP Assessment of all Units
Whole Body Dose Equivalent	25	7.79E+00
Thyroid Dose	75	9.17E+00[c]
Dose to Another Organ	25	1.14E+01

a. an adult receives the maximum individual total body dose
b. a teenager receives the maximum individual organ dose which is to the liver
c. Note that the collective thyroid dose includes the maximum organ dose due to gaseous effluents from Units 1 & 2. This value bounds the thyroid dose.

Table 2-4
Estimated Population Dose from Liquid Effluents (person-rem/yr, per unit)

Dose	CPNPP Unit 3 or 4 Assessment
Total Body	2.14E+00
GI-LLI (Max. organ)	2.23E+00
Thyroid	2.04E+00

Table 2-5
CPNPP Units 3 and 4
Doses to Primary and Secondary Organisms (Biota) (mRad/yr)

Organism	Internal Dose	External Dose	Total Dose	Dose Limit[a] (per site)
Fish	9.10E+00	9.48E+00	1.86E+01	Total Body: 25 Thyroid: 75 Another organ:25
Invertebrate	1.29E+01	1.90E+01	3.18E+01	
Algae	4.08E+01	7.82E-03	4.08E+01	
Muskrat	6.10E+01	6.32E+00	6.73E+01	
Raccoon	1.56E+01	4.74E+00	2.03E+01	
Heron	1.97E+02	6.32E+00	2.04E+02	
Duck	5.84E+01	9.48E+00	6.79E+01	

a. 40 CFR 190 [Reference 3.6]

Table 2-6
CPNPP All Units
Doses to Primary and Secondary Organisms (Biota) (mRad/yr)

Organism	Total Dose[a]	Dose Limit[b] (per site)
Fish	1.33E+02	Total Body: 25 Thyroid: 75 Another organ:25
Invertebrate	3.18E+01[c]	
Algae	4.08E+01[c]	
Muskrat	7.32E+01	
Raccoon	2.62E+01	
Heron	2.10E+02	
Duck	7.37E+01	

a. Units 1 and 2 biota doses obtained from Reference 3.33, Section 5.2. Note that Units 1 and 2 doses include contributions from both liquid and gaseous pathways.
b. 40 CFR 190 [Reference 3.6]
c. Units 1 & 2 dose contributions unavailable

Table 2-7
10 CFR 50 Appendix I Comparison
Additional Use Location, Squaw Creek Reservoir (mrem/yr, per unit)

Dose[a]	Appendix I Objective	CPNPP Unit 3 or 4 Assessment
Total Body	3	8.85E-01[b]
Maximum Organ	10	1.27E+00[c]

a. The uses of Squaw Creek Reservoir is limited to shoreline recreation and fishing. No drinking water pathway is included.
b. an adult receives the maximum individual total body dose
c. a teenager receives the maximum individual organ dose which is to the liver

3.0 References

3.1 LADTAP II - Technical Reference and User Guide, NUREG/CR-4013, PNL-5270, April 1986.

3.2 ENERCON Computer Program Certification, LADTAP II - A Computer Program for Calculating Radiation Exposure to Man from Routine Release of Nuclear Reactor Liquid Effluents, September 2002 release, 1/20/2003.

3.3 U.S. Nuclear Regulatory Commission, NUREG-1555, Standard Review Plans for Environmental Reviews for Nuclear Power Plants, October 1999.

3.4 U.S. Nuclear Regulatory Commission, Regulatory Guide 1.109, Calculation of Annual Does to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I, Revision 1, October 1977.

3.5 U.S. Nuclear Regulatory Commission, 10 CFR 50 Appendix I, Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents.

3.6 U.S. Nuclear Regulatory Commission, 40 CFR 190, Environmental Radiation Protection Standards for Nuclear Power Operations.

3.7 U.S. Nuclear Regulatory Commission, Regulatory Guide 1.206, Combined License Applications for Nuclear Power Plants (LWR Edition), Revision 0, June 2007

3.8 U.S. Nuclear Regulatory Commission, 10 CFR 20.1301, Radiation Dose Limits for Individual Members of the Public

3.9 U.S. Nuclear Regulatory Commission, NUREG-0543, Methods for Demonstrating LWR Compliance with the EPA Uranium Fuel Cycle Standard (40 CFR Part 190), January 1980.

3.10 U.S. Nuclear Regulatory Commission, Regulatory Guide 1.113, Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I, Revision 1, April 1977

3.11 Mitsubishi Heavy Industries, Ltd., Design Control Document for the US-APWR, MUAP-DC011, Revision 1

3.12 Comanche Peak Nuclear Power Plant, Units 3 & 4, COL Application, Part 3 – Environmental Report, Revision 0

3.13 Comanche Peak Steam Electric Station Final Safety Analysis Report, Amendment 102a.

3.14 Certificate of Adjudication Number 12-4097, The Adjudication of Water Rights in the Brazos II River Segment of the Brazos River Basin, Permit 2871, Texas Utilities Electric Company, Somervell and Hood Counties, November 8, 1985

3.15 Mitsubishi Heavy Industries, Ltd., US-APWR Design Description, October 2006

3.16 U.S. Nuclear Regulatory Commission, Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000

3.17 United States Department of Agriculture (USDA), Transportation and Marketing, Statistics from the Census of Agriculture (5-year Cycle), Texas: Bosque County, Hill County, Johnson County, McClennan County and Somervell County (see Appendix 11)

3.18 U.S. Environmental Protection Agency, Office of Science and Technology, U.S. EPA Reach File 1 (RF1) for the Conterminous United States in BASINS, Version 4.0

3.19 Record of Phone Conference between Darren Lavvorn, Enercon and Brad Brunette, Brazos River Authority, Lake Whitney Municiple Surface Water Contracts, 4/16/08 (see Appendix 5)

3.20 Email from John Tibbs, Texas Parks and Wildlife Department, to Audrey Thompson, Enercon, Subject: RE: Recreation and Fisheries Data Needed for Local Rivers, April 11, 2008 (see Appendix 6)

3.21 Texas Parks and Wildlife, Historical Fish Kill Events Involving the Golden Alga, Prymnesium parvum, in Texas, http://www.tpwd.state.tx.us/landwater/water/environconcerns/hab/ga/blooms.phtml, accessed 4/27/2008 (see Appendix 7)

3.22 North Carolina Sport Fish Profiles, http://www.ncwildlife.org/fishing/profiles/index.htm, accessed 4/27/2008

3.23 Fishes Found in Texas Freshwater, http://www.tpwd.state.tx.us/landwater/water/aquaticspecies/inland.phtml, accessed 4/27/2008

3.24 U. S. Census Bureau, American Fact Finder, Population Finder, http://factfinder.census.gov/servlet/SAFFPopulation?_submenuId=population_0&_sse=on, accessed 4/11/2008 (see Appendix 8)

3.25 Texas Water Development Board, Volumetric Survey of Lake Whitney, June 2005 Survey, September 2006 (see Appendix 9)

3.26 Mitsubishi Heavy Industries, Ltd., US-APWR (Comanche Peak #3/4) Radioactive Release Rates for Calculations of Public Doses, CP34-HKH-0013, Revision 2

3.27 Email from Sei Kudo, Mitsubishi Heavy Industries, Ltd., to Marvin Morris, et al., Enercon, Subject: Final Confirmation of Parameters, April 22, 2008 (see Appendix 10)

3.28 Email from Melissa Gayley, Enercon, to MAMorris et al., Subject: Population for Calculation, Attachments: PopulationResults.xls, PopSectorMiles (0 – 10 mi).jpg, PopSectorMiles (10 – 50 mi).jpg, March 14, 2008 (see Appendix 4)

3.29 Email from Darren Lovvorn, Enercon, to Joanne Morris, Enercon, Subject: Information Request, April 18, 2008 (Reference to eroom files including WATER USER TABLES.xls, see Appendix 3)

3.30 Calculation TXUT-001-ER-5.4-CALC-011, CPNPP Offsite Dose Due to Normal Gaseous Releases, Revision 2

3.31 USGS National Water Information System: Web Interface, USGS 08091730 Squaw Ck Res nr Glen Rose, TX, http://waterdata.usgs.gov/nwis/nwisman/?site_no=08091730&agency_cd=USGS, accessed 5/12/2008 (see Appendix 12)

3.32 Texas Water Development Board, Volumetric Survey of Squaw Creek Reservoir, March 10, 2003 (see Appendix 13)

3.33 Comanche Peak Steam Electric Station, Environmental Report, Volume II, Amendment 2, January 21, 1974.

4.0 Assumptions

4.1 LADTAP II calculations can only be performed for radionuclides that are included in the LADTAP dose conversion factor library. As a result, releases of Rh-103m, Rh-106, AG-110, and Ba-137m are not used in this analysis. Given the relatively short half-lives of these radionuclides, 56.12 minutes, 29.92 seconds, 24.57 seconds and 2.55 minutes, respectively, the effect of this omission is considered negligible.

4.2 The midpoint of Whitney Reservoir is approximately 50,654 ft downstream of the water diversion location for the City of Cleburne on the Brazos River. The transit time from the City of Cleburne diversion to the midpoint of the lake is determined using the average Brazos River stream velocity of 1.3 ft/sec [Reference 3.18]. Assumption of this stream velocity is conservative since velocity is reduced with increasing width and depth of the lake. The use of a higher stream velocity produces more conservative doses resulting from a shorter transit time and reduced decay.

4.3 The dilution factor for the water use locations associated with the City of Whitney, is assumed to be 1645.4. The dilution factor determined for complete mixing of the Squaw Creek effluent into the Brazos River, 822.7, is increased by a factor of two (2) for dilution in Whitney Reservoir. This is a conservative assumption given the large capacity of Whitney Reservoir, 554,203 ac-ft (1.81E+11 gal) [Reference 3.25].

4.4 Shoreline distances from the Squaw Creek dam to each of the surface water user diversion locations were calculated using Google Earth Maps which can be accessed via the following website: http://maps.google.com/maps?hl=en&tab=wl. The distances are documented in Reference 3.29 and Appendix 3. The distances were reviewed for reasonableness and are assumed to be sufficiently accurate for the purposes of this calculation.

4.5 The projected populations of Cleburne and Whitney are used for evaluation of potential future drinking water pathways (see Section 5.2.6.2). The 2006 populations of these cities were obtained from U.S. Census Bureau data [Reference 3.24]. Projection of the population data for these cities to 2058 was based on the ratio of the 2056 fifty (50) mile population to the 2007 fifty (50) mile population (2,760,243/1,538,761=1.79; say 1.8) [Reference 3.12, Tables 2.5-1 2.5-2]. The population of these towns was conservatively assumed to increase at the same rate as the population of the entire fifty (50) mile region including Ft Worth.

4.6 It is assumed that only 50% of the population within 50 miles of CPNPP Units 3 and 4 will spend recreational time in the vicinity of Whitney Reservoir. Since the majority of the population within fifty (50) miles of CPNPP is located north of the plant site in the Dallas/Ft Worth area and there are many recreational lakes closer than Whitney Reservoir, which is well south of the plant site, this is a reasonable assumption.

5.0 Design Inputs

5.1 Regulatory Dose Limits

The regulatory dose limits applicable to normal liquid radiological releases are specified in 10 CFR 50, Appendix I [Reference 3.5] and 10 CFR 20.1301(d) [Reference 3.8]. NUREG-0543 provides guidance for meeting the 10 CFR 20.1301(d) requirement for compliance with 40 CFR Part 190 [Reference 3.6]. These dose limits are also given in NUREG-1555, Section 5.4.3.

Table 5.1-1
10 CFR 50 Appendix I Annual Dose Limit from Liquid Effluents

Dose	Appendix I (per unit)
Total body dose[(a)]	3 mrem
Maximum organ dose[(a)]	10 mrem

(a) Maximally exposed individual

In accordance with the statement of considerations for 10 CFR 20 (5 CFR 23360), demonstration of compliance with the limits of 40 CFR 190 (as referenced in 10 CFR 20.1301(d)) is considered to be in compliance with the 0.1-rem limit (10 CFR 20.1301).

Table 5.1-2
40 CFR 190 Dose Limits[(a)]

Annual whole body dose equivalent[(b)]	25 mrem
Thyroid dose	75 mrem
Dose to another organ	25 mrem

(a) Doses are for all units at a site.
(b) This dose limit applies to all pathways for all effluents and direct radiation sources for all units at the site.

5.2 LADTAP II Inputs

5.2.1 Site Characteristics

Regulatory Guide 1.109 [Reference 3.4] provides guidance for addressing doses to man from routine release of reactor effluents including doses from liquid effluent pathways. The maximally exposed individual and the population within fifty (50) miles of the plant site are to be considered. For this reason liquid pathways within fifty (50) miles of CPNPP are considered.

The proposed onsite liquid effluent release location for Comanche Peak Units 3 and 4 is the Squaw Creek Reservoir impoundment in the Brazos River Basin located in rural Somervell and Hood counties in north central Texas. Squaw Creek Reservoir is the cooling water source for CPNPP Units 1 and 2. The liquid radioactive waste discharge from CPNPP Units 3 and 4 is directed to either Units 1 or 2 circulating water system, where it is diluted and then combined prior to discharge to Squaw Creek Reservoir. [Reference 3.12, Section 3.5.1.3]

The discharge from Squaw Creek Reservoir is Squaw Creek, a freshwater stream that converges with the Paluxy and Brazos Rivers approximately 4.3 miles south of the reservoir. [Reference 3.12, Section 2.3.1.3.5]

Figure 5.2.1-1
Confluence of Squaw Creek, Paluxy River and Brazos River

From its confluence with the Paluxy River, the Brazos River flows approximately sixty (60) stream miles south to Whitney Reservoir. Whitney Dam impounds Whitney Reservoir, a lake with a capacity of 554,203 ac-ft [Reference 3.25] and length of approximately thirty (30) stream miles. Below Whitney Dam, the Brazos River continues to flow south for many miles; however, only approximately 16 stream miles are considered in this analysis since at this point the river flows outside the fifty (50) mile radius of CPNPP. Figure 5.2.1-2 shows the Brazos River system within fifty (50) miles of CPNPP.

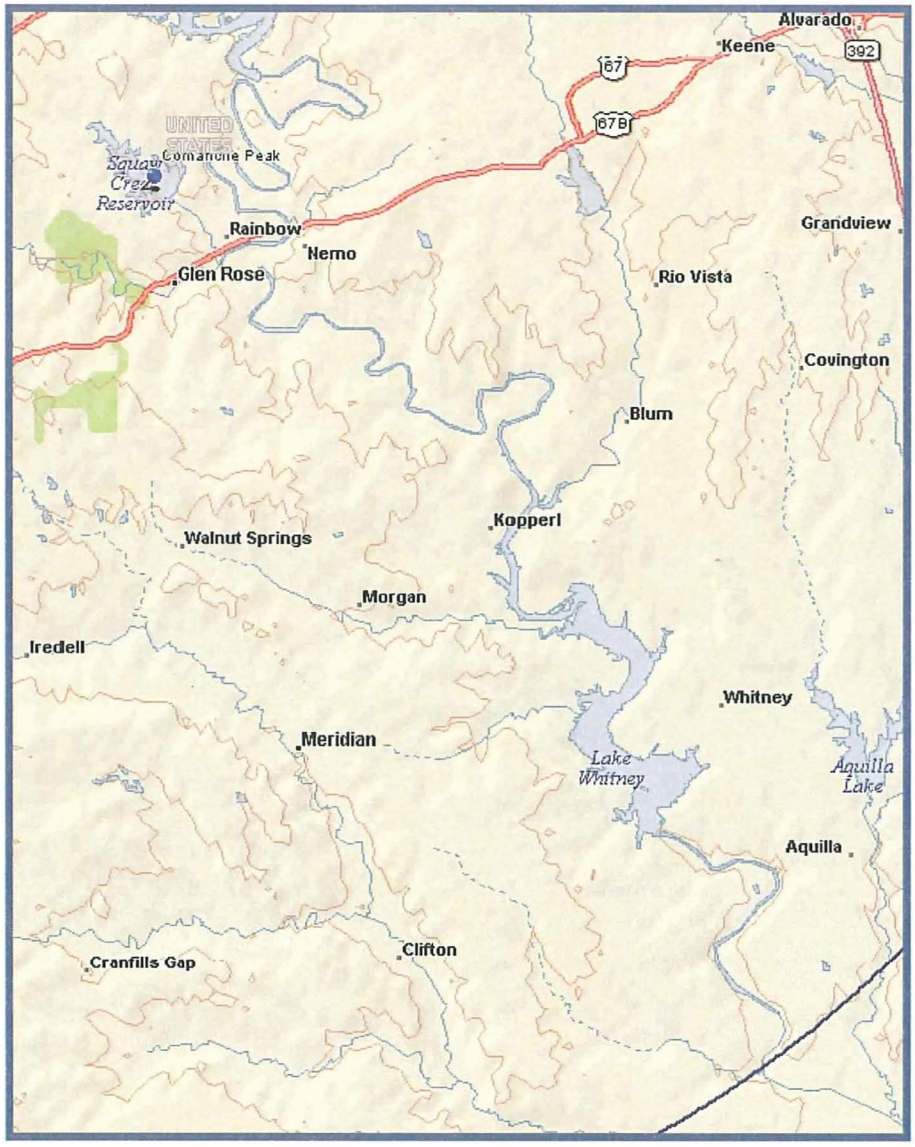


Figure 5.2.1-2
Brazos River System within 50 Miles of CPNPP

5.2.2 Site Population Data

General expressions for population dose given in Appendix D of Regulatory Guide 1.109 [Reference 3.4] address dose to permanent and transient population where they might be considered to be exposed to the average radionuclide concentration estimated for the sub-region. Excluding the Fort Worth Metropolitan area, the bulk of transient population in the region surrounding CPNPP comes from parks, camping, and lodging [Reference 3.12, Section 2.5.1.3]. Since recreational activities associated with visitors to an area such as boating, swimming and shoreline use are considered among liquid effluent pathways, it is conservative to include transient population in the evaluation of dose associated with liquid effluents.

NUREG 1555 [Reference 3.3] requires that the population distribution for 80 km (50 mi) around the site for 5 years after the time of the licensing action be considered in the assessment of effluent doses. The projected permanent and transient population for the year 2058, 3,493,553 persons [Reference 3.28], conservatively bounds this requirement. Population projections derived from county estimates and the cohort-component method are documented in Reference 3.28 and Appendix 4. Default population fractions of 0.71 (adult), 0.11 (teen), and 0.18 (child) are assumed. The source term multiplier is set to the default value of 1.0 for evaluation of one unit.

5.2.3 Radionuclide Release Information

The annual average release of nuclides from the US-APWR were determined using the PWR-GALE Code. Per Table 3 of Reference 3.26, the associated projected annual releases from a single US-APWR plant are as given in Table 5.2.3-1 below.

Table 5.2.3-1
US APWR Liquid Radionuclide Releases (one unit, Ci/yr)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste	TOTAL Releases
Corrosion and Activation Products						
Na-24	0.00000	0.00029	0.00002	0.00031	0.00000	4.70E-03
P-32	0.00000	0.00000	0.00000	0.00000	0.00018	1.80E-04
Cr-51	0.00000	0.00008	0.00000	0.00008	0.00470	6.00E-03
Mn-54	0.00000	0.00004	0.00000	0.00005	0.00380	4.50E-03
Fe-55	0.00000	0.00003	0.00000	0.00003	0.00720	7.70E-03
Fe-59	0.00000	0.00001	0.00000	0.00001	0.00220	2.30E-03
Co-58	0.00000	0.00012	0.00000	0.00013	0.00790	9.80E-03
Co-60	0.00000	0.00001	0.00000	0.00002	0.01400	1.40E-02
Ni-63	0.00000	0.00000	0.00000	0.00000	0.00170	1.70E-03
Zn-65	0.00000	0.00001	0.00000	0.00001	0.00000	2.20E-04
W-187	0.00000	0.00002	0.00000	0.00002	0.00000	3.50E-04
Np-239	0.00000	0.00003	0.00000	0.00004	0.00000	5.30E-04
Fission Products						
Rb-88	0.00000	0.00187	0.00000	0.00187	0.00000	2.80E-02
Sr-89	0.00000	0.00000	0.00000	0.00000	0.00009	1.50E-04
Sr-90	0.00000	0.00000	0.00000	0.00000	0.00001	1.80E-05
Sr-91	0.00000	0.00000	0.00000	0.00000	0.00000	6.80E-05
Y-91m	0.00000	0.00000	0.00000	0.00000	0.00000	4.40E-05
Y-91	0.00000	0.00000	0.00000	0.00000	0.00008	9.00E-05
Y-93	0.00000	0.00002	0.00000	0.00002	0.00000	3.10E-04
Zr-95	0.00000	0.00001	0.00000	0.00001	0.00110	1.30E-03
Nb-95	0.00000	0.00001	0.00000	0.00001	0.00190	2.00E-03
Mo-99	0.00000	0.00011	0.00000	0.00011	0.00006	1.70E-03
Tc-99m	0.00000	0.00011	0.00000	0.00011	0.00000	1.70E-03

Table 5.2.3-1
US APWR Liquid Radionuclide Releases (one unit, Ci/yr)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste	TOTAL Releases
Ru-103	0.00001	0.00020	0.00000	0.00021	0.00029	3.40E-03
Rh-103m	0.00001	0.00020	0.00000	0.00021	0.00000	3.10E-03
Ru-106	0.00010	0.00243	0.00005	0.00257	0.00890	4.70E-02
Rh-106	0.00010	0.00243	0.00005	0.00257	0.00000	3.90E-02
Ag-110m	0.00000	0.00003	0.00000	0.00004	0.00120	1.80E-03
Ag-110	0.00000	0.00000	0.00000	0.00000	0.00000	7.20E-05
Sb-124	0.00000	0.00000	0.00000	0.00000	0.00043	4.30E-04
Te-129m	0.00000	0.00000	0.00000	0.00001	0.00000	7.80E-05
Te-129	0.00000	0.00002	0.00000	0.00002	0.00000	3.10E-04
Te-131m	0.00000	0.00002	0.00000	0.00002	0.00000	2.50E-04
Te-131	0.00000	0.00000	0.00000	0.00001	0.00000	7.60E-05
I-131	0.00002	0.00001	0.00000	0.00002	0.00160	2.00E-03
Te-132	0.00000	0.00003	0.00000	0.00003	0.00000	4.70E-04
I-132	0.00000	0.00001	0.00001	0.00002	0.00000	3.10E-04
I-133	0.00001	0.00002	0.00003	0.00005	0.00000	8.10E-04
I-134	0.00000	0.00001	0.00000	0.00001	0.00000	8.90E-05
Cs-134	0.00002	0.00005	0.00000	0.00007	0.01100	1.20E-02
I-135	0.00000	0.00002	0.00003	0.00005	0.00000	7.80E-04
Cs-136	0.00030	0.00112	0.00000	0.00141	0.00037	2.20E-02
Cs-137	0.00003	0.00008	0.00000	0.00011	0.01600	1.80E-02
Ba-137m	0.00003	0.00000	0.00000	0.00003	0.00000	4.60E-04
Ba-140	0.00001	0.00031	0.00001	0.00033	0.00091	5.80E-03
La-140	0.00001	0.00051	0.00001	0.00053	0.00000	8.00E-03
Ce-141	0.00000	0.00000	0.00000	0.00000	0.00023	2.90E-04
Ce-143	0.00000	0.00003	0.00000	0.00003	0.00000	5.00E-04
Pr-143	0.00000	0.00001	0.00000	0.00001	0.00000	7.90E-05
Ce-144	0.00000	0.00011	0.00000	0.00011	0.00390	5.60E-03
Pr-144	0.00000	0.00011	0.00000	0.00011	0.00000	1.70E-03
Allothers	0.00000	0.00000	0.00000	0.00000	0.00000	1.20E-05
TOTAL (except H-3)	**0.00065**	**0.01053**	**0.00025**	**0.01143**	**0.08975**	**2.60E-01**
H-3 release	1.60E+03					

As CPNPP Units 3 and 4 will not have an onsite laundry [Reference 3.26], detergent wastes are omitted. In addition, LADTAP II calculations can only be performed for radionuclides that are included in the LADTAP II dose conversion factor library. As a result, releases of Rh-103m, Rh-106, AG-110, and Ba-137m are not used in this analysis. Given the relatively short half-lives of these radionuclides, the effect of this exclusion is considered negligible (see Assumption 4.1). The release rates used in the LADTAP II analysis are given in Table 5.2.3-2 below.

Table 5.2.3-2
CPNPP Units 3 and 4 Estimated Liquid Radionuclide Releases (one unit, Ci/yr)

Na-24	4.70E-03	Ru-106	3.81E-02
P-32	0.00E+00	Ag-110m	6.00E-04
Cr-51	1.30E-03	Sb-124	0.00E+00
Mn-54	7.00E-04	Te-129m	7.80E-05
Fe-55	5.00E-04	Te-129	3.10E-04
Fe-59	1.00E-04	Te-131m	2.50E-04
Co-58	1.90E-03	Te-131	7.60E-05
Co-60	0.00E+00	I-131	4.00E-04
Ni-63	0.00E+00	Te-132	4.70E-04
Zn-65	2.20E-04	I-132	3.10E-04
W-187	3.50E-04	I-133	8.10E-04
Np-239	5.30E-04	I-134	8.90E-05
Rb-88	2.80E-02	Cs-134	1.00E-03
Sr-89	6.00E-05	I-135	7.80E-04
Sr-90	8.00E-06	Cs-136	2.16E-02
Sr-91	6.80E-05	Cs-137	2.00E-03
Y-91m	4.40E-05	Ba-140	4.89E-03
Y-91	1.00E-05	La-140	8.00E-03
Y-93	3.10E-04	Ce-141	6.00E-05
Zr-95	2.00E-04	Ce-143	5.00E-04
Nb-95	1.00E-04	Pr-143	7.90E-05
Mo-99	1.64E-03	Ce-144	1.70E-03
Tc-99m	1.70E-03	Pr-144	1.70E-03
Ru-103	3.11E-03	Total (except H-3)	1.29E-01
		H-3	1.60E+03

5.2.4 Impoundment Reconcentation Model Data

Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Releases for the Purpose of Implementing Appendix I" [Reference 3.10] presents transport and water use models acceptable to the NRC for use in calculating the potential annual average radiation doses to the public. Regulatory Guide 1.113 models include both simplified and complex models. Simplified models must employ demonstrably conservative assumptions. If this approach supports a conclusion of compliance with 10 CFR 50 Appendix I limits, no further effort is indicated.

The LADTAP II hydrologic model used to represent mixing of the CPNPP Units 3 and 4 liquid effluent in Squaw Creek Reservoir is the completely mixed impoundment (reservoir) model. The LADTAP II completely mixed impoundment model assumptions are consistent with Regulatory Guide 1.113. The reservoir is represented as a completely mixed tank. All inputs of material makeup are instantaneously mixed throughout the tank so that the concentration is homogeneous. Negligible evaporation and leakage losses are assumed. Per Regulatory Guide 1.113, simple models such as the completely mixed model may be used to describe all cooling ponds; however, the analytical techniques, assumptions, and level of conservatism of the model must be fully justified.

Since the Squaw Creek Reservoir is represented as a completely mixed tank, the circulating water system flowrate from CPNPP Units 1 and 2 to Squaw Creek Reservoir does not affect the reconcentration in the impoundment or the resulting doses. The total Unit 1 and 2 circulating water system flow rate, 2.2E+06 gpm [Reference 3.13, Section 10.4.5.1], serves only to demonstrate that the reservoir would be fairly homogeneous, satisfying the "completely mixed" limitation of the model. Although the liquid radwaste discharge rate from the plant to the impoundment is not used in the LADTAP II calculation, a value of 247,500 gpm is input for this parameter. This flow rate represents 90% of the flow rate of one of eight Unit 1 and 2 circulating water system pumps (275,000 gpm/pump) [Reference 3.13].

The volume of Squaw Creek Reservoir is another required impoundment model parameter. Per Reference 3.12, Section 2.3.1.2.5, the volume of Squaw Creek Reservoir at the conservation pool elevation of 775 ft is 151,418 ac-ft; however, USGS data shows a minimum pool elevation of 772.98 ft [Reference 3.31]. This pool elevation equates to a volume of approximately 144,700 ac-ft (6.3E+09 ft^3) [Reference 3.32]. Since it is conservative for a minimum volume to be applied in an impoundment model, a volume of 6.3E+09 ft^3 will be used in this calculation.

Another important hydrological parameter associated with the completely mixed model is the flushing of the reservoir by the blowdown stream. Lower effluent releases from Squaw Creek Reservoir result in higher reconcentration in the impoundment; therefore, it is conservative to use a low flowrate when evaluating compliance with 10 CFR 50 Appendix I limits. The minimum discharge flowrate from Squaw Creek Reservoir is 1.5 ft^3/s. This minimum flowrate is based on the current contract with the Brazos River Authority for water allocation rights [Reference 3.14]. The contract stipulates that the owner make sufficient releases to maintain a minimum flow of 1.5 ft^3/s at the Highway 144 crossing over Squaw Creek. United States Geological Survey (USGS) data for Squaw Creek is consistent with a release rate of 1.5 ft^3/s. USGS data gives an average mean minimum flow of 2 ft^3/s for the time period from 1977 to 2006.

The expected average release rate from Squaw Creek Reservoir, once Units 3 and 4 are operational, is anticipated to be approximately 45.4 ft^3/s (32,900 acre ft/year) [Reference 3.27]. More realistic doses are calculated using this value for comparison with the Appendix I case (Case 1). Input and output files for the realistic case (Case 2) can be found in Appendix 2.

Effluent concentrations are estimated at the midpoint of plant life, 30 years [Reference 3.15, Table 1.3-1].

5.2.5 ALARA Analysis Usage Location Data

5.2.5.1 Maximally Exposed Individual

The LADTAP II As Low As Reasonably Achievable (ALARA) analysis calculates doses to individuals from ingestion of aquatic food, ingestion of drinking water, external exposure from shoreline activities, and exposure from swimming and boating. Doses associated with ingested irrigated foods and milk and meat production are also considered (see Section 5.2.6). This hypothetical individual represents the maximally exposed individual within 50 miles. 10 CFR 50 Appendix I ALARA limits apply to individuals in unrestricted areas, therefore, unrestricted areas within 50 miles of CPNPP were reviewed to identify the most limiting locations and pathways of exposure.

Squaw Creek Reservoir is owned by Luminant Generation Company LLC (Luminant) and is closed to the public [Reference 3.12, Section 2.5.1.3]. Access is limited to those persons (employees and guests) granted access rights by Luminant [Reference 3.12, Section 2.2]. Squaw Creek Reservoir discharges to

Squaw Creek. There are no other sources of dilution in Squaw Creek; therefore, the most limiting location for aquatic food and recreation for an individual in an unrestricted area is along Squaw Creek. For calculation of shoreline dose, a width factor is input to define the shoreline geometry of Squaw Creek. A shore-width factor for rivers of 0.2 is used [Reference 3.1].

Squaw Creek flows approximately 4.3 miles south of CPNPP to the Paluxy River. Regulatory Guide 1.109 [Reference 3.4] characterizes the maximum individual as "maximum" with regard to usage of the region in the vicinity of the plant representing habits with reasonable deviations from the average. In this calculation, aquatic food and recreation pathways will be evaluated for an individual located approximately two (2) miles (10,560 ft) south of the Squaw Creek dam. Given the size and access to Squaw Creek, usage by the maximally exposed individual at two (2) miles is judged to be reasonable and conservative. Using the stream velocity in the reach of Squaw Creek at mean flow obtained from Reference 3.18, 0.4 ft/sec, a transit time of 7.3 hours is obtained. Since there are no other sources of dilution along Squaw Creek, a dilution factor of 1 is applied.

The Texas Commission on Environmental Quality (TCEQ) is the environmental agency for the state of Texas. The TCEQ is the regulatory agency responsible for water rights. Through the TCEQ it was determined that the Brazos River Authority (BRA) holds the majority of water rights within the Brazos River basin and sells water to various individuals, municipalities, and industries. A review of water rights granted by these agencies showed that drinking water and irrigation water are not obtained from surface water in close proximity to CPNPP. The nearest possible source of drinking water that was identified is associated with the City of Cleburne. The BRA has a municipal/domestic use water contract with the City of Cleburne for 5000 ac-ft/yr. However, according to the BRA [Reference 3.19], there is no diversion infrastructure in place and no water has ever been diverted. The diversion location of the City of Cleburne water use contract number 213383 is shown in Figure 5.2.5.1-1. The shoreline distance from the Squaw Creek dam to this location is approximately 257,750 ft. Since NUREG 1555, Section 5.4 guidance indicates that present and known future drinking water intake locations be considered, the location of the Cleburne water right is conservatively used for evaluation of the drinking water pathway for the maximally exposed individual.

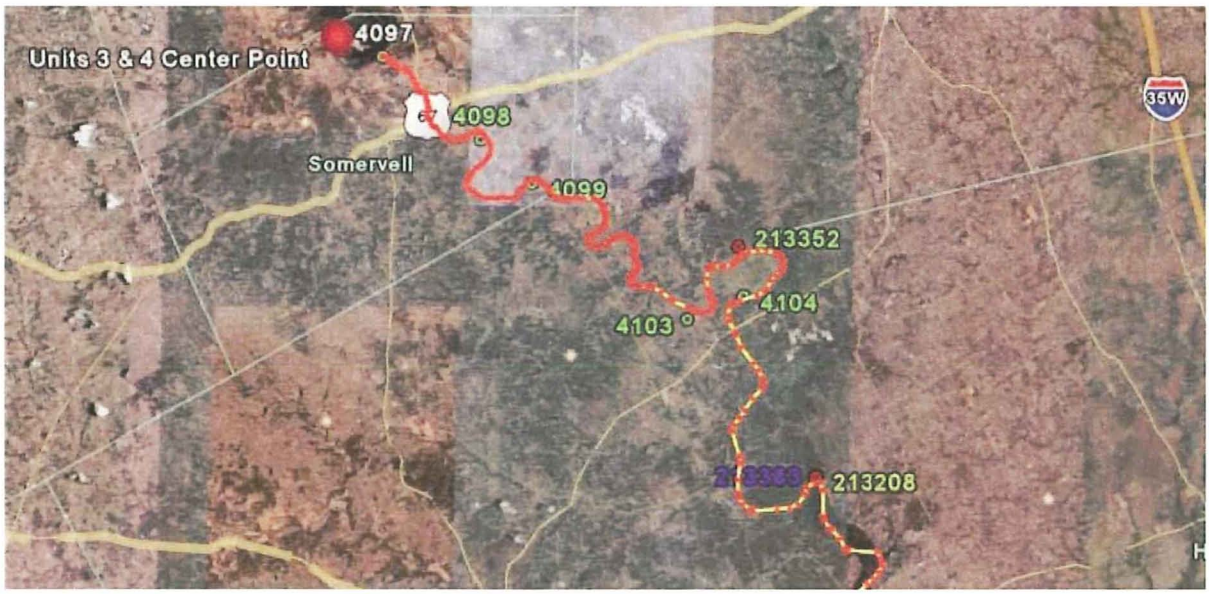


Figure 5.2.5.1-1
Water Use Locations Above Whitney Reservoir

Given the distance from the confluence of Squaw Creek, the Paluxy River and the Brazos River to the City of Cleburne water right, complete mixing is assumed. The Brazos River monthly average stream flow is 1,234 ft^3/sec [Reference 3.12, Table 2.3-13]. A ratio of this value and the Squaw Creek stream flow given for Case 1 in Section 5.2.4, 1.5 ft^3/sec, is used to determine the dilution factor for the drinking water pathway for the maximally exposed individual, 822.7. The dilution factor determined for Case 2 (ratio of 1,234 ft^3/sec and 45.4 ft^3/sec) is 27.2.

The Squaw Creek and Brazos River stream velocities at mean flow are 0.4 and 1.3 ft/sec, respectively [References 3.18]. The shoreline distance from the Squaw Creek dam to the confluence with the Paluxy River is approximately 4.3 miles (22,704 ft). The shoreline distance from the Squaw Creek confluence of the Paluxy River to the drinking water diversion on the Brazos River is approximately 235,046 ft. These values are used to determine the transit time for the drinking water pathway for the maximally exposed individual as shown below. Note that the Brazos River stream velocity is used for the approximately 400 ft along the Paluxy River to the Brazos River.

$$\text{Transit Time} = \left[\frac{22{,}704\text{ ft}}{0.4\text{ ft/sec}} + \frac{257{,}750\text{ ft} - 22{,}704\text{ ft}}{1.3\text{ ft/sec}}\right] \times \frac{1\text{hour}}{3600\text{ sec}} = 66\text{ hours}$$

LADTAP II default usage and consumption parameter values, which are consistent with the guidance of Regulatory Guide 1.109, are used without change in this ALARA analysis.

5.2.5.2 Additional Locations

An additional location in the restricted area around Squaw Creek Reservoir was selected for an analysis similar to the ALARA analysis described above. This evaluation considers those persons (employees and guests) granted access rights to the reservoir by Luminant. The parameters that must be entered for a LADTAP II evaluation of an individual other than the maximally exposed individual are the dilution factor for all pathways, the transit time from the discharge point to the usage location, and the shore-width factor. Since this location represents employee use of Squaw Creek Reservoir for shoreline activities, swimming and fishing, a dilution factor of one (1) and a transit time of zero (0) are appropriate. A lake shore is the applicable shoreline geometry for Squaw Creek Reservoir; therefore, a shore-width factor of 0.3 is used [Reference 3.1]. Although LADTAP II determines doses associated with the drinking water pathway for additional usage locations, there is no drinking water taken from Squaw Creek Reservoir. Doses associated with the drinking water pathway are neglected.

5.2.6 Population Dose Usage Location Data

Locations and usage data for sport fishing harvest, irrigated foods and milk and meat production are described below. This data is used for population dose estimates associated with the consumption of aquatic and irrigated foods as well as milk and meat. LADTAP II default usage and consumption parameter values, which are consistent with the guidance of Regulatory Guide 1.109, are used without change.

There is no commercial fish harvest in Squaw Creek, the Brazos River below the Paluxy River, or Whitney Reservoir [Reference 3.20]. In addition, as is typical of freshwater sites, there is no sport or commercial harvest of invertebrates. Aquatic vegetation is not normally consumed in the vicinity surrounding CPNPP; therefore, this pathway is not evaluated. Sport fishing, irrigation and milk and meat production are discussed below.

5.2.6.1 Sport Fishing Harvest

Current sport fish harvest data is not available for the Brazos River Basin in the vicinity of CPNPP [Reference 3.20]. In addition, outbreaks of golden alga, a microscopic organism that produces toxins causing massive fish kills, were experienced in Lake Granbury, the Brazos River and Whitney Reservoir as recently as March of 2003 [Reference 3.21]. Sport species require considerable stocking effort and

years to recover naturally from a golden alga outbreak; therefore, creel data for Whitney Reservoir from 1999-2000, prior to the outbreaks which have impacted fishing and the number of anglers on the reservoir, are used in evaluation of the aquatic foods pathway.

The total number of sport fish harvested by species in Whitney Reservoir from 12/1/1999 through 11/29/2000 was obtained from the Texas Parks and Wildlife Department [Reference 3.20]. Typical weight of each species [Reference 3.22 and 3.23] was used to conservatively estimate the total weight of each species harvested. To account for the lack of creel data for the Brazos River and the future increase in the quantity of sport fish harvested, the total weight of sport fish harvested in 1999 – 2000 is increased by 25%. This increase is reasonable since there is no public access to the Brazos River above Whitney Reservoir and harvest data predates recent fish kills associated with golden alga. See Table 5.2.6.1-1 for the Whitney Reservoir sport fish harvest data used in the LADTAP II analysis. A total harvest value of 715,125 lbs/yr (324,375 kg/yr) is input.

Table 5.2.6.1-1
Sportfish Harvest by Species, Whitney Reservoir, 12/1/99 through 11/30/00

Fish Species	Harvest	Species Weight Used (lbs)	Total Species Weight (lbs)
White bass	13,866	3	41,598
Striped bass	13,994	17	237,898
Largemouth bass	2,960	10	29,600
Smallmouth bass	114	5	570
White crappie	4,152	3	12,456
Black crappie	1,736	3	5,208
Freshwater drum	433	20	8,660
Blue catfish	2,681	30	80,430
Channel catfish	7,784	20	155,680
Total Harvest Weight (lbs)			572,100
Total Harvest Weight Used in LADTAP II (25% added)			**715,125**

Since the annual sport fish harvest is assumed to be caught in both the Brazos River and Whitney Reservoir, the location of the City of Cleburne municipal water diversion above Lake Whitney is conservatively assumed for the determination of the transit time (66 hrs) and dilution factor (822.7) for aquatic foods. (see Section 5.2.5.1)

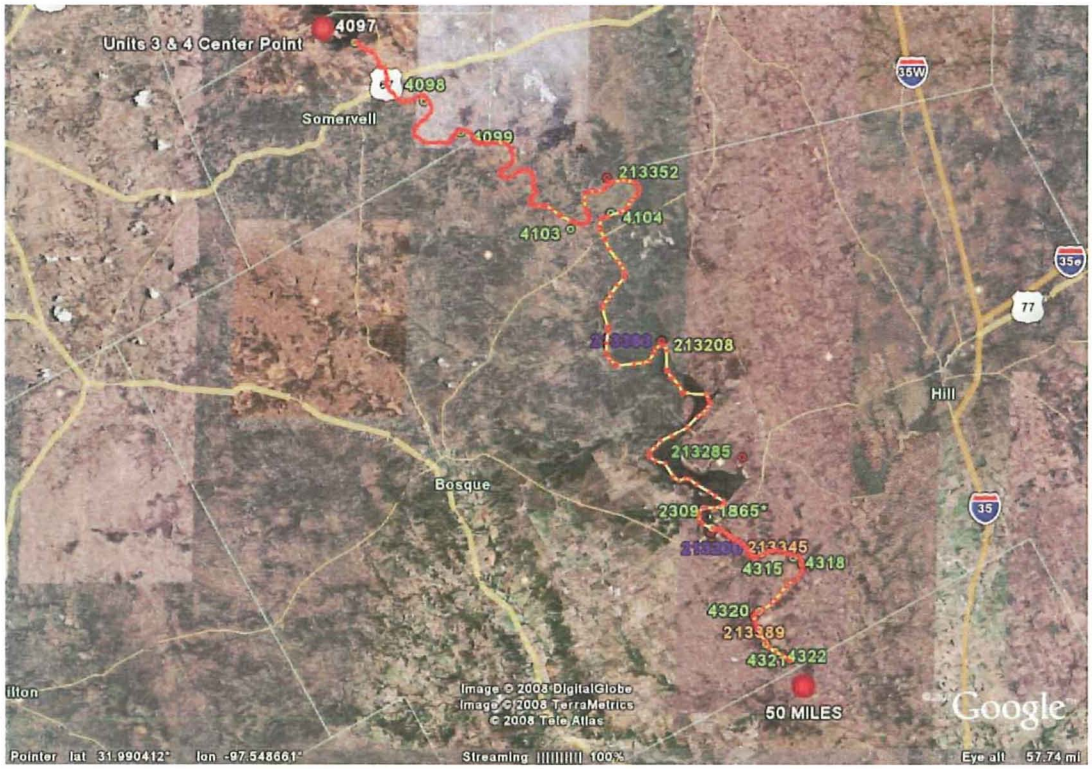
5.2.6.2 Drinking Water

The TCEQ is the Texas regulatory agency responsible for water rights. Through the TCEQ it was determined that the Brazos River Authority (BRA) holds the majority of water rights within the Brazos River Basin and sells water to various individuals, municipalities, and industries. A review of water rights granted by these agencies showed that municipal (drinking) water is not obtained from surface water in close proximity to CPNPP. Table 5.2.6.2-1 shows TCEQ and BRA municipal water rights within 50 miles of CPNPP from the Brazos River system. As noted in Section 5.2.5.2, although water rights contracts exist, no diversion of water has been made for municipal use and, in most cases, no infrastructure currently exists. Consistent with the guidance of NUREG 1555, these water contracts are conservatively considered as potential future drinking water sources.

Table 5.2.6.2-1
TCEQ and BRA Municipal Water Rights

Water Right / Contract No.	Owner	Use	Ac-Ft/Yr	Distance From SCR Dam (Ft)
213200	Whitney, City of	Municiple	750	359,057
213206	Cleburne, City of	Municiple	4700	359,057
213277	Lake Whitney Water Co.	Municiple	150	359,057
213311	Fred T. Owen, Jr.	Municiple	60	359,057
213383	Cleburne, City of	Multi	5000	257,750

Figures 5.2.6.2-1, 5.2.6.2-2 and 5.2.6.2-3 below show the locations of TCEQ and BRA municipal water rights identified in Table 5.2.6.2-1. The numbers for water right contracts for municipal use are shown in blue.



Figures 5.2.6.2-1
Brazos River System Water Rights within 50 Miles of CPNPP

Figures 5.2.6.2-2
Brazos River System Water Rights below Whitney Reservoir, View 1

Figures 5.2.6.2-3
Brazos River System Water Rights below Whitney Reservoir, View 2

As shown in Table 5.2.6.2-1, there are two identified locations for municiple water use contracts. The first location, the City of Cleburne, is located approximately 257,750 ft below Squaw Creek dam, just above Whitney Reservoir. All of the other water rights are approximately 359,057 ft below Squaw Creek Dam immediately below Whitney Reservoir. However, since there is no infrastructure, the actual future use location for these other water rights might be anywhere along Whitney Reservoir; therefore, for the purpose of conservatively calculating transit time, a location at the midpoint of the reservoir will be assumed. The transit time for the City of Cleburne diversion location is 66 hours as given in Section 5.2.5.1. The transit time for the midpoint of Whitney Reservoir, an additional 50,654 ft downstream, is determined to be 77 hours assuming the average Brazos River stream velocity of 1.3 ft/sec (see Assumption 4.2). The dilution factor for the City of Cleburne drinking water diversion location was determined to be 822.7 in Section 5.2.5.1. The dilution factor for the remaining water use locations, which are primarily associated with the City of Whitney, is determined by assuming an additional dilution factor of two (2) due to mixing in the volume of Whitney Reservoir (see Assumption 4.3). The resulting value is 1645.4.

The populations of Cleburne and Whitney from U.S. Census Bureau 2006 data, are 29,689 and 2,068, respectively [Reference 3.24]. These populations are conservatively increased by 80% to 53,440 and 3,722 to project the populations to the year 2058 (see Assumption 4.5).

5.2.6.3 Population Shoreline Usage Location Data

It is assumed that 50% of the population within 50 miles of CPNPP Units 3 and 4 will spend recreational time in the vicinity of Whitney Reservoir (see Assumption 4.6). Since the majority of the population within fifty (50) miles of CPNPP is located north of the plant site in the Dallas/Ft Worth area and there are many recreational lakes closer than Whitney Reservoir, this is a reasonable assumption. The total transient and permanent population within fifty (50) miles of CPNPP is 3,493,553 [Reference 3.28]. Fifty percent of this number is 1,746,777.

The assumed location for calculating the dilution factor and transit time is the midpoint of Whitney Reservoir. This is the same location as assumed for the City of Whitney drinking water diversion described in Section 5.2.6.3. The transit time and dilution factor used for the shoreline pathway for Case 1 are 77 hours and 1645.4, respectively. The transit time and dilution factor used for the shoreline pathway for Case 2 are 77 hours and 54.4, respectively.

The average exposure time per person for each age group is taken from Table E-4 of Regulatory Guide 1.109. The exposure times for children, teenagers, and adults are 9.5 hrs/yr, 47 hrs/yr, and 8.3 hrs/yr, respectively. Multiplying these values by the fraction of the population represented by each age group, yields a shoreline exposure time of 12.8 hrs/person/yr. The default values for the fraction of the population represented by each age group are 71% adults, 11% teens, and 18% children [Reference 3.1]. The percentage of infants is conservatively included in that of children. These values are in accordance with Regulatory Guide 1.109 [Reference 3.4]. The population shoreline usage time calculated for this location is 22,358,746 person-hr/yr.

A shore-width factor of 0.3 for a lake is applied.

5.2.6.4 Population Boating and Swimming Usage Location Data

The same parameters used for shoreline use are conservatively applied to the boating and swimming pathways. See Section 5.2.6.3.

5.2.6.5 Irrigated Food Pathway Data

Surface water is not commonly used for irrigation in the vicinity of CPNPP Units 3 and 4. Some water is diverted from the Brazos River system downstream of the plant for the purpose of irrigation [Reference 3.29]; however, a review of water rights granted by the TCEQ and BRA showed that it is not used for

cultivation of farm products for human consumption. Identified uses are irrigation of grass, hay and oats [Reference 3.29]. Although acreage irrigated with surface water is normally used for the production of feed for livestock, the irrigated food pathways for vegetables and leafy vegetables will be considered in this evaluation for conservatism. Locations of TCEQ and BRA water rights associated with irrigation and irrigated acreage are identified in Table 5.2.6.5-1 below.

Table 5.2.6.5-1
TCEQ and BRA Irrigation Water Rights

Water Right / Contract No.	Owner	Use	Acres	Ac-Ft/Yr	Distance From SCR Dam (Ft)
4098	Bob Harris Oil Co	Irrigation	130	258	37907
4099	Dorothy W Little Et Al	Irrigation	27	5	69958
4103	Cyril Wagner Jr Et Al	Irrigation	186	186	135764
4104	Chisholm Trail Ventures Lp	Irrigation	968	3,811	183745
2309	Clubcorp Golf	Irrigation	150	400	359057
4315	Clifford N Auten	Irrigation	14	30	379320
4316	B W Bowers & Wife	Irrigation	20	75	383024
4317	Mary Ann Jenkins Et Al	Irrigation	963	243	389302
4318	Smith Bend Ranch Ltd	Irr., Ind., Mun.	629	2153	390124
4319	Birch Wilfong	Irrigation	27	34	394184
4320	Warren D Whitlow Et Ux	Irrigation	84	84	415075
4321	David Ballew	Irrigation	123	337	428128
4322	Ronald Lee Burnette	Irrigation	255	175	432010
4323	Ronald Lee Burnette / Kenneth Gage Burnette	Irrigation	35	173	434524
4324	Charles L Harless Et Ux	Irrigation	60	305	437513
213208	Double Diamond, Inc. (White Bluff)	Irrigation	not given	1000	257750
213259	Lakeside Domestic Use	Irrigation	not given	15	359057
213285	Lake Whitney Golf Club	Irrigation	not given	50	351325
213345	James K. Boyd	Agriculture	not given	10	368220
213352	Double Diamond, Inc. (The Retreat)	Irrigation	not given	1200	159886
213389	Charles Matthews	Agriculture	not given	50	417935
Total			2574	10,594	

Figures 5.2.6.2-1, 5.2.6.2-2 and 5.2.6.2-3 show the locations of TCEQ and BRA irrigation water rights identified in Table 5.2.6.5-1. The numbers for water right contracts for irrigation use are shown in green and yellow. The total irrigation rate from the Brazos River system within fifty (50) miles of CPNPP is 10,594 ac-ft/yr (1.09E+09 L/mo). The irrigated acreage from the Brazos River system within fifty (50) miles of CPNPP that is used in determination of the irrigation rate is 3,600 acres (1.46E+07 m^2). This value is based on TCEQ data conservatively increased by approximately 40% to include BRA water

contracts that do not identify acreage [Reference 3.29]. The irrigation rate and acreage are used to determine the irrigation rate in the units required for LADTAP II input, 74.6 $L/m^2/mo$.

Vegetable, milk and meat production data was determined from United States Department of Agriculture (USDA) county farm statistics [Reference 3.17]. Data from the counties bordering the Brazos River System below CPNPP was reviewed to determine the total farm acreage and the total irrigated farm acreage. The fraction of cropland irrigated and the fraction of the county south of CPNPP and along Brazos River within the fifty (50) mile radius of CPNPP [Reference 3.12, Figure 2.5-3] were used to determine the fraction of the vegetable, meat, and milk production from each county that is produced from irrigation with water from the Brazos River. See Table 5.2.6.5-2 below.

Table 5.2.6.5-2
TCEQ and BRA Irrigation Water Rights

Counties Bordering Brazos River	Total Acres of Cropland	Irrigated Acres of Cropland	Fraction of Cropland Irrigated	Fraction of Co. in 50 mi Radius South of Site	Fraction of Production Irrigated
Bosque Co.	46,538	1,592	0.03	1.00	0.0342
Hill Co.	211,217	3,864	0.02	0.60	0.0110
Johnson Co.	80,868	1,004	0.01	0.25	0.0031
McLennan Co.	178,252	1,596	0.01	0.05	0.0004
Somervell Co.	6,736	129	0.02	1.00	0.0192

The fraction of the production irrigated in each county was then applied to the total production of vegetables, meat and milk in each county to determine the overall production values to use in the liquid effluent dose evaluation.

Table 5.2.6.5-3 below shows the methodology used to determine vegetable production from total acreage irrigated and harvested in the vicinity of the Brazos River. The acreage harvested for each crop is multiplied by the United States average yield of each crop, which is obtained from USDA county agriculture statistics [Reference 3.17]. The average yield for the leafy vegetables is determined based on the production values for the ten major vegetables produced in Texas for 2007 according to USDA records [Reference 3.30]. Some of the average crop yields are based on bushels. For these crops, the average weight per bushel based on Reference 3.30 is used to calculate a total weight for each crop. The total irrigated production of leafy vegetables and other vegetables is given in Table 5.2.6.5-3.

Table 5.2.6.5-3
Irrigated Vegetable Production

Group	Description	Total Acreage	Ave. Yield / Acre		Wt. / Bushel (lbs)	Total Wt. (lbs)	Total Wt. (kgs)
Grains	Corn for Grain or Seed	545	158.9	bushels	70	6,066,614	2,751,299
	Sorghum for Grain or Seed	567	66.4	bushels	56	2,110,081	956,953
	Wheat	704	71.4	bushels	60	3,017,371	1,368,422
	Oats	91	80	bushels	32	232,347	105,373
Green Leafy	Vegetables	4	6.0	tons		54,038	24,507
Other	Orchards	89	2000	lbs		178,212	80,822
Legumes/Seeds	Soybeans	6	42.9	bushels	60	14,654	6,646
Total Leafy Veg.						54,038	24,507
Total All Others						11,619,279	5,269,514

Table 5.2.6.5-4 shows the methodology used to determine meat and milk production from total numbers raised on irrigated feed in the vicinity of the Brazos River. By dividing the number of cattle slaughtered in Texas in 2002, 6,471,600 [Reference 3.30], by the total inventory of cattle and calves in Texas in 2002, 13,978,987 [Reference 3.30], a slaughter rate in Texas of 46.3% is calculated. This same methodology is also used to calculate the slaughter rate of hogs/pigs in Texas. By dividing the number of hogs/pigs slaughtered in Texas in 2002, 429,500 [Reference 3.30], by the total inventory of hogs/pigs in Texas in 2002, 930,000 [Reference 3.30], a slaughter rate in Texas of 46.2% is calculated. For conservatism, a slaughter rate of 50% is used for both beef cows and hogs/pigs.

The total number of slaughtered beef cows is multiplied by the 2006 average dressed weight of 780 lbs/head and the total number of slaughtered hogs/pigs is multiplied by the 2006 average dressed weight of 204 lbs/head. The average dressed weights are based on USDA livestock slaughter data [Reference 3.30]. The average dressed weights from 2006 were used instead of the average dressed weights from 2002 because the 2006 average dressed weights are higher and therefore conservative. The total beef and pork production from Brazos River irrigation is given in Table 5.2.6.5-4.

The number of milk cows raised along the Brazos River system within 50 miles of the Comanche Peak site is multiplied by the 2006 average milk produced per cow in the state of Texas, which is 21,328 lbs/cow [Reference 3.30]. Similarly, the total number of milk goats raised along the Brazos River system within 50 miles of the Comanche Peak site is multiplied by the average milk produced per goat. The highest annual milk production per goat for any breed identified in Reference 3.30 is 2,077 lbs/goat. For conservatism, an average milk production per goat of 2,200 lbs/goat was used. To convert pounds of milk to liters of milk, a density of 1,030 kg/m^3 for whole milk is used [Reference 3.30]. Using the density of whole milk is conservative because it has a lower density than skim milk. A lower density results in a greater volume of milk. The total annual milk production from milk cows and milk goats raised along the Brazos River system within 50 miles of the site is given in Table 5.2.6.5-4.

Table 5.2.6.5-4
Irrigated Meat and Milk Production

Group	Total Numbers	Ave. Slaughter Rate	Dressed Weight (lbs)	Individual Milk Production (lbs/yr)	Total Production (lbs/yr)	Total Production. (kg/yr or L/yr)
Beef Cattle	1,584	50%	780	-	617,760	280,163
Hogs/Pigs	22	50%	204	-	2,244	1,018
Milk Cows	96	-	-	21,328	2,047,488	901,520
Milk Goats	43	-	-	2,077	94,600	41,653
Total Meat Production (kg/yr)						281,181
Total Milk Production (L/yr)						943,173

As shown in Table 5.2.6.5-1, there are numerous locations identified for irrigation water use contracts. For conservatism and calculational simplicity, the location of the Double Diamond, Inc. White Bluff diversion is used for the determination of transit time for all irrigation sources. Most other irrigation take-off locations are below the Double Diamond, Inc. diversion. The Double Diamond, Inc. White Bluff diversion is located approximately 257,750 ft below Squaw Creek dam, just above Whitney Reservoir. It is at the same location as the City of Cleburne municiple water diversion. The transit time for the City of Cleburne diversion location for Case 1 is sixty-six (66) hours as given in Section 5.2.5.1. The dilution factor for the City of Cleburne municiple water diversion location, 822.7, was also determined in Section 5.2.5.1. The dilution factor for Case 2, also found in Section 5.2.5.1, is 27.2.

5.2.7 Biota

A location in the restricted area around Squaw Creek Reservoir was selected for the evaluation of the impacts of radiological effluent on biota. The parameters that must be entered for the biota evaluation are the dilution factor and the transit time from the discharge point to the usage location. For a location on Squaw Creek Reservoir, a dilution factor of one (1) and a transit time of zero (0) are appropriate. A lake shore is the applicable shoreline geometry for Squaw Creek Reservoir; therefore, a shore-width factor of 0.3 is used.

5.2.8 Block Data

LADTAP II block data parameters include radionuclide constants and data for the various exposure pathways that are not likely to be site or case specific. These parameters include age-specific consumption rates, pathway usage parameters, and bioaccumulation factors for each aquatic and terrestrial food pathway. Default values are supplied for all of these parameters. Most default parameters are derived from Regulatory Guide 1.109 [Reference 3.4]; however, as noted in Section 3.3 of the LADTAP II Users Guide [Reference 3.1], the LADTAP II dose factor file includes modifications that reflect more current values for several dosimetry parameters.

With the exception of the midpoint of plant life, which is 30 years for a US-APWR, the LADTAP II block data was not changed in this calculation.

6.0 Methodology

The evaluation of the doses due to the release of liquid activity under normal conditions was performed by using the methodology given in NUREG/CR-4013 [Reference 3.1] as implemented in the LADTAP II computer code. LADTAP II provides an evaluation of radiological exposure due to the release of radioactive material from nuclear power plants during normal operation via liquid effluent pathways. The LADTAP II computer program was developed by the Nuclear Regulatory Commission to estimate radiation doses to individuals and population groups from radionuclide releases as liquid effluents from light-water nuclear reactors during routine operation. The code provides an estimated radiation dose to individuals and population groups from ingestion (aquatic foods) and external exposure pathways. The calculated doses provide information for determining compliance with Appendix I of 10 CFR 50 (the "ALARA" philosophy).

LADTAP II implements the radiological exposure models described in Regulatory Guide 1.109, Revision 1, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50 Appendix I", for radioactivity releases in liquid effluent. The exposure pathway models estimate the radiation dose to selected individuals and population groups. The exposure pathways considered in LADTAP II are:

1. external exposure to contaminated water by way of swimming, boating, or walking on the shoreline
2. ingestion of foods which are irrigated by contaminated water
3. ingestion of contaminated water
4. ingestion of aquatic animals exposed to contaminated water

7.0 Calculations

As discussed in the Methodology section, liquid effluent dose calculations are done using the LADTAP II computer code. Two cases are considered. The first case uses the minimum release rate from Squaw Creek Reservoir to Squaw Creek to determine the dose to the maximally exposed individual. Case 1 is also used for evaluation of an additional use location representing Luminant employees and guests using Squaw Creek Reservoir for recreational purposes. The second case uses the expected release rate from Squaw Creek Reservoir to Squaw Creek when Units 3 and 4 are operational. Case 2 produces the more conservative population doses. LADTAP II output files for Case 1 and Case 2 are attached in Appendices 1 and 2, respectively. Calculation results are summarized in Section 2.0.

Appendix 1

Case 1 - CPNPP Unit 3 or 4 Appendix I LADTAP II Output File

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*                                                                                           *
*                                                                                           *
*                                                                                           *
*              L       AAA   DDDD   TTTTT   AAA   PPPP     IIIII IIIII                      *
*              L      A   A  D   D    T    A   A  P   P      I     I                        *
*              L      A   A  D   D    T    A   A  P   P      I     I                        *
*              L      AAAAA  D   D    T    AAAAA  PPPP       I     I                        *
*              L      A   A  D   D    T    A   A  P          I     I                        *
*              LLLLL  A   A  DDDD     T    A   A  P        IIIII IIIII                      *
*                                                                                           *
*                                                                                           *
*                                                                                           *
*                                                                                           *
*                                                                                           *
*            EVALUATION OF RADIATION DOSES FROM RELEASES OF RADIACTIVITY                    *
*                                                                                           *
*                     IN NUCLEAR POWER PLANTS LIQUID EFFLUENTS                              *
*                                                                                           *
*                      REVISION DATE:  JSB PC - February 1996                               *
*                                                                                           *
*                                                                                           *
*        CPNPP Unit 3 or 4 Case 1 Liquid Effluent Dose Appendix I Calc Rev 1                *
*                                                                                           *
*                                                                                           *
*                                                                                           *
*                                                                                           *
*                          RADIOLOGICAL ASSESSMENT BRANCH                                   *
*                                                                                           *
*                          DIVISION OF SYSTEMS INTEGRATION                                  *
*                                                                                           *
*                          U. S. NUCLEAR REGULATORY COMMISSION                              *
*                                                                                           *
*                          WASHINGTON, D. C.                                                *
*                                                                                           *
*                          DATE OF RUN:    17-Sep-2009                                      *
*                                                                                           *
*********************************************************************************************
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1
0    1* ARRAY     16 ENTRIES READ
0    0T
1
  CPNPP Unit 3 or 4 Case 1 Liquid Effluent Dose Appendix I Calc Rev 1
0  DISCHARGE=5.51E+02 CFS          SOURCE TERM MULTIPLIER=1.00E+00
0  50-MILE POPULATION=3.49E+06     FRACTION ---  ADULT= .71
                                                 TEENAGER= .11
                                                 CHILD= .18
0  FRESHWATER SITE
1
  US APWR Liquid Releases DCD Table 11-2-10 w/o Det Waste
  COMPLETELY MIXED MODEL-- POND BLOWDOWN (CFS) - 1.50E+00     POND VOLUME (CF) - 6.30E+09
0                          *  *  *  ADULT DOSE FACTORS  *  *  *
0
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			INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)		
NUCLIDE		CURIE/YEAR	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON
1H	3	1.60E+03	0.00E+00	5.99E-08	5.99E-08	5.99E-08	5.99E-08	5.99E-08	5.99E-08	0.00E+00	0.00E+00	3.69E+01
11NA	24	4.70E-03	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	2.90E-08	2.50E-08	6.84E-03
24CR	51	1.30E-03	0.00E+00	0.00E+00	2.66E-09	1.59E-09	5.86E-10	3.53E-09	6.69E-07	2.60E-10	2.20E-10	3.02E-01
25MN	54	7.00E-04	0.00E+00	4.57E-06	8.72E-07	0.00E+00	1.36E-06	0.00E+00	1.40E-05	6.80E-09	5.80E-09	3.37E+00
26FE	55	5.00E-04	2.75E-06	1.90E-06	4.43E-07	0.00E+00	0.00E+00	1.06E-06	1.09E-06	0.00E+00	0.00E+00	1.04E+01
26FE	59	1.00E-04	4.34E-06	1.02E-05	3.91E-06	0.00E+00	0.00E+00	2.85E-06	3.40E-05	9.40E-09	8.00E-09	4.86E-01
27CO	58	1.90E-03	0.00E+00	7.45E-07	1.67E-06	0.00E+00	0.00E+00	0.00E+00	1.51E-05	8.20E-09	7.00E-09	7.73E-01
30ZN	65	2.20E-04	4.84E-06	1.54E-05	6.96E-06	0.00E+00	1.03E-05	0.00E+00	9.70E-06	4.60E-09	4.00E-09	2.64E+00
74W	187	3.50E-04	1.03E-07	8.61E-08	3.01E-08	0.00E+00	0.00E+00	0.00E+00	2.82E-05	3.60E-09	3.10E-09	1.09E-02
93NP	239	5.30E-04	1.19E-09	1.17E-10	6.45E-11	0.00E+00	3.65E-10	0.00E+00	2.40E-05	1.10E-09	9.50E-10	2.57E-02
37RB	88	2.80E-02	0.00E+00	6.05E-08	3.21E-08	0.00E+00	0.00E+00	0.00E+00	8.36E-19	4.00E-09	3.50E-09	1.35E-04
38SR	89	6.00E-05	3.08E-04	0.00E+00	8.84E-06	0.00E+00	0.00E+00	0.00E+00	4.94E-05	6.50E-13	5.60E-13	5.50E-01
38SR	90	8.00E-06	8.71E-03	0.00E+00	1.75E-04	0.00E+00	0.00E+00	0.00E+00	2.19E-04	0.00E+00	0.00E+00	5.33E+01
38SR	91	6.80E-05	5.67E-06	0.00E+00	2.29E-07	0.00E+00	0.00E+00	0.00E+00	2.70E-05	8.30E-09	7.10E-09	4.31E-03
39Y	91M	4.40E-05	9.09E-11	0.00E+00	3.52E-12	0.00E+00	0.00E+00	0.00E+00	2.67E-10	4.40E-09	3.80E-09	3.76E-04
39Y	91	1.00E-05	1.41E-07	0.00E+00	3.77E-09	0.00E+00	0.00E+00	0.00E+00	7.76E-05	2.70E-11	2.40E-11	6.38E-01
39Y	93	3.10E-04	2.68E-09	0.00E+00	7.40E-11	0.00E+00	0.00E+00	0.00E+00	8.50E-05	7.80E-10	5.70E-10	4.58E-03
40ZR	95	2.00E-04	3.04E-08	9.75E-09	6.60E-09	0.00E+00	1.53E-08	0.00E+00	3.09E-05	5.80E-09	5.00E-09	6.99E-01
41NB	95	1.00E-04	6.22E-09	3.46E-09	1.86E-09	0.00E+00	3.42E-09	0.00E+00	2.10E-05	6.00E-09	5.10E-09	3.83E-01
42MO	99	1.60E-03	0.00E+00	4.31E-06	8.20E-07	0.00E+00	9.76E-06	0.00E+00	9.99E-06	2.20E-09	1.90E-09	3.00E-02
43TC	99M	1.70E-03	2.47E-10	6.98E-10	8.89E-09	0.00E+00	1.06E-08	3.42E-10	4.13E-07	1.10E-09	9.60E-10	2.74E-03
44RU	103	3.10E-03	1.85E-07	0.00E+00	7.97E-08	0.00E+00	7.06E-07	0.00E+00	2.16E-05	4.20E-09	3.60E-09	4.29E-01
44RU	106	3.80E-02	2.75E-06	0.00E+00	3.48E-07	0.00E+00	5.31E-06	0.00E+00	1.78E-04	1.80E-09	1.50E-09	3.97E+00
47AG	110M	6.00E-04	1.60E-07	1.48E-07	8.79E-08	0.00E+00	2.91E-07	0.00E+00	6.04E-05	2.10E-08	1.80E-08	2.71E+00
52TE	129M	7.80E-05	1.15E-05	4.29E-06	1.82E-06	3.95E-06	4.80E-05	0.00E+00	5.79E-05	9.00E-10	7.70E-10	3.66E-01
52TE	129	3.10E-04	3.14E-08	1.18E-08	7.65E-09	2.41E-08	1.32E-07	0.00E+00	2.37E-08	8.40E-10	7.10E-10	5.27E-04
52TE	131M	2.50E-04	1.73E-06	8.46E-07	7.05E-07	1.34E-06	8.57E-06	0.00E+00	8.40E-05	9.90E-09	8.40E-09	1.36E-02
52TE	131	7.60E-05	1.97E-08	8.23E-09	6.22E-09	1.62E-08	8.63E-08	0.00E+00	2.79E-09	2.60E-06	2.20E-09	1.90E-04

53I	131	4.00E-04	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	0.00E+00	1.57E-06	3.40E-09	2.80E-09	8.77E-02
52TE	132	4.70E-04	2.52E-06	1.63E-06	1.53E-06	1.80E-06	1.57E-05	0.00E+00	7.71E-05	2.00E-09	1.70E-09	3.56E-02
53I	132	3.10E-04	2.03E-07	5.43E-07	1.90E-07	1.90E-05	8.65E-07	0.00E+00	1.02E-07	2.00E-08	1.70E-08	1.05E-03
53I	133	8.10E-04	1.42E-06	2.47E-06	7.53E-07	3.63E-04	4.31E-06	0.00E+00	2.22E-06	4.50E-09	3.70E-09	9.46E-03
53I	134	8.90E-05	1.06E-07	2.88E-07	1.03E-07	4.99E-06	4.58E-07	0.00E+00	2.51E-10	1.90E-08	1.60E-08	3.98E-04
55CS	134	1.00E-03	6.22E-05	1.48E-04	1.21E-04	0.00E+00	4.79E-05	1.59E-05	2.59E-06	1.40E-08	1.20E-08	8.00E+00
53I	135	7.80E-04	4.43E-07	1.16E-06	4.28E-07	7.65E-05	1.86E-06	0.00E+00	1.31E-06	1.40E-08	1.20E-08	3.00E-03
55CS	136	2.20E-02	6.51E-06	2.57E-05	1.85E-05	0.00E+00	1.43E-05	1.96E-06	2.92E-06	1.70E-08	1.50E-08	1.43E-01
55CS	137	2.00E-03	7.97E-05	1.09E-04	7.14E-05	0.00E+00	3.70E-05	1.23E-05	2.11E-06	4.90E-09	4.20E-09	5.42E+01
56BA	140	4.90E-03	2.03E-05	2.55E-08	1.33E-06	0.00E+00	8.67E-09	1.46E-08	4.18E-05	2.40E-09	2.10E-09	1.40E-01
57LA	140	8.00E-03	2.50E-09	1.26E-09	3.33E-10	0.00E+00	0.00E+00	0.00E+00	9.25E-05	1.70E-08	1.50E-08	1.83E-02
58CE	141	6.00E-05	9.36E-09	6.33E-09	7.18E-10	0.00E+00	2.94E-09	0.00E+00	2.42E-05	6.20E-10	5.50E-10	3.54E-01
58CE	143	5.00E-04	1.65E-09	1.22E-06	1.35E-10	0.00E+00	5.37E-10	0.00E+00	4.56E-05	2.50E-09	2.20E-09	1.51E-02
59PR	143	7.90E-05	9.20E-09	3.69E-09	4.56E-10	0.00E+00	2.13E-09	0.00E+00	4.03E-05	0.00E+00	0.00E+00	1.48E-01
59PR	144	1.70E-03	3.01E-11	1.25E-11	1.53E-12	0.00E+00	7.05E-12	0.00E+00	4.33E-18	2.30E-10	2.00E-10	1.31E-04
58CE	144	1.70E-03	4.88E-07	2.04E-07	2.62E-08	0.00E+00	1.21E-07	0.00E+00	1.65E-04	3.70E-10	3.20E-10	3.08E+00

0 * * * TEENAGER DOSE FACTORS * * *

0

		INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)		
NUCLIDE	CURIE/YEAR	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON
1H	3	1.60E+03	0.00E+00	6.04E-08	6.04E-08	6.04E-08	6.04E-08	6.04E-08			
11NA	24	4.70E-03	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06			
24CR	51	1.30E-03	0.00E+00	0.00E+00	3.60E-09	2.00E-09	7.89E-10	5.14E-09	6.05E-07		
25MN	54	7.00E-04	0.00E+00	5.90E-06	1.17E-06	0.00E+00	1.76E-06	0.00E+00	1.21E-05		
26FE	55	5.00E-04	3.78E-06	2.68E-06	6.25E-07	0.00E+00	0.00E+00	1.70E-06	1.16E-06		
26FE	59	1.00E-04	5.87E-06	1.37E-05	5.29E-06	0.00E+00	0.00E+00	4.32E-06	3.24E-05		
27CO	58	1.90E-03	0.00E+00	9.72E-07	2.24E-06	0.00E+00	0.00E+00	0.00E+00	1.34E-05		
30ZN	65	2.20E-04	5.76E-06	2.00E-05	9.33E-06	0.00E+00	1.28E-05	0.00E+00	8.47E-06		
74W	187	3.50E-04	1.46E-07	1.19E-07	4.17E-08	0.00E+00	0.00E+00	0.00E+00	3.22E-05		
93NP	239	5.30E-04	1.76E-09	1.66E-10	9.22E-11	0.00E+00	5.21E-10	0.00E+00	2.67E-05		
37RB	88	2.80E-02	0.00E+00	8.52E-08	4.54E-08	0.00E+00	0.00E+00	0.00E+00	7.30E-15		
38SR	89	6.00E-05	4.40E-04	0.00E+00	1.26E-05	0.00E+00	0.00E+00	0.00E+00	5.24E-05		
38SR	90	8.00E-06	1.02E-02	0.00E+00	2.04E-04	0.00E+00	0.00E+00	0.00E+00	2.33E-04		
38SR	91	6.80E-05	8.07E-06	0.00E+00	3.21E-07	0.00E+00	0.00E+00	0.00E+00	3.66E-05		
39Y	91M	4.40E-05	1.29E-10	0.00E+00	4.93E-12	0.00E+00	0.00E+00	0.00E+00	6.09E-09		
39Y	91	1.00E-05	2.01E-07	0.00E+00	5.39E-09	0.00E+00	0.00E+00	0.00E+00	8.24E-05		
39Y	93	3.10E-04	3.83E-09	0.00E+00	1.05E-10	0.00E+00	0.00E+00	0.00E+00	1.17E-04		
40ZR	95	2.00E-04	4.12E-08	1.30E-08	8.94E-09	0.00E+00	1.91E-08	0.00E+00	3.00E-05		
41NB	95	1.00E-04	8.22E-09	4.56E-09	2.51E-09	0.00E+00	4.42E-09	0.00E+00	1.95E-05		
42MO	99	1.60E-03	0.00E+00	6.03E-06	1.15E-06	0.00E+00	1.38E-05	0.00E+00	1.08E-05		
43TC	99M	1.70E-03	3.32E-10	9.26E-10	1.20E-08	0.00E+00	1.38E-08	5.14E-10	6.08E-07		
44RU	103	3.10E-03	2.55E-07	0.00E+00	1.09E-07	0.00E+00	8.99E-07	0.00E+00	2.13E-05		
44RU	106	3.80E-02	3.92E-06	0.00E+00	4.94E-07	0.00E+00	7.56E-06	0.00E+00	1.88E-04		
47AG	110M	6.00E-04	2.05E-07	1.94E-07	1.18E-07	0.00E+00	3.70E-07	0.00E+00	5.45E-05		
52TE	129M	7.80E-05	1.63E-05	6.05E-06	2.58E-06	5.26E-06	6.82E-05	0.00E+00	6.12E-05		

52TE	129	3.10E-04	4.48E-08	1.67E-08	1.09E-08	3.20E-08	1.88E-07	0.00E+00	2.45E-07
52TE	131M	2.50E-04	2.44E-06	1.17E-06	9.76E-07	1.76E-06	1.22E-05	0.00E+00	9.39E-05
52TE	131	7.60E-05	2.79E-08	1.15E-08	8.72E-09	2.15E-08	1.22E-07	0.00E+00	2.29E-09
53I	131	4.00E-04	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	0.00E+00	1.62E-06
52TE	132	4.70E-04	3.49E-06	2.21E-06	2.08E-06	2.33E-06	2.12E-05	0.00E+00	7.00E-05
53I	132	3.10E-04	2.79E-07	7.30E-07	2.62E-07	2.46E-05	1.15E-06	0.00E+00	3.18E-07
53I	133	8.10E-04	2.01E-06	3.41E-06	1.04E-06	4.76E-04	5.98E-06	0.00E+00	2.58E-06
53I	134	8.90E-05	1.46E-07	3.87E-07	1.39E-07	6.45E-06	6.10E-07	0.00E+00	5.10E-09
55CS	134	1.00E-03	8.37E-05	1.97E-04	9.14E-05	0.00E+00	6.26E-05	2.39E-05	2.45E-06
53I	135	7.80E-04	6.10E-07	1.57E-06	5.82E-07	1.01E-04	2.48E-06	0.00E+00	1.74E-06
55CS	136	2.20E-02	8.59E-06	3.38E-05	2.27E-05	0.00E+00	1.84E-05	2.90E-06	2.72E-06
55CS	137	2.00E-03	1.12E-04	1.49E-04	5.19E-05	0.00E+00	5.07E-05	1.97E-05	2.12E-06
56BA	140	4.90E-03	2.84E-05	3.48E-08	1.83E-06	0.00E+00	1.18E-08	2.34E-08	4.38E-05
57LA	140	8.00E-03	3.48E-09	1.71E-09	4.55E-10	0.00E+00	0.00E+00	0.00E+00	9.82E-05
58CE	141	6.00E-05	1.33E-08	8.88E-09	1.02E-09	0.00E+00	4.18E-09	0.00E+00	2.54E-05
58CE	143	5.00E-04	2.35E-09	1.71E-06	1.91E-10	0.00E+00	7.67E-10	0.00E+00	5.14E-05
59PR	143	7.90E-05	1.31E-08	5.23E-09	6.52E-10	0.00E+00	3.04E-09	0.00E+00	4.31E-05
59PR	144	1.70E-03	4.30E-11	1.76E-11	2.18E-12	0.00E+00	1.01E-11	0.00E+00	4.74E-14
58CE	144	1.70E-03	6.96E-07	2.88E-07	3.74E-08	0.00E+00	1.72E-07	0.00E+00	1.75E-04

0 * * * CHILD DOSE FACTORS * * *

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			INGESTION DOSE FACTORS (MREM/PCI INTAKE)						SHORELINE (MREM/HR)/(PCI/M**2)		
NUCLIDE		CURIE/YEAR	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON
1H	3	1.60E+03	0.00E+00	1.16E-07	1.16E-07	1.16E-07	1.16E-07	1.16E-07	1.16E-07			
11NA	24	4.70E-03	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06			
24CR	51	1.30E-03	0.00E+00	0.00E+00	8.90E-09	4.94E-09	1.35E-09	9.02E-09	4.72E-07			
25MN	54	7.00E-04	0.00E+00	1.07E-05	2.85E-06	0.00E+00	3.00E-06	0.00E+00	8.98E-06			
26FE	55	5.00E-04	1.15E-05	6.10E-06	1.89E-06	0.00E+00	0.00E+00	3.45E-06	1.13E-06			
26FE	59	1.00E-04	1.65E-05	2.67E-05	1.33E-05	0.00E+00	0.00E+00	7.74E-06	2.78E-05			
27CO	58	1.90E-03	0.00E+00	1.80E-06	5.51E-06	0.00E+00	0.00E+00	0.00E+00	1.05E-05			
30ZN	65	2.20E-04	1.37E-05	3.65E-05	2.27E-05	0.00E+00	2.30E-05	0.00E+00	6.41E-06			
74W	187	3.50E-04	4.29E-07	2.54E-07	1.14E-07	0.00E+00	0.00E+00	0.00E+00	3.57E-05			
93NP	239	5.30E-04	5.25E-09	3.77E-10	2.65E-10	0.00E+00	1.09E-09	0.00E+00	2.79E-05			
37RB	88	2.80E-02	0.00E+00	1.90E-07	1.32E-07	0.00E+00	0.00E+00	0.00E+00	9.32E-09			
38SR	89	6.00E-05	1.32E-03	0.00E+00	3.77E-05	0.00E+00	0.00E+00	0.00E+00	5.11E-05			
38SR	90	8.00E-06	2.56E-02	0.00E+00	5.15E-04	0.00E+00	0.00E+00	0.00E+00	2.29E-04			
38SR	91	6.80E-05	2.40E-05	0.00E+00	9.06E-07	0.00E+00	0.00E+00	0.00E+00	5.30E-05			
39Y	91M	4.40E-05	3.82E-10	0.00E+00	1.39E-11	0.00E+00	0.00E+00	0.00E+00	7.48E-07			
39Y	91	1.00E-05	6.02E-07	0.00E+00	1.61E-08	0.00E+00	0.00E+00	0.00E+00	8.02E-05			
39Y	93	3.10E-04	1.14E-08	0.00E+00	3.13E-10	0.00E+00	0.00E+00	0.00E+00	1.70E-04			
40ZR	95	2.00E-04	1.16E-07	2.55E-08	2.27E-08	0.00E+00	3.65E-08	0.00E+00	2.66E-05			
41NB	95	1.00E-04	2.25E-08	8.76E-09	6.26E-09	0.00E+00	8.23E-09	0.00E+00	1.62E-05			
42MO	99	1.60E-03	0.00E+00	1.33E-05	3.29E-06	0.00E+00	2.84E-05	0.00E+00	1.10E-05			
43TC	99M	1.70E-03	9.23E-10	1.81E-09	3.00E-08	0.00E+00	2.63E-08	9.19E-10	1.03E-06			
44RU	103	3.10E-03	7.31E-07	0.00E+00	2.81E-07	0.00E+00	1.84E-06	0.00E+00	1.89E-05			

	44RU	106	3.80E-02	1.17E-05	0.00E+00	1.46E-06	0.00E+00	1.58E-05	0.00E+00	1.82E-04
	47AG	110M	6.00E-04	5.39E-07	3.64E-07	2.91E-07	0.00E+00	6.78E-07	0.00E+00	4.33E-05
	52TE	129M	7.80E-05	4.87E-05	1.36E-05	7.56E-06	1.57E-05	1.43E-04	0.00E+00	5.94E-05
	52TE	129	3.10E-04	1.34E-07	3.74E-08	3.18E-08	9.56E-08	3.92E-07	0.00E+00	8.34E-06
	52TE	131M	2.50E-04	7.20E-06	2.49E-06	2.65E-06	5.12E-06	2.41E-05	0.00E+00	1.01E-04
	52TE	131	7.60E-05	8.30E-08	2.53E-08	2.47E-08	6.35E-08	2.51E-07	0.00E+00	4.36E-07
	53I	131	4.00E-04	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	0.00E+00	1.54E-06
	52TE	132	4.70E-04	1.01E-05	4.47E-06	5.40E-06	6.51E-06	4.15E-05	0.00E+00	4.50E-05
	53I	132	3.10E-04	8.00E-07	1.47E-06	6.76E-07	6.82E-05	2.25E-06	0.00E+00	1.73E-06
	53I	133	8.10E-04	5.92E-06	7.32E-06	2.77E-06	1.36E-03	1.22E-05	0.00E+00	2.95E-06
	53I	134	8.90E-05	4.19E-07	7.78E-07	3.58E-07	1.79E-05	1.19E-06	0.00E+00	5.16E-07
	55CS	134	1.00E-03	2.34E-04	3.84E-04	8.10E-05	0.00E+00	1.19E-04	4.27E-05	2.07E-06
	53I	135	7.80E-04	1.75E-06	3.15E-06	1.49E-06	2.79E-04	4.83E-06	0.00E+00	2.40E-06
	55CS	136	2.20E-02	2.35E-05	6.46E-05	4.18E-05	0.00E+00	3.44E-05	5.13E-06	2.27E-06
	55CS	137	2.00E-03	3.27E-04	3.13E-04	4.62E-05	0.00E+00	1.02E-04	3.67E-05	1.96E-06
	56BA	140	4.90E-03	8.31E-05	7.28E-08	4.85E-06	0.00E+00	2.37E-08	4.34E-08	4.21E-05
	57LA	140	8.00E-03	1.01E-08	3.53E-09	1.19E-09	0.00E+00	0.00E+00	0.00E+00	9.84E-05
	58CE	141	6.00E-05	3.97E-08	1.98E-08	2.94E-09	0.00E+00	8.68E-09	0.00E+00	2.47E-05
	58CE	143	5.00E-04	6.99E-09	3.79E-06	5.49E-10	0.00E+00	1.59E-09	0.00E+00	5.55E-05
	59PR	143	7.90E-05	3.93E-08	1.18E-08	1.95E-09	0.00E+00	6.39E-09	0.00E+00	4.24E-05
	59PR	144	1.70E-03	1.29E-10	3.99E-11	6.49E-12	0.00E+00	2.11E-11	0.00E+00	8.59E-08
	58CE	144	1.70E-03	2.08E-06	6.52E-07	1.11E-07	0.00E+00	3.61E-07	0.00E+00	1.70E-04

0 * * * INFANT DOSE FACTORS * * *

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			INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)		
NUCLIDE		CURIE/YEAR	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON
1H	3	1.60E+03	0.00E+00	1.76E-07	1.76E-07	1.76E-07	1.76E-07	1.76E-07	1.76E-07			
11NA	24	4.70E-03	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05			
24CR	51	1.30E-03	0.00E+00	0.00E+00	1.41E-08	9.20E-09	2.01E-09	1.79E-08	4.11E-07			
25MN	54	7.00E-04	0.00E+00	1.99E-05	4.51E-06	0.00E+00	4.41E-06	0.00E+00	7.31E-06			
26FE	55	5.00E-04	1.39E-05	8.98E-06	2.40E-06	0.00E+00	0.00E+00	4.39E-06	1.14E-06			
26FE	59	1.00E-04	3.08E-05	5.38E-05	2.12E-05	0.00E+00	0.00E+00	1.59E-05	2.57E-05			
27CO	58	1.90E-03	0.00E+00	3.60E-06	8.98E-06	0.00E+00	0.00E+00	0.00E+00	8.97E-06			
30ZN	65	2.20E-04	1.84E-05	6.31E-05	2.91E-05	0.00E+00	3.06E-05	0.00E+00	5.33E-05			
74W	187	3.50E-04	9.03E-07	6.28E-07	2.17E-07	0.00E+00	0.00E+00	0.00E+00	3.69E-05			
93NP	239	5.30E-04	1.11E-08	9.93E-10	5.61E-10	0.00E+00	1.98E-09	0.00E+00	2.87E-05			
37RB	88	2.80E-02	0.00E+00	4.98E-07	2.73E-07	0.00E+00	0.00E+00	0.00E+00	4.85E-07			
38SR	89	6.00E-05	2.51E-03	0.00E+00	7.20E-05	0.00E+00	0.00E+00	0.00E+00	5.16E-05			
38SR	90	8.00E-06	2.83E-02	0.00E+00	5.74E-04	0.00E+00	0.00E+00	0.00E+00	2.31E-04			
38SR	91	6.80E-05	5.00E-05	0.00E+00	1.81E-06	0.00E+00	0.00E+00	0.00E+00	5.92E-05			
39Y	91M	4.40E-05	8.10E-10	0.00E+00	2.76E-11	0.00E+00	0.00E+00	0.00E+00	2.70E-06			
39Y	91	1.00E-05	1.13E-06	0.00E+00	3.01E-08	0.00E+00	0.00E+00	0.00E+00	8.10E-05			
39Y	93	3.10E-04	2.43E-08	0.00E+00	6.62E-10	0.00E+00	0.00E+00	0.00E+00	1.92E-04			
40ZR	95	2.00E-04	2.06E-07	5.02E-08	3.56E-08	0.00E+00	5.41E-08	0.00E+00	2.50E-05			
41NB	95	1.00E-04	4.20E-08	1.73E-08	1.00E-08	0.00E+00	1.24E-08	0.00E+00	1.46E-05			

42MO 99	1.60E-03	0.00E+00	3.40E-05	6.63E-06	0.00E+00	5.08E-05	0.00E+00	1.12E-05
43TC 99M	1.70E-03	1.92E-09	3.96E-09	5.10E-08	0.00E+00	4.26E-08	2.07E-09	1.15E-06
44RU 103	3.10E-03	1.48E-06	0.00E+00	4.95E-07	0.00E+00	3.08E-06	0.00E+00	1.80E-05
44RU 106	3.80E-02	2.41E-05	0.00E+00	3.01E-06	0.00E+00	2.85E-05	0.00E+00	1.83E-04
47AG 110M	6.00E-04	9.96E-07	7.27E-07	4.81E-07	0.00E+00	1.04E-06	0.00E+00	3.77E-05
52TE 129M	7.80E-05	1.00E-04	3.43E-05	1.54E-05	3.84E-05	2.50E-04	0.00E+00	5.97E-05
52TE 129	3.10E-04	2.84E-07	9.79E-08	6.63E-08	2.38E-07	7.07E-07	0.00E+00	2.27E-05
52TE 131M	2.50E-04	1.52E-05	6.12E-06	5.05E-06	1.24E-05	4.21E-05	0.00E+00	1.03E-04
52TE 131	7.60E-05	1.76E-07	6.50E-08	4.94E-08	1.57E-07	4.50E-07	0.00E+00	7.11E-06
53I 131	4.00E-04	3.59E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	0.00E+00	1.51E-06
52TE 132	4.70E-04	2.08E-05	1.03E-05	9.61E-06	1.52E-05	6.44E-05	0.00E+00	3.81E-05
53I 132	3.10E-04	1.66E-06	3.37E-06	1.20E-06	1.58E-04	3.76E-06	0.00E+00	2.73E-06
53I 133	8.10E-04	1.25E-05	1.82E-05	5.33E-06	3.31E-03	2.14E-05	0.00E+00	3.08E-06
53I 134	8.90E-05	8.69E-07	1.78E-06	6.33E-07	4.15E-05	1.99E-06	0.00E+00	1.84E-06
55CS 134	1.00E-03	3.77E-04	7.03E-04	7.10E-05	0.00E+00	1.81E-04	7.42E-05	1.91E-06
53I 135	7.80E-04	3.64E-06	7.24E-06	2.64E-06	6.49E-04	8.07E-06	0.00E+00	2.62E-06
55CS 136	2.20E-02	4.59E-05	1.35E-04	5.04E-05	0.00E+00	5.38E-05	1.10E-05	2.05E-06
55CS 137	2.00E-03	5.22E-04	6.11E-04	4.33E-05	0.00E+00	1.64E-04	6.64E-05	1.91E-06
56BA 140	4.90E-03	1.71E-04	1.71E-07	8.81E-06	0.00E+00	4.06E-08	1.05E-07	4.20E-05
57LA 140	8.00E-03	2.11E-08	8.32E-09	2.14E-09	0.00E+00	0.00E+00	0.00E+00	9.77E-05
58CE 141	6.00E-05	7.87E-08	4.80E-08	5.65E-09	0.00E+00	1.48E-08	0.00E+00	2.48E-05
58CE 143	5.00E-04	1.48E-08	9.82E-06	1.12E-09	0.00E+00	2.86E-09	0.00E+00	5.73E-05
59PR 143	7.90E-05	8.13E-08	3.04E-08	4.03E-09	0.00E+00	1.13E-08	0.00E+00	4.29E-05
59PR 144	1.70E-03	2.74E-10	1.06E-10	1.38E-11	0.00E+00	3.84E-11	0.00E+00	4.93E-06
58CE 144	1.70E-03	2.98E-06	1.22E-06	1.67E-07	0.00E+00	4.93E-07	0.00E+00	1.71E-04

0TOTAL NUMBER IN SOURCE TERM IS 44 TOTAL RELEASE IS 1.6001E+03

1 * * * AS LOW AS REASONABLY ACHIEVABLE * * *

0 A D U L T D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		7.86E-01	1.25E+00	8.83E-01	1.36E-01	5.15E-01	2.61E-01	1.72E-01
DRINKING		2.40E-05	6.39E-03	6.39E-03	6.37E-03	6.38E-03	6.37E-03	6.42E-03
SHORELINE	1.52E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03
TOTAL	1.52E-03	7.87E-01	1.26E+00	8.91E-01	1.43E-01	5.22E-01	2.68E-01	1.79E-01

0	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR= .2
FISH	21.0	1.0	31.30	
DRINKING	730.0	822.7	78.00	
SHORELINE	12.0	1.0	7.30	

0 T E E N A G E R D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		8.38E-01	1.26E+00	5.22E-01	1.04E-01	4.98E-01	2.56E-01	1.32E-01
DRINKING		2.24E-05	4.51E-03	4.50E-03	4.49E-03	4.50E-03	4.49E-03	4.52E-03
SHORELINE	8.47E-03	7.25E-03	7.25E-03	7.25E-03	7.25E-03	7.25E-03	7.25E-03	7.25E-03
TOTAL	8.47E-03	8.46E-01	1.27E+00	5.34E-01	1.16E-01	5.10E-01	2.68E-01	1.44E-01

0 USAGE (KG/YR,HR/YR) DILUTION TIME(HR) SHOREWIDTH FACTOR= .2

FISH	16.0	1.0	31.30
DRINKING	510.0	822.7	78.00
SHORELINE	67.0	1.0	7.30

0 C H I L D D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.05E+00	1.13E+00	2.49E-01	8.64E-02	4.26E-01	2.08E-01	9.74E-02
DRINKING		6.32E-05	8.67E-03	8.63E-03	8.62E-03	8.64E-03	8.62E-03	8.65E-03
SHORELINE	1.77E-03	1.51E-03	1.51E-03	1.51E-03	1.51E-03	1.51E-03	1.51E-03	1.51E-03
TOTAL	1.77E-03	1.05E+00	1.14E+00	2.59E-01	9.65E-02	4.36E-01	2.18E-01	1.08E-01

0 USAGE (KG/YR,HR/YR) DILUTION TIME(HR) SHOREWIDTH FACTOR= .2

FISH	6.9	1.0	31.30
DRINKING	510.0	822.7	78.00
SHORELINE	14.0	1.0	7.30

0 I N F A N T D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
DRINKING		6.16E-05	8.52E-03	8.47E-03	8.46E-03	8.48E-03	8.47E-03	8.48E-03
SHORELINE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL	0.00E+00	6.16E-05	8.52E-03	8.47E-03	8.46E-03	8.48E-03	8.47E-03	8.48E-03

0 USAGE (KG/YR,HR/YR) DILUTION TIME(HR) SHOREWIDTH FACTOR= .2

FISH	.0	1.0	31.30
DRINKING	330.0	822.7	78.00

1 * * * SELECTED LOCATION * * *

0LOCATION IS SCR Employee Use

0 A D U L T D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		7.86E-01	1.25E+00	8.83E-01	1.36E-01	5.15E-01	2.61E-01	1.72E-01
DRINKING		1.98E-02	5.26E+00	5.26E+00	5.24E+00	5.25E+00	5.24E+00	5.28E+00
SHORELINE	2.27E-03	1.95E-03	1.95E-03	1.95E-03	1.95E-03	1.95E-03	1.95E-03	1.95E-03
TOTAL	2.27E-03	8.08E-01	6.52E+00	6.14E+00	5.38E+00	5.77E+00	5.51E+00	5.46E+00

0 USAGE (KG/YR,HR/YR) DILUTION TIME(HR) SHOREWIDTH FACTOR= .3

FISH	21.0	1.0	24.00
DRINKING	730.0	1.0	12.00
SHORELINE	12.0	1.0	.00

0LOCATION IS SCR Employee Use

0 T E E N A G E R D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		8.38E-01	1.26E+00	5.22E-01	1.04E-01	4.98E-01	2.56E-01	1.32E-01
DRINKING		1.85E-02	3.71E+00	3.70E+00	3.69E+00	3.70E+00	3.70E+00	3.72E+00
SHORELINE	1.27E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02

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 TOTAL              1.27E-02       8.68E-01       4.99E+00       4.23E+00       3.81E+00       4.21E+00       3.96E+00       3.87E+00
0            USAGE (KG/YR,HR/YR)           DILUTION       TIME(HR)           SHOREWIDTH FACTOR= .3
 FISH                  16.0                  1.0          24.00
 DRINKING             510.0                  1.0          12.00
 SHORELINE             67.0                  1.0            .00
0LOCATION IS  SCR Employee Use
0                    C H I L D   D O S E S
0                                                                  DOSE__(MREM PER YEAR INTAKE)_____
0PATHWAY              SKIN           BONE           LIVER        TOTAL BODY       THYROID         KIDNEY          LUNG           GI-LLI
 FISH                              1.05E+00       1.13E+00       2.49E-01       8.64E-02       4.26E-01       2.08E-01       9.74E-02
 DRINKING                          5.20E-02       7.13E+00       7.10E+00       7.09E+00       7.11E+00       7.10E+00       7.12E+00
 SHORELINE          2.65E-03       2.27E-03       2.27E-03       2.27E-03       2.27E-03       2.27E-03       2.27E-03       2.27E-03
 TOTAL              2.65E-03       1.11E+00       8.26E+00       7.35E+00       7.18E+00       7.54E+00       7.31E+00       7.22E+00
0            USAGE (KG/YR,HR/YR)           DILUTION       TIME(HR)           SHOREWIDTH FACTOR= .3
 FISH                   6.9                  1.0          24.00
 DRINKING             510.0                  1.0          12.00
 SHORELINE             14.0                  1.0            .00
0LOCATION IS  SCR Employee Use
0                    I N F A N T   D O S E S
0                                                                  DOSE__(MREM PER YEAR INTAKE)_____
0PATHWAY              SKIN           BONE           LIVER        TOTAL BODY       THYROID         KIDNEY          LUNG           GI-LLI
 FISH                              0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00
 DRINKING                          5.07E-02       7.01E+00       6.97E+00       6.96E+00       6.98E+00       6.97E+00       6.98E+00
 SHORELINE          0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00
 TOTAL              0.00E+00       5.07E-02       7.01E+00       6.97E+00       6.96E+00       6.98E+00       6.97E+00       6.98E+00
0            USAGE (KG/YR,HR/YR)           DILUTION       TIME(HR)           SHOREWIDTH FACTOR= .3
 FISH                   .0                  1.0          24.00
 DRINKING             330.0                  1.0          12.00
1                              *  *  *  FISH CONSUMPTION POPULATION DOSES  *  *  *
                                                 PERSON-REM
0__________SPORT HARVEST__________
0                                 ----------------------------DOSE (PERSON-REM)-------------------------
0PATHWAY     AGE GROUP       USAGE      BONE      LIVER    TOTAL BODY  THYROID    KIDNEY      LUNG      GI-LLI
 FISH        ADULT         2.71E+05  1.23E-02  1.96E-02  1.38E-02  2.13E-03  8.04E-03  4.08E-03  2.68E-03
 FISH        TEENAGER      3.16E+04  2.01E-03  3.03E-03  1.25E-03  2.50E-04  1.19E-03  6.14E-04  3.15E-04
 FISH        CHILD         2.19E+04  4.05E-03  4.34E-03  9.53E-04  3.33E-04  1.64E-03  8.00E-04  3.74E-04
 FISH        TOTAL         3.24E+05  1.84E-02  2.69E-02  1.60E-02  2.71E-03  1.09E-02  5.49E-03  3.36E-03
0    LOCATION          DILUTION    CATCH     TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 1.68E+02 HR      POPULATION=5.53E+04
  Sport Fish Above W    8.23E+02  3.24E+05  2.34E+02
0AVERAGE INDIVIDUAL CONSUMPTION (KG/YR)     ADULT=6.90E+00      TEEN=5.20E+00      CHILD=2.20E+00
1                              *  *  *  POPULATION WATER CONSUMPTION DOSES  *  *  *
0_____
0SUPPLIER-City of Whitney
0                                 ----------------------------DOSE (PERSON-REM)-------------------------
0PATHWAY     AGE GROUP       USAGE      BONE      LIVER    TOTAL BODY  THYROID    KIDNEY      LUNG      GI-LLI
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 DRINKING    ADULT         9.78E+05  1.61E-05  4.28E-03  4.28E-03  4.27E-03  4.27E-03  4.27E-03  4.30E-03
 DRINKING    TEENAGER      1.06E+05  2.34E-06  4.71E-04  4.69E-04  4.68E-04  4.69E-04  4.69E-04  4.72E-04
 DRINKING    CHILD         1.74E+05  1.08E-05  1.48E-03  1.47E-03  1.47E-03  1.47E-03  1.47E-03  1.48E-03
 DRINKING    TOTAL         1.26E+06  2.92E-05  6.23E-03  6.22E-03  6.21E-03  6.22E-03  6.21E-03  6.25E-03
0POPULATION=3.72E+03     DILUTION=1.65E+03     TRANSIT TIME=1.01E+02 HR (INCLUDING 24 HR FOR TREATMENT FACILITY)
0AVERAGE INDIVIDUAL CONSUMPTION (L/YR)     ADULT=3.70E+02     TEEN=2.60E+02     CHILD=2.60E+02
0_____________________________________________________________________________________________________________
0SUPPLIER-City of Cleburne
0                                  ----------------------------DOSE (PERSON-REM)-------------------------
0PATHWAY     AGE GROUP       USAGE     BONE     LIVER   TOTAL BODY  THYROID   KIDNEY     LUNG     GI-LLI
 DRINKING    ADULT         1.40E+07  4.61E-04  1.23E-01  1.23E-01  1.22E-01  1.23E-01  1.23E-01  1.23E-01
 DRINKING    TEENAGER      1.53E+06  6.72E-05  1.35E-02  1.35E-02  1.34E-02  1.35E-02  1.35E-02  1.36E-02
 DRINKING    CHILD         2.50E+06  3.10E-04  4.25E-02  4.23E-02  4.23E-02  4.23E-02  4.23E-02  4.24E-02
 DRINKING    TOTAL         1.81E+07  8.38E-04  1.79E-01  1.79E-01  1.78E-01  1.78E-01  1.78E-01  1.79E-01
0POPULATION=5.34E+04     DILUTION=8.23E+02     TRANSIT TIME=9.00E+01 HR (INCLUDING 24 HR FOR TREATMENT FACILITY)
0AVERAGE INDIVIDUAL CONSUMPTION (L/YR)     ADULT=3.70E+02     TEEN=2.60E+02     CHILD=2.60E+02
0-----CUMULATIVE TOTAL-----
0PATHWAY     AGE GROUP       USAGE     BONE     LIVER   TOTAL BODY  THYROID   KIDNEY     LUNG     GI-LLI
 DRINKING    CUMUL TOTAL   1.93E+07  8.67E-04  1.85E-01  1.85E-01  1.84E-01  1.85E-01  1.84E-01  1.86E-01
0_____________________________________________________________________________________________________________
0__________HYDROSPHERE TRITIUM DOSE__________
0AVERAGE INDIVIDUAL WATER CONSUMPTION = 3.0 L/DAY
0PATHWAY     AGE GROUP       USAGE     BONE     LIVER   TOTAL BODY  THYROID   KIDNEY     LUNG     GI-LLI
 WATER       TOTAL         2.86E+11  0.00E+00  1.47E-02  1.47E-02  1.47E-02  1.47E-02  1.47E-02  1.47E-02
1                                  *   *   *   RECREATION POPULATION DOSES   *   *   *
0_____________________________________________________________________________________________________________
0LOCATION- Shore W R
0DILUTION= 1.65E+03          TRANSIT TIME= 7.70E+01 HR          SWF=  .3
0                                                  _____________DOSE (PERSON-REM)_____________
0PATHWAY      AGE GROUP          USAGE            SKIN        TOTAL BODY      THYROID
 SHORELINE   TOTAL POPUL        2.24E+07        2.57E-03       2.20E-03       2.20E-03
0_____________________________________________________________________________________________________________
0LOCATION-  Swim W R
0DILUTION= 1.65E+03          TRANSIT TIME= 7.70E+01 HR
0                                                  _____________DOSE (PERSON-REM)_____________
0PATHWAY      AGE GROUP          USAGE            SKIN        TOTAL BODY      THYROID
 SWIMMING    TOTAL POPUL        2.24E+07                        5.97E-06       5.97E-06
0_____________________________________________________________________________________________________________
0LOCATION-  Boat W R
0DILUTION= 1.65E+03          TRANSIT TIME= 7.70E+01 HR
0                                                  _____________DOSE (PERSON-REM)_____________
0PATHWAY      AGE GROUP          USAGE            SKIN        TOTAL BODY      THYROID
 BOATING     TOTAL POPUL        2.24E+07                        2.98E-06       2.98E-06
1                                   *    *    *  IRRIGATED FOOD PATHWAY  *    *    *
 LEAFY VEGE
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0     TOTAL 50-MILE-PRODUCTION POPULATION SERVED=  9.88E+02
      TOTAL POPULATION SERVED FROM IRRIGATED PRODUCTION=  9.88E+02
0                                          INDIVIDUAL DOSES(MREM PER YEAR INTAKE)
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             1.44E-05      5.72E-04       5.68E-04       5.58E-04       5.64E-04       5.60E-04       5.85E-04
 TEENAGER          1.26E-05      3.82E-04       3.74E-04       3.70E-04       3.74E-04       3.71E-04       3.88E-04
 CHILD             2.19E-05      4.55E-04       4.42E-04       4.39E-04       4.45E-04       4.41E-04       4.50E-04
0              NOTE- INDIVIDUAL DOSES CALCULATED WITH DILUTION= 8.23E+02 AND TRANSIT TIME= 6.60E+01 HRS.
0                                 POPULATION DOSES(PERSON-REM)
0*  *  *  NEPA DOSES  *  *  *
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             4.74E-06      1.88E-04       1.87E-04       1.84E-04       1.85E-04       1.84E-04       1.92E-04
 TEENAGER          6.53E-07      1.98E-05       1.94E-05       1.91E-05       1.94E-05       1.92E-05       2.01E-05
 CHILD             1.50E-06      3.11E-05       3.02E-05       3.01E-05       3.05E-05       3.02E-05       3.08E-05
 TOTAL             6.89E-06      2.39E-04       2.36E-04       2.33E-04       2.35E-04       2.34E-04       2.43E-04
0$  $  $  ALARA DOSES  $  $  $
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             4.74E-06      1.88E-04       1.87E-04       1.84E-04       1.85E-04       1.84E-04       1.92E-04
 TEENAGER          6.53E-07      1.98E-05       1.94E-05       1.91E-05       1.94E-05       1.92E-05       2.01E-05
 CHILD             1.50E-06      3.11E-05       3.02E-05       3.01E-05       3.05E-05       3.02E-05       3.08E-05
 TOTAL             6.89E-06      2.39E-04       2.36E-04       2.33E-04       2.35E-04       2.34E-04       2.43E-04
0IRRI FOOD        IRRIGATION RATE= 7.46E+01 L/M**2/MON
                  NON-IRRIGATED FEED FRACTION= 0.00E+00
                  WATER FRACTION NOT VIA IRRIGATION= 0.00E+00
                  TOTAL 50 MILE GROW= 2.50E+04 KG/YR
                  TOTAL CROP IRRIGATION= 2.50E+04
                  CROP GROWING PERIOD= 6.00E+01 DAYS
                  CROP YIELD= 2.00E+00 KG/M**2

                     LOCATION          DILUTION  HARVEST  TRANSIT TIME
                  Leafy Above W R      8.23E+02  2.50E+04  6.60E+01
0INDIVIDUAL CONSUMPTION RATES    ADULT=6.40E+01 KG     TEEN=4.20E+01     CHILD=2.60E+01     FOOD PROCESS TIME=2.40E+01 HR
 POPULATION CONSUMPTION RATES    ADULT=3.00E+01 KG     TEEN=2.00E+01     CHILD=1.00E+01     FOOD PROCESS TIME=4.80E+01 HR
1                                   *    *    *  IRRIGATED FOOD PATHWAY  *    *    *
 VEGETATION
0     TOTAL 50-MILE-PRODUCTION POPULATION SERVED=  2.67E+04
      TOTAL POPULATION SERVED FROM IRRIGATED PRODUCTION=  2.67E+04
0                                          INDIVIDUAL DOSES(MREM PER YEAR INTAKE)
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             1.17E-04      4.64E-03       4.60E-03       4.53E-03       4.57E-03       4.54E-03       4.74E-03
 TEENAGER          1.89E-04      5.72E-03       5.60E-03       5.53E-03       5.60E-03       5.56E-03       5.80E-03
 CHILD             4.38E-04      9.09E-03       8.82E-03       8.77E-03       8.89E-03       8.81E-03       8.99E-03
0              NOTE- INDIVIDUAL DOSES CALCULATED WITH DILUTION= 8.23E+02 AND TRANSIT TIME= 6.60E+01 HRS.
0                                 POPULATION DOSES(PERSON-REM)
0*  *  *  NEPA DOSES  *  *  *
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0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             8.03E-04      3.19E-02       3.17E-02       3.12E-02       3.15E-02       3.12E-02       3.25E-02
 TEENAGER          2.10E-04      6.35E-03       6.22E-03       6.15E-03       6.23E-03       6.18E-03       6.43E-03
 CHILD             8.03E-04      1.67E-02       1.62E-02       1.61E-02       1.63E-02       1.62E-02       1.65E-02
 TOTAL             1.82E-03      5.50E-02       5.41E-02       5.34E-02       5.40E-02       5.36E-02       5.54E-02
0$  $  $  ALARA DOSES  $  $  $
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             8.03E-04      3.19E-02       3.17E-02       3.12E-02       3.15E-02       3.12E-02       3.25E-02
 TEENAGER          2.10E-04      6.35E-03       6.22E-03       6.15E-03       6.23E-03       6.18E-03       6.43E-03
 CHILD             8.03E-04      1.67E-02       1.62E-02       1.61E-02       1.63E-02       1.62E-02       1.65E-02
 TOTAL             1.82E-03      5.50E-02       5.41E-02       5.34E-02       5.40E-02       5.36E-02       5.54E-02
0IRRI FOOD        IRRIGATION RATE= 7.46E+01 L/M**2/MON
                  NON-IRRIGATED FEED FRACTION= 0.00E+00
                  WATER FRACTION NOT VIA IRRIGATION= 0.00E+00
                  TOTAL 50 MILE GROW= 5.27E+06 KG/YR
                  TOTAL CROP IRRIGATION= 5.27E+06
                  CROP GROWING PERIOD= 6.00E+01 DAYS
                  CROP YIELD= 2.00E+00 KG/M**2

                     LOCATION          DILUTION  HARVEST  TRANSIT TIME
                  Veg Above W R        8.23E+02  5.27E+06  6.60E+01
0INDIVIDUAL CONSUMPTION RATES    ADULT=5.20E+02 KG     TEEN=6.30E+02     CHILD=5.20E+02     FOOD PROCESS TIME=3.36E+02 HR
 POPULATION CONSUMPTION RATES    ADULT=1.90E+02 KG     TEEN=2.40E+02     CHILD=2.00E+02     FOOD PROCESS TIME=1.44E+03 HR
1                                  *    *    *  IRRIGATED FOOD PATHWAY  *    *    *
 MILK
0     TOTAL 50-MILE-PRODUCTION POPULATION SERVED=  7.21E+03
      TOTAL POPULATION SERVED FROM IRRIGATED PRODUCTION=  7.21E+03
0                    _____________________________________INDIVIDUAL DOSES(MREM PER YEAR INTAKE)_____________________________
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             6.84E-05      2.80E-03       2.77E-03       2.71E-03       2.74E-03       2.72E-03       2.71E-03
 TEENAGER          1.23E-04      3.69E-03       3.58E-03       3.52E-03       3.58E-03       3.54E-03       3.53E-03
 CHILD             2.95E-04      5.86E-03       5.62E-03       5.58E-03       5.67E-03       5.61E-03       5.58E-03
0               NOTE- INDIVIDUAL DOSES CALCULATED WITH DILUTION= 8.23E+02 AND TRANSIT TIME= 6.60E+01 HRS.
0                   _____________POPULATION DOSES(PERSON-REM)____________
0*  *  *  NEPA DOSES  *  *  *
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             1.24E-04      5.09E-03       5.03E-03       4.92E-03       4.98E-03       4.94E-03       4.93E-03
 TEENAGER          4.88E-05      1.46E-03       1.42E-03       1.40E-03       1.42E-03       1.41E-03       1.40E-03
 CHILD             1.97E-04      3.92E-03       3.76E-03       3.73E-03       3.79E-03       3.75E-03       3.73E-03
 TOTAL             3.70E-04      1.05E-02       1.02E-02       1.00E-02       1.02E-02       1.01E-02       1.01E-02
0$  $  $  ALARA DOSES  $  $  $
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             1.24E-04      5.09E-03       5.03E-03       4.92E-03       4.98E-03       4.94E-03       4.93E-03
 TEENAGER          4.88E-05      1.46E-03       1.42E-03       1.40E-03       1.42E-03       1.41E-03       1.40E-03
 CHILD             1.97E-04      3.92E-03       3.76E-03       3.73E-03       3.79E-03       3.75E-03       3.73E-03
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 TOTAL              3.70E-04       1.05E-02       1.02E-02       1.00E-02       1.02E-02       1.01E-02       1.01E-02
0IRRI FOOD         IRRIGATION RATE= 7.46E+01 L/M**2/MON
                   NON-IRRIGATED FEED FRACTION= 0.00E+00
                   WATER FRACTION NOT VIA IRRIGATION= 0.00E+00
                   TOTAL 50 MILE GROW= 9.43E+05 KG/YR
                   TOTAL CROP IRRIGATION= 9.43E+05
                   CROP GROWING PERIOD= 3.00E+01 DAYS
                   CROP YIELD= 7.00E-01 KG/M**2

                      LOCATION          DILUTION  HARVEST  TRANSIT TIME
                   Milk Above W R       8.23E+02  9.43E+05  6.60E+01
0INDIVIDUAL CONSUMPTION RATES    ADULT=3.10E+02 KG     TEEN=4.00E+02     CHILD=3.30E+02     FOOD PROCESS TIME=4.80E+01 HR
 POPULATION CONSUMPTION RATES    ADULT=1.10E+02 KG     TEEN=2.00E+02     CHILD=1.70E+02     FOOD PROCESS TIME=9.60E+01 HR
1                                   *    *    *  IRRIGATED FOOD PATHWAY  *    *    *
 MEAT
0     TOTAL 50-MILE-PRODUCTION POPULATION SERVED=  3.49E+03
      TOTAL POPULATION SERVED FROM IRRIGATED PRODUCTION=  3.49E+03
0                                                  INDIVIDUAL DOSES(MREM PER YEAR INTAKE)
0                     BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT              4.04E-05       9.71E-04       9.71E-04       9.60E-04       1.03E-03       9.61E-04       3.04E-03
 TEENAGER           3.39E-05       5.81E-04       5.79E-04       5.72E-04       6.27E-04       5.73E-04       1.87E-03
 CHILD              6.34E-05       7.05E-04       7.01E-04       6.93E-04       7.65E-04       6.94E-04       1.48E-03
0               NOTE- INDIVIDUAL DOSES CALCULATED WITH DILUTION= 8.23E+02 AND TRANSIT TIME= 6.60E+01 HRS.
0                              POPULATION DOSES(PERSON-REM)
0*  *  *  NEPA DOSES  *  *  *
0                     BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT              8.64E-05       2.08E-03       2.08E-03       2.05E-03       2.19E-03       2.05E-03       6.49E-03
 TEENAGER           1.18E-05       2.02E-04       2.01E-04       1.99E-04       2.18E-04       2.00E-04       6.50E-04
 CHILD              3.59E-05       3.99E-04       3.97E-04       3.92E-04       4.33E-04       3.93E-04       8.41E-04
 TOTAL              1.34E-04       2.68E-03       2.68E-03       2.64E-03       2.84E-03       2.65E-03       7.98E-03
0$  $  $  ALARA DOSES  $  $  $
0                     BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT              8.64E-05       2.08E-03       2.08E-03       2.05E-03       2.19E-03       2.05E-03       6.49E-03
 TEENAGER           1.18E-05       2.02E-04       2.01E-04       1.99E-04       2.18E-04       2.00E-04       6.50E-04
 CHILD              3.59E-05       3.99E-04       3.97E-04       3.92E-04       4.33E-04       3.93E-04       8.41E-04
 TOTAL              1.34E-04       2.68E-03       2.68E-03       2.64E-03       2.84E-03       2.65E-03       7.98E-03
0IRRI FOOD         IRRIGATION RATE= 7.46E+01 L/M**2/MON
                   NON-IRRIGATED FEED FRACTION= 0.00E+00
                   WATER FRACTION NOT VIA IRRIGATION= 0.00E+00
                   TOTAL 50 MILE GROW= 2.81E+05 KG/YR
                   TOTAL CROP IRRIGATION= 2.81E+05
                   CROP GROWING PERIOD= 3.00E+01 DAYS
                   CROP YIELD= 7.00E-01 KG/M**2

                      LOCATION          DILUTION  HARVEST  TRANSIT TIME
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                  Meat Above W R       8.23E+02  2.81E+05  6.60E+01
0INDIVIDUAL CONSUMPTION RATES    ADULT=1.10E+02 KG     TEEN=6.50E+01     CHILD=4.10E+01     FOOD PROCESS TIME=4.80E+02 HR
 POPULATION CONSUMPTION RATES    ADULT=9.50E+01 KG     TEEN=5.90E+01     CHILD=3.70E+01     FOOD PROCESS TIME=4.80E+02 HR
1*    *    *  DOSE TO BIOTA  *    *    *
0                  MRADS PER YEAR
0_____________________________________________________
   Biota                DILUTION=  1.00E+00          TRANSIT TIME=  0.00E+00 HR
0                     INTERNAL        EXTERNAL          TOTAL
 FISH                 4.55E+00        4.74E+00        9.29E+00
 INVERTEBRATE         6.44E+00        9.48E+00        1.59E+01
 ALGAE                2.04E+01        3.91E-03        2.04E+01
 MUSKRAT              3.05E+01        3.16E+00        3.36E+01
 RACCOON              7.79E+00        2.37E+00        1.02E+01
 HERON                9.87E+01        3.16E+00        1.02E+02
 DUCK                 2.92E+01        4.74E+00        3.39E+01
1                      *  *  *  COST-BENEFIT ANALYSIS  *  *  *
0  NUCLIDE       RELEASE        _____PERSON-REM DOSE_____PERSON-REM PER CURIE____
                 !   CI/YR    ! TOTAL BODY !   THYROID  ! TOTAL BODY !   THYROID  !
    1H    3    !  1.60E+03  !  2.53E-01  !  2.53E-01  !  1.58E-04  !  1.58E-04  !
   11NA  24    !  4.70E-03  !  3.65E-10  !  3.65E-10  !  7.76E-08  !  7.76E-08  !
   24CR  51    !  1.30E-03  !  2.84E-09  !  2.74E-09  !  2.18E-06  !  2.11E-06  !
   25MN  54    !  7.00E-04  !  4.75E-06  !  3.66E-06  !  6.79E-03  !  5.23E-03  !
   26FE  55    !  5.00E-04  !  7.41E-07  !  1.38E-11  !  1.48E-03  !  2.76E-08  !
   26FE  59    !  1.00E-04  !  5.46E-08  !  1.78E-08  !  5.46E-04  !  1.78E-04  !
   27CO  58    !  1.90E-03  !  1.09E-06  !  6.91E-07  !  5.76E-04  !  3.64E-04  !
   30ZN  65    !  2.20E-04  !  9.20E-06  !  4.91E-07  !  4.18E-02  !  2.23E-03  !
   74W  187    !  3.50E-04  !  1.58E-11  !  1.51E-11  !  4.51E-08  !  4.31E-08  !
   93NP 239    !  5.30E-04  !  6.27E-11  !  6.26E-11  !  1.18E-07  !  1.18E-07  !
   37RB  88    !  2.80E-02  !  0.00E+00  !  0.00E+00  !  0.00E+00  !  0.00E+00  !
   38SR  89    !  6.00E-05  !  4.02E-08  !  6.74E-12  !  6.71E-04  !  1.12E-07  !
   38SR  90    !  8.00E-06  !  1.64E-05  !  9.52E-12  !  2.05E+00  !  1.19E-06  !
   38SR  91    !  6.80E-05  !  9.15E-14  !  8.54E-14  !  1.35E-09  !  1.26E-09  !
   39Y   91M   !  4.40E-05  !  1.60E-43  !  1.60E-43  !  3.63E-39  !  3.63E-39  !
   39Y   91    !  1.00E-05  !  1.22E-11  !  8.84E-12  !  1.22E-06  !  8.84E-07  !
   39Y   93    !  3.10E-04  !  5.75E-14  !  5.74E-14  !  1.85E-10  !  1.85E-10  !
   40ZR  95    !  2.00E-04  !  4.43E-08  !  4.42E-08  !  2.22E-04  !  2.21E-04  !
   41NB  95    !  1.00E-04  !  9.13E-09  !  7.43E-09  !  9.13E-05  !  7.43E-05  !
   42MO  99    !  1.60E-03  !  1.61E-09  !  5.07E-10  !  1.00E-06  !  3.17E-07  !
   43TC  99M   !  1.70E-03  !  6.69E-15  !  6.61E-15  !  3.94E-12  !  3.89E-12  !
   44RU 103    !  3.10E-03  !  2.19E-07  !  1.93E-07  !  7.06E-05  !  6.23E-05  !
   44RU 106    !  3.80E-02  !  9.44E-05  !  7.08E-05  !  2.48E-03  !  1.86E-03  !
   47AG 110M   !  6.00E-04  !  6.40E-06  !  6.35E-06  !  1.07E-02  !  1.06E-02  !
   52TE 129M   !  7.80E-05  !  2.42E-08  !  5.06E-08  !  3.10E-04  !  6.49E-04  !
   52TE 129    !  3.10E-04  !  4.81E-35  !  4.81E-35  !  1.55E-31  !  1.55E-31  !
   52TE 131M   !  2.50E-04  !  8.10E-11  !  1.02E-10  !  3.24E-07  !  4.10E-07  !
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	52TE 131	7.60E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
	53I 131	4.00E-04	7.77E-09	3.67E-06	1.94E-05	9.19E-03	
	52TE 132	4.70E-04	2.16E-09	2.52E-09	4.60E-06	5.35E-06	
	53I 132	3.10E-04	3.66E-23	3.66E-23	1.18E-19	1.18E-19	
	53I 133	8.10E-04	4.36E-11	9.00E-09	5.38E-08	1.11E-05	
	53I 134	8.90E-05	5.59E-41	5.59E-41	6.28E-37	6.28E-37	
	55CS 134	1.00E-03	1.65E-03	6.03E-05	1.65E+00	6.03E-02	
	53I 135	7.80E-04	1.04E-13	9.74E-13	1.34E-10	1.25E-09	
	55CS 136	2.20E-02	6.59E-05	8.82E-07	3.00E-03	4.01E-05	
	55CS 137	2.00E-03	1.49E-02	2.07E-03	7.47E+00	1.03E+00	
	56BA 140	4.90E-03	7.71E-08	2.44E-08	1.57E-05	4.98E-06	
	57LA 140	8.00E-03	7.41E-09	7.41E-09	9.27E-07	9.27E-07	
	58CE 141	6.00E-05	4.01E-10	4.00E-10	6.68E-06	6.66E-06	
	58CE 143	5.00E-04	3.93E-11	3.93E-11	7.85E-08	7.85E-08	
	59PR 143	7.90E-05	1.06E-12	6.58E-13	1.34E-08	8.33E-09	
	59PR 144	1.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
	58CE 144	1.70E-03	4.33E-07	4.09E-07	2.55E-04	2.41E-04	
0	TOTAL		2.70E-01	2.56E-01			
1							

Appendix 2

Case 2 - CPNPP Unit 3 or 4 Population Dose LADTAP II Output File

```
L       AAA   DDDD   TTTTT   AAA   PPPP     IIIII IIIII
L      A   A  D   D    T    A   A  P   P      I     I
L      A   A  D   D    T    A   A  P   P      I     I
L      AAAAA  D   D    T    AAAAA  PPPP       I     I
L      A   A  D   D    T    A   A  P          I     I
LLLLL  A   A  DDDD     T    A   A  P        IIIII IIIII

          EVALUATION OF RADIATION DOSES FROM RELEASES OF RADIACTIVITY

                    IN NUCLEAR POWER PLANTS LIQUID EFFLUENTS

                     REVISION DATE:  JSB PC - February 1996

       CPNPP Unit 3 or 4 Case 2 Liquid Effluent Population Dose Rev 1

                          RADIOLOGICAL ASSESSMENT BRANCH

                          DIVISION OF SYSTEMS INTEGRATION

                          U. S. NUCLEAR REGULATORY COMMISSION

                          WASHINGTON, D. C.

                          DATE OF RUN:    17-Sep-2009
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1
0    1* ARRAY     16 ENTRIES READ
0    0T
1
  CPNPP Unit 3 or 4 Case 2 Liquid Effluent Population Dose Rev 1
0  DISCHARGE=5.51E+02 CFS          SOURCE TERM MULTIPLIER=1.00E+00
0  50-MILE POPULATION=3.49E+06     FRACTION ---  ADULT= .71
                                                 TEENAGER= .11
                                                 CHILD= .18
0  FRESHWATER SITE
1
  US APWR Liquid Releases DCD Table 11-2-10 w/o Det Waste
  COMPLETELY MIXED MODEL-- POND BLOWDOWN (CFS) - 4.54E+01     POND VOLUME (CF) - 6.30E+09
0                            *  *  *  ADULT DOSE FACTORS  *  *  *
0                        _____________________INGESTION DOSE FACTORS_____________________ _____SHORELINE_____
                                              (MREM/PCI INTAKE)                          (MREM/HR)/(PCI/M**2)
 NUCLIDE  CURIE/YEAR     BONE     LIVER  TOTAL BODY  THYROID  KIDNEY     LUNG     GI-LLI     SKIN  TOTAL BODY   RECON
    1H     3   1.60E+03 0.00E+00 5.99E-08 5.99E-08 5.99E-08 5.99E-08 5.99E-08 5.99E-08 0.00E+00 0.00E+00 9.74E+00
   11NA   24   4.70E-03 1.70E-06 1.70E-06 1.70E-06 1.70E-06 1.70E-06 1.70E-06 1.70E-06 2.90E-08 2.50E-08 6.83E-03
   24CR   51   1.30E-03 0.00E+00 0.00E+00 2.66E-09 1.59E-09 5.86E-10 3.53E-09 6.69E-07 2.60E-10 2.20E-10 2.94E-01
   25MN   54   7.00E-04 0.00E+00 4.57E-06 8.72E-07 0.00E+00 1.36E-06 0.00E+00 1.40E-05 6.80E-09 5.80E-09 2.66E+00
   26FE   55   5.00E-04 2.75E-06 1.90E-06 4.43E-07 0.00E+00 0.00E+00 1.06E-06 1.09E-06 0.00E+00 0.00E+00 5.70E+00
   26FE   59   1.00E-04 4.34E-06 1.02E-05 3.91E-06 0.00E+00 0.00E+00 2.85E-06 3.40E-05 9.40E-09 8.00E-09 4.68E-01
   27CO   58   1.90E-03 0.00E+00 7.45E-07 1.67E-06 0.00E+00 0.00E+00 0.00E+00 1.51E-05 8.20E-09 7.00E-09 7.28E-01
   30ZN   65   2.20E-04 4.84E-06 1.54E-05 6.96E-06 0.00E+00 1.03E-05 0.00E+00 9.70E-06 4.60E-09 4.00E-09 2.18E+00
   74W   187   3.50E-04 1.03E-07 8.61E-08 3.01E-08 0.00E+00 0.00E+00 0.00E+00 2.82E-05 3.60E-09 3.10E-09 1.09E-02
   93NP 239   5.30E-04 1.19E-09 1.17E-10 6.45E-11 0.00E+00 3.65E-10 0.00E+00 2.40E-05 1.10E-09 9.50E-10 2.57E-02
   37RB   88   2.80E-02 0.00E+00 6.05E-08 3.21E-08 0.00E+00 0.00E+00 0.00E+00 8.36E-19 4.00E-09 3.50E-09 1.35E-04
   38SR   89   6.00E-05 3.08E-04 0.00E+00 8.84E-06 0.00E+00 0.00E+00 0.00E+00 4.94E-05 6.50E-13 5.60E-13 5.27E-01
   38SR   90   8.00E-06 8.71E-03 0.00E+00 1.75E-04 0.00E+00 0.00E+00 0.00E+00 2.19E-04 0.00E+00 0.00E+00 1.10E+01
   38SR   91   6.80E-05 5.67E-06 0.00E+00 2.29E-07 0.00E+00 0.00E+00 0.00E+00 2.70E-05 8.30E-09 7.10E-09 4.31E-03
   39Y    91M  4.40E-05 9.09E-11 0.00E+00 3.52E-12 0.00E+00 0.00E+00 0.00E+00 2.67E-10 4.40E-09 3.80E-09 3.76E-04
   39Y    91   1.00E-05 1.41E-07 0.00E+00 3.77E-09 0.00E+00 0.00E+00 0.00E+00 7.76E-05 2.70E-11 2.40E-11 6.07E-01
   39Y    93   3.10E-04 2.68E-09 0.00E+00 7.40E-11 0.00E+00 0.00E+00 0.00E+00 8.50E-05 7.80E-10 5.70E-10 4.58E-03
   40ZR   95   2.00E-04 3.04E-08 9.75E-09 6.60E-09 0.00E+00 1.53E-08 0.00E+00 3.09E-05 5.80E-09 5.00E-09 6.62E-01
   41NB   95   1.00E-04 6.22E-09 3.46E-09 1.86E-09 0.00E+00 3.42E-09 0.00E+00 2.10E-05 6.00E-09 5.10E-09 3.72E-01
   42MO   99   1.60E-03 0.00E+00 4.31E-06 8.20E-07 0.00E+00 9.76E-06 0.00E+00 9.99E-06 2.20E-09 1.90E-09 2.99E-02
   43TC   99M  1.70E-03 2.47E-10 6.98E-10 8.89E-09 0.00E+00 1.06E-08 3.42E-10 4.13E-07 1.10E-09 9.60E-10 2.73E-03
   44RU 103   3.10E-03 1.85E-07 0.00E+00 7.97E-08 0.00E+00 7.06E-07 0.00E+00 2.16E-05 4.20E-09 3.60E-09 4.14E-01
   44RU 106   3.80E-02 2.75E-06 0.00E+00 3.48E-07 0.00E+00 5.31E-06 0.00E+00 1.78E-04 1.80E-09 1.50E-09 3.02E+00
   47AG 110M  6.00E-04 1.60E-07 1.48E-07 8.79E-08 0.00E+00 2.91E-07 0.00E+00 6.04E-05 2.10E-08 1.80E-08 2.23E+00
   52TE 129M  7.80E-05 1.15E-05 4.29E-06 1.82E-06 3.95E-06 4.80E-05 0.00E+00 5.79E-05 9.00E-10 7.70E-10 3.55E-01
   52TE 129   3.10E-04 3.14E-08 1.18E-08 7.65E-09 2.41E-08 1.32E-07 0.00E+00 2.37E-08 8.40E-10 7.10E-10 5.27E-04
   52TE 131M  2.50E-04 1.73E-06 8.46E-07 7.05E-07 1.34E-06 8.57E-06 0.00E+00 8.40E-05 9.90E-09 8.40E-09 1.36E-02
   52TE 131   7.60E-05 1.97E-08 8.23E-09 6.22E-09 1.62E-08 8.63E-08 0.00E+00 2.79E-09 2.60E-06 2.20E-09 1.90E-04
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	53I	131	4.00E-04	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	0.00E+00	1.57E-06	3.40E-09	2.80E-09	8.71E-02
	52TE	132	4.70E-04	2.52E-06	1.63E-06	1.53E-06	1.80E-06	1.57E-05	0.00E+00	7.71E-05	2.00E-09	1.70E-09	3.55E-02
	53I	132	3.10E-04	2.03E-07	5.43E-07	1.90E-07	1.90E-05	8.65E-07	0.00E+00	1.02E-07	2.00E-08	1.70E-08	1.05E-03
	53I	133	8.10E-04	1.42E-06	2.47E-06	7.53E-07	3.63E-04	4.31E-06	0.00E+00	2.22E-06	4.50E-09	3.70E-09	9.45E-03
	53I	134	8.90E-05	1.06E-07	2.88E-07	1.03E-07	4.99E-06	4.58E-07	0.00E+00	2.51E-10	1.90E-08	1.60E-08	3.98E-04
	55CS	134	1.00E-03	6.22E-05	1.48E-04	1.21E-04	0.00E+00	4.79E-05	1.59E-05	2.59E-06	1.40E-08	1.20E-08	4.89E+00
	53I	135	7.80E-04	4.43E-07	1.16E-06	4.28E-07	7.65E-05	1.86E-06	0.00E+00	1.31E-06	1.40E-08	1.20E-08	3.00E-03
	55CS	136	2.20E-02	6.51E-06	2.57E-05	1.85E-05	0.00E+00	1.43E-05	1.96E-06	2.92E-06	1.70E-08	1.50E-08	1.41E-01
	55CS	137	2.00E-03	7.97E-05	1.09E-04	7.14E-05	0.00E+00	3.70E-05	1.23E-05	2.11E-06	4.90E-09	4.20E-09	1.10E+01
	56BA	140	4.90E-03	2.03E-05	2.55E-08	1.33E-06	0.00E+00	8.67E-09	1.46E-08	4.18E-05	2.40E-09	2.10E-09	1.38E-01
	57LA	140	8.00E-03	2.50E-09	1.26E-09	3.33E-10	0.00E+00	0.00E+00	0.00E+00	9.25E-05	1.70E-08	1.50E-08	1.83E-02
	58CE	141	6.00E-05	9.36E-09	6.33E-09	7.18E-10	0.00E+00	2.94E-09	0.00E+00	2.42E-05	6.20E-10	5.50E-10	3.44E-01
	58CE	143	5.00E-04	1.65E-09	1.22E-06	1.35E-10	0.00E+00	5.37E-10	0.00E+00	4.56E-05	2.50E-09	2.20E-09	1.50E-02
	59PR	143	7.90E-05	9.20E-09	3.69E-09	4.56E-10	0.00E+00	2.13E-09	0.00E+00	4.03E-05	0.00E+00	0.00E+00	1.47E-01
	59PR	144	1.70E-03	3.01E-11	1.25E-11	1.53E-12	0.00E+00	7.05E-12	0.00E+00	4.33E-18	2.30E-10	2.00E-10	1.31E-04
	58CE	144	1.70E-03	4.88E-07	2.04E-07	2.62E-08	0.00E+00	1.21E-07	0.00E+00	1.65E-04	3.70E-10	3.20E-10	2.47E+00

0 * * * TEENAGER DOSE FACTORS * * *

0

			INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)		
NUCLIDE		CURIE/YEAR	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON
1H	3	1.60E+03	0.00E+00	6.04E-08	6.04E-08	6.04E-08	6.04E-08	6.04E-08	6.04E-08			
11NA	24	4.70E-03	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06			
24CR	51	1.30E-03	0.00E+00	0.00E+00	3.60E-09	2.00E-09	7.89E-10	5.14E-09	6.05E-07			
25MN	54	7.00E-04	0.00E+00	5.90E-06	1.17E-06	0.00E+00	1.76E-06	0.00E+00	1.21E-05			
26FE	55	5.00E-04	3.78E-06	2.68E-06	6.25E-07	0.00E+00	0.00E+00	1.70E-06	1.16E-06			
26FE	59	1.00E-04	5.87E-06	1.37E-05	5.29E-06	0.00E+00	0.00E+00	4.32E-06	3.24E-05			
27CO	58	1.90E-03	0.00E+00	9.72E-07	2.24E-06	0.00E+00	0.00E+00	0.00E+00	1.34E-05			
30ZN	65	2.20E-04	5.76E-06	2.00E-05	9.33E-06	0.00E+00	1.28E-05	0.00E+00	8.47E-06			
74W	187	3.50E-04	1.46E-07	1.19E-07	4.17E-08	0.00E+00	0.00E+00	0.00E+00	3.22E-05			
93NP	239	5.30E-04	1.76E-09	1.66E-10	9.22E-11	0.00E+00	5.21E-10	0.00E+00	2.67E-05			
37RB	88	2.80E-02	0.00E+00	8.52E-08	4.54E-08	0.00E+00	0.00E+00	0.00E+00	7.30E-15			
38SR	89	6.00E-05	4.40E-04	0.00E+00	1.26E-05	0.00E+00	0.00E+00	0.00E+00	5.24E-05			
38SR	90	8.00E-06	1.02E-02	0.00E+00	2.04E-04	0.00E+00	0.00E+00	0.00E+00	2.33E-04			
38SR	91	6.80E-05	8.07E-06	0.00E+00	3.21E-07	0.00E+00	0.00E+00	0.00E+00	3.66E-05			
39Y	91M	4.40E-05	1.29E-10	0.00E+00	4.93E-12	0.00E+00	0.00E+00	0.00E+00	6.09E-09			
39Y	91	1.00E-05	2.01E-07	0.00E+00	5.39E-09	0.00E+00	0.00E+00	0.00E+00	8.24E-05			
39Y	93	3.10E-04	3.83E-09	0.00E+00	1.05E-10	0.00E+00	0.00E+00	0.00E+00	1.17E-04			
40ZR	95	2.00E-04	4.12E-08	1.30E-08	8.94E-09	0.00E+00	1.91E-08	0.00E+00	3.00E-05			
41NB	95	1.00E-04	8.22E-09	4.56E-09	2.51E-09	0.00E+00	4.42E-09	0.00E+00	1.95E-05			
42MO	99	1.60E-03	0.00E+00	6.03E-06	1.15E-06	0.00E+00	1.38E-05	0.00E+00	1.08E-05			
43TC	99M	1.70E-03	3.32E-10	9.26E-10	1.20E-08	0.00E+00	1.38E-08	5.14E-10	6.08E-07			
44RU	103	3.10E-03	2.55E-07	0.00E+00	1.09E-07	0.00E+00	8.99E-07	0.00E+00	2.13E-05			
44RU	106	3.80E-02	3.92E-06	0.00E+00	4.94E-07	0.00E+00	7.56E-06	0.00E+00	1.88E-04			
47AG	110M	6.00E-04	2.05E-07	1.94E-07	1.18E-07	0.00E+00	3.70E-07	0.00E+00	5.45E-05			
52TE	129M	7.80E-05	1.63E-05	6.05E-06	2.58E-06	5.26E-06	6.82E-05	0.00E+00	6.12E-05			

52TE	129	3.10E-04	4.48E-08	1.67E-08	1.09E-08	3.20E-08	1.88E-07	0.00E+00	2.45E-07
52TE	131M	2.50E-04	2.44E-06	1.17E-06	9.76E-07	1.76E-06	1.22E-05	0.00E+00	9.39E-05
52TE	131	7.60E-05	2.79E-08	1.15E-08	8.72E-09	2.15E-08	1.22E-07	0.00E+00	2.29E-09
53I	131	4.00E-04	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	0.00E+00	1.62E-06
52TE	132	4.70E-04	3.49E-06	2.21E-06	2.08E-06	2.33E-06	2.12E-05	0.00E+00	7.00E-05
53I	132	3.10E-04	2.79E-07	7.30E-07	2.62E-07	2.46E-05	1.15E-06	0.00E+00	3.18E-07
53I	133	8.10E-04	2.01E-06	3.41E-06	1.04E-06	4.76E-04	5.98E-06	0.00E+00	2.58E-06
53I	134	8.90E-05	1.46E-07	3.87E-07	1.39E-07	6.45E-06	6.10E-07	0.00E+00	5.10E-09
55CS	134	1.00E-03	8.37E-05	1.97E-04	9.14E-05	0.00E+00	6.26E-05	2.39E-05	2.45E-06
53I	135	7.80E-04	6.10E-07	1.57E-06	5.82E-07	1.01E-04	2.48E-06	0.00E+00	1.74E-06
55CS	136	2.20E-02	8.59E-06	3.38E-05	2.27E-05	0.00E+00	1.84E-05	2.90E-06	2.72E-06
55CS	137	2.00E-03	1.12E-04	1.49E-04	5.19E-05	0.00E+00	5.07E-05	1.97E-05	2.12E-06
56BA	140	4.90E-03	2.84E-05	3.48E-08	1.83E-06	0.00E+00	1.18E-08	2.34E-08	4.38E-05
57LA	140	8.00E-03	3.48E-09	1.71E-09	4.55E-10	0.00E+00	0.00E+00	0.00E+00	9.82E-05
58CE	141	6.00E-05	1.33E-08	8.88E-09	1.02E-09	0.00E+00	4.18E-09	0.00E+00	2.54E-05
58CE	143	5.00E-04	2.35E-09	1.71E-06	1.91E-10	0.00E+00	7.67E-10	0.00E+00	5.14E-05
59PR	143	7.90E-05	1.31E-08	5.23E-09	6.52E-10	0.00E+00	3.04E-09	0.00E+00	4.31E-05
59PR	144	1.70E-03	4.30E-11	1.76E-11	2.18E-12	0.00E+00	1.01E-11	0.00E+00	4.74E-14
58CE	144	1.70E-03	6.96E-07	2.88E-07	3.74E-08	0.00E+00	1.72E-07	0.00E+00	1.75E-04

0 * * * CHILD DOSE FACTORS * * *

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			INGESTION DOSE FACTORS (MREM/PCI INTAKE)						SHORELINE (MREM/HR)/(PCI/M**2)		
NUCLIDE		CURIE/YEAR	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON
1H	3	1.60E+03	0.00E+00	1.16E-07	1.16E-07	1.16E-07	1.16E-07	1.16E-07	1.16E-07			
11NA	24	4.70E-03	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06			
24CR	51	1.30E-03	0.00E+00	0.00E+00	8.90E-09	4.94E-09	1.35E-09	9.02E-09	4.72E-07			
25MN	54	7.00E-04	0.00E+00	1.07E-05	2.85E-06	0.00E+00	3.00E-06	0.00E+00	8.98E-06			
26FE	55	5.00E-04	1.15E-05	6.10E-06	1.89E-06	0.00E+00	0.00E+00	3.45E-06	1.13E-06			
26FE	59	1.00E-04	1.65E-05	2.67E-05	1.33E-05	0.00E+00	0.00E+00	7.74E-06	2.78E-05			
27CO	58	1.90E-03	0.00E+00	1.80E-06	5.51E-06	0.00E+00	0.00E+00	0.00E+00	1.05E-05			
30ZN	65	2.20E-04	1.37E-05	3.65E-05	2.27E-05	0.00E+00	2.30E-05	0.00E+00	6.41E-06			
74W	187	3.50E-04	4.29E-07	2.54E-07	1.14E-07	0.00E+00	0.00E+00	0.00E+00	3.57E-05			
93NP	239	5.30E-04	5.25E-09	3.77E-10	2.65E-10	0.00E+00	1.09E-09	0.00E+00	2.79E-05			
37RB	88	2.80E-02	0.00E+00	1.90E-07	1.32E-07	0.00E+00	0.00E+00	0.00E+00	9.32E-09			
38SR	89	6.00E-05	1.32E-03	0.00E+00	3.77E-05	0.00E+00	0.00E+00	0.00E+00	5.11E-05			
38SR	90	8.00E-06	2.56E-02	0.00E+00	5.15E-04	0.00E+00	0.00E+00	0.00E+00	2.29E-04			
38SR	91	6.80E-05	2.40E-05	0.00E+00	9.06E-07	0.00E+00	0.00E+00	0.00E+00	5.30E-05			
39Y	91M	4.40E-05	3.82E-10	0.00E+00	1.39E-11	0.00E+00	0.00E+00	0.00E+00	7.48E-07			
39Y	91	1.00E-05	6.02E-07	0.00E+00	1.61E-08	0.00E+00	0.00E+00	0.00E+00	8.02E-05			
39Y	93	3.10E-04	1.14E-08	0.00E+00	3.13E-10	0.00E+00	0.00E+00	0.00E+00	1.70E-04			
40ZR	95	2.00E-04	1.16E-07	2.55E-08	2.27E-08	0.00E+00	3.65E-08	0.00E+00	2.66E-05			
41NB	95	1.00E-04	2.25E-08	8.76E-09	6.26E-09	0.00E+00	8.23E-09	0.00E+00	1.62E-05			
42MO	99	1.60E-03	0.00E+00	1.33E-05	3.29E-06	0.00E+00	2.84E-05	0.00E+00	1.10E-05			
43TC	99M	1.70E-03	9.23E-10	1.81E-09	3.00E-08	0.00E+00	2.63E-08	9.19E-10	1.03E-06			
44RU	103	3.10E-03	7.31E-07	0.00E+00	2.81E-07	0.00E+00	1.84E-06	0.00E+00	1.89E-05			

44RU	106	3.80E-02	1.17E-05	0.00E+00	1.46E-06	0.00E+00	1.58E-05	0.00E+00	1.82E-04
47AG	110M	6.00E-04	5.39E-07	3.64E-07	2.91E-07	0.00E+00	6.78E-07	0.00E+00	4.33E-05
52TE	129M	7.80E-05	4.87E-05	1.36E-05	7.56E-06	1.57E-05	1.43E-04	0.00E+00	5.94E-05
52TE	129	3.10E-04	1.34E-07	3.74E-08	3.18E-08	9.56E-08	3.92E-07	0.00E+00	8.34E-06
52TE	131M	2.50E-04	7.20E-06	2.49E-06	2.65E-06	5.12E-06	2.41E-05	0.00E+00	1.01E-04
52TE	131	7.60E-05	8.30E-08	2.53E-08	2.47E-08	6.35E-08	2.51E-07	0.00E+00	4.36E-07
53I	131	4.00E-04	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	0.00E+00	1.54E-06
52TE	132	4.70E-04	1.01E-05	4.47E-06	5.40E-06	6.51E-06	4.15E-05	0.00E+00	4.50E-05
53I	132	3.10E-04	8.00E-07	1.47E-06	6.76E-07	6.82E-05	2.25E-06	0.00E+00	1.73E-06
53I	133	8.10E-04	5.92E-06	7.32E-06	2.77E-06	1.36E-03	1.22E-05	0.00E+00	2.95E-06
53I	134	8.90E-05	4.19E-07	7.78E-07	3.58E-07	1.79E-05	1.19E-06	0.00E+00	5.16E-07
55CS	134	1.00E-03	2.34E-04	3.84E-04	8.10E-05	0.00E+00	1.19E-04	4.27E-05	2.07E-06
53I	135	7.80E-04	1.75E-06	3.15E-06	1.49E-06	2.79E-04	4.83E-06	0.00E+00	2.40E-06
55CS	136	2.20E-02	2.35E-05	6.46E-05	4.18E-05	0.00E+00	3.44E-05	5.13E-06	2.27E-06
55CS	137	2.00E-03	3.27E-04	3.13E-04	4.62E-05	0.00E+00	1.02E-04	3.67E-05	1.96E-06
56BA	140	4.90E-03	8.31E-05	7.28E-08	4.85E-06	0.00E+00	2.37E-08	4.34E-08	4.21E-05
57LA	140	8.00E-03	1.01E-08	3.53E-09	1.19E-09	0.00E+00	0.00E+00	0.00E+00	9.84E-05
58CE	141	6.00E-05	3.97E-08	1.98E-08	2.94E-09	0.00E+00	8.68E-09	0.00E+00	2.47E-05
58CE	143	5.00E-04	6.99E-09	3.79E-06	5.49E-10	0.00E+00	1.59E-09	0.00E+00	5.55E-05
59PR	143	7.90E-05	3.93E-08	1.18E-08	1.95E-09	0.00E+00	6.39E-09	0.00E+00	4.24E-05
59PR	144	1.70E-03	1.29E-10	3.99E-11	6.49E-12	0.00E+00	2.11E-11	0.00E+00	8.59E-08
58CE	144	1.70E-03	2.08E-06	6.52E-07	1.11E-07	0.00E+00	3.61E-07	0.00E+00	1.70E-04

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		INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)		
NUCLIDE	CURIE/YEAR	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON
1H 3	1.60E+03	0.00E+00	1.76E-07	1.76E-07	1.76E-07	1.76E-07	1.76E-07	1.76E-07			
11NA 24	4.70E-03	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05			
24CR 51	1.30E-03	0.00E+00	0.00E+00	1.41E-08	9.20E-09	2.01E-09	1.79E-08	4.11E-07			
25MN 54	7.00E-04	0.00E+00	1.99E-05	4.51E-06	0.00E+00	4.41E-06	0.00E+00	7.31E-06			
26FE 55	5.00E-04	1.39E-05	8.98E-06	2.40E-06	0.00E+00	0.00E+00	4.39E-06	1.14E-06			
26FE 59	1.00E-04	3.08E-05	5.38E-05	2.12E-05	0.00E+00	0.00E+00	1.59E-05	2.57E-05			
27CO 58	1.90E-03	0.00E+00	3.60E-06	8.98E-06	0.00E+00	0.00E+00	0.00E+00	8.97E-06			
30ZN 65	2.20E-04	1.84E-05	6.31E-05	2.91E-05	0.00E+00	3.06E-05	0.00E+00	5.33E-05			
74W 187	3.50E-04	9.03E-07	6.28E-07	2.17E-07	0.00E+00	0.00E+00	0.00E+00	3.69E-05			
93NP 239	5.30E-04	1.11E-08	9.93E-10	5.61E-10	0.00E+00	1.98E-09	0.00E+00	2.87E-05			
37RB 88	2.80E-02	0.00E+00	4.98E-07	2.73E-07	0.00E+00	0.00E+00	0.00E+00	4.85E-07			
38SR 89	6.00E-05	2.51E-03	0.00E+00	7.20E-05	0.00E+00	0.00E+00	0.00E+00	5.16E-05			
38SR 90	8.00E-06	2.83E-02	0.00E+00	5.74E-04	0.00E+00	0.00E+00	0.00E+00	2.31E-04			
38SR 91	6.80E-05	5.00E-05	0.00E+00	1.81E-06	0.00E+00	0.00E+00	0.00E+00	5.92E-05			
39Y 91M	4.40E-05	8.10E-10	0.00E+00	2.76E-11	0.00E+00	0.00E+00	0.00E+00	2.70E-06			
39Y 91	1.00E-05	1.13E-06	0.00E+00	3.01E-08	0.00E+00	0.00E+00	0.00E+00	8.10E-05			
39Y 93	3.10E-04	2.43E-08	0.00E+00	6.62E-10	0.00E+00	0.00E+00	0.00E+00	1.92E-04			
40ZR 95	2.00E-04	2.06E-07	5.02E-08	3.56E-08	0.00E+00	5.41E-08	0.00E+00	2.50E-05			
41NB 95	1.00E-04	4.20E-08	1.73E-08	1.00E-08	0.00E+00	1.24E-08	0.00E+00	1.46E-05			

42MO 99	1.60E-03	0.00E+00	3.40E-05	6.63E-06	0.00E+00	5.08E-05	0.00E+00	1.12E-05
43TC 99M	1.70E-03	1.92E-09	3.96E-09	5.10E-08	0.00E+00	4.26E-08	2.07E-09	1.15E-06
44RU 103	3.10E-03	1.48E-06	0.00E+00	4.95E-07	0.00E+00	3.08E-06	0.00E+00	1.80E-05
44RU 106	3.80E-02	2.41E-05	0.00E+00	3.01E-06	0.00E+00	2.85E-05	0.00E+00	1.83E-04
47AG 110M	6.00E-04	9.96E-07	7.27E-07	4.81E-07	0.00E+00	1.04E-06	0.00E+00	3.77E-05
52TE 129M	7.80E-05	1.00E-04	3.43E-05	1.54E-05	3.84E-05	2.50E-04	0.00E+00	5.97E-05
52TE 129	3.10E-04	2.84E-07	9.79E-08	6.63E-08	2.38E-07	7.07E-07	0.00E+00	2.27E-05
52TE 131M	2.50E-04	1.52E-05	6.12E-06	5.05E-06	1.24E-05	4.21E-05	0.00E+00	1.03E-04
52TE 131	7.60E-05	1.76E-07	6.50E-08	4.94E-08	1.57E-07	4.50E-07	0.00E+00	7.11E-06
53I 131	4.00E-04	3.59E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	0.00E+00	1.51E-06
52TE 132	4.70E-04	2.08E-05	1.03E-05	9.61E-06	1.52E-05	6.44E-05	0.00E+00	3.81E-05
53I 132	3.10E-04	1.66E-06	3.37E-06	1.20E-06	1.58E-04	3.76E-06	0.00E+00	2.73E-06
53I 133	8.10E-04	1.25E-05	1.82E-05	5.33E-06	3.31E-03	2.14E-05	0.00E+00	3.08E-06
53I 134	8.90E-05	8.69E-07	1.78E-06	6.33E-07	4.15E-05	1.99E-06	0.00E+00	1.84E-06
55CS 134	1.00E-03	3.77E-04	7.03E-04	7.10E-05	0.00E+00	1.81E-04	7.42E-05	1.91E-06
53I 135	7.80E-04	3.64E-06	7.24E-06	2.64E-06	6.49E-04	8.07E-06	0.00E+00	2.62E-06
55CS 136	2.20E-02	4.59E-05	1.35E-04	5.04E-05	0.00E+00	5.38E-05	1.10E-05	2.05E-06
55CS 137	2.00E-03	5.22E-04	6.11E-04	4.33E-05	0.00E+00	1.64E-04	6.64E-05	1.91E-06
56BA 140	4.90E-03	1.71E-04	1.71E-07	8.81E-06	0.00E+00	4.06E-08	1.05E-07	4.20E-05
57LA 140	8.00E-03	2.11E-08	8.32E-09	2.14E-09	0.00E+00	0.00E+00	0.00E+00	9.77E-05
58CE 141	6.00E-05	7.87E-08	4.80E-08	5.65E-09	0.00E+00	1.48E-08	0.00E+00	2.48E-05
58CE 143	5.00E-04	1.48E-08	9.82E-06	1.12E-09	0.00E+00	2.86E-09	0.00E+00	5.73E-05
59PR 143	7.90E-05	8.13E-08	3.04E-08	4.03E-09	0.00E+00	1.13E-08	0.00E+00	4.29E-05
59PR 144	1.70E-03	2.74E-10	1.06E-10	1.38E-11	0.00E+00	3.84E-11	0.00E+00	4.93E-06
58CE 144	1.70E-03	2.98E-06	1.22E-06	1.67E-07	0.00E+00	4.93E-07	0.00E+00	1.71E-04

0TOTAL NUMBER IN SOURCE TERM IS 44 TOTAL RELEASE IS 1.6001E+03

1 * * * AS LOW AS REASONABLY ACHIEVABLE * * *

0 A D U L T D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.79E-01	3.09E-01	2.25E-01	3.58E-02	1.30E-01	6.60E-02	5.22E-02
DRINKING		1.74E-04	5.10E-02	5.09E-02	5.08E-02	5.09E-02	5.08E-02	5.20E-02
SHORELINE	3.57E-04	3.05E-04	3.05E-04	3.05E-04	3.05E-04	3.05E-04	3.05E-04	3.05E-04
TOTAL	3.57E-04	1.79E-01	3.61E-01	2.76E-01	8.69E-02	1.81E-01	1.17E-01	1.05E-01

0 USAGE (KG/YR,HR/YR)		DILUTION	TIME(HR)	SHOREWIDTH FACTOR= .2
FISH	21.0	1.0	31.30	
DRINKING	730.0	27.2	78.00	
SHORELINE	12.0	1.0	7.30	

0 T E E N A G E R D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.90E-01	3.10E-01	1.35E-01	2.75E-02	1.24E-01	6.38E-02	4.02E-02
DRINKING		1.63E-04	3.60E-02	3.59E-02	3.58E-02	3.59E-02	3.58E-02	3.66E-02
SHORELINE	1.99E-03	1.70E-03	1.70E-03	1.70E-03	1.70E-03	1.70E-03	1.70E-03	1.70E-03
TOTAL	1.99E-03	1.92E-01	3.48E-01	1.73E-01	6.50E-02	1.62E-01	1.01E-01	7.85E-02

0 USAGE (KG/YR,HR/YR) DILUTION TIME(HR) SHOREWIDTH FACTOR= .2

FISH	16.0	1.0	31.30
DRINKING	510.0	27.2	78.00
SHORELINE	67.0	1.0	7.30

0 C H I L D D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.37E-01	2.74E-01	6.62E-02	2.28E-02	1.05E-01	5.17E-02	2.79E-02
DRINKING		4.61E-04	6.91E-02	6.88E-02	6.87E-02	6.89E-02	6.88E-02	6.96E-02
SHORELINE	4.17E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04
TOTAL	4.17E-04	2.38E-01	3.44E-01	1.35E-01	9.19E-02	1.75E-01	1.21E-01	9.78E-02

0 USAGE (KG/YR,HR/YR) DILUTION TIME(HR) SHOREWIDTH FACTOR= .2

FISH	6.9	1.0	31.30
DRINKING	510.0	27.2	78.00
SHORELINE	14.0	1.0	7.30

0 I N F A N T D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
DRINKING		4.66E-04	6.79E-02	6.75E-02	6.75E-02	6.77E-02	6.75E-02	6.80E-02
SHORELINE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL	0.00E+00	4.66E-04	6.79E-02	6.75E-02	6.75E-02	6.77E-02	6.75E-02	6.80E-02

0 USAGE (KG/YR,HR/YR) DILUTION TIME(HR) SHOREWIDTH FACTOR= .2

FISH	.0	1.0	31.30
DRINKING	330.0	27.2	78.00

1 * * * SELECTED LOCATION * * *

0LOCATION IS SCR Employee Use

0 A D U L T D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.79E-01	3.09E-01	2.25E-01	3.58E-02	1.30E-01	6.60E-02	5.23E-02
DRINKING		4.74E-03	1.39E+00	1.39E+00	1.38E+00	1.39E+00	1.38E+00	1.41E+00
SHORELINE	5.36E-04	4.58E-04	4.58E-04	4.58E-04	4.58E-04	4.58E-04	4.58E-04	4.58E-04
TOTAL	5.36E-04	1.84E-01	1.70E+00	1.61E+00	1.42E+00	1.52E+00	1.45E+00	1.47E+00

0 USAGE (KG/YR,HR/YR) DILUTION TIME(HR) SHOREWIDTH FACTOR= .3

FISH	21.0	1.0	24.00
DRINKING	730.0	1.0	12.00
SHORELINE	12.0	1.0	.00

0LOCATION IS SCR Employee Use

0 T E E N A G E R D O S E S

0 DOSE (MREM PER YEAR INTAKE)

0PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.90E-01	3.11E-01	1.35E-01	2.75E-02	1.24E-01	6.39E-02	4.02E-02
DRINKING		4.45E-03	9.78E-01	9.76E-01	9.74E-01	9.76E-01	9.74E-01	9.97E-01
SHORELINE	2.99E-03	2.56E-03	2.56E-03	2.56E-03	2.56E-03	2.56E-03	2.56E-03	2.56E-03

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 TOTAL              2.99E-03       1.97E-01       1.29E+00       1.11E+00       1.00E+00       1.10E+00       1.04E+00       1.04E+00
0            USAGE (KG/YR,HR/YR)           DILUTION       TIME(HR)           SHOREWIDTH FACTOR= .3
 FISH                  16.0                  1.0          24.00
 DRINKING             510.0                  1.0          12.00
 SHORELINE             67.0                  1.0            .00
0LOCATION IS  SCR Employee Use
0                     C H I L D   D O S E S
0                                                                  DOSE  (MREM PER YEAR INTAKE)
0PATHWAY              SKIN           BONE           LIVER          TOTAL BODY      THYROID         KIDNEY          LUNG           GI-LLI
 FISH                              2.37E-01       2.75E-01       6.62E-02       2.28E-02       1.05E-01       5.17E-02       2.79E-02
 DRINKING                          1.26E-02       1.88E+00       1.87E+00       1.87E+00       1.88E+00       1.87E+00       1.89E+00
 SHORELINE          6.25E-04       5.34E-04       5.34E-04       5.34E-04       5.34E-04       5.34E-04       5.34E-04       5.34E-04
 TOTAL              6.25E-04       2.50E-01       2.15E+00       1.94E+00       1.89E+00       1.98E+00       1.92E+00       1.92E+00
0            USAGE (KG/YR,HR/YR)           DILUTION       TIME(HR)           SHOREWIDTH FACTOR= .3
 FISH                   6.9                  1.0          24.00
 DRINKING             510.0                  1.0          12.00
 SHORELINE             14.0                  1.0            .00
0LOCATION IS  SCR Employee Use
0                     I N F A N T    D O S E S
0                                                                  DOSE  (MREM PER YEAR INTAKE)
0PATHWAY              SKIN           BONE           LIVER          TOTAL BODY      THYROID         KIDNEY          LUNG           GI-LLI
 FISH                              0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00
 DRINKING                          1.27E-02       1.85E+00       1.84E+00       1.84E+00       1.84E+00       1.84E+00       1.85E+00
 SHORELINE          0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00       0.00E+00
 TOTAL              0.00E+00       1.27E-02       1.85E+00       1.84E+00       1.84E+00       1.84E+00       1.84E+00       1.85E+00
0            USAGE (KG/YR,HR/YR)           DILUTION       TIME(HR)           SHOREWIDTH FACTOR= .3
 FISH                   .0                   1.0          24.00
 DRINKING             330.0                  1.0          12.00
1                              *  *  *  FISH CONSUMPTION POPULATION DOSES  *  *  *
                                                PERSON-REM
0__________SPORT HARVEST__________
0                                 ----------------------------DOSE (PERSON-REM)-------------------------
0PATHWAY     AGE GROUP       USAGE      BONE      LIVER    TOTAL BODY  THYROID   KIDNEY      LUNG      GI-LLI
 FISH        ADULT         2.71E+05  8.43E-02  1.45E-01  1.06E-01  1.70E-02  6.07E-02  3.12E-02  2.45E-02
 FISH        TEENAGER      3.16E+04  1.37E-02  2.23E-02  9.71E-03  2.00E-03  8.91E-03  4.62E-03  2.89E-03
 FISH        CHILD         2.19E+04  2.75E-02  3.17E-02  7.56E-03  2.66E-03  1.22E-02  6.00E-03  3.23E-03
 FISH        TOTAL         3.24E+05  1.26E-01  1.99E-01  1.23E-01  2.16E-02  8.18E-02  4.18E-02  3.06E-02
0    LOCATION         DILUTION    CATCH     TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 1.68E+02 HR     POPULATION=5.53E+04
  Sport Fish Above W   2.72E+01  3.24E+05  2.34E+02
0AVERAGE INDIVIDUAL CONSUMPTION (KG/YR)     ADULT=6.90E+00     TEEN=5.20E+00     CHILD=2.20E+00
1                              *  *  *  POPULATION WATER CONSUMPTION DOSES  *  *  *
0_____________________________________________________________________________________________________
0SUPPLIER-City of Whitney
0                                 ----------------------------DOSE (PERSON-REM)-------------------------
0PATHWAY     AGE GROUP       USAGE      BONE      LIVER    TOTAL BODY  THYROID   KIDNEY      LUNG      GI-LLI
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 DRINKING    ADULT         9.78E+05  1.16E-04  3.41E-02  3.41E-02  3.40E-02  3.41E-02  3.40E-02  3.48E-02
 DRINKING    TEENAGER      1.06E+05  1.70E-05  3.75E-03  3.74E-03  3.73E-03  3.74E-03  3.74E-03  3.82E-03
 DRINKING    CHILD         1.74E+05  7.87E-05  1.18E-02  1.17E-02  1.17E-02  1.18E-02  1.17E-02  1.19E-02
 DRINKING    TOTAL         1.26E+06  2.12E-04  4.97E-02  4.96E-02  4.95E-02  4.96E-02  4.95E-02  5.05E-02
0POPULATION=3.72E+03     DILUTION=5.44E+01     TRANSIT TIME=1.01E+02 HR (INCLUDING 24 HR FOR TREATMENT FACILITY)
0AVERAGE INDIVIDUAL CONSUMPTION (L/YR)     ADULT=3.70E+02     TEEN=2.60E+02     CHILD=2.60E+02
0_____________________________________________________________________________________________________
0SUPPLIER-City of Cleburn
0                                  ----------------------------DOSE (PERSON-REM)-------------------------
0PATHWAY     AGE GROUP       USAGE     BONE     LIVER   TOTAL BODY  THYROID   KIDNEY     LUNG     GI-LLI
 DRINKING    ADULT         1.40E+07  3.34E-03  9.80E-01  9.79E-01  9.77E-01  9.79E-01  9.77E-01  9.99E-01
 DRINKING    TEENAGER      1.53E+06  4.89E-04  1.08E-01  1.07E-01  1.07E-01  1.08E-01  1.07E-01  1.10E-01
 DRINKING    CHILD         2.50E+06  2.26E-03  3.39E-01  3.37E-01  3.37E-01  3.38E-01  3.37E-01  3.41E-01
 DRINKING    TOTAL         1.81E+07  6.09E-03  1.43E+00  1.42E+00  1.42E+00  1.42E+00  1.42E+00  1.45E+00
0POPULATION=5.34E+04     DILUTION=2.72E+01     TRANSIT TIME=9.00E+01 HR (INCLUDING 24 HR FOR TREATMENT FACILITY)
0AVERAGE INDIVIDUAL CONSUMPTION (L/YR)     ADULT=3.70E+02     TEEN=2.60E+02     CHILD=2.60E+02
0-----CUMULATIVE TOTAL-----
0PATHWAY     AGE GROUP       USAGE     BONE     LIVER   TOTAL BODY  THYROID   KIDNEY     LUNG     GI-LLI
 DRINKING    CUMUL TOTAL   1.93E+07  6.30E-03  1.48E+00  1.47E+00  1.47E+00  1.47E+00  1.47E+00  1.50E+00
0_____________________________________________________________________________________________________
0__________HYDROSPHERE TRITIUM DOSE__________
0AVERAGE INDIVIDUAL WATER CONSUMPTION = 3.0 L/DAY
0PATHWAY     AGE GROUP       USAGE     BONE     LIVER   TOTAL BODY  THYROID   KIDNEY     LUNG     GI-LLI
 WATER       TOTAL         2.86E+11  0.00E+00  1.47E-02  1.47E-02  1.47E-02  1.47E-02  1.47E-02  1.47E-02
1                                 *   *   *   RECREATION POPULATION DOSES   *   *   *
0_____________________________________________________________________________________________________
0LOCATION- Shore W R
0DILUTION= 5.44E+01          TRANSIT TIME= 7.70E+01 HR          SWF=  .3
0                                                  _____________DOSE (PERSON-REM)_____________
0PATHWAY      AGE GROUP          USAGE            SKIN        TOTAL BODY       THYROID
 SHORELINE   TOTAL POPUL        2.24E+07        1.83E-02        1.57E-02        1.57E-02
0_____________________________________________________________________________________________________
0LOCATION-  Swim W R
0DILUTION= 5.44E+01          TRANSIT TIME= 7.70E+01 HR
0                                                  _____________DOSE (PERSON-REM)_____________
0PATHWAY      AGE GROUP          USAGE            SKIN        TOTAL BODY       THYROID
 SWIMMING    TOTAL POPUL        2.24E+07                        8.74E-05        8.74E-05
0_____________________________________________________________________________________________________
0LOCATION-  Boat W R
0DILUTION= 5.44E+01          TRANSIT TIME= 7.70E+01 HR
0                                                  _____________DOSE (PERSON-REM)_____________
0PATHWAY      AGE GROUP          USAGE            SKIN        TOTAL BODY       THYROID
 BOATING     TOTAL POPUL        2.24E+07                        4.37E-05        4.37E-05
1                                    *    *    *  IRRIGATED FOOD PATHWAY  *    *    *
 LEAFY VEGE
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0     TOTAL 50-MILE-PRODUCTION POPULATION SERVED=  9.88E+02
      TOTAL POPULATION SERVED FROM IRRIGATED PRODUCTION=  9.88E+02
0                                          INDIVIDUAL DOSES(MREM PER YEAR INTAKE)
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             1.02E-04      4.55E-03       4.52E-03       4.45E-03       4.51E-03       4.46E-03       5.06E-03
 TEENAGER          8.97E-05      3.04E-03       2.98E-03       2.95E-03       2.99E-03       2.96E-03       3.37E-03
 CHILD             1.57E-04      3.62E-03       3.53E-03       3.50E-03       3.56E-03       3.52E-03       3.76E-03
0              NOTE- INDIVIDUAL DOSES CALCULATED WITH DILUTION= 2.72E+01 AND TRANSIT TIME= 6.60E+01 HRS.
0                              POPULATION DOSES(PERSON-REM)
0*  *  *  NEPA DOSES  *  *  *
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             3.35E-05      1.50E-03       1.49E-03       1.46E-03       1.48E-03       1.47E-03       1.67E-03
 TEENAGER          4.64E-06      1.57E-04       1.54E-04       1.53E-04       1.55E-04       1.53E-04       1.74E-04
 CHILD             1.07E-05      2.47E-04       2.41E-04       2.40E-04       2.44E-04       2.41E-04       2.57E-04
 TOTAL             4.89E-05      1.90E-03       1.88E-03       1.86E-03       1.88E-03       1.86E-03       2.10E-03
0$  $  $  ALARA DOSES  $  $  $
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             3.35E-05      1.50E-03       1.49E-03       1.46E-03       1.48E-03       1.47E-03       1.67E-03
 TEENAGER          4.64E-06      1.57E-04       1.54E-04       1.53E-04       1.55E-04       1.53E-04       1.74E-04
 CHILD             1.07E-05      2.47E-04       2.41E-04       2.40E-04       2.44E-04       2.41E-04       2.57E-04
 TOTAL             4.89E-05      1.90E-03       1.88E-03       1.86E-03       1.88E-03       1.86E-03       2.10E-03
0IRRI FOOD        IRRIGATION RATE= 7.46E+01 L/M**2/MON
                  NON-IRRIGATED FEED FRACTION= 0.00E+00
                  WATER FRACTION NOT VIA IRRIGATION= 0.00E+00
                  TOTAL 50 MILE GROW= 2.50E+04 KG/YR
                  TOTAL CROP IRRIGATION= 2.50E+04
                  CROP GROWING PERIOD= 6.00E+01 DAYS
                  CROP YIELD= 2.00E+00 KG/M**2

                     LOCATION          DILUTION  HARVEST  TRANSIT TIME
                  Leafy Above W R      2.72E+01  2.50E+04  6.60E+01
0INDIVIDUAL CONSUMPTION RATES    ADULT=6.40E+01 KG     TEEN=4.20E+01     CHILD=2.60E+01     FOOD PROCESS TIME=2.40E+01 HR
 POPULATION CONSUMPTION RATES    ADULT=3.00E+01 KG     TEEN=2.00E+01     CHILD=1.00E+01     FOOD PROCESS TIME=4.80E+01 HR
1                                  *    *    *  IRRIGATED FOOD PATHWAY  *    *    *
 VEGETATION
0     TOTAL 50-MILE-PRODUCTION POPULATION SERVED=  2.67E+04
      TOTAL POPULATION SERVED FROM IRRIGATED PRODUCTION=  2.67E+04
0                                          INDIVIDUAL DOSES(MREM PER YEAR INTAKE)
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             8.24E-04      3.69E-02       3.67E-02       3.61E-02       3.65E-02       3.62E-02       4.10E-02
 TEENAGER          1.34E-03      4.54E-02       4.46E-02       4.41E-02       4.48E-02       4.43E-02       5.03E-02
 CHILD             3.11E-03      7.22E-02       7.04E-02       6.99E-02       7.11E-02       7.02E-02       7.49E-02
0              NOTE- INDIVIDUAL DOSES CALCULATED WITH DILUTION= 2.72E+01 AND TRANSIT TIME= 6.60E+01 HRS.
0                              POPULATION DOSES(PERSON-REM)
0*  *  *  NEPA DOSES  *  *  *
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0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             5.62E-03       2.54E-01       2.52E-01       2.48E-01       2.51E-01       2.49E-01       2.79E-01
 TEENAGER          1.47E-03       5.05E-02       4.96E-02       4.90E-02       4.98E-02       4.92E-02       5.54E-02
 CHILD             5.66E-03       1.33E-01       1.29E-01       1.28E-01       1.30E-01       1.29E-01       1.37E-01
 TOTAL             1.27E-02       4.37E-01       4.31E-01       4.26E-01       4.31E-01       4.27E-01       4.71E-01
0$  $  $  ALARA DOSES  $  $  $
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             5.62E-03       2.54E-01       2.52E-01       2.48E-01       2.51E-01       2.49E-01       2.79E-01
 TEENAGER          1.47E-03       5.05E-02       4.96E-02       4.90E-02       4.98E-02       4.92E-02       5.54E-02
 CHILD             5.66E-03       1.33E-01       1.29E-01       1.28E-01       1.30E-01       1.29E-01       1.37E-01
 TOTAL             1.27E-02       4.37E-01       4.31E-01       4.26E-01       4.31E-01       4.27E-01       4.71E-01
0IRRI FOOD        IRRIGATION RATE= 7.46E+01 L/M**2/MON
                  NON-IRRIGATED FEED FRACTION= 0.00E+00
                  WATER FRACTION NOT VIA IRRIGATION= 0.00E+00
                  TOTAL 50 MILE GROW= 5.27E+06 KG/YR
                  TOTAL CROP IRRIGATION= 5.27E+06
                  CROP GROWING PERIOD= 6.00E+01 DAYS
                  CROP YIELD= 2.00E+00 KG/M**2

                     LOCATION          DILUTION  HARVEST  TRANSIT TIME
                  Veg Above W R        2.72E+01  5.27E+06  6.60E+01
0INDIVIDUAL CONSUMPTION RATES    ADULT=5.20E+02 KG     TEEN=6.30E+02     CHILD=5.20E+02     FOOD PROCESS TIME=3.36E+02 HR
 POPULATION CONSUMPTION RATES    ADULT=1.90E+02 KG     TEEN=2.40E+02     CHILD=2.00E+02     FOOD PROCESS TIME=1.44E+03 HR
1                                  *    *    *  IRRIGATED FOOD PATHWAY  *    *    *
 MILK
0     TOTAL 50-MILE-PRODUCTION POPULATION SERVED=  7.21E+03
      TOTAL POPULATION SERVED FROM IRRIGATED PRODUCTION=  7.21E+03
0                    _____________________________________INDIVIDUAL DOSES(MREM PER YEAR INTAKE)_____________________________
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             4.66E-04       2.23E-02       2.21E-02       2.16E-02       2.18E-02       2.17E-02       2.17E-02
 TEENAGER          8.36E-04       2.93E-02       2.85E-02       2.81E-02       2.85E-02       2.82E-02       2.82E-02
 CHILD             1.99E-03       4.65E-02       4.48E-02       4.45E-02       4.52E-02       4.47E-02       4.46E-02
0               NOTE- INDIVIDUAL DOSES CALCULATED WITH DILUTION= 2.72E+01 AND TRANSIT TIME= 6.60E+01 HRS.
0                   _____________POPULATION DOSES(PERSON-REM)_____________
0*  *  *  NEPA DOSES  *  *  *
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             8.46E-04       4.05E-02       4.01E-02       3.92E-02       3.96E-02       3.94E-02       3.94E-02
 TEENAGER          3.31E-04       1.16E-02       1.13E-02       1.11E-02       1.13E-02       1.12E-02       1.12E-02
 CHILD             1.33E-03       3.11E-02       3.00E-02       2.98E-02       3.02E-02       2.99E-02       2.98E-02
 TOTAL             2.51E-03       8.32E-02       8.14E-02       8.01E-02       8.12E-02       8.05E-02       8.04E-02
0$  $  $  ALARA DOSES  $  $  $
0                    BONE          LIVER        TOTAL BODY      THYROID         KIDNEY          LUNG          GI-LLI
 ADULT             8.46E-04       4.05E-02       4.01E-02       3.92E-02       3.96E-02       3.94E-02       3.94E-02
 TEENAGER          3.31E-04       1.16E-02       1.13E-02       1.11E-02       1.13E-02       1.12E-02       1.12E-02
 CHILD             1.33E-03       3.11E-02       3.00E-02       2.98E-02       3.02E-02       2.99E-02       2.98E-02
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 TOTAL              2.51E-03       8.32E-02       8.14E-02       8.01E-02       8.12E-02       8.05E-02       8.04E-02
0IRRI FOOD         IRRIGATION RATE= 7.46E+01 L/M**2/MON
                   NON-IRRIGATED FEED FRACTION= 0.00E+00
                   WATER FRACTION NOT VIA IRRIGATION= 0.00E+00
                   TOTAL 50 MILE GROW= 9.43E+05 KG/YR
                   TOTAL CROP IRRIGATION= 9.43E+05
                   CROP GROWING PERIOD= 3.00E+01 DAYS
                   CROP YIELD= 7.00E-01 KG/M**2

                      LOCATION          DILUTION  HARVEST  TRANSIT TIME
                   Milk Above W R       2.72E+01  9.43E+05  6.60E+01
0INDIVIDUAL CONSUMPTION RATES    ADULT=3.10E+02 KG     TEEN=4.00E+02     CHILD=3.30E+02     FOOD PROCESS TIME=4.80E+01 HR
 POPULATION CONSUMPTION RATES    ADULT=1.10E+02 KG     TEEN=2.00E+02     CHILD=1.70E+02     FOOD PROCESS TIME=9.60E+01 HR
1                                   *    *    *  IRRIGATED FOOD PATHWAY  *    *    *
 MEAT
0     TOTAL 50-MILE-PRODUCTION POPULATION SERVED=  3.49E+03
      TOTAL POPULATION SERVED FROM IRRIGATED PRODUCTION=  3.49E+03
0                                                  INDIVIDUAL DOSES(MREM PER YEAR INTAKE)
0                    BONE           LIVER          TOTAL BODY       THYROID         KIDNEY          LUNG          GI-LLI
 ADULT              7.95E-04       7.74E-03       7.81E-03       7.66E-03       9.11E-03       7.67E-03       5.54E-02
 TEENAGER           6.68E-04       4.63E-03       4.66E-03       4.56E-03       5.78E-03       4.57E-03       3.44E-02
 CHILD              1.25E-03       5.61E-03       5.69E-03       5.53E-03       7.13E-03       5.54E-03       2.37E-02
0              NOTE- INDIVIDUAL DOSES CALCULATED WITH DILUTION= 2.72E+01 AND TRANSIT TIME= 6.60E+01 HRS.
0                                 POPULATION DOSES(PERSON-REM)
0*  *  *  NEPA DOSES  *  *  *
0                    BONE           LIVER          TOTAL BODY       THYROID         KIDNEY          LUNG          GI-LLI
 ADULT              1.70E-03       1.65E-02       1.67E-02       1.64E-02       1.95E-02       1.64E-02       1.18E-01
 TEENAGER           2.33E-04       1.61E-03       1.62E-03       1.59E-03       2.01E-03       1.59E-03       1.20E-02
 CHILD              7.11E-04       3.18E-03       3.22E-03       3.13E-03       4.04E-03       3.14E-03       1.34E-02
 TOTAL              2.64E-03       2.13E-02       2.15E-02       2.11E-02       2.55E-02       2.11E-02       1.44E-01
0$  $  $  ALARA DOSES  $  $  $
0                    BONE           LIVER          TOTAL BODY       THYROID         KIDNEY          LUNG          GI-LLI
 ADULT              1.70E-03       1.65E-02       1.67E-02       1.64E-02       1.95E-02       1.64E-02       1.18E-01
 TEENAGER           2.33E-04       1.61E-03       1.62E-03       1.59E-03       2.01E-03       1.59E-03       1.20E-02
 CHILD              7.11E-04       3.18E-03       3.22E-03       3.13E-03       4.04E-03       3.14E-03       1.34E-02
 TOTAL              2.64E-03       2.13E-02       2.15E-02       2.11E-02       2.55E-02       2.11E-02       1.44E-01
0IRRI FOOD         IRRIGATION RATE= 7.46E+01 L/M**2/MON
                   NON-IRRIGATED FEED FRACTION= 0.00E+00
                   WATER FRACTION NOT VIA IRRIGATION= 0.00E+00
                   TOTAL 50 MILE GROW= 2.81E+05 KG/YR
                   TOTAL CROP IRRIGATION= 2.81E+05
                   CROP GROWING PERIOD= 3.00E+01 DAYS
                   CROP YIELD= 7.00E-01 KG/M**2

                      LOCATION          DILUTION  HARVEST  TRANSIT TIME
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                  Meat Above L W       2.72E+01  2.81E+05  6.60E+01
0INDIVIDUAL CONSUMPTION RATES    ADULT=1.10E+02 KG     TEEN=6.50E+01     CHILD=4.10E+01     FOOD PROCESS TIME=4.80E+02 HR
 POPULATION CONSUMPTION RATES    ADULT=9.50E+01 KG     TEEN=5.90E+01     CHILD=3.70E+01     FOOD PROCESS TIME=4.80E+02 HR
1*    *    *  DOSE TO BIOTA  *    *    *
0                  MRADS PER YEAR
0_____________________________________________
   Biota              DILUTION=  1.00E+00          TRANSIT TIME=  0.00E+00 HR
0                    INTERNAL       EXTERNAL         TOTAL
 FISH                1.22E+00       1.12E+00       2.33E+00
 INVERTEBRATE        3.30E+00       2.23E+00       5.53E+00
 ALGAE               1.42E+01       1.92E-03       1.42E+01
 MUSKRAT             8.07E+00       7.44E-01       8.82E+00
 RACCOON             2.01E+00       5.57E-01       2.57E+00
 HERON               2.45E+01       7.44E-01       2.52E+01
 DUCK                7.70E+00       1.12E+00       8.81E+00
1                     *  *  *  COST-BENEFIT ANALYSIS  *  *  *
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0 NUCLIDE	RELEASE	PERSON-REM DOSE		PERSON-REM PER CURIE	
	CI/YR	TOTAL BODY	THYROID	TOTAL BODY	THYROID
1H 3	1.60E+03	2.02E+00	2.02E+00	1.26E-03	1.26E-03
11NA 24	4.70E-03	1.10E-08	1.10E-08	2.34E-06	2.34E-06
24CR 51	1.30E-03	8.38E-08	8.09E-08	6.45E-05	6.22E-05
25MN 54	7.00E-04	1.13E-04	8.72E-05	1.62E-01	1.25E-01
26FE 55	5.00E-04	1.22E-05	2.28E-10	2.45E-02	4.56E-07
26FE 59	1.00E-04	1.59E-06	5.19E-07	1.59E-02	5.19E-03
27CO 58	1.90E-03	3.12E-05	1.97E-05	1.64E-02	1.04E-02
30ZN 65	2.20E-04	2.30E-04	1.23E-05	1.04E+00	5.57E-02
74W 187	3.50E-04	4.77E-10	4.55E-10	1.36E-06	1.30E-06
93NP 239	5.30E-04	1.89E-09	1.89E-09	3.57E-06	3.57E-06
37RB 88	2.80E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38SR 89	6.00E-05	1.17E-06	1.95E-10	1.94E-02	3.26E-06
38SR 90	8.00E-06	1.02E-04	5.93E-11	1.28E+01	7.41E-06
38SR 91	6.80E-05	2.77E-12	2.58E-12	4.07E-08	3.80E-08
39Y 91M	4.40E-05	4.82E-42	4.82E-42	1.10E-37	1.10E-37
39Y 91	1.00E-05	3.52E-10	2.54E-10	3.52E-05	2.54E-05
39Y 93	3.10E-04	1.74E-12	1.74E-12	5.60E-09	5.60E-09
40ZR 95	2.00E-04	1.27E-06	1.27E-06	6.35E-03	6.33E-03
41NB 95	1.00E-04	2.68E-07	2.18E-07	2.68E-03	2.18E-03
42MO 99	1.60E-03	4.84E-08	1.53E-08	3.03E-05	9.56E-06
43TC 99M	1.70E-03	2.02E-13	2.00E-13	1.19E-10	1.18E-10
44RU 103	3.10E-03	6.40E-06	5.65E-06	2.06E-03	1.82E-03
44RU 106	3.80E-02	2.17E-03	1.63E-03	5.71E-02	4.28E-02
47AG 110M	6.00E-04	1.59E-04	1.58E-04	2.65E-01	2.63E-01
52TE 129M	7.80E-05	7.11E-07	1.49E-06	9.11E-03	1.91E-02
52TE 129	3.10E-04	1.46E-33	1.46E-33	4.69E-30	4.69E-30
52TE 131M	2.50E-04	2.45E-09	3.09E-09	9.79E-06	1.24E-05

52TE	131	7.60E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53I	131	4.00E-04	2.33E-07	1.10E-04	5.84E-04	2.76E-01	
52TE	132	4.70E-04	6.52E-08	7.59E-08	1.39E-04	1.61E-04	
53I	132	3.10E-04	1.11E-21	1.11E-21	3.58E-18	3.58E-18	
53I	133	8.10E-04	1.32E-09	2.72E-07	1.63E-06	3.36E-04	
53I	134	8.90E-05	1.69E-39	1.69E-39	1.90E-35	1.90E-35	
55CS	134	1.00E-03	3.05E-02	1.11E-03	3.05E+01	1.11E+00	
53I	135	7.80E-04	3.15E-12	2.94E-11	4.04E-09	3.77E-08	
55CS	136	2.20E-02	1.97E-03	2.64E-05	8.96E-02	1.20E-03	
55CS	137	2.00E-03	9.19E-02	1.27E-02	4.59E+01	6.36E+00	
56BA	140	4.90E-03	2.31E-06	7.30E-07	4.71E-04	1.49E-04	
57LA	140	8.00E-03	2.24E-07	2.24E-07	2.80E-05	2.80E-05	
58CE	141	6.00E-05	1.18E-08	1.18E-08	1.97E-04	1.96E-04	
58CE	143	5.00E-04	1.19E-09	1.19E-09	2.37E-06	2.37E-06	
59PR	143	7.90E-05	3.18E-11	1.97E-11	4.02E-07	2.49E-07	
59PR	144	1.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
58CE	144	1.70E-03	1.05E-05	9.94E-06	6.19E-03	5.85E-03	
0 TOTAL			2.15E+00	2.04E+00			

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Appendix 3
Email from Darren Lovvorn, Enercon, to Joanne Morris, Enercon, Subject: Information Request
(Reference to eroom files including WATER USER TABLES.xls)

Joanne Morris

From: ddlovvorn@enercon.com
Sent: Friday, April 18, 2008 1:43 AM
To: 'Joanne Morris'
Subject: Information Request

Joanne,

I have updated just about everything in the e-room in your folder. The changes mainly include the addition of water rights and clarification of the water uses. The distance maps (from the site and dam) have also been updated. The green tabs in the Water User Tables summarize the information. The other tabs are the sorting steps to find the appropriate water rights and/or contracts to include from the large databases. I am finished pending additional requests or clarifications from you.

-Darren

TCEQ ACTIVE WATER RIGHTS

WATER RIGHT NO.	OWNER	USE	LONGITUDE	LATITUDE	AC-FT/YR	DISTANCE FROM SCR DAM (FT)	CROP	ACRES
4098	BOB HARRIS OIL CO	IRR	-97.684181	32.240025	258	37907	No Use Reported	130
4099	DOROTHY W LITTLE ET AL	IRR	-97.645012	32.213223	5	69958	No Use Reported	27
4103	CYRIL WAGNER JR ET AL	IRR	-97.526665	32.129845	186	135764	No Use Reported	186
4104	CHISHOLM TRAIL VENTURES LP	IRR	-97.484886	32.145153	3,811	183745	Coastal Hay/Blue Stem	334/634
5157	BRAZOS RIVER AUTHORITY	MUN,IND,REC	-97.372017	31.866777	18,336	359057	NA	NA
1856*	CITY OF CLEBURNE*	MUN	-97.372017	31.866777	4,700	359057	No Diversion	NA
1874*	CITY OF WHITNEY*	MUN	-97.369652	31.866104	750	359057	No Diversion	NA
2309*	CLUBCORP GOLF*	IRR	LAKE WHITNEY*		400	359057	Bermuda Grass	150
1865	FRED T OWEN JR ET AL*	MUN	LAKE WHITNEY*		60	359057	No Diversion	NA
4315	CLIFFORD N AUTEN	IRR	-97.318924	31.845894	30	379320	Grass	14
4316	B W BOWERS & WIFE	IRR	-97.307419	31.84919	75	383024	Hay	20
4317	MARY ANN JENKINS ET AL	IRR	-97.288483	31.842878	243	389302	No Use Reported	96
4318	SMITH BEND RANCH LTD[1]	IRR, IND, MUN	-97.285728	31.842089	2153	390124	No Use Reported	628.85
4319	BIRCH WILFONG	IRR	-97.275978	31.836432	34	394184	No Use Reported	27
4320	WARREN D WHITLOW ET UX[2]	IRR	-97.320229	31.794353	84	415075	No Use Reported	84
4321	DAVID BALLEW	IRR	-97.312424	31.764927	337	428128	Coastal Hay/Oats	55/68
4322	RONALD LEE BURNETTE	IRR	-97.302727	31.758867	175	432010	Hay	25
4323	RONALD LEE BURNETTE/KENNETH GAGE BURNETTE	IRR	-97.295204	31.7563	173	434524	Hay	35
4324	CHARLES L HARLESS ET UX	IRR	-97.286903	31.751728	305	437513	Coastal Bermuda	60

WATER RIGHT NO.	OWNER	USE	LONGITUDE	LATITUDE	AC-FT/YR	DISTANCE FROM SCR DAM (FT)	CROP	ACRES
4325	NELDA KATHRYN CARGILL	IRR	-97.280098	31.718229	48	Beyond 50 Miles	No Use Reported	-
4326	DAN WELDON WILLIAMS	IRR	-97.283684	31.716646	6	Beyond 50 Miles		
4327	DAN WELDON WILLIAMS	IRR	-97.285622	31.714777	4	Beyond 50 Miles		
4328	GEORGE L MOORE	IRR	-97.287415	31.703897	40	Beyond 50 Miles	No Use Reported	-
4329	THOMAS BROTHERS GRASS LTD	IRR	-97.276237	31.697586	856	Beyond 50 Miles	No Use Reported	274

* Denotes Water Supply Contract with BRA
Irrigation
Municipal/Domestic

[1] This water right has been ammended to include future muncipal use for customers that have not been identified and mining/industrial use.
2 This water right appears to have been ammended for use in Brazos County; however, references to the Guadalupe River Basin and Bosque County are also cited.

Source
TCEQ Water Rights Database. http://www.tceq.state.tx.us/permitting/water_supply/water_rights/wr_databases.html
Records for individual water rights obtained from TCEQ Headquarters Central Records Room.

BRA WATER CONTRACTS

OBJECTID	CONTRACT_I	COMPANY_NA	TYPE_CODE	LONGITUDE	LATITUDE	DISTANCE FROM SCR DAM (FT)	AC-FT/YR
213200	WHITNEY	WHITNEY, CITY OF[1]	MU	-97.37220000	31.86310000	359057	750
213206	CLEBURNE	CLEBURNE, CITY OF[2]	MU	-97.37440000	31.86390000	359057	4700
213208	WHITE BLUFF_SW	DOUBLE DIAMOND, INC.	IR	-97.42780000	32.03330000	257750	1000
213259	LOCAL_WT	LAKESIDE DOMESTIC USE[3]	IR	-97.37360000	31.86360000	359057	15
213277	HILCO UNITED	LAKE WHITNEY WATER COMPANY[4]	MU	-97.37080000	31.85420000	359057	150
213285	WHITNEY GOLF	LAKE WHITNEY GOLF CLUB	IR	-97.34166667	31.93055556	351325	50
213311	OWEN	FRED T. OWEN, JR.[5]	MU	-97.37310000	31.86330000	359057	60
213345	BOYD	JAMES K. BOYD	AG	-97.34666667	31.85500000	368220	10
213352	THE RETREAT	DOUBLE DIAMOND, INC.	IR	-97.48972222	32.17638889	159886	1200
213383	CLEBURNE 3	CLEBURNE, CITY OF[2]	MULTI	-97.42861111	32.03250000	257750	5000
213389	MATTHEWS-08	CHARLES MATTHEWS	AG	-97.32583333	31.78944444	417935	50

Municipal/Domestic
Irrigation
Agricultural

[1] According to Brad Brunette (BRA Hydrologist), the City of Whitney has a municipal use contract with the BRA ; however, there is no diversion infrastructure and
[2] According to Brad Brunette (BRA Hydrologist), the City of Cleburne has two (2) municipal use contracts with the BRA ; however, there is no diversion infrastructure and no water has been diverted.
[3] According to Brad Brunette (BRA Hydrologist), Lakeside Domestic Use, constitutes several contracts with residents along the shores of Lake Whitney for lawn irrigation. Residents pay the BRA and the water use is approxiamted.
[4] According to Kent Smith (Hillco - Lake Whitney Water Company), the Lake Whitney Water Company uses groundwater from the Trinity Aquifer. A surface water contract with the BRA for municipal use exists (Lake Whitney); however, there is currently no diversion.
[5] According to Brad Brunette (BRA Hydrologist), Fred T. Owen, Jr. has a municipal use contract with the BRA for the development of a subdivision; however, there is no diversion infrastructure and no water has been diverted.

Source:
Spacial data and selected contract use amounts obtained from Van Walker (BRA-GIS)

Appendix 4

Email from Melissa Gayley, Enercon, to MAMorris et al., Subject: Population for Calculation, Attachments: PopulationResults.xls, PopSectorMiles (0 – 10 mi).jpg, PopSectorMiles (10 – 50 mi).jpg

From: Melissa Gayley [mgayley@enercon.com]
Sent: Friday, March 14, 2008 3:22 PM
To: mamorris@enercon.com; 'Joanne Morris'
Cc: 'Christy Batterson'; BWELTMA1@txu.com; 'Chris Byerman'

Subject: Population for Calculation
Attachments: PopulationResults.xls; PopSectorMiles (0 - 10 mi).jpg; PopSectorMiles (10 - 50 mi).jpg

Hello everyone,

Here is the completed population analysis using the mile radii (1, 2, 3, 4, 5, 10, 20, 30, 40, 50 mi). I have included permanent, transient, and total population projections for the years 2026 and 2058. The figures illustrate the sectors that correspond to the sector numbers in the table. Please keep I mind that these sector maps and population totals differ from the ones included in the document as the document analysis is based on kilometer radii per NUREG 1555. If there are any problems or if you need any further information for the calculation please contact me.

Thanks!

Melissa Gayley
GIS Specialist

Enercon Services, Inc.
6525 N. Meridian, Ste. 400
Oklahoma City, OK 73116
mgayley@enercon.com
(405) 722-7693

Direction	Distance	Sector Number	2026 Permanent Population	2026 Transient Population	2026 Total Population	2058 Permanent Population	2058 Transient Population	2058 Total Population
N	0-1 mi	1	0	0	0	0	0	0
NNE	0-1 mi	2	0	0	0	0	0	0
NE	0-1 mi	3	0	0	0	0	0	0
ENE	0-1 mi	4	0	0	0	0	0	0
E	0-1 mi	5	0	0	0	0	0	0
ESE	0-1 mi	6	0	0	0	0	0	0
SE	0-1 mi	7	0	0	0	0	0	0
SSE	0-1 mi	8	0	0	0	0	0	0
S	0-1 mi	9	0	0	0	0	0	0
SSW	0-1 mi	10	13	0	13	16	0	16
SW	0-1 mi	11	12	0	12	15	0	15
WSW	0-1 mi	12	25	0	25	33	0	33
W	0-1 mi	13	10	0	10	13	0	13
WNW	0-1 mi	14	1	0	1	1	0	1
NW	0-1 mi	15	0	0	0	1	0	1
NNW	0-1 mi	16	0	0	0	0	0	0
N	1-2 mi	17	9	0	9	13	0	13
NNE	1-2 mi	18	13	0	13	17	0	17
NE	1-2 mi	19	8	0	8	11	0	11
ENE	1-2 mi	20	0	0	0	0	0	0
E	1-2 mi	21	0	0	0	0	0	0
ESE	1-2 mi	22	3	0	3	4	0	4
SE	1-2 mi	23	19	0	19	25	0	25
SSE	1-2 mi	24	31	0	31	40	0	40
S	1-2 mi	25	88	0	88	114	0	114
SSW	1-2 mi	26	97	0	97	126	0	126
SW	1-2 mi	27	73	0	73	95	0	95
WSW	1-2 mi	28	48	36	84	63	46	109
W	1-2 mi	29	13	0	13	17	0	17
WNW	1-2 mi	30	4	0	4	5	0	5
NW	1-2 mi	31	2	0	2	3	0	3
NNW	1-2 mi	32	1	0	1	1	0	1
N	2-3 mi	33	27	0	27	39	0	39
NNE	2-3 mi	34	27	0	27	39	0	39
NE	2-3 mi	35	27	0	27	37	0	37
ENE	2-3 mi	36	19	0	19	25	0	25
E	2-3 mi	37	65	0	65	84	0	84
ESE	2-3 mi	38	57	0	57	74	0	74
SE	2-3 mi	39	117	0	117	151	0	151
SSE	2-3 mi	40	205	0	205	265	0	265
S	2-3 mi	41	31	0	31	40	0	40
SSW	2-3 mi	42	15	0	15	19	0	19

Direction	Distance	Sector Number	2026 Permanent Population	2026 Transient Population	2026 Total Population	2058 Permanent Population	2058 Transient Population	2058 Total Population
SW	2-3 mi	43	26	0	26	33	0	33
WSW	2-3 mi	44	24	0	24	31	0	31
W	2-3 mi	45	22	0	22	31	0	31
WNW	2-3 mi	46	8	0	8	12	0	12
NW	2-3 mi	47	5	0	5	7	0	7
NNW	2-3 mi	48	12	0	12	17	0	17
N	3-4 mi	49	78	0	78	111	0	111
NNE	3-4 mi	50	64	0	64	92	0	92
NE	3-4 mi	51	160	0	160	228	0	228
ENE	3-4 mi	52	35	0	35	46	0	46
E	3-4 mi	53	109	0	109	141	0	141
ESE	3-4 mi	54	64	0	64	82	0	82
SE	3-4 mi	55	74	3514	3588	96	4548	4644
SSE	3-4 mi	56	105	0	105	136	0	136
S	3-4 mi	57	22	0	22	29	0	29
SSW	3-4 mi	58	22	644	666	29	1106	1135
SW	3-4 mi	59	27	0	27	35	0	35
WSW	3-4 mi	60	47	0	47	62	0	62
W	3-4 mi	61	74	0	74	105	0	105
WNW	3-4 mi	62	40	0	40	57	0	57
NW	3-4 mi	63	6	0	6	8	0	8
NNW	3-4 mi	64	22	0	22	32	0	32
N	4-5 mi	65	187	0	187	266	0	266
NNE	4-5 mi	66	126	0	126	180	0	180
NE	4-5 mi	67	198	0	198	282	0	282
ENE	4-5 mi	68	106	0	106	146	0	146
E	4-5 mi	69	28	0	28	37	0	37
ESE	4-5 mi	70	112	0	112	145	0	145
SE	4-5 mi	71	187	2655	2842	242	3436	3679
SSE	4-5 mi	72	1015	0	1015	1314	0	1314
S	4-5 mi	73	148	307	455	191	397	588
SSW	4-5 mi	74	25	0	25	32	0	32
SW	4-5 mi	75	54	0	54	70	0	70
WSW	4-5 mi	76	21	0	21	29	0	29
W	4-5 mi	77	113	0	113	161	0	161
WNW	4-5 mi	78	77	0	77	110	0	110
NW	4-5 mi	79	4	0	4	6	0	6
NNW	4-5 mi	80	80	0	80	114	0	114
N	5-10 mi	81	13110	39561	52672	18648	56273	74921
NNE	5-10 mi	82	9004	80	9083	12807	113	12920
NE	5-10 mi	83	3569	278	3847	5077	396	5473
ENE	5-10 mi	84	3797	0	3797	5377	0	5377
E	5-10 mi	85	262	0	262	340	0	340

Direction	Distance	Sector Number	2026 Permanent Population	2026 Transient Population	2026 Total Population	2058 Permanent Population	2058 Transient Population	2058 Total Population
ESE	5-10 mi	86	898	0	898	1162	0	1162
SE	5-10 mi	87	717	766	1483	928	991	1920
SSE	5-10 mi	88	2485	2087	4572	3217	2701	5917
S	5-10 mi	89	527	364	891	683	471	1153
SSW	5-10 mi	90	285	0	285	369	0	369
SW	5-10 mi	91	159	0	159	206	0	206
WSW	5-10 mi	92	149	0	149	204	0	204
W	5-10 mi	93	220	0	220	313	0	313
WNW	5-10 mi	94	394	0	394	560	0	560
NW	5-10 mi	95	1388	226	1613	1974	321	2295
NNW	5-10 mi	96	1370	0	1370	1949	0	1949
N	10-20 mi	97	11316	180	11496	16062	256	16318
NNE	10-20 mi	98	8864	143	9007	12609	203	12812
NE	10-20 mi	99	4644	111	4755	6788	162	6950
ENE	10-20 mi	100	2979	0	2979	4410	0	4410
E	10-20 mi	101	1431	364	1795	2119	539	2658
ESE	10-20 mi	102	574	0	574	836	0	836
SE	10-20 mi	103	401	0	401	500	0	500
SSE	10-20 mi	104	308	0	308	382	0	382
S	10-20 mi	105	1322	0	1322	1650	0	1650
SSW	10-20 mi	106	281	328	609	360	419	780
SW	10-20 mi	107	696	1	697	903	2	905
WSW	10-20 mi	108	683	0	683	888	0	888
W	10-20 mi	109	495	0	495	645	0	645
WNW	10-20 mi	110	692	0	692	925	0	925
NW	10-20 mi	111	849	30	878	1201	42	1243
NNW	10-20 mi	112	4679	8	4686	6649	11	6660
N	20-30 mi	113	10483	7520	18002	14807	10622	25429
NNE	20-30 mi	114	8875	0	8875	12527	0	12527
NE	20-30 mi	115	12350	0	12350	17815	0	17815
ENE	20-30 mi	116	45101	0	45101	67032	0	67032
E	20-30 mi	117	48046	15962	64008	71297	23687	94985
ESE	20-30 mi	118	2617	0	2617	3528	0	3528
SE	20-30 mi	119	2192	0	2192	2778	0	2778
SSE	20-30 mi	120	3331	834	4165	4130	1034	5164
S	20-30 mi	121	809	0	809	1003	0	1003
SSW	20-30 mi	122	2498	0	2498	2903	0	2903
SW	20-30 mi	123	1190	0	1190	1528	0	1528
WSW	20-30 mi	124	24402	6784	31186	31690	8810	40500
W	20-30 mi	125	4082	0	4082	5302	0	5302
WNW	20-30 mi	126	1292	0	1292	1675	0	1675
NW	20-30 mi	127	2150	0	2150	2789	0	2789
NNW	20-30 mi	128	3606	0	3606	5089	0	5089

Direction	Distance	Sector Number	2026 Permanent Population	2026 Transient Population	2026 Total Population	2058 Permanent Population	2058 Transient Population	2058 Total Population
N	30-40 mi	129	45504	52638	98142	64275	74352	138627
NNE	30-40 mi	130	89478	121	89599	125265	169	125434
NE	30-40 mi	131	418539	82858	501397	579473	114717	694190
ENE	30-40 mi	132	83056	7883	90939	122405	11617	134023
E	30-40 mi	133	11530	0	11530	16681	0	16681
ESE	30-40 mi	134	5882	0	5882	7779	0	7779
SE	30-40 mi	135	12977	13490	26466	16749	17411	34161
SSE	30-40 mi	136	5772	6187	11959	7157	7671	14827
S	30-40 mi	137	1113	0	1113	1320	0	1320
SSW	30-40 mi	138	428	0	428	451	0	451
SW	30-40 mi	139	1286	0	1286	1488	0	1488
WSW	30-40 mi	140	8238	0	8238	10651	0	10651
W	30-40 mi	141	1627	0	1627	2108	0	2108
WNW	30-40 mi	142	1326	0	1326	1691	0	1691
NW	30-40 mi	143	2334	0	2334	2885	0	2885
NNW	30-40 mi	144	28367	14601	42968	38695	19917	58611
N	40-50 mi	145	21230	151	21382	30146	215	30361
NNE	40-50 mi	146	103323	1171	104493	143955	1631	145586
NE	40-50 mi	147	707790	193182	900971	978773	267143	1245916
ENE	40-50 mi	148	185543	0	185543	270180	0	270180
E	40-50 mi	149	11949	0	11949	17747	0	17747
ESE	40-50 mi	150	14223	0	14223	18881	0	18881
SE	40-50 mi	151	3671	0	3671	4755	0	4755
SSE	40-50 mi	152	3669	10	3679	4559	12	4572
S	40-50 mi	153	2882	0	2882	3655	0	3655
SSW	40-50 mi	154	4698	1871	6569	4957	1974	6930
SW	40-50 mi	155	1436	0	1436	1424	0	1424
WSW	40-50 mi	156	5336	0	5336	5304	0	5304
W	40-50 mi	157	893	0	893	923	0	923
WNW	40-50 mi	158	1280	0	1280	1495	0	1495
NW	40-50 mi	159	1165	0	1165	1440	0	1440
NNW	40-50 mi	160	7700	0	7700	10106	0	10106
		Total:	2,050,406	456,942	2,507,348	2,860,136	633,417	3,493,553

Appendix 5
Record of Phone Conference between Darren Lavvorn, Enercon and Brad Brunette, Brazos River Authority, Lake Whitney Municiple Surface Water Contracts

Record of Phone Conference

Contact Information

Project Number:	MITS004	Enercon Rep:	Darren Lovvorn
Subject:	Lake Whitney Municipal Surface Water Contracts	Follow-up by:	
Date:	4/16/08	NOTES:	
Outside Party:	Brad Brunette		
Job Title:	Hydrologist		
Company:	Brazos River Authority		
Website:	N/A		
Phone:	(254) 761-3171		
Address:			
Email:	N/A		

Information Requested

The status of BRA municipal use water contracts on Lake Whitney.

Information Obtained

According to Brad Brunette (BRA Hydrologist), the City of Whitney has a municipal use contract with the BRA ; however, there is no diversion infrastructure and no water has been diverted.
Lakeside Domestic Use, constitutes several contracts with residents along the shores of Lake Whitney for lawn irrigation. Residents pay the BRA and the water use is approximated. The City of Cleburne has two (2) municipal use contracts with the BRA; however, there is no diversion infrastructure and no water has been diverted. Fred T. Owen, Jr. has a municipal use contract with the BRA for the development of a subdivision; however, there is no diversion infrastructure and no water has been diverted.

Appendix 6
Email from John Tibbs, Texas Parks and Wildlife Department, to Audrey Thompson, Enercon, Subject: RE: Recreation and Fisheries Data Needed for Local Rivers

From: John Tibbs [John.Tibbs@tpwd.state.tx.us]
Sent: Friday, April 11, 2008 2:29 PM
To: 'Audrey Thompson'
Cc: michael.baird@tpwd.state.tx.us; 'Brian VanZee'
Subject: RE: Recreation and Fisheries Data Needed for Local Rivers

Attachments: Whitney creel harvest 2000 for Comanche peak request 2008.xls

Audrey,

I'd be happy to help you with the questions you have regarding the fisheries downstream of Comanche Peak. Unfortunately, the information we have is rather limited, or at least different, compared to what you are looking for.
We don't have any data for that stretch of the Brazos River. The data we have for Squaw Creek is all catch data from standard sampling that we conduct using electrofishing and nets. That data is limited to pre 9/11 samples, as the angling public has not been allowed on Squaw Creek since that day.

We have some creel data for Lake Whitney that will address some of what you are looking for, but it is from 1999-2000, prior to the golden alga outbreaks which have impacted fishing and the number of anglers on the reservoir. I can provide total hours of angler usage for that year, as well as number of fish harvested or released by species. I do not have weight information. We do have quite a bit of electrofishing and netting data on Whitney if that would meet your needs. Also, we plan on sampling the Brazos River over the next two years using a new river sampling boat that we are putting together.

There is no commercial fish harvest in Squaw Creek, that section of the Brazos River, and Lake Whitney.

For additional information on usage by the public and water quality, you should probably contact the USACE, BRA, and TCEQ.

Please see the attached Excel sheet regarding the above information.

Let me know if this is all you need, or if you have other questions. I will be out of the office Mon-Wed of next week.

John Tibbs
Texas Parks & Wildlife Dept
Inland Fisheries District Supervisor - Waco 254-666-5190

-----Original Message-----
From: Audrey Thompson [mailto:athompson@enercon.com]
Sent: Thursday, April 10, 2008 8:19 AM
To: john.tibbs@tpwd.state.tx.us
Subject: Recreation and Fisheries Data Needed for Local Rivers

Mr. Tibbs,

I am currently working with Comanche Peak Nuclear Power Plant to conduct a study of the local water bodies within 50 miles of the plant, particularly for the Whitney Reservoir, the Brazos River, and Squaw Creek. However, I am having trouble locating some important information. Could you please point me in the right direction to locate the following data:

Shoreline usage
Boating usage
Swimming usage
Harvest of sport fish (kg/year)
Harvest of commercial fish (kg/year)

Any information or guidance you can provide would be greatly appreciated. Thank you.

Audrey Thompson
Enercon Services, Inc.
(770)590-2014

Table 1: Total hours fished by bank anglers and boat anglers on Lake Whitney 12/1/99 through 11/30/00

Bank	RSE	Boat	RSE	Total	RSE
34768	26.7	134071	17	168838	17

RSE = relative standard error

Table 2: Total number of sportfish harvested or released by species on Lake Whitney 12/1/99 through 11/30/00

Fish Species	Harvest	RSE	Released	RSE
White bass	13866	40	6816	57
Striped bass	13994	32	7456	38
Largemouth bass	2960	65	16931	39
Smallmouth bass	114	286	2985	100
White crappie	4152	73	892	157
Black crappie	1736	139	0	0
Freshwater drum	433	290	1830	112
Blue catfish	2681	95	1036	173
Channel catfish	7784	47	3418	79

Harvest is # of fish harvested
RSE = relative standard error

Appendix 7

Texas Parks and Wildlife, Historical Fish Kill Events Involving the Golden Alga, Prymnesium parvum, in Texas

Harmful Algal Blooms:
- Golden Alga
- Brown Tide
- Red Tide
- Other Harmful Algae
- HAB Research

Golden Alga Information:
- Current Bloom Status Reports
- FAQ
- Golden Alga News Releases
- Historic Blooms
- Research and Management

Historic Blooms in Texas

Historical Fish Kill Events Involving the Golden Alga, *Prymnesium parvum*, in Texas

This page features historical data through Spring 2004. *Get current bloom status.*

This is a historical listing of fish kills due to toxic Golden Alga in Texas in chronological order by river basin. This chart gives the estimated number of fish killed at each event; bivalves (i.e. clams and mussels) have also been killed but are not included here.

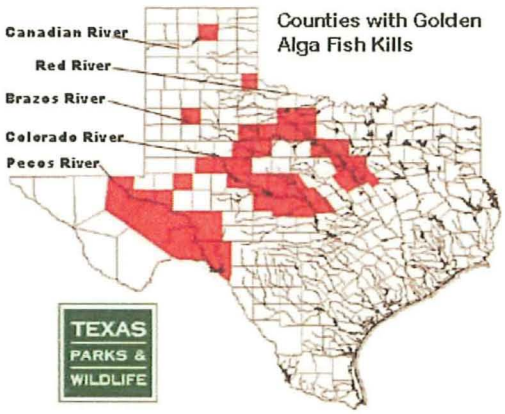
Beginning	End	River Basin	County(ies)	Affected Waterbody (ies)	Estimated # of Fish Killed
08/14/1981*	08/18/1981	Brazos	Stonewall	Brazos River	506,600
10/20/1982*	12/10/1982	Brazos	Haskell	California Creek	4,681
10/25/1988	11/06/1988	Brazos	Haskell, Throckmorton	California Creek, Paint Creek	43,356
04/24/1989	05/16/1989	Brazos	Haskellq	Paint Creek	15,162
05/02/1992	?	Brazos	Stonewall	Double Mountain Fork Brazos R.	700
10/05/1997	10/12/1997	Brazos	Young	Brazos River	640,446
06/25/1998	07/20/1998	Brazos	Fisher	Clear Fork of the Brazos	33,873
01/11/2001	07/15/2001	Brazos	Palo Pinto	Possum Kingdom Reservoir	200,027
01/27/2001	06/20/2001	Brazos	Hood	Lake Granbury	409,952
04/13/2001	06/21/2001	Brazos	Hill, Bosque	Lake Whitney	9,596

01/01/2003	04/21/2003	Brazos	Palo Pinto	Possum Kingdom Reservoir	1,475,212
02/03/2003	04/30/2003	Brazos	Hood	Lake Granbury	3,550,159
02/18/2003	05/01/2003	Brazos	Hill, Bosque	Lake Whitney, Brazos River	1,264,236
03/18/2003	04/10/2003	Brazos	Nolan	Lake Sweetwater	7,801
02/03/2003	04/30/2003	Brazos	Lubbock	Lubbock City Lakes 1-6	9,130
03/10/2003	04/30/2003	Brazos	Lubbuck	Buffalo Springs Lake	2,203
08/14/2003	08/30/2003	Brazos	Young	Brazos River	124,799
				Total in Brazos River Basin	**8,297,933**
02/10/2003	04/01/2003	Canadian	Hutchinson	Stilling Basin Lake Meredith	48
				Total in Canadian River Basin	**48**
08/12/1989	08/18/1989	Colorado	Runnels	Colorado River	4,080
08/16/1989	08/30/1989	Colorado	Runnels	Colorado River	1,723
08/30/1989	09/11/1989	Colorado	Coke	Colorado River	8,542
09/11/1989	09/15/1989	Colorado	Coleman	Colorado River	1,000
11/12/1989	11/18/1989	Colorado	Mills, San Saba	Colorado River	48,928
10/23/2001	10/30/2001	Colorado	Howard	Moss Creek Lake	6,381
10/18/2001	10/30/2001	Colorado	Coke	E.V. Spence Reservoir	2,213,953
01/24/2002	01/28/2002	Colorado	Mitchell	Colorado City Lake	4,060
11/26/2001	12/20/2001	Colorado	Runnels	Colorado River	5,986

01/15/2002	01/29/2002	Colorado	Midland	Wadley-Barrow Park Pond	6,300
01/29/2002	02/05/2002	Colorado	Coke	E.V. Spence Reservoir	1,223
01/29/2002	02/05/2002	Colorado	Mitchell	Colorado City Lake	61,781
10/09/2002	03/19/2003	Colorado	Mitchell	Colorado City Lake	15
01/08/2003	03/19/2003	Colorado	Coke	E.V. Spence Reservoir	175
01/14/2003	03/19/2003	Colorado	Mitchell, Coke, Concho, Runnels	Colorado River	1,199
				Total in Colorado River Basin	**2,365,346**
01/15/2001	03/15/2001	Red	Archer	Dundee State Fish Hatchery	5,121,827
03/12/2001	06/15/2001	Red	Baylor, Archer	Lake Diversion	309
02/282002	04/10/2002	Red	Baylor	Lake Kemp	7,400
01/08/2003	04/20/2003	Red	Baylor	Lake Kemp	329
03/24/2003	04/20/2003	Red	Childress	Baylor Lake	1,490
				Total in Colorado River Basin	**5,131,355**
04/21/1985*	04/27/1985	Rio Grande	Loving	Red Bluff Reservoir	10,125
10/31/1985	11/10/1985	Rio Grande	Crockett, Pecos, Terrell, Val Verde	Pecos River	111,459
11/19/1985*	11/20/1985	Rio Grande	Val Verde	Pecos River	300
11/20/1986*	12/12/1986	Rio Grande	Pecos, Terrell, Val Verde, Crockett	Pecos River	263,879
11/05/1988	11/16/1988	Rio	Reeves, Loving, Ward, Pecos	Red Bluff Reservoir	1,580,320

		Grande	Crane, Crockett	Pecos R.	
12/06/1989	12/06/1989	Rio Grande	Reeves	Red Bluff Reservoir	50
11/03/1993	11/21/1993	Rio Grande	Pecos, Terrell, Val Verde, Crockett	Pecos River	33,124
12/05/1995	12/09/1995	Rio Grande	Crockett, Terrell	Pecos River	7,598
01/06/2003	02/15/2003	Rio Grande	Reeves	Red Bluff Reservoir	1,156
				Total in Rio Grande Basin	**2,008,011**
				Total	**17,802,293**

*** Suspected due to *P. parvum***



Texas rivers affected by Golden Alga. Read details of map.

Impacts of Blooms

Current Bloom Status

top of page

Aditional Information:
Would you like to know more?

The Biology of Golden Alga summarizes what we know about the alga and its toxins.

Where does golden alga fit compared to other single-celled organisms?
The Golden Alga Family Tree gives examples of and information about golden alga and other protists.

What does golden alga look like?
TPWD Golden Alga Images has photos of fish kills, golden algal cells, and short videos of live golden alga. These images may be used for noncommercial/educational purposes as long as TPWD is given credit and other site policies are followed.

Golden Alga Information Card: TPWD has collaborated with TCEQ and other entities to produce a golden alga information card(pdf document). The purpose of this card is to educate the public on golden alga blooms and answer some common questions. Hard copies of this card are available for free by contacting Meridith Byrd at 512.912.7068.

Appendix 8
U. S. Census Bureau, American Fact Finder, Population Finder

Cleburne city, Texas - Population Finder - American FactFinder Page 1 of 1

POPULATION FINDER

United States | Texas | Cleburne city

Cleburne city, Texas

city, town, county, or zip
Cleburne
state
Texas
go
search by address »

The 2006 population estimate for Cleburne city, Texas is 29,689.

Note: Information about challenges to population estimates data can be found on the Population Estimates Challenges page.

View population trends...

	2006	2000	1990
Population	29,689	26,005	22,205

Source: U.S. Census Bureau, 2006 Population Estimates, Census 2000, 1990 Census

View more results...

Population for all cities and towns in Texas, 2000:
alphabetic | ranked

Map of Persons per Square Mile, City/Town by Census Tract:
2000 | 1990

See more data for Cleburne city, Texas on the Fact Sheet.

The letters PDF or symbol indicate a document is in the Portable Document Format (PDF). To view the file you will need the Adobe® Acrobat® Reader, which is available for free from the Adobe web site.

POPULATION FINDER

United States | Texas | Whitney town

Whitney town, Texas

city, town, county, or zip
Whitney
state
Texas
go
search by address »

The 2006 population estimate for Whitney town, Texas is 2,068.

Note: Information about challenges to population estimates data can be found on the Population Estimates Challenges page.

View population trends...

	2006	2000	1990
Population	2,068	1,833	1,626

Source: U.S. Census Bureau, 2006 Population Estimates, Census 2000, 1990 Census

View more results...

Population for all cities and towns in Texas, 2000:
alphabetic | ranked

Map of Persons per Square Mile, City/Town by Census Tract:
2000 | 1990

See more data for Whitney town, Texas on the Fact Sheet.

The letters PDF or symbol indicate a document is in the Portable Document Format (PDF). To view the file you will need the Adobe® Acrobat® Reader, which is available for free from the Adobe web site.

Volumetric Survey of Lake Whitney

June 2005 Survey

Prepared by:

The Texas Water Development Board

September 2006

Texas Water Development Board

J. Kevin Ward, Executive Administrator

Texas Water Development Board

E. G. Rod Pittman, Chairman
William W. Meadows, Member
Dario Vidal Guerra, Jr., Member
Jack Hunt, Vice Chairman
Thomas Weir Labatt III, Member
James Herring, Member

Prepared for:

Brazos River Authority

In cooperation with:

U.S Army Corps of Engineers, Fort Worth District

This report was prepared by staff of the Surface Water Resources Division:

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Published and Distributed by the
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Austin, TX 78711-3231

Executive Summary

In May of 2005, the Texas Water Development Board (TWDB) entered into agreement with the Brazos River Authority, for the purpose of performing a volumetric survey of Lake Whitney while the reservoir was near the top of the conservation pool elevation. This information was converted into updated Elevation-Volume and Elevation-Area Tables. Additionally, the results of the 2005 survey were compared to a previous resurvey of Lake Whitney conducted by the U.S. Army Corps of Engineers (USACE) in 1959. Cross-sections from the 2005 survey are compared to similar cross-sections from the 1959 USACE resurvey and to the original cross-sections of 1951, as plotted in the 1959 report.

The results of the TWDB 2005 Survey indicate Lake Whitney has a capacity of 554,203 acre-feet and encompasses 23,220 acres at the conservation pool elevation of 533.0 feet above mean sea level. The Report of Sedimentation, Resurvey, Whitney Reservoir, in 1959 by the USACE indicated Lake Whitney had a volume of 627,100 acre-feet and encompassed 23,560 acres at conservation pool elevation. It appears that between 2005 and 1959, Lake Whitney lost 72,897 acre-feet or 11.6% of its capacity and experienced a 1.4 % decrease in area.

Forty-three sediment range lines were established in 1951 by the USACE and thirty-two were resurveyed in 1959. The original range line end points are unavailable, therefore, TWDB staff re-established sediment range lines in the vicinity of the original range lines. Nine cross-sections presented in the 1959 report, including both the 1951 and the 1959 cross-sections, are presented for comparison with the 2005 cross-sections in Appendix G.

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Appendices

APPENDIX A: 2005 LAKE WHITNEY VOLUME TABLE
APPENDIX B: 2005 LAKE WHITNEY AREA TABLE
APPENDIX C: 2005 ELEVATION- VOLUME GRAPH
APPENDIX D: 2005 ELEVATION- AREA GRAPH
APPENDIX E: VOLUME COMPARISONS BETWEEN 2005 AND 1959
APPENDIX F: ELEVATION-VOLUME GRAPH COMPARING 2005 AND 1959
APPENDIX G: SEDIMENT RANGE LINES

Lake Whitney General Information

Lake Whitney is located in Bosque and Hill Counties on the main stem of the Brazos River in Central Texas. The primary purpose of Lake Whitney is flood control. Secondarily the lake supports the production of hydroelectric power and recreation. Lake Whitney is a part of the Mid-Brazos Project in the Fort Worth District of the U.S. Army Corps of Engineers.[1]

Lake Whitney was originally authorized by Congress under the Flood Control Act of August 18, 1941 (Public Law 228, 77th Congress, 1st Session)[2]. However, when the U.S. became involved in World War II all funding was diverted to the war effort. Construction was reauthorized by the Flood Control Act of December 22, 1944 (Public Law 534, 78th Congress, 2nd Session).[2,3] Construction of Whitney Dam began on May 12, 1947, and deliberate impoundment began on December 10, 1951. Construction of the powerhouse began in April 1951 and power generation began on June 25, 1953.[2,3] Whitney Dam powerhouse uses two 13,000 volt generators that produce 15,000 kilowatts per hour and have a turbine capacity of 20,700 horsepower, each. Average annual power production is 73,100,000 kilowatt-hours.[4]

Lake Whitney is owned by the U.S Government and operated by the U.S Army Corps of Engineers. The water rights to Lake Whitney are appropriated to the Brazos River Authority (BRA) by Certificate of Adjudication 12-5157, with a priority date of August 30, 1982. The BRA is authorized to impound 50,000 acre-feet of water, between elevations 520 feet and 533 feet above mean sea level, in Lake Whitney. The certificate authorizes a priority right to divert and use not to exceed 18,336 acre-feet of water per annum from the reservoir for municipal and industrial purposes. The amount of this priority right may be used in computing the sum of priority rights for the purpose of system operation as authorized by Commission Order of July 23, 1964. For purposes of system operation the BRA is authorized to exceed the priority right and annually divert and use from Lake Whitney not to exceed 25,000 acre-feet of water per annum for municipal purposes and 25,000 acre-feet of water for industrial purposes. All diversions and use of water exceeding 18,336 acre-feet in any calendar year shall be charged against the sum of the amounts designated as priority rights in other reservoirs included in the

System Operation Order. The owner is also authorized to use the water impounded for non-consumptive recreational uses. Section 5-O renders this certificate junior in priority rights to any rights which may be granted by the Texas Water Commission to the City of Stephenville pursuant to Application No. 4237.

Additionally, the BRA has subordinated their Lake Whitney rights to Somervell County Water District's Permit 5744. The complete certificates and permits are on file in the Records Division of the Texas Commission on Environmental Quality (TCEQ).

More information about Whitney Dam and Lake Whitney are presented below in Table 1. A map showing the location of Lake Whitney is presented in Figure 1.

Table 1. Pertinent Data for Whitney Dam and Lake Whitney[5,6]

Owner of Lake Whitney and Facilities	
The U.S. Government, Operated by the U.S. Army Corps of Engineers, Fort Worth District.	
Engineer (Design)	
U.S Army Corps of Engineers	
Location of Dam	
River Mile 442.4 on the Brazos River in Hill and Bosque Counties, 38 miles upstream from Waco, and 7.4 miles southwest of the City of Whitney.	
Drainage Area	
Approximately 27,189 square miles, of which 9,566 square miles is probably noncontributing.	
Dam	
Type	Concrete gravity and earthfill
Length	17,695 ft
Maximum Height	159 ft
Top Width	Embankment 34 ft and spillway 28 ft
Spillway	
Type	Ogee
Length (net at crest)	680.0 ft
Crest elevation	533.0 ft above msl
Control	17 tainter gates, each 40 by 38 ft
Outlet Works	
Type	16 conduits, each 5 by 9 ft
Control	Gates operated from tunnel
Invert elevation	448.83 ft above msl
Power Generation Features	
Number of units	2
Total capacity	30,000 kw

Table 1. Pertinent Data for Whitney Dam and Lake Whitney (Continued)

Reservoir Data (Based on TWDB 2005 Volumetric Survey)

Feature	Elevation (ft above msl)	Capacity (Acre-feet)	Area (Acres)
Top of Concrete Dam	584.0	N/A	N/A
Top of earth embankment	580.0	N/A	N/A
Maximum design water surface	573.0	N/A	N/A
Top of flood-control pool	571.0	N/A	N/A
Spillway Crest (top of ultimate Power pool)	533.0	554,203	23,220
Top of interim power pool	523.0	365,457	15,614
Invert of lowest intake*	448.83	854	165
Streambed**	425.0	0	0
Sediment reserve and power-head Storage space	520.0	320,711	14,301

*Capacity and area values given for elevation 448.8 ft above msl
**Lowest elevation surveyed during TWDB 2005 Survey: 432.71 ft above msl

Volumetric Survey of Lake Whitney

Introduction

In May of 2005, the Texas Water Development Board entered into agreement with the Brazos River Authority, for the purpose of performing a volumetric survey of Lake Whitney while the reservoir was at or near the top of the conservation pool elevation. This information was converted into updated Elevation-Volume and Elevation-Area Tables. Additionally, the results of the 2005 survey are compared to a prior survey of Lake Whitney conducted by the U.S. Army Corps of Engineers in 1959. Cross-sections of the 2005 survey are compared to cross-sections from the 1959 USACE report and to 1951 cross sections presented in the same report.

Bathymetric Survey

Bathymetric data collection for Lake Whitney occurred between June 20th and June 30th of 2005, while the water surface elevation was above the conservation pool elevation of 533.0 ft above mean sea level (msl). The water surface elevation varied between 533.30 ft and 533.81 ft above msl during the TWDB survey. The survey team used two boats equipped with depth sounders, velocity profilers, and integrated Differential Global Positioning System (DGPS) equipment to navigate along pre-planned range lines spaced approximately 500 feet apart in a perpendicular fashion to the original

stream channel. During the 2005 survey, the team navigated over 533 miles of range lines and collected over 270,000 data points. Figure 2 shows the data points collected during the TWDB 2005 survey.

The depth sounders were calibrated each day using the velocity profilers to measure the speed of sound in the water column and a weighted tape or stadia rod to verify the depth reading. The average speed of sound through the water column varied between 4,934.6 and 4,960.2 feet per second during the 2005 survey.

Datum

The vertical datum used during this survey is that used by the United States Geological Survey (USGS) for the reservoir elevation gauge USGS 08092500 Whitney Lk nr Whitney, TX.[7] The datum for this gauge is reported as National Geodetic Vertical Datum 1929 (NGVD29) or mean sea level (msl), thus elevations reported here are in feet (ft) above msl. Volume and area calculations in this report are referenced to water levels provided by the USGS gauge. The horizontal datum used for this report is NAD83 State Plane Texas Central Zone.

Survey Results

The results of the TWDB 2005 Survey indicate Lake Whitney has a volume of 554,203 acre-feet and encompasses 23,220 acres at conservation pool elevation. The results of the TWDB survey are compared to the USACE 1959 Resurvey of Lake Whitney in Table 2.

Feature	USACE Resurvey	TWDB Volumetric Survey
Year	1959	2005
Area (Acres)	23,560	23,220
Volume (Acre-feet)	627,100	554,203

Between the 2005 TWDB Survey and 1959, Lake Whitney appears to have lost 72,897 acre-feet or 11.6 % of its volume and experienced a 1.4 % decrease in area. The

USACE 1959 Resurvey consisted of resurveying 32 of the original 43 range lines that were established in 1951.[2] The original 1951 capacities for Lake Whitney are unavailable, although the 1959 report includes several tables of original volumes between many of the range lines. The Corps original calculations consisted of planimetering the area within each 10-foot contour on maps prepared by the BRA in 1937 and 1938 and deriving the volumes from the area curve at each foot using the average end-area method. The ranges that were resurveyed in 1959 were spotted on the 10-foot contour map and the segmental areas were planimetered at 10-foot intervals and capacities were calculated between the ranges.[2] Due to the methodological differences in computing the area and volume, direct comparisons of the TWDB 2005 survey with prior surveys of Lake Whitney are not recommended and are presented here for informational purposes only.[8] The TWDB considers the 2005 survey to be a significant improvement over previous methods and recommends that Lake Whitney be resurveyed in 5 to 10 years. The Brazos River Authority might also want to consider using a multi-frequency depth sounder which would allow more accurate identification of sediment depth, location, and volume.

Data Processing

Model Boundary

The reservoir boundary was digitized from aerial photographs using Environmental Systems Research Institute's (ESRI) ArcGIS 9.1 software. The aerial photographs, or digital orthophoto quadrangle images (DOQs), used for Lake Whitney were Laguna Park, Smiths Bend, Allen Bend, Whitney, Lakeside Village, Blum, Brazos Point, Morgan, and Blanton. These images were photographed between August 4th and September 8th of 2004. At the time the photographs were taken, the water surface elevation measured between 533.32 ft and 532.72 ft above mean sea level. Although only two of the photographs were above conservation pool elevation, at the recommended mapping scale of 1:12,000 for the DOQs, the difference in the land water interface between photos of varying water surface elevations is indiscernible. Therefore,

for modeling purposes, the boundary was digitized at the land water interface from the photos, and assigned the conservation pool elevation of 533.0 ft.

The United States Department of Agriculture, Farm Service Agency's, Aerial Photography Field Office (APFO), National Agriculture Imagery Program (NAIP) acquires the photographic imagery during the agricultural growing seasons in the continental U.S.[9] The imagery resides in the public domain and can be downloaded from the Texas Natural Resources Information System (TNRIS) website at http://www.tnris.state.tx.us/. For more information visit the APFO website at http://www.apfo.usda.gov/NAIP.html or contact TNRIS.

Triangular Irregular Network (TIN) Model

Upon completion of data collection, the raw data files are edited in HYPACK MAX to remove any data anomalies. The water surface elevations for each respective day are applied and the depths are converted to corresponding elevations and exported as a MASS points file. The MASS points and boundary files are used to create a Triangulated Irregular Network (TIN) model, a function of the 3D Analyst Extension of ArcGIS. The model uses Delauney's criteria for triangulation to place a triangle between three non-uniformly spaced points, including the boundary.[10]

Using Arc/Info software, volumes and areas are calculated from the TIN Model for the entire lake at one-tenth of a foot intervals, from elevation 432.7 ft to elevation 533.0 ft. The Elevation-Volume and Elevation-Area Tables, updated for 2005, are presented in Appendices A and B, respectively. An Elevation-Volume graph and an Elevation- Area graph are presented in Appendices C and D, respectively. Appendix E compares the Elevation-Volume Tables of 2005 to 1959, and Appendix F is a graphical representation comparing the 2005 volumes to 1959.

The TIN Model was interpolated and averaged using a cellsize of 10 ft and converted to a raster. The raster was used to produce Figure 3, an Elevation Relief Map representing the topography of the lake bottom, Figure 4, a map showing shaded depth ranges for Lake Whitney, and Figure 5, a 5-ft contour map.

Sediment Range Lines

Sedimentation Ranges were established by the USACE between April and December of 1951, and the first resurvey was conducted by the USACE from April to May of 1959.[2] The ranges were established to calculate the area, volume, and sedimentation rate of Lake Whitney. Nine of the cross-sections plotted in the 1959 report, including plots from 1951, were scanned and digitized for comparison with the 2005 cross-sections.

The original data and endpoint coordinates for each line are unavailable; therefore, the survey team estimated the range line endpoints by geo-referencing a paper copy of a 1963 USACE revised map showing original range line locations. The range lines were digitized from the map and the endpoint coordinates were projected to NAD83 from NAD27, the projection of the USACE map. Distortion is introduced during this process due to the aging and photocopying of the original map. However, horizontal distortion between the 2005 cross-sections and the historical cross-sections are predominately a result of map scale; for example, on the rectified USACE paper map, with a scale of 1:72,000, each range line may represent as much as 200 feet in width across the reservoir, while the 2005 map that the cross-sections were extracted from, has a 1:12,000 map scale, equal to the DOQs the reservoir boundary was digitized from. Horizontal distortion was corrected by aligning prominent features in the 2005 profiles to match those in the historical profiles. Other factors contributing to the variations in the cross-sections may include survey intensity, interpolations of the TIN Model from which the 2005 cross-sections were extracted, and/or sediment accumulation in the reservoir.

Generally, the cross-sectional comparisons indicate significant sedimentation at and upstream of SR09. Downstream of SR09, significant sediment accumulation appears to be confined to the historical stream channels. A resurvey using a multi-frequency depth sounder would aid in locating and quantifying the sediment volume within the reservoir.

The plotted cross-sectional comparisons are presented in Appendix G. Also in Appendix G is a map showing the location of the range lines and Table 3, a list of the endpoint coordinates for each range line re-established in 2005 by the TWDB.

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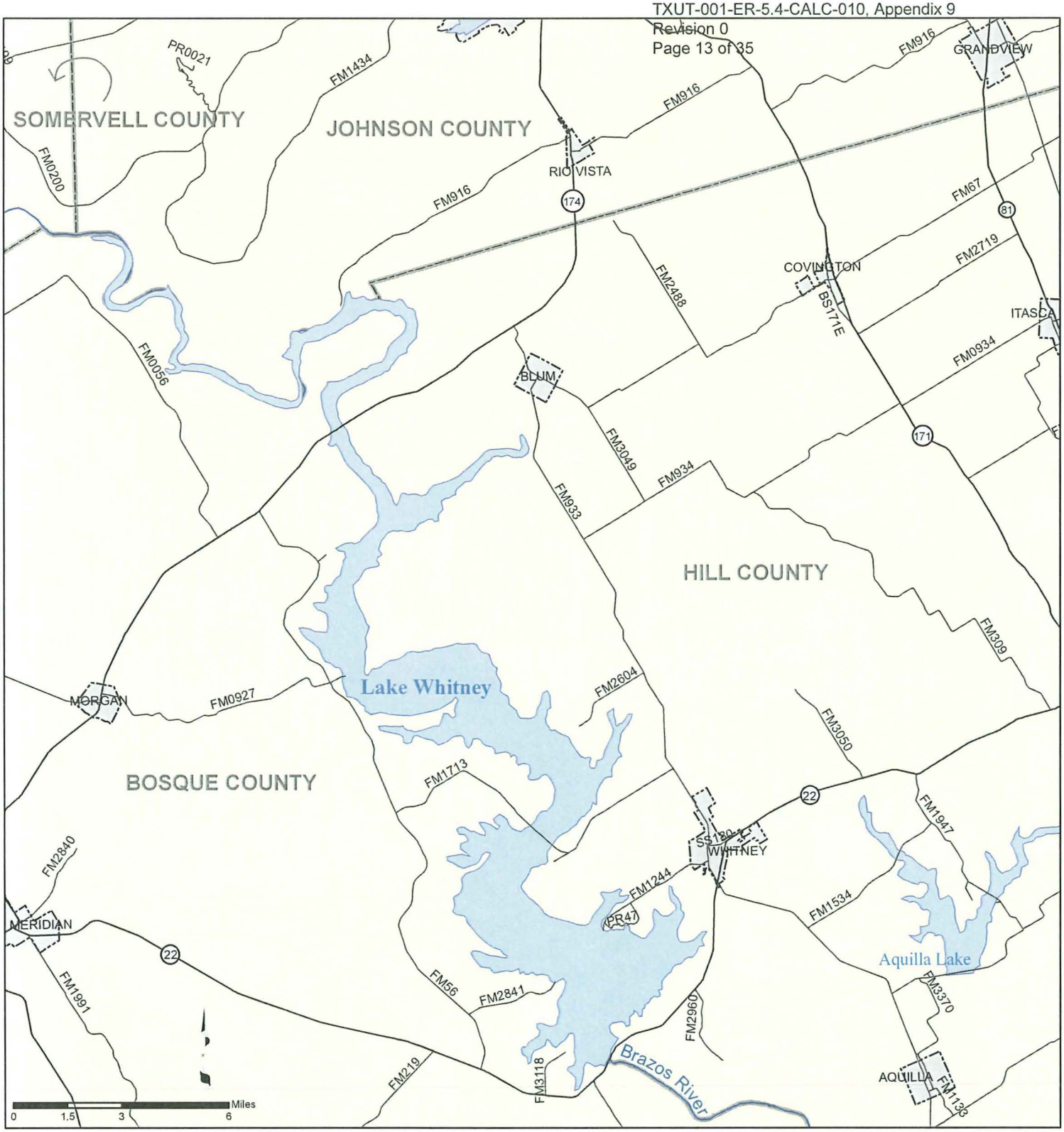


Figure 1

Whitney Lake

Location Map

Figure 2

Whitney Lake

Data Points collected during 2005 TWDB Survey

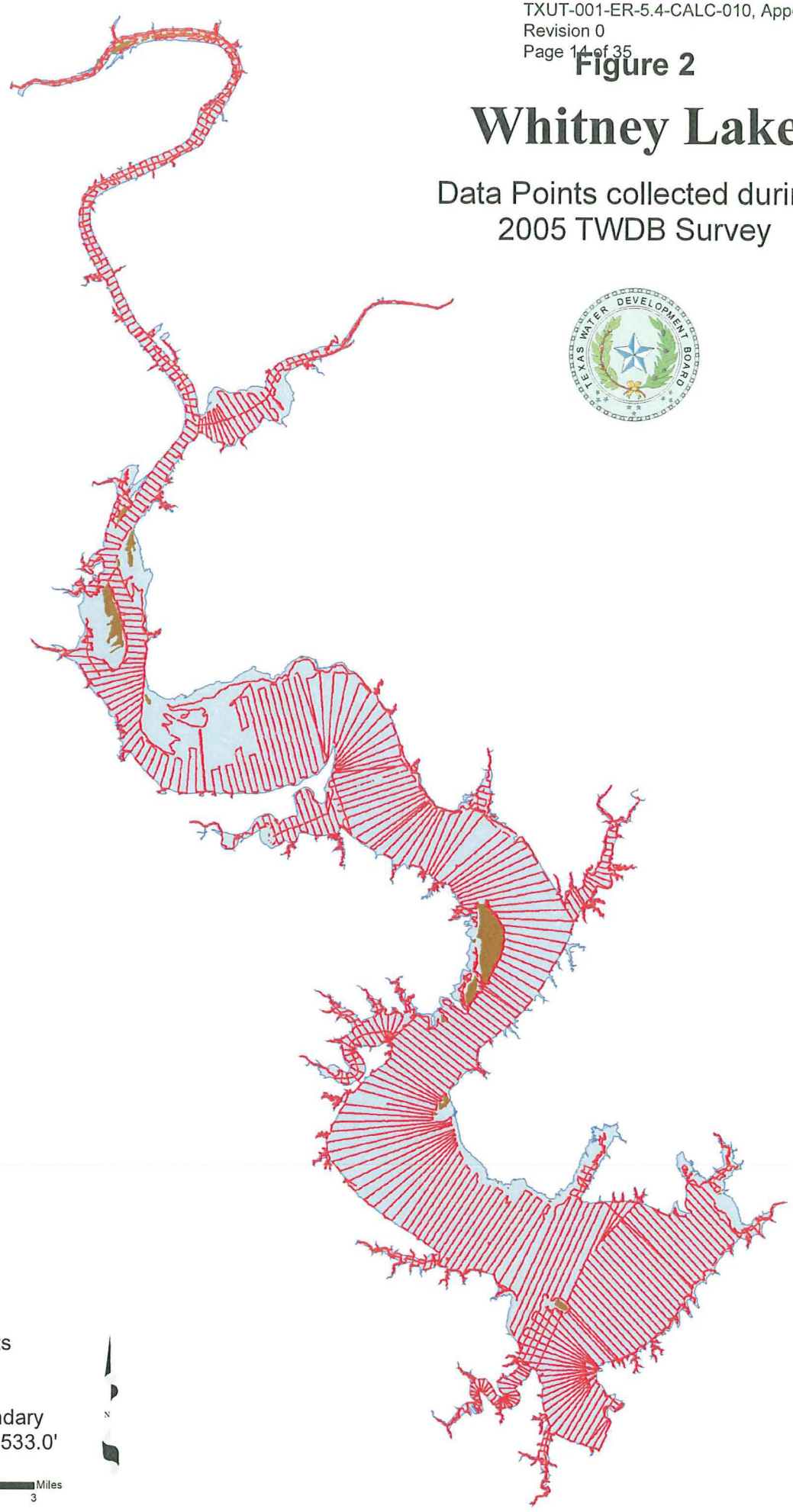


Figure 3

Whitney Lake

Elevation Relief Map

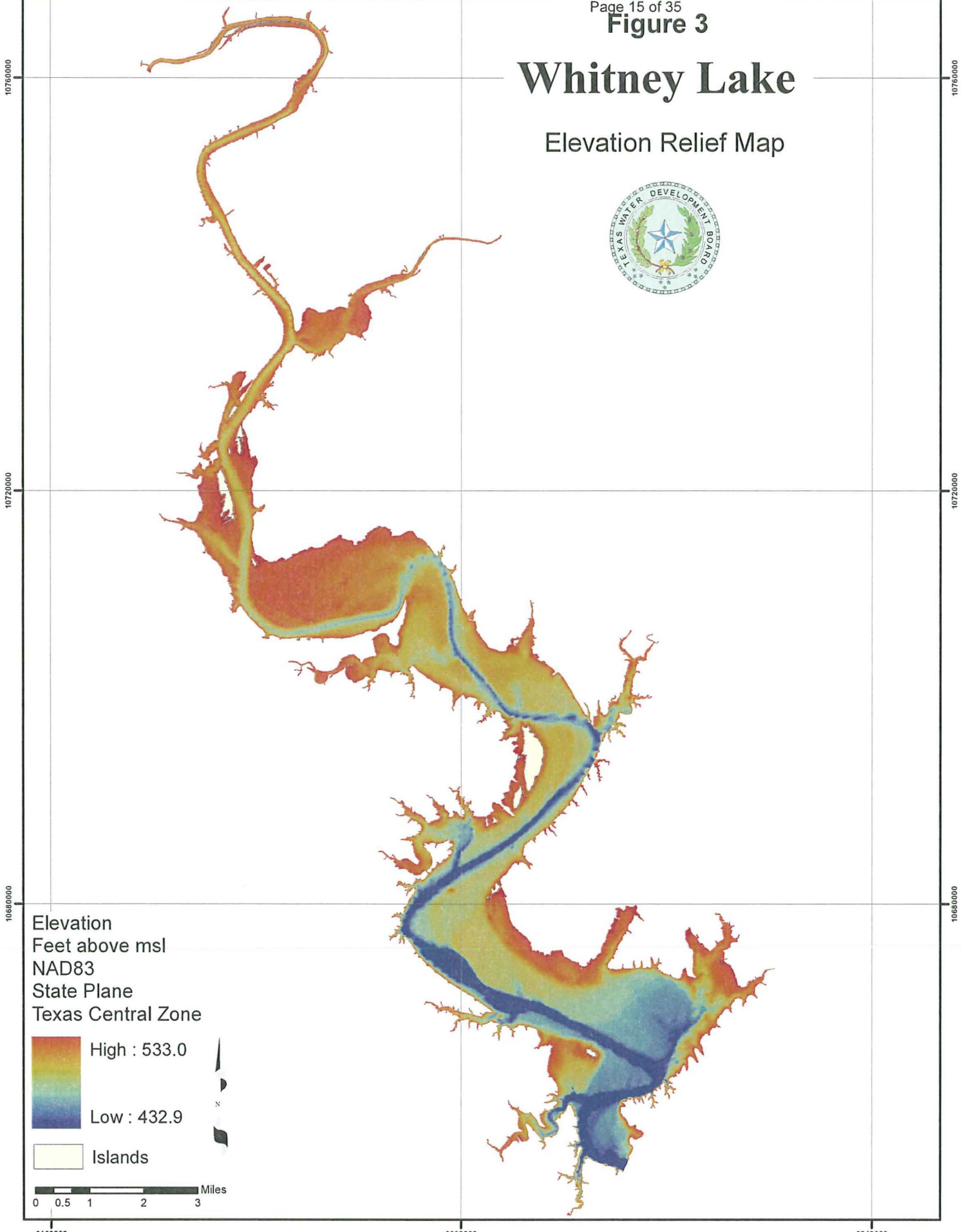
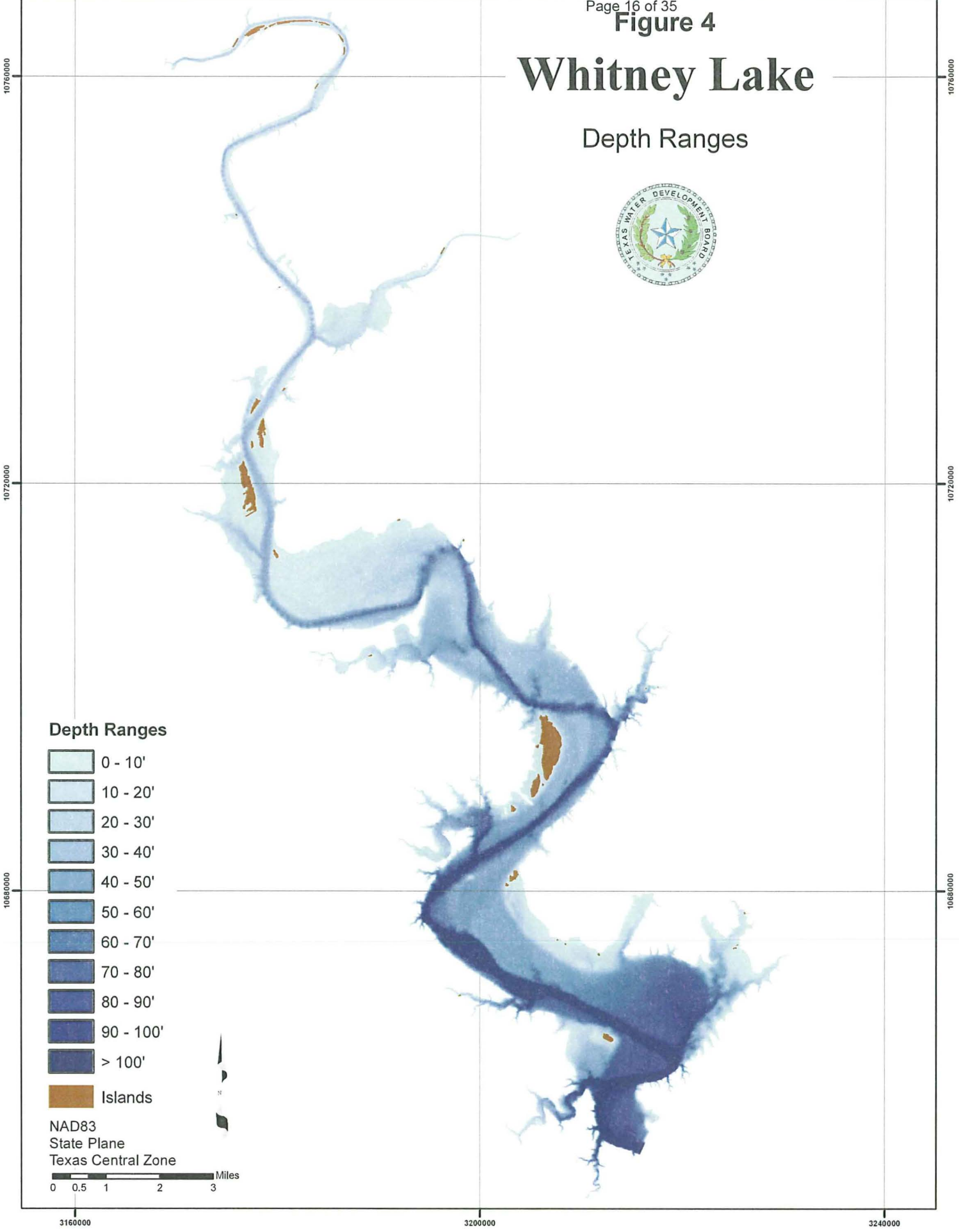


Figure 4

Whitney Lake

Depth Ranges



Appendix A

Whitney Lake

RESERVOIR VOLUME TABLE

TEXAS WATER DEVELOPMENT BOARD — JUNE 2005 SURVEY

Conservation Pool Elevation 533.0'

VOLUME IN ACRE-FEET — ELEVATION INCREMENT IS ONE TENTH FOOT

ELEVATION in Feet	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
432								0	0	0
433	0	0	0	0	0	0	0	0	0	0
434	0	0	0	1	1	1	1	1	1	2
435	2	2	2	3	3	3	4	4	4	5
436	5	6	7	7	8	9	10	11	12	13
437	15	16	17	19	21	22	24	26	27	29
438	31	33	35	38	40	42	45	47	49	52
439	55	57	60	63	66	69	72	75	78	81
440	84	87	91	94	98	101	105	109	113	117
441	121	125	129	134	138	143	148	153	158	163
442	168	174	179	185	191	197	203	209	215	222
443	228	235	242	249	255	263	270	277	284	292
444	300	307	315	323	331	339	348	356	364	373
445	382	391	400	409	418	427	437	447	456	466
446	477	487	498	509	520	532	543	555	567	579
447	592	605	617	631	644	657	671	685	699	714
448	728	743	758	774	789	805	821	837	854	870
449	887	904	921	939	956	974	992	1,010	1,029	1,047
450	1,066	1,085	1,104	1,124	1,143	1,163	1,183	1,203	1,223	1,244
451	1,265	1,286	1,307	1,329	1,351	1,373	1,396	1,418	1,441	1,465
452	1,488	1,512	1,536	1,560	1,585	1,610	1,635	1,661	1,686	1,712
453	1,739	1,765	1,792	1,819	1,846	1,874	1,902	1,930	1,959	1,987
454	2,017	2,046	2,075	2,105	2,135	2,166	2,197	2,228	2,259	2,291
455	2,323	2,355	2,387	2,420	2,453	2,487	2,520	2,554	2,589	2,624
456	2,659	2,694	2,730	2,765	2,802	2,838	2,875	2,913	2,950	2,989
457	3,027	3,066	3,105	3,144	3,184	3,224	3,265	3,306	3,348	3,389
458	3,432	3,474	3,517	3,561	3,605	3,649	3,694	3,739	3,785	3,831
459	3,877	3,924	3,971	4,019	4,068	4,116	4,166	4,215	4,266	4,316
460	4,368	4,419	4,472	4,524	4,578	4,632	4,686	4,741	4,796	4,852
461	4,909	4,966	5,024	5,082	5,141	5,201	5,261	5,322	5,383	5,445
462	5,507	5,570	5,634	5,698	5,763	5,829	5,895	5,962	6,030	6,098
463	6,167	6,236	6,306	6,377	6,448	6,520	6,593	6,666	6,740	6,814
464	6,889	6,965	7,042	7,119	7,196	7,275	7,354	7,434	7,514	7,595
465	7,677	7,760	7,843	7,927	8,012	8,097	8,184	8,271	8,359	8,448
466	8,537	8,628	8,719	8,811	8,903	8,997	9,091	9,187	9,283	9,380
467	9,478	9,576	9,676	9,776	9,878	9,980	10,083	10,187	10,292	10,398
468	10,505	10,613	10,721	10,831	10,942	11,054	11,167	11,281	11,396	11,513
469	11,630	11,748	11,867	11,987	12,109	12,231	12,354	12,478	12,602	12,728
470	12,855	12,983	13,112	13,241	13,371	13,503	13,635	13,768	13,902	14,036
471	14,172	14,308	14,445	14,583	14,722	14,861	15,002	15,143	15,285	15,427
472	15,571	15,715	15,860	16,006	16,153	16,300	16,449	16,598	16,748	16,898
473	17,050	17,202	17,355	17,509	17,663	17,819	17,975	18,132	18,290	18,449
474	18,608	18,769	18,930	19,092	19,255	19,419	19,583	19,749	19,915	20,082
475	20,250	20,419	20,589	20,760	20,931	21,104	21,277	21,451	21,626	21,802
476	21,978	22,156	22,335	22,514	22,695	22,876	23,058	23,242	23,427	23,612
477	23,799	23,987	24,176	24,366	24,558	24,750	24,944	25,139	25,335	25,533
478	25,731	25,931	26,133	26,335	26,539	26,744	26,950	27,157	27,366	27,576
479	27,787	27,999	28,213	28,428	28,644	28,861	29,080	29,300	29,521	29,744
480	29,969	30,194	30,421	30,650	30,880	31,111	31,344	31,578	31,813	32,050
481	32,289	32,529	32,770	33,013	33,258	33,505	33,753	34,003	34,255	34,510
482	34,766	35,025	35,286	35,549	35,815	36,082	36,352	36,625	36,900	37,177
483	37,456	37,737	38,021	38,307	38,595	38,886	39,178	39,474	39,772	40,072
484	40,376	40,682	40,991	41,304	41,620	41,938	42,259	42,582	42,908	43,237
485	43,568	43,902	44,238	44,576	44,918	45,261	45,608	45,957	46,308	46,662
486	47,018	47,376	47,737	48,099	48,465	48,832	49,203	49,575	49,950	50,327
487	50,706	51,087	51,471	51,857	52,245	52,635	53,028	53,423	53,820	54,220
488	54,621	55,024	55,430	55,837	56,247	56,660	57,074	57,491	57,910	58,331
489	58,754	59,179	59,606	60,035	60,466	60,899	61,334	61,771	62,210	62,652
490	63,095	63,541	63,990	64,440	64,892	65,347	65,803	66,262	66,722	67,184
491	67,648	68,114	68,582	69,052	69,524	69,998	70,474	70,952	71,431	71,913

Appendix A (continued)

Whitney Lake

RESERVOIR VOLUME TABLE

TEXAS WATER DEVELOPMENT BOARD — JUNE 2005 SURVEY

Conservation Pool Elevation 533.0'

VOLUME IN ACRE-FEET — ELEVATION INCREMENT IS ONE TENTH FOOT

ELEVATION in Feet	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
492	72,397	72,883	73,370	73,859	74,351	74,844	75,339	75,836	76,335	76,836
493	77,339	77,845	78,352	78,861	79,372	79,886	80,401	80,920	81,440	81,963
494	82,489	83,017	83,547	84,079	84,614	85,150	85,689	86,229	86,772	87,316
495	87,863	88,411	88,962	89,514	90,068	90,625	91,183	91,743	92,305	92,868
496	93,434	94,002	94,572	95,144	95,718	96,294	96,872	97,451	98,033	98,617
497	99,203	99,791	100,381	100,974	101,569	102,166	102,765	103,366	103,970	104,575
498	105,182	105,791	106,402	107,015	107,629	108,246	108,865	109,486	110,108	110,733
499	111,359	111,988	112,618	113,250	113,883	114,519	115,157	115,796	116,437	117,080
500	117,725	118,372	119,020	119,671	120,323	120,977	121,633	122,291	122,951	123,612
501	124,276	124,941	125,608	126,277	126,948	127,620	128,294	128,971	129,649	130,329
502	131,011	131,695	132,381	133,068	133,758	134,450	135,145	135,843	136,542	137,244
503	137,948	138,655	139,363	140,074	140,787	141,503	142,221	142,942	143,665	144,392
504	145,123	145,857	146,595	147,337	148,082	148,831	149,584	150,341	151,101	151,865
505	152,633	153,404	154,179	154,958	155,742	156,530	157,323	158,120	158,922	159,728
506	160,539	161,355	162,175	163,000	163,831	164,667	165,509	166,356	167,208	168,065
507	168,927	169,795	170,668	171,547	172,430	173,319	174,212	175,110	176,012	176,919
508	177,830	178,746	179,666	180,591	181,521	182,456	183,396	184,341	185,290	186,245
509	187,205	188,171	189,142	190,119	191,103	192,092	193,086	194,086	195,090	196,098
510	197,112	198,130	199,153	200,181	201,213	202,251	203,294	204,342	205,394	206,452
511	207,515	208,582	209,653	210,729	211,809	212,894	213,983	215,077	216,175	217,277
512	218,385	219,497	220,615	221,737	222,864	223,996	225,132	226,274	227,419	228,571
513	229,725	230,884	232,048	233,215	234,388	235,563	236,743	237,927	239,115	240,307
514	241,503	242,704	243,909	245,117	246,331	247,549	248,771	249,998	251,229	252,466
515	253,707	254,953	256,204	257,459	258,719	259,982	261,249	262,521	263,796	265,075
516	266,358	267,644	268,935	270,229	271,527	272,829	274,134	275,443	276,756	278,072
517	279,392	280,716	282,044	283,376	284,713	286,052	287,395	288,742	290,092	291,447
518	292,804	294,165	295,531	296,899	298,271	299,646	301,025	302,409	303,796	305,187
519	306,581	307,978	309,380	310,784	312,192	313,603	315,018	316,436	317,858	319,283
520	320,711	322,142	323,578	325,017	326,460	327,906	329,356	330,811	332,268	333,731
521	335,196	336,665	338,139	339,616	341,099	342,586	344,077	345,574	347,074	348,581
522	350,091	351,606	353,126	354,650	356,180	357,713	359,251	360,795	362,344	363,898
523	365,457	367,020	368,590	370,163	371,743	373,327	374,916	376,512	378,112	379,718
524	381,329	382,945	384,568	386,196	387,831	389,472	391,119	392,773	394,432	396,097
525	397,768	399,444	401,126	402,813	404,507	406,204	407,908	409,618	411,332	413,053
526	414,778	416,509	418,247	419,990	421,740	423,496	425,258	427,029	428,805	430,589
527	432,378	434,173	435,976	437,784	439,599	441,420	443,246	445,081	446,920	448,768
528	450,621	452,480	454,348	456,221	458,103	459,991	461,887	463,791	465,702	467,623
529	469,550	471,486	473,431	475,385	477,348	479,320	481,302	483,295	485,297	487,311
530	489,334	491,369	493,415	495,471	497,539	499,617	501,704	503,802	505,908	508,025
531	510,148	512,280	514,420	516,567	518,723	520,884	523,053	525,231	527,414	529,606
532	531,805	534,011	536,225	538,446	540,675	542,911	545,153	547,405	549,663	551,930
533	554,203									

Appendix B

Whitney Lake

RESERVOIR AREA TABLE

TEXAS WATER DEVELOPMENT BOARD — JUNE 2005 SURVEY

Conservation Pool Elevation 533.0'

AREA IN ACRES — ELEVATION INCREMENT IS ONE TENTH FOOT

ELEVATION in Feet	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
432								0	0	0
433	0	0	0	0	0	0	0	0	0	1
434	1	1	1	1	1	1	2	2	2	2
435	2	3	3	3	3	4	4	4	5	5
436	6	6	7	8	8	9	10	11	12	12
437	13	14	15	15	16	17	17	18	19	19
438	20	21	21	22	23	23	24	25	25	26
439	26	27	28	28	29	30	30	31	31	32
440	33	33	34	35	36	36	37	38	39	40
441	42	43	44	45	46	47	49	50	51	53
442	54	55	56	58	59	60	61	62	63	65
443	66	67	68	69	70	71	72	73	75	76
444	77	78	79	80	81	82	83	85	86	87
445	88	89	91	92	93	94	96	97	99	102
446	104	106	109	111	113	115	117	120	122	124
447	126	128	130	132	134	136	138	141	143	146
448	148	151	153	155	157	159	161	163	165	167
449	169	171	173	175	177	179	181	183	185	187
450	189	191	192	194	196	198	201	203	205	208
451	210	213	215	218	221	223	226	229	231	234
452	236	239	242	245	248	250	253	256	259	261
453	264	267	270	272	275	278	281	283	286	289
454	292	295	297	300	303	306	309	312	315	318
455	321	324	327	330	333	336	339	342	345	348
456	352	355	358	362	365	368	372	375	379	382
457	386	389	393	397	401	404	408	412	416	420
458	424	429	433	437	441	445	450	454	458	463
459	467	471	476	480	485	490	495	500	505	510
460	515	520	525	531	536	541	547	552	558	563
461	569	575	581	586	592	598	604	610	616	621
462	627	634	640	647	654	660	666	673	679	685
463	692	698	704	710	716	723	729	735	741	747
464	754	760	767	774	781	787	794	801	808	815
465	821	829	836	844	852	860	868	876	884	892
466	900	907	915	923	932	940	949	957	966	974
467	983	991	1,000	1,009	1,017	1,027	1,036	1,045	1,054	1,064
468	1,073	1,083	1,093	1,103	1,113	1,124	1,136	1,147	1,158	1,167
469	1,177	1,187	1,197	1,207	1,216	1,226	1,235	1,244	1,254	1,263
470	1,273	1,282	1,291	1,300	1,308	1,317	1,325	1,334	1,342	1,351
471	1,359	1,367	1,375	1,383	1,391	1,399	1,407	1,415	1,423	1,431
472	1,439	1,447	1,455	1,463	1,471	1,479	1,487	1,495	1,503	1,510
473	1,518	1,526	1,534	1,542	1,550	1,558	1,567	1,575	1,583	1,591
474	1,600	1,608	1,616	1,625	1,634	1,642	1,651	1,659	1,668	1,676
475	1,685	1,694	1,702	1,711	1,719	1,728	1,736	1,745	1,754	1,763
476	1,772	1,781	1,790	1,800	1,809	1,819	1,829	1,840	1,852	1,863
477	1,874	1,885	1,896	1,908	1,920	1,932	1,944	1,956	1,969	1,981
478	1,993	2,005	2,018	2,031	2,043	2,055	2,068	2,081	2,093	2,105
479	2,117	2,130	2,142	2,155	2,167	2,181	2,194	2,208	2,222	2,235
480	2,250	2,264	2,278	2,291	2,305	2,319	2,334	2,348	2,362	2,377
481	2,392	2,408	2,424	2,440	2,456	2,473	2,492	2,514	2,534	2,555
482	2,576	2,597	2,620	2,643	2,665	2,689	2,713	2,736	2,760	2,782
483	2,804	2,825	2,847	2,870	2,893	2,917	2,941	2,966	2,992	3,019
484	3,047	3,079	3,112	3,142	3,169	3,195	3,221	3,248	3,274	3,299
485	3,324	3,349	3,374	3,399	3,425	3,450	3,475	3,501	3,525	3,549
486	3,571	3,594	3,618	3,641	3,664	3,690	3,715	3,738	3,759	3,780
487	3,802	3,824	3,847	3,869	3,892	3,916	3,940	3,962	3,983	4,003
488	4,023	4,044	4,066	4,089	4,112	4,134	4,156	4,177	4,198	4,221
489	4,241	4,261	4,281	4,301	4,320	4,340	4,361	4,382	4,403	4,425
490	4,448	4,471	4,493	4,515	4,535	4,555	4,574	4,593	4,612	4,630
491	4,649	4,669	4,689	4,710	4,731	4,750	4,769	4,788	4,807	4,827

Appendix B (continued)

Whitney Lake

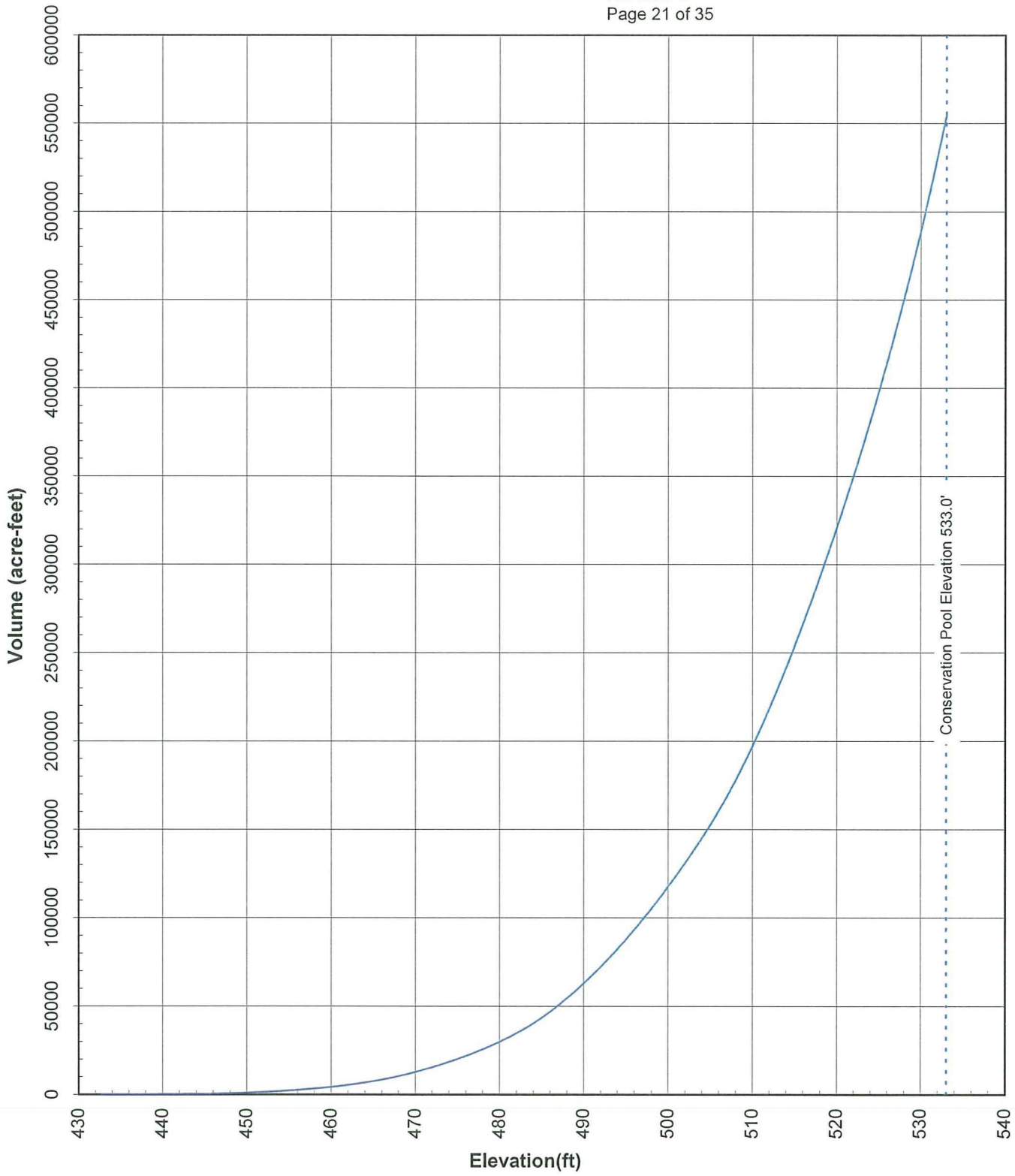
RESERVOIR AREA TABLE

TEXAS WATER DEVELOPMENT BOARD — JUNE 2005 SURVEY

Conservation Pool Elevation 533.0'

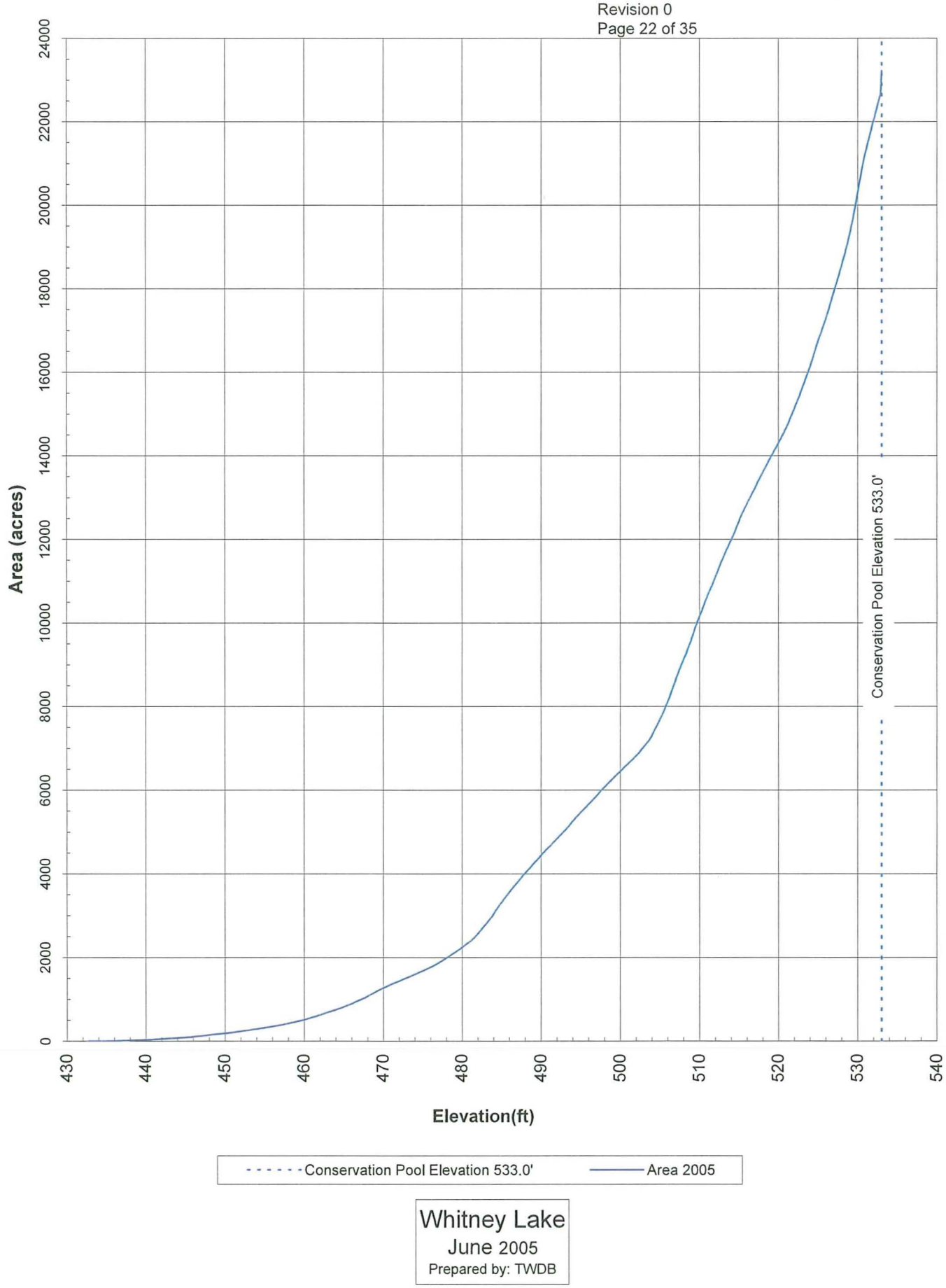
AREA IN ACRES — ELEVATION INCREMENT IS ONE TENTH FOOT

ELEVATION in Feet	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
492	4,847	4,866	4,885	4,904	4,923	4,942	4,961	4,980	5,000	5,020
493	5,041	5,061	5,082	5,103	5,123	5,145	5,169	5,193	5,218	5,244
494	5,268	5,291	5,313	5,334	5,355	5,375	5,395	5,415	5,434	5,455
495	5,475	5,495	5,515	5,534	5,553	5,571	5,590	5,610	5,629	5,648
496	5,669	5,691	5,710	5,729	5,748	5,767	5,786	5,807	5,828	5,849
497	5,870	5,892	5,915	5,938	5,960	5,982	6,003	6,024	6,043	6,062
498	6,080	6,099	6,118	6,138	6,157	6,177	6,197	6,217	6,237	6,256
499	6,274	6,292	6,310	6,329	6,347	6,366	6,384	6,402	6,420	6,439
500	6,458	6,477	6,496	6,515	6,533	6,552	6,570	6,588	6,606	6,625
501	6,643	6,661	6,679	6,697	6,716	6,734	6,753	6,772	6,791	6,810
502	6,829	6,848	6,867	6,886	6,908	6,937	6,962	6,986	7,008	7,030
503	7,053	7,075	7,098	7,120	7,144	7,168	7,193	7,220	7,251	7,286
504	7,324	7,363	7,400	7,436	7,472	7,510	7,547	7,584	7,621	7,658
505	7,695	7,733	7,773	7,813	7,858	7,905	7,951	7,996	8,040	8,085
506	8,132	8,179	8,227	8,279	8,336	8,390	8,443	8,493	8,545	8,597
507	8,652	8,706	8,758	8,811	8,861	8,909	8,955	9,000	9,044	9,089
508	9,136	9,182	9,226	9,272	9,324	9,374	9,424	9,474	9,524	9,574
509	9,626	9,682	9,742	9,807	9,864	9,917	9,968	10,018	10,065	10,112
510	10,158	10,206	10,254	10,302	10,350	10,400	10,452	10,503	10,554	10,601
511	10,648	10,693	10,737	10,781	10,825	10,868	10,912	10,958	11,004	11,051
512	11,099	11,148	11,198	11,247	11,294	11,342	11,390	11,436	11,483	11,529
513	11,572	11,614	11,655	11,697	11,739	11,779	11,818	11,859	11,901	11,942
514	11,983	12,025	12,069	12,112	12,157	12,201	12,246	12,292	12,339	12,387
515	12,436	12,484	12,530	12,573	12,614	12,655	12,695	12,734	12,772	12,809
516	12,847	12,885	12,923	12,960	12,998	13,035	13,072	13,109	13,144	13,180
517	13,221	13,262	13,302	13,342	13,379	13,413	13,450	13,487	13,524	13,559
518	13,594	13,629	13,665	13,702	13,738	13,775	13,813	13,851	13,889	13,925
519	13,960	13,994	14,028	14,062	14,096	14,130	14,164	14,198	14,232	14,266
520	14,301	14,336	14,371	14,407	14,445	14,484	14,524	14,561	14,598	14,635
521	14,674	14,714	14,756	14,801	14,846	14,892	14,939	14,987	15,034	15,081
522	15,129	15,176	15,221	15,267	15,313	15,361	15,411	15,462	15,514	15,564
523	15,614	15,663	15,713	15,765	15,818	15,870	15,924	15,978	16,031	16,084
524	16,140	16,196	16,253	16,314	16,376	16,441	16,504	16,564	16,622	16,679
525	16,735	16,791	16,847	16,902	16,956	17,010	17,065	17,119	17,174	17,230
526	17,287	17,345	17,403	17,463	17,526	17,594	17,665	17,734	17,800	17,864
527	17,926	17,989	18,052	18,115	18,178	18,241	18,305	18,368	18,433	18,500
528	18,567	18,635	18,705	18,776	18,848	18,923	18,998	19,075	19,154	19,236
529	19,320	19,407	19,494	19,583	19,676	19,770	19,871	19,974	20,079	20,187
530	20,296	20,404	20,512	20,619	20,726	20,827	20,926	21,022	21,114	21,199
531	21,280	21,359	21,435	21,510	21,584	21,657	21,731	21,805	21,878	21,952
532	22,026	22,100	22,174	22,248	22,323	22,398	22,472	22,547	22,622	22,697
533	23,220									



Whitney Lake
June 2005
Prepared by: TWDB

Appendix C Elevation vs. Volume



Appendix D Elevation vs. Area

Appendix E

Whitney Lake

RESERVOIR VOLUME COMPARISON TABLE

TEXAS WATER DEVELOPMENT BOARD

Conservation Pool Elevation 533.0'

TWDB 2005 SURVEY vs. USACE 1959 RESURVEY[2]

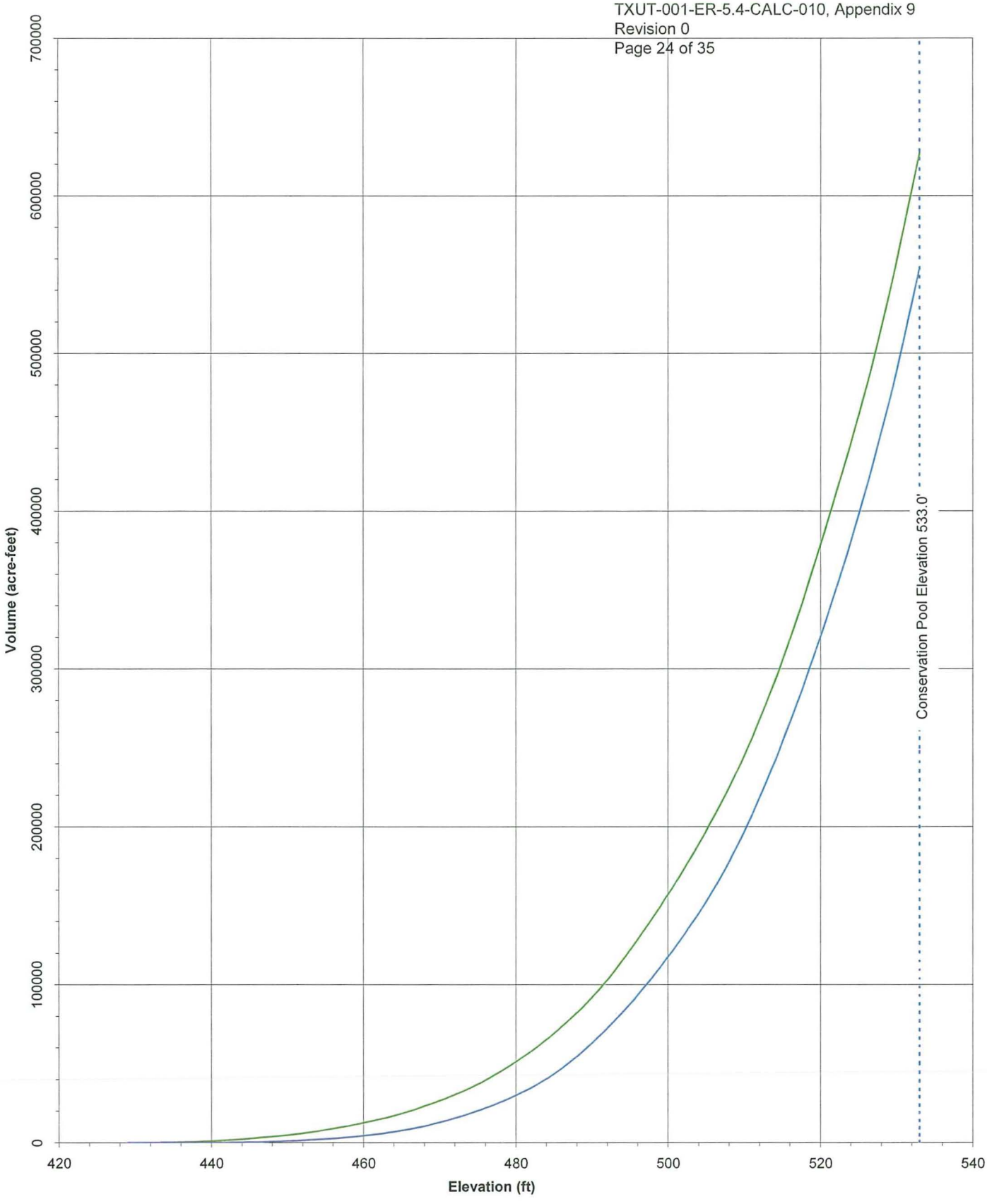
VOLUME IN ACRE-FEET

ELEVATION INCREMENT IS ONE FOOT

ELEVATION in feet	0	1	2	3	4	5	6	7	8	9
430	**0**	**0**	**0**	**0**	**0**	**2**	**5**	**15**	**31**	**55**
	9	43	110	180	260	340	450	580	730	920
440	**84**	**121**	**168**	**228**	**300**	**382**	**477**	**592**	**728**	**887**
	1,100	1,400	1,600	1,900	2,200	2,600	3,000	3,400	3,900	4,300
450	**1,066**	**1,265**	**1,488**	**1,739**	**2,017**	**2,323**	**2,659**	**3,027**	**3,432**	**3,877**
	4,800	5,400	5,900	6,600	7,300	8,100	8,900	9,700	10,600	11,600
460	**4,368**	**4,909**	**5,507**	**6,167**	**6,889**	**7,677**	**8,537**	**9,478**	**10,505**	**11,630**
	12,600	13,600	14,700	15,800	17,000	18,400	19,900	21,500	23,200	24,900
470	**12,855**	**14,172**	**15,571**	**17,050**	**18,608**	**20,250**	**21,978**	**23,799**	**25,731**	**27,787**
	26,700	28,500	30,500	32,500	34,700	37,000	39,600	42,300	45,100	48,100
480	**29,969**	**32,289**	**34,766**	**37,456**	**40,376**	**43,568**	**47,018**	**50,706**	**54,621**	**58,754**
	51,200	54,500	57,900	61,500	65,300	69,300	73,500	77,800	82,300	86,900
490	**63,095**	**67,648**	**72,397**	**77,339**	**82,489**	**87,863**	**93,434**	**99,203**	**105,182**	**111,359**
	91,900	97,200	102,900	109,000	115,400	121,900	128,600	135,500	142,600	149,800
500	**117,725**	**124,276**	**131,011**	**137,948**	**145,123**	**152,633**	**160,539**	**168,927**	**177,830**	**187,205**
	157,200	164,800	172,600	180,600	189,000	197,500	206,400	215,500	225,000	234,800
510	**197,112**	**207,515**	**218,385**	**229,725**	**241,503**	**253,707**	**266,358**	**279,392**	**292,804**	**306,581**
	245,200	256,200	267,800	279,800	292,300	305,400	319,100	333,400	348,200	363,500
520	**320,711**	**335,196**	**350,091**	**365,457**	**381,329**	**397,768**	**414,778**	**432,378**	**450,621**	**469,550**
	379,100	395,000	411,100	427,400	444,000	461,000	478,800	497,400	517,100	537,800
530	**489,334**	**510,148**	**531,805**	**554,203**						
	559,200	581,300	603,900	627,100						

TWDB 2005 Survey values on top

USACE 1959 Resurvey Values on Bottom



Whitney Lake
June 2005
Prepared by TWDB

Appendix F Elevation vs. Volume Comparison

Appendix G

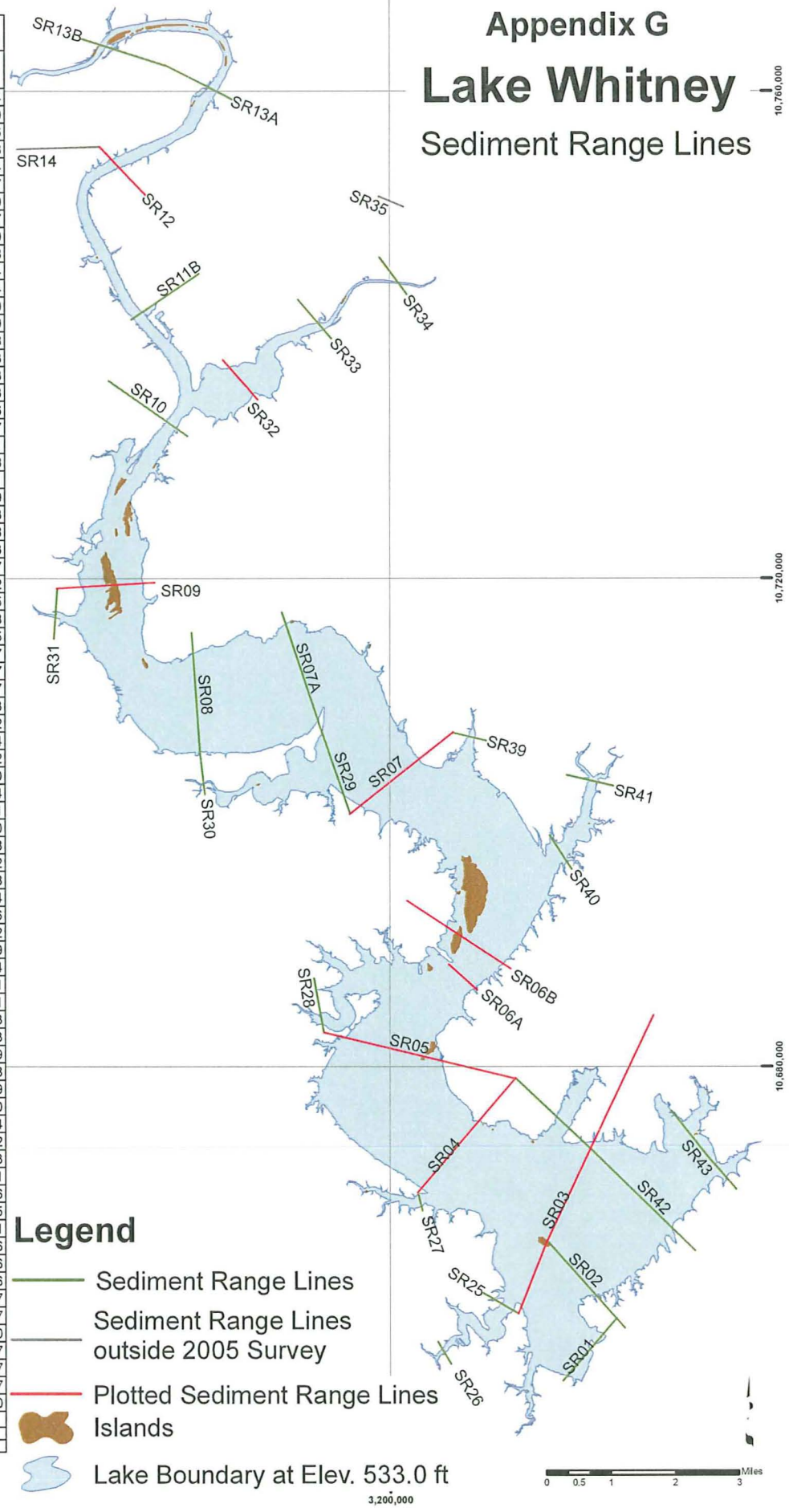
Lake Whitney

Sediment Range Lines

Table 3. Endpoint Coordinates for Whitney Lake Sediment Range Lines est. 2005 TWDB

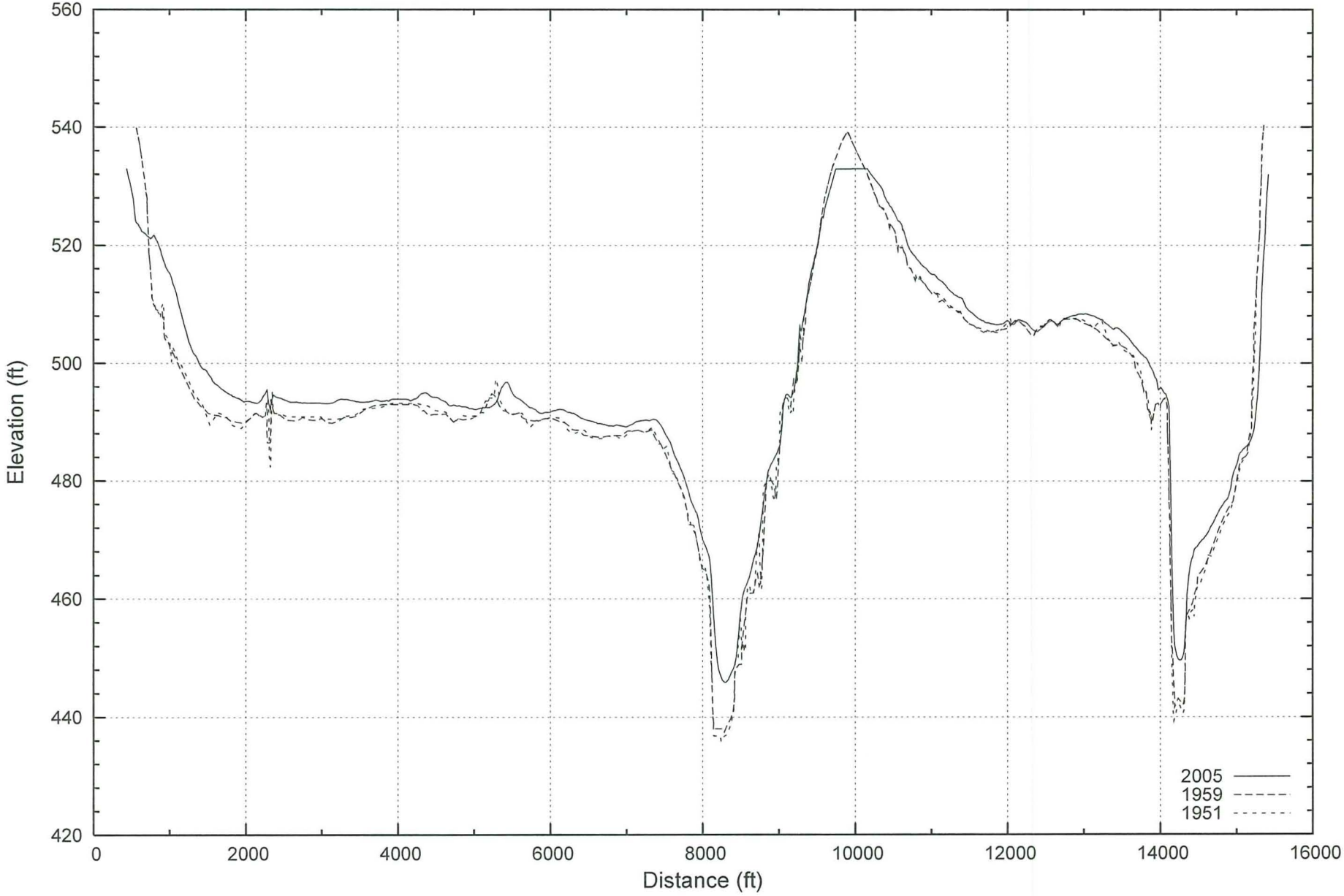
Range	L=Left R=Right	X	Y
SR01	L	3,218,623.047081	10,659,363.516084
	R	3,214,210.499983	10,654,246.000000
SR02	L	3,219,335.250020	10,658,572.999996
	R	3,212,934.550527	10,665,677.514418
SR03**	L	3,221,690.500012	10,684,212.000034
	R	3,210,542.499980	10,659,757.999987
SR04**	L	3,210,319.942514	10,679,007.215590
	R	3,202,271.499972	10,669,646.999997
SR05**	L	3,210,319.942514	10,679,007.215590
	R	3,194,539.750011	10,682,773.000018
SR06A**	L	3,207,211.249969	10,686,254.000034
	R	3,204,858.750002	10,688,358.999964
SR06B**	L	3,209,943.250031	10,687,987.000010
	R	3,201,432.249982	10,693,560.999989
SR07**	L	3,205,208.249966	10,707,405.999978
	R	3,196,721.255340	10,700,712.734643
SR07A	L	3,191,123.250010	10,717,236.000023
	R	3,194,144.499987	10,708,157.000023
SR08	L	3,183,691.249989	10,715,556.999966
	R	3,184,350.499984	10,705,787.999977
SR09**	L	3,180,634.749976	10,719,693.000011
	R	3,172,583.791081	10,719,215.390198
SR10	L	3,183,331.750005	10,731,680.000031
	R	3,176,858.749991	10,736,235.000029
SR11B	L	3,184,262.749972	10,745,016.000033
	R	3,178,722.000009	10,741,267.000008
SR12**	L	3,179,879.749966	10,751,510.000023
	R	3,176,103.499980	10,755,478.999977
SR13A	L	3,187,018.749965	10,759,338.000002
	R	3,181,478.500007	10,762,150.000005
SR13B	L	3,174,670.250016	10,764,298.999978
	R	3,181,478.500007	10,762,121.999965
SR14*	L	3,169,267.750025	10,755,257.999967
	R	3,176,103.499980	10,755,452.000017
SR15*	L	3,162,128.750026	10,754,707.000027
	R	3,161,191.500001	10,752,446.999973
SR16*	L	3,153,032.500012	10,759,393.000002
	R	3,151,020.249996	10,760,577.999994
SR17*	L	3,142,916.500009	10,766,365.999992
	R	3,142,585.750001	10,764,492.000020
SR18*	L	3,139,305.500025	10,777,281.999984
	R	3,138,891.999978	10,775,324.999971
SR19*	L	3,126,929.249965	10,780,617.000030
	R	3,127,425.499978	10,779,182.999988
SR25	L	3,207,623.750007	10,661,465.000012
	R	3,210,540.250032	10,659,756.999978
SR26	L	3,203,936.499971	10,657,444.000014
	R	3,205,019.749966	10,655,610.999986
SR27	L	3,202,294.249964	10,669,625.000012
	R	3,202,690.249995	10,668,209.999999
SR28	L	3,193,727.249978	10,687,245.999984
	R	3,194,529.249986	10,682,769.999991
SR29	L	3,194,144.499987	10,708,120.999981
	R	3,196,721.255340	10,700,712.734643
SR30	L	3,184,367.249994	10,705,793.000023
	R	3,184,761.250006	10,702,318.999999
SR31	L	3,172,583.791081	10,719,215.390198
	R	3,172,333.749980	10,715,069.000029
SR32**	L	3,189,141.749988	10,734,670.000010
	R	3,186,250.249976	10,737,957.999984
SR33	L	3,195,182.499999	10,739,681.000012
	R	3,192,449.249998	10,742,909.000013
SR34	L	3,201,401.249986	10,743,325.000011
	R	3,199,143.500024	10,746,354.999996
SR35*	L	3,201,150.749993	10,750,540.999995
	R	3,199,061.999996	10,751,392.000021
SR39	L	3,207,943.999990	10,706,699.999986
	R	3,205,174.750019	10,707,342.999976
SR40	L	3,214,965.999997	10,696,166.999976
	R	3,213,136.249999	10,698,936.000017
SR41	L	3,218,378.000029	10,702,990.999967
	R	3,214,570.499971	10,703,880.999990
SR42	L	3,225,103.499981	10,664,918.999997
	R	3,210,367.250030	10,679,012.000027
SR43	L	3,228,515.750015	10,669,913.999997
	R	3,223,175.000013	10,676,342.000030

Coordinates in NAD83 (feet) State Plane Texas Central Zone
* Cross-Sections located outside extent of TWDB 2005 Survey
** Cross-Sections selected for comparison, plotted



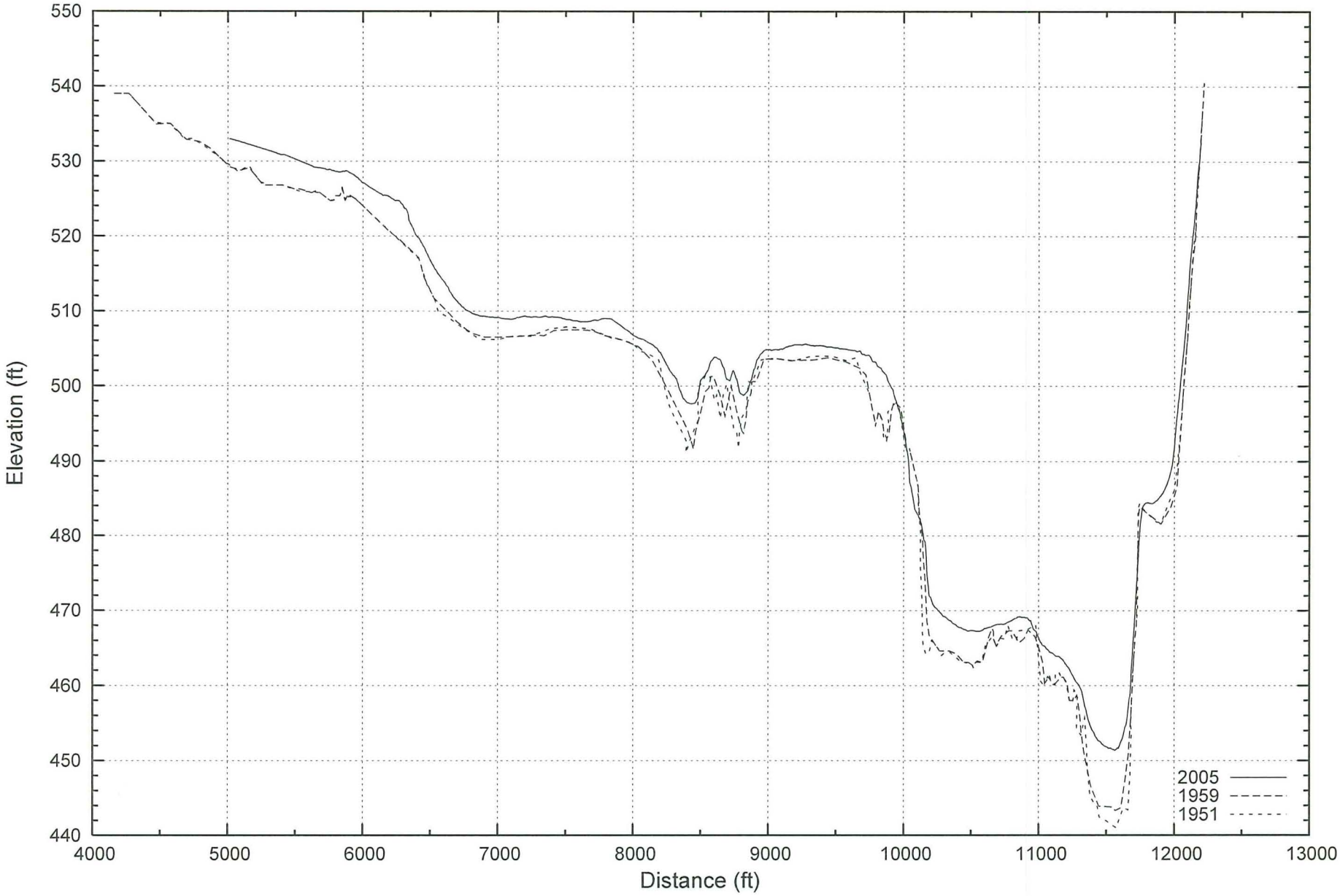
Lake Whitney

Range Line SR03



Lake Whitney

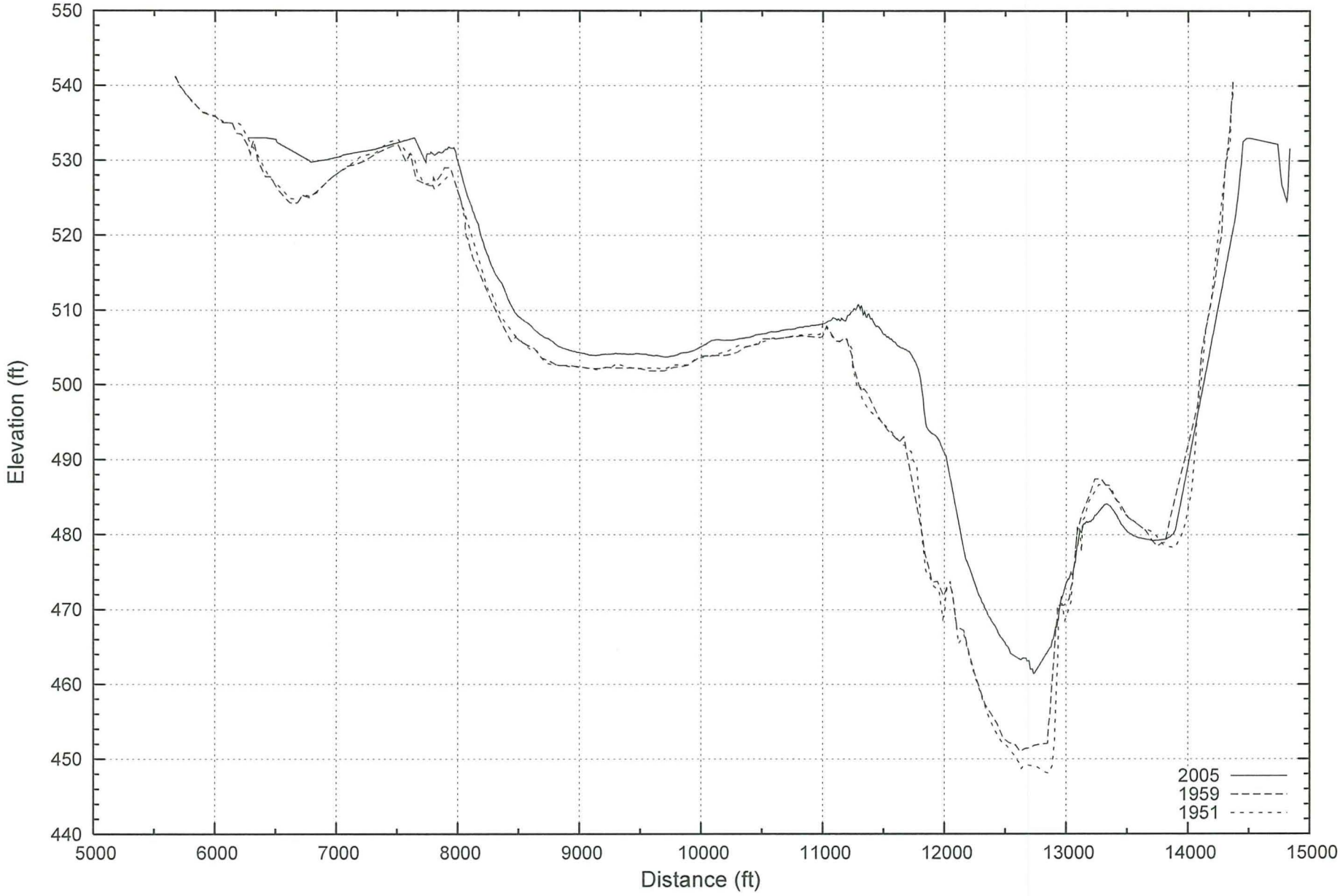
Range Line SR04



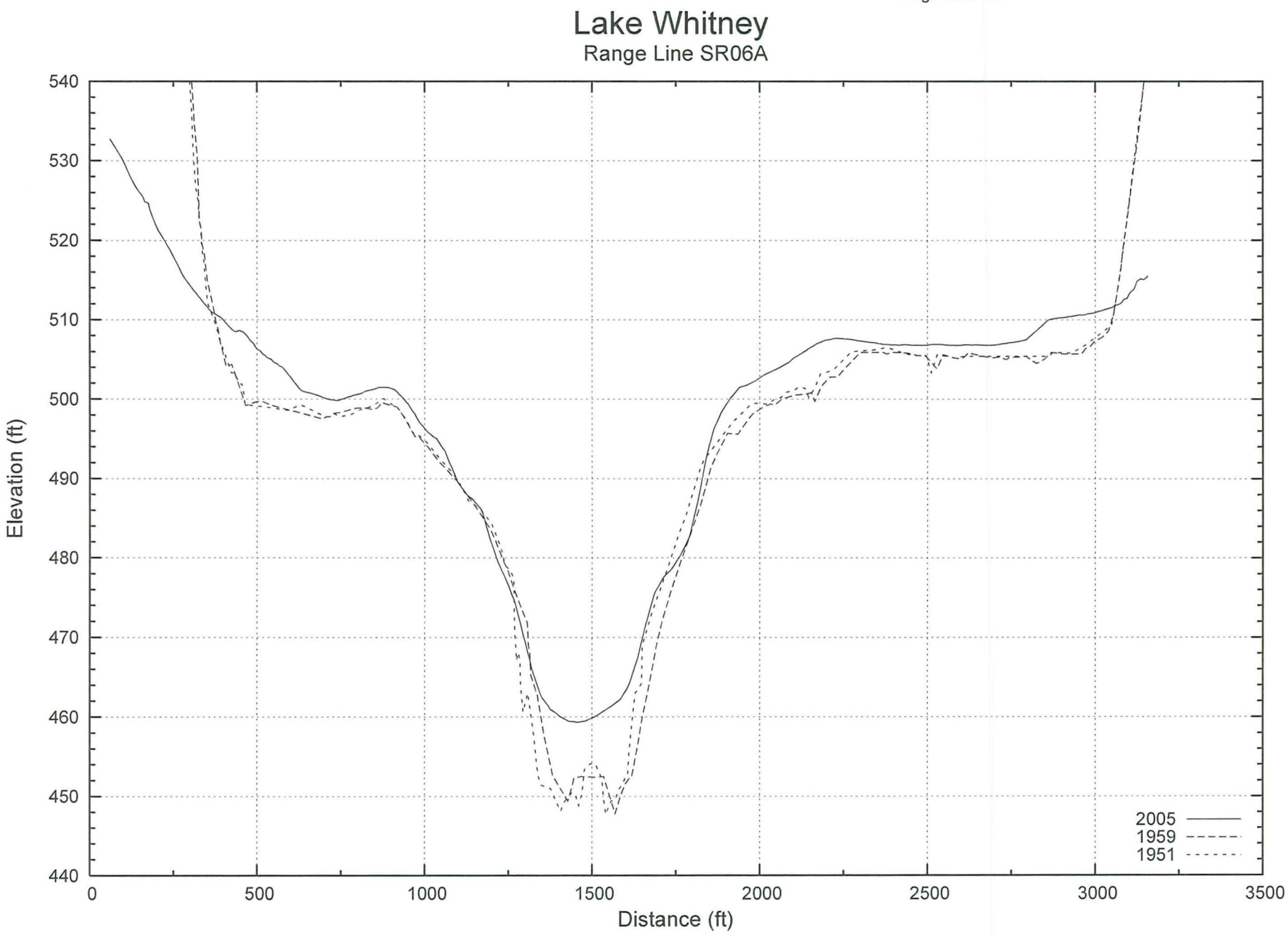
Appendix G

Lake Whitney

Range Line SR05

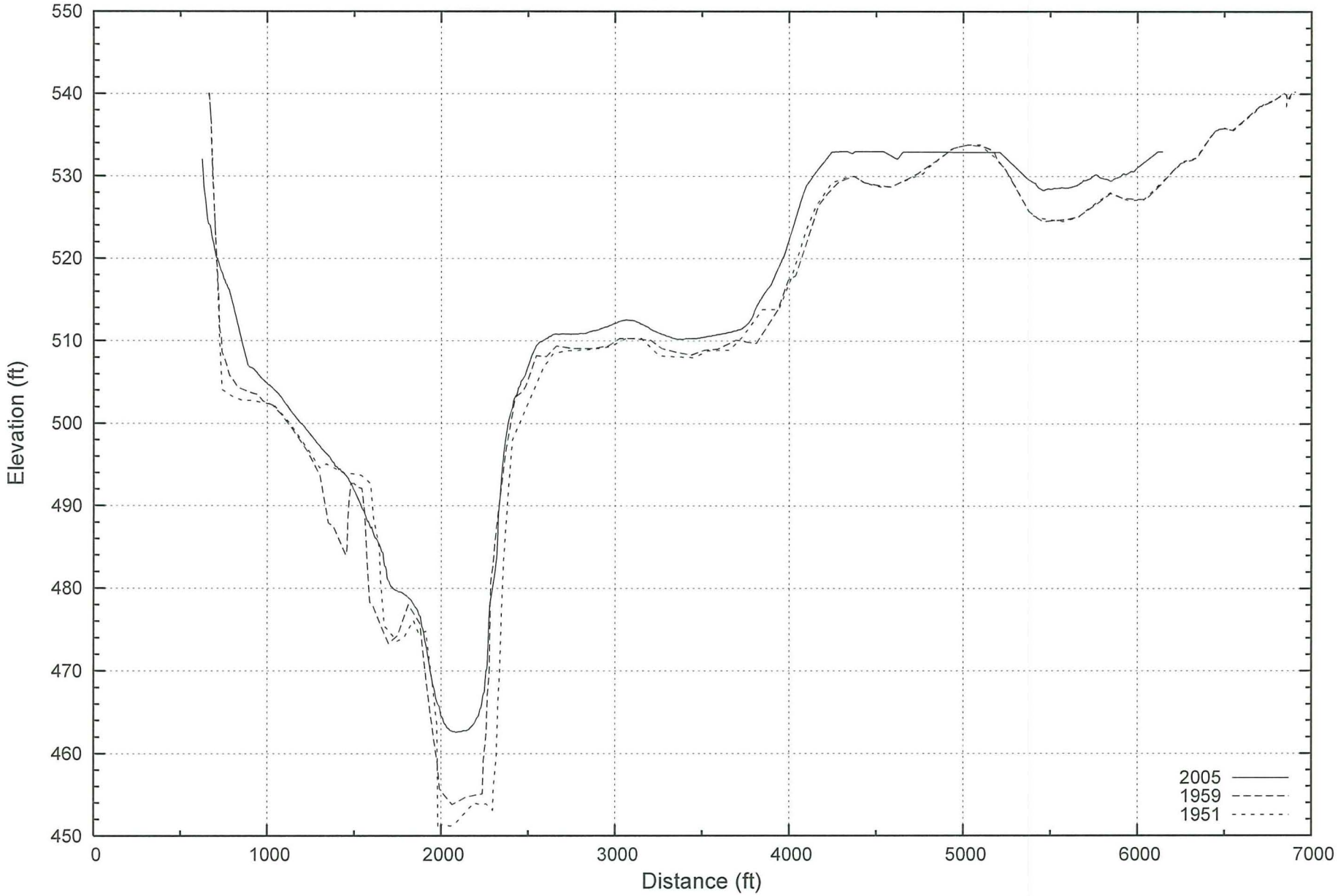


Appendix G

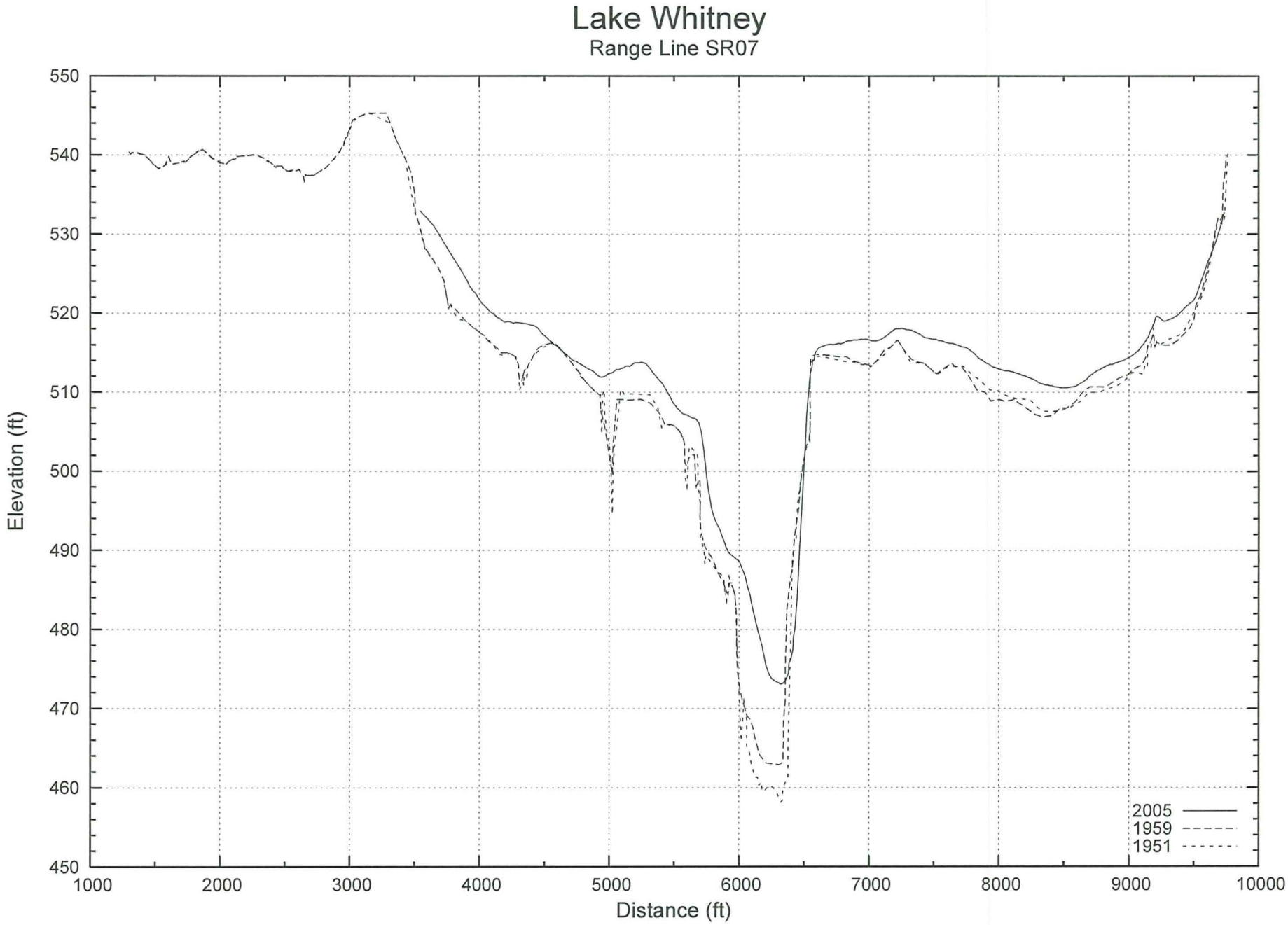

Lake Whitney
Range Line SR06A
Elevation (ft)
Distance (ft)
540
530
520
510
500
490
480
470
460
450
440
0
500
1000
1500
2000
2500
3000
3500
2005
1959
1951

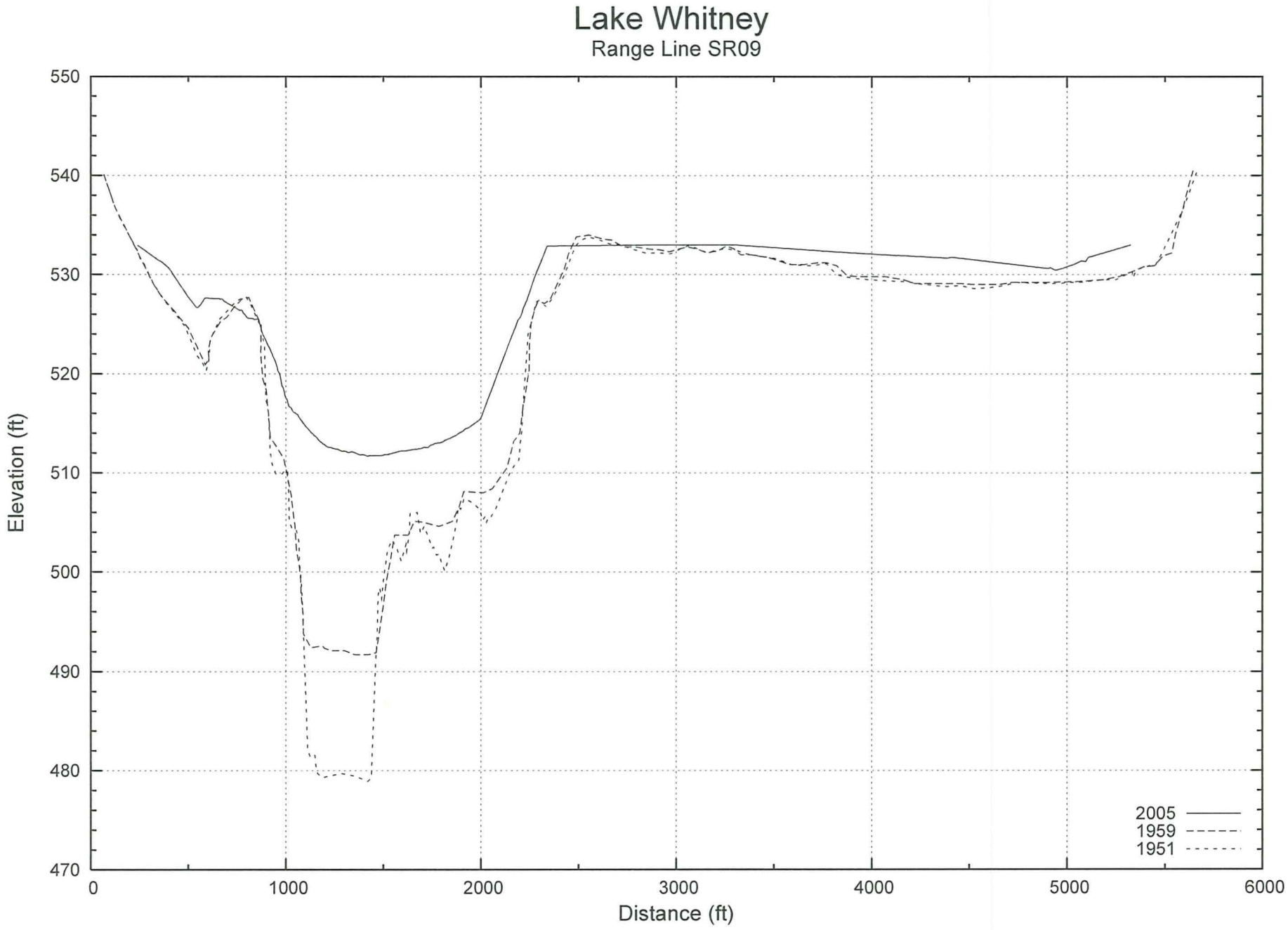
Lake Whitney

Range Line SR06B



Appendix G

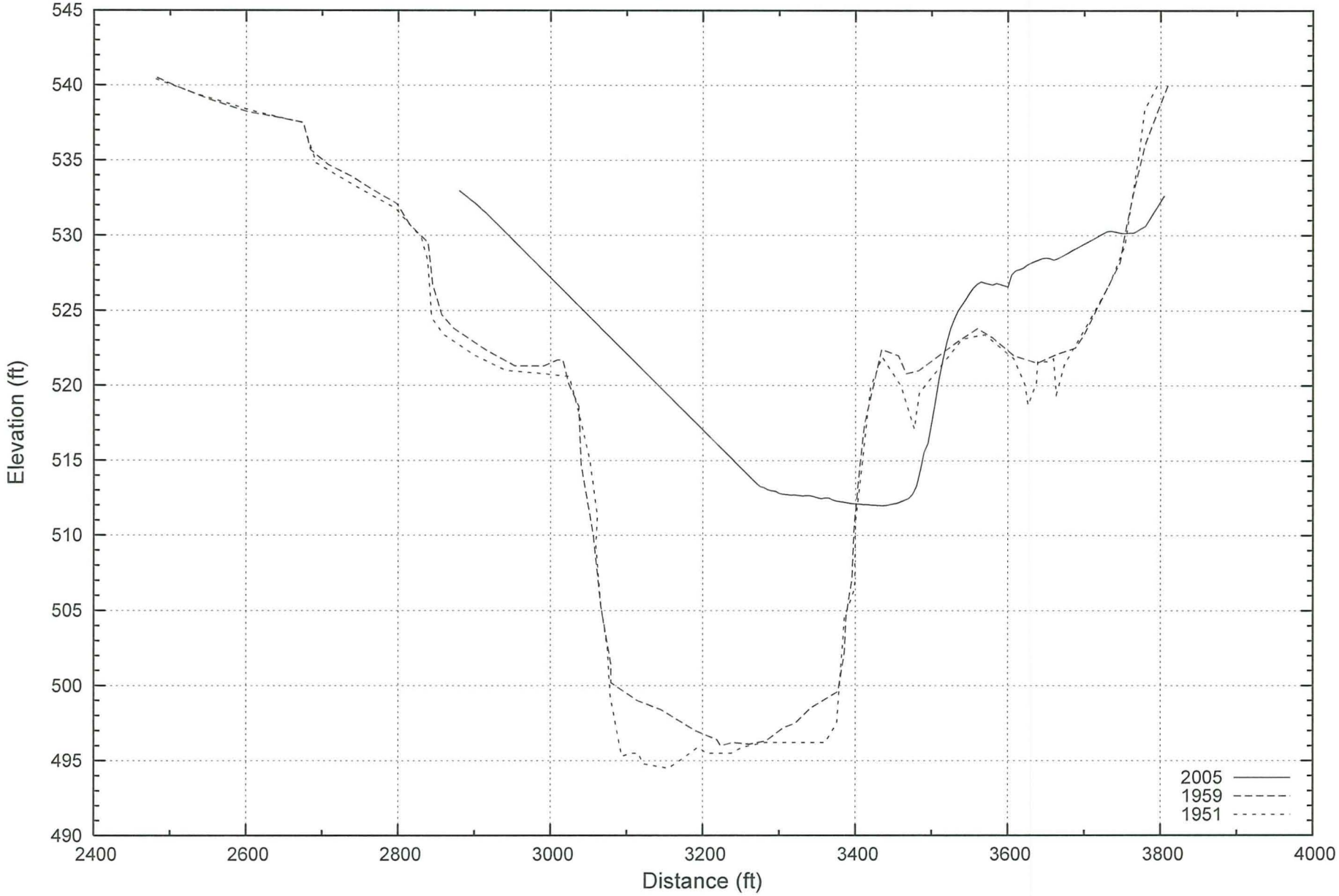

Lake Whitney
Range Line SR07
Elevation (ft)
550
540
530
520
510
500
490
480
470
460
450
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Distance (ft)
2005
1959
1951


Lake Whitney
Range Line SR09
Elevation (ft)
550
540
530
520
510
500
490
480
470
0
1000
2000
3000
4000
5000
6000
Distance (ft)
2005
1959
1951

Appendix G

Lake Whitney

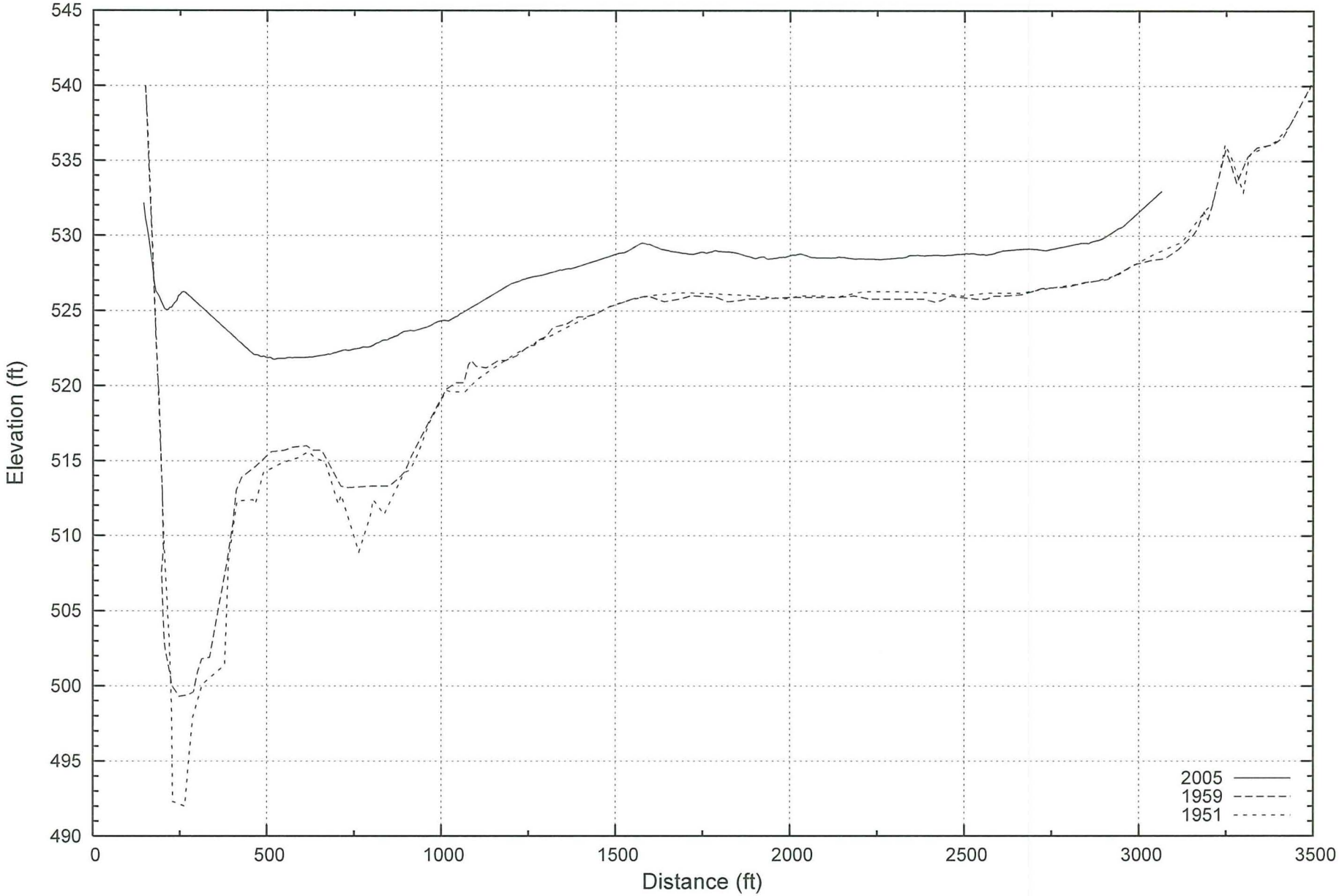
Range Line SR12



Appendix G

Lake Whitney

Range Line SR32



Appendix G

Figure 5

LAKE WHITNEY

5' - Contour Map

CONTOURS

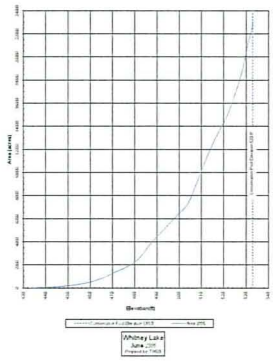
435
440
445
450
455
460
465
470
475
480
485
490
495
500
505
510
515
520
525
530

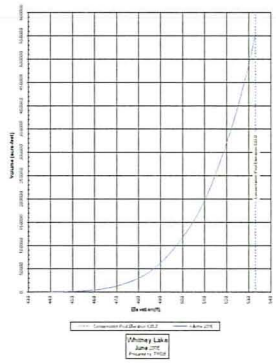
Islands

Whitney Lake
Elevation: 533.0'
Conservation Pool
Elevation

Projection: NAD83
State Plane
Texas Central Zone

Bosque and Hill Counties





This map is the product of a survey conducted by the Texas Water Development Board's Hydrographic Survey Program to determine the capacity of Whitney Lake. The Texas Water Development Board make no representation or assumes any liability.

Prepared by: TEXAS WATER DEVELOPMENT BOARD JUNE 2005 SURVEY

Appendix 10

Email from Sei Kudo, Mitsubishi Heavy Industries, Ltd., to Marvin Morris, et al., Enercon, Subject: Final Confirmation of Parameters

Joanne Morris

From:	sei_kudo@mhi.co.jp
Sent:	Tuesday, April 22, 2008 8:34 AM
To:	mamorris@enercon.com; jmorris@enercon.com; jmonroe@enercon.com
Cc:	bob.weitman@txu.com; mlaggart@enercon.com; Irving.Tsang@wgint.com; keiko_chitose@mnes-us.com; satoshi_hanada@mnes-us.com; yoshihisa_yamaura@mnes-us.com; hiroki_nishio@mhi.co.jp; hiromasa_nishino@mhi.co.jp; motoki_konno@mhi.co.jp; masatsugu_tsutsumi@mhi.co.jp; ryota_hirano@mhi.co.jp
Subject:	Final confirmation of parameters
Attachments:	Dose_calculation_conditions_CP34.doc; Table4 _Dose_Evaluation_Parameters_(LADTAP_Population).xls; Table1_Dose_Evaluation Parameters_(GASPAR_Individual).xls; Table2_Dose_Evaluation Parameters_(LADTAP_Individual).xls; Table3 _Dose_Evaluation_Parameters_(GASPAR_Population).xls

Dear Marvin Morris, Joanne Morris, jared Monroe,

I executed the re-arrangement of the spreadsheet of the dose evaluation parameters.

Please make new input data when the spillover rate of SCR is changed to 32900gpm.
(Please fill the numerical value under the frame in the balloon part.)

If these spreadsheets are completed, I think that we send these spreadsheets and your OHPs which you explained on 14th April to Luminant, the confirmation and approval of data are executed to Luminant.

Please arrange data finally immediately.

Thank you.

Best regards,
Seiichi Kudo (MHI)
(See attached file: Dose_calculation_conditions_CP34.doc)
(See attached file:
Table4_Dose_Evaluation_Parameters_(LADTAP_Population).xls)(See attached file: Table1_Dose_Evaluation Parameters_(GASPAR_Individual).xls)(See attached file: Table2_Dose_Evaluation Parameters_(LADTAP_Individual).xls)
(See attached file:
Table3_Dose_Evaluation_Parameters_(GASPAR_Population).xls)