6.3 SOCH Steady-State Calibration

Fort Loudoun Reservoir

The SOCH model of Fort Loudoun Reservoir was run under steady-state conditions and compared to the steady-state profiles from HEC-RAS. The downstream boundary conditions, Table 24, were set at 817 ft, to account for surcharge of the reservoir pool until the flow increases to spillway capacity. As flow continues to increase up to 1,000,000 cfs, the boundary condition follows the dam rating curve developed to account for modeled tailwater and interaction with the Canal (Reference 2.24). For discharges between 1,200,000 and 1,400,000 cfs, Ft. Loudoun is assumed to have failed; therefore the boundary condition then follows a curve taken from a SOCH model seismic failure run up to 1,400,000 cfs (Reference 2.24 and Attachment 10). Uniform, steady-state flow in 100,000 cfs or 200,000 cfs increments was specified so no local inflows were used.

A double node was used at the connection point between the Canal and Fort Loudoun Reservoir. Because there was not a section at Tennessee RM 602.70 (Fort Loudoun/Canal Junction), the location where the Canal connects to the reservoir, an additional section had to be added. The section at RM 602.30 was considered representative for use at RM 602.70 and the channel bottom elevation was interpolated based on channel elevations at RM 602.30 and 604.36. Because the SOCH model requires a minimum of five sections for any river segment, the segment from Fort Loudoun Dam (Tennessee River Mile 602.30) to the junction with the Canal (Tennessee River Mile 602.70) will have five sections. To accomplish this, three of the five sections on the segment from Fort Loudoun dam to junction with the Canal are interpolated sections (Tennessee River Mile 602.40, 602.50 and 602.60).

Initially, the Manning's *n* values were adjusted so the SOCH steady-state profiles coincided with the HEC-RAS steady-state 1,400,000 cfs profile. This approach did not provide a good match between the SOCH and HEC-RAS profiles at the lower flows. The Manning's *n* values were then adjusted so the SOCH steady-state profiles coincided with the HEC-RAS steady-state 600,000 cfs profile. This is in the range of the expected PMF and provided a better match between the SOCH and HEC-RAS profiles over the entire range of flows. Several iterations of Manning's *n* values were run to achieve calibration. These iterations are not shown in this calculation; only the final Manning's *n* values are shown. The Manning's *n* values calibrated for the SOCH model are compared to the Manning's *n* values calibrated for the HEC-RAS steady-state model in Table 38. Additionally, a closer calibration was obtained when one cross-section was interpolated between each of the original cross-sections in the SOCH model, resulting in 59 cross-sections rather than 29. The interpolated cross-sections are noted in Table 38.

Table 38. SOCH Manning's *n* Values for Fort Loudoun Reservoir Compared to HEC-RAS Manning's *n* Values

Tennessee River Mile	HEC-RAS Manning's *n*	SOCH Manning's *n*
652.22	0.031	0.026
651.18*		0.026
650.14	0.031	0.026
649.44*		0.026
648.73	0.031	0.035
648.01*		0.035
647.29	0.029	0.045
646.92*		0.035
646.55	0.029	0.028
645.82*		0.028
645.09	0.029	0.028
644.49*		0.028
643.89	0.029	0.023
642.83*		0.021
641.77	0.020	0.021
640.64*		0.021
639.50	0.020	0.025
638.51*		0.020
637.52	0.020	0.020
636.56*		0.020
635.59	0.020	0.020
635.10*		0.020
634.60	0.020	0.020
634.05*		0.020
633.50	0.020	0.020
632.46*		0.020
631.41	0.020	0.020
630.77*		0.020
630.12	0.023	0.025
629.72*		0.025
629.31	0.023	0.021

Tennessee River Mile	HEC-RAS Manning's *n*	SOCH Manning's *n*
628.23*		0.024
627.15	0.023	0.024
626.22*		0.024
625.28	0.023	0.024
624.19*		0.024
623.10	0.023	0.024
622.06*		0.024
621.02	0.035	0.024
619.98*		0.033
618.94	0.035	0.033
617.61*		0.033
616.27	0.035	0.033
615.48*		0.033
614.68	0.035	0.033
613.68*		0.033
612.68	0.035	0.033
611.66*		0.033
610.63	0.035	0.033
609.59*		0.033
608.54	0.031	0.029
607.49*		0.029
606.43	0.031	0.023
604.36	0.031	0.023
602.70**		0.023
602.60*		0.023
602.50*		0.023
602.40*		0.023
602.30	0.031	0.023

*Interpolated Section in SOCH
**Copied Section

Tellico Reservoir

The SOCH model of Tellico Reservoir was run under steady-state conditions and compared to the steady-state profiles from HEC-RAS. The downstream boundary conditions, Table 25, were set at the surcharge level, 817 ft, of the reservoir for flows up to spillway capacity. After 400,000 cfs flow has been reached, the boundary conditions then followed the Tellico dam rating curve. Uniform, steady-state flow in 100,000 cfs increments was specified so no local inflows were used.

A double node was used at the connection point between the Canal and Tellico Reservoir. Because there was not a section at Little Tennessee RM 0.60 (Tellico/Canal Junction), the location where the Canal connects to the reservoir, an additional section had to be added. The section at Little Tennessee RM 0.30 was considered representative for use at RM 0.60 and the channel bottom elevation was interpolated based on the channel elevations at RM 0.30 and 3.68. Because the SOCH model requires a minimum of five sections for any river segment, the segment from Tellico dam (Little Tennessee River Mile 0.30) to the junction with the Canal (Little Tennessee River Mile 0.60) will have five sections. To accomplish this, three of the five sections on the segment from Tellico dam to the junction with the Canal are interpolated sections (Little Tennessee River Mile 0.38, 0.45, and 0.53).

Initially, the Manning's *n* values were adjusted so the SOCH steady-state profiles coincided with the HEC-RAS steady-state 600,000 cfs profile. This approach did not provide a good match between the SOCH and HEC-RAS profiles at the lower flows. The Manning's *n* values were then adjusted so the SOCH steady-state profiles coincided with the HEC-RAS steady-state 200,000 cfs profile. This is in the range of the expected PMF and provided a better match between the SOCH and HEC-RAS profiles over the entire range of flows. Several iterations of Manning's *n* value were run to achieve calibration. These iterations are not shown in this calculation; only the runs using the final Manning's *n* values are shown. The Manning's *n* values calibrated for the SOCH model are compared to the Manning's *n* values calibrated for the HEC-RAS steady-state model in Table 39. Additionally, a closer calibration was obtained when one cross-section was interpolated between each of the original cross-sections in the SOCH model, resulting in 49 cross-sections rather than 23.

Table 39. SOCH Manning's *n* Values for Tellico Reservoir Compared to HEC-RAS Manning's *n* Values

Tellico Reservoir Mile	HEC-RAS Manning's *n*	SOCH Manning's *n*
33.60	0.038	0.042
32.97*		0.042
32.34	0.038	0.040
31.95*		0.029
31.55	0.038	0.029
30.62*		0.029
29.68	0.038	0.029
28.65*		0.029
27.62	0.030	0.029
27.18*		0.029
26.73	0.030	0.033
26.24*		0.033
25.74	0.030	0.035
25.08*		0.035
24.41	0.030	0.035
24.07*		0.035
23.73	0.030	0.035
23.14*		0.035
22.54	0.030	0.028
21.86*		0.028
21.17	0.030	0.028
20.64*		0.028
20.1	0.030	0.028
19.99*		0.028
19.87	0.030	0.028

Tellico Reservoir Mile	HEC-RAS Manning's *n*	SOCH Manning's *n*
19.49*		0.028
19.11	0.030	0.028
18.85*		0.033
18.59	0.030	0.033
17.62*		0.033
16.64	0.030	0.033
16.35*		0.033
16.05	0.030	0.025
14.68*		0.025
13.31	0.030	0.025
11.49*		0.025
9.66	0.030	0.025
9.05*		0.025
8.43	0.030	0.025
7.38*		0.027
6.33	0.030	0.027
5.01*		0.027
3.68	0.030	0.027
2.14*		0.027
0.60**		0.027
0.53*		0.027
0.45*		0.027
0.38*		0.027
0.30	0.030	0.027

*Interpolated Section in SOCH
** Copied Section

Holston River and French Broad River

The SOCH model of Holston River and French Broad River was run under steady-state conditions and compared to the steady-state profiles from HEC-RAS. The two rivers meet at the Forks of the Rivers, TRM 652.22. The downstream boundary conditions for both the Holston River and French Broad River models, Table 28, were set as the water-surface elevation at TRM 652.22 determined by running steady-state profiles of Fort Loudoun Reservoir. The Holston River contributes 35% of the flow at TRM 652.22 while the French Broad River contributes 65% of the flow. This ratio was determined by comparing the flow from each river during the 1 Percent Annual Chance flood (Table 26). So, the water-surface elevation for a flow of 100,000 cfs at TRM 652.22 was set as the downstream boundary condition for a steady-state profile of 35,000 cfs in the Holston River and for a flow of 65,000 cfs in the French Broad River. Uniform, steady-state flow in 100,000 cfs increments was specified so no local inflows were used.

Initially, the Manning's *n* values were adjusted so the SOCH steady-state profiles coincided with the HEC-RAS steady-state 490,000 cfs profile on the Holston River and 845,000 cfs profile on the French Broad River. This approach did not provide a good match between the SOCH and HEC-RAS profiles at the lower flows. The Manning's *n* values were then

adjusted so the SOCH steady-state profiles coincided with the HEC-RAS steady-state 250,000 cfs profile on the Holston River and the HEC-RAS steady-state 325,000 cfs profile on the French Broad River. Both of these flows are in the range of the expected PMF for their respective rivers and provided a better match between the SOCH and HEC-RAS profiles over the entire range of flows. Several iterations of Manning's *n* value were run to achieve calibration. These iterations are not shown in this calculation; only the final Manning's *n* values are shown. The Manning's *n* values calibrated for the Holston River SOCH model are compared to the Manning's *n* values calibrated for the HEC-RAS steady-state model of the Holston River in Table 40. The Manning's *n* values calibrated for the French Broad SOCH model are compared to the Manning's *n* values calibrated for the HEC-RAS steady-state model of the French Broad River in Table 41. Additionally, a closer calibration was obtained when one cross-section was interpolated between each of the original cross-sections in the SOCH model, resulting in 57 cross-sections for the Holston River rather than 29 and 49 cross-sections for the French Broad River rather than 25.

Table 40. SOCH Manning's *n* Values for Holston River Compared to HEC-RAS Manning's *n* Values

Holston River Mile	HEC-RAS Manning's *n*	SOCH Manning's *n*	Holston River Mile	HEC-RAS Manning's *n*	SOCH Manning's *n*
52.30	0.050	0.051	23.14*		0.028
51.32*		0.051	22.14	0.028	0.028
50.34	0.045	0.051	21.14*		0.028
49.33*		0.036	20.14	0.028	0.022
48.31	0.045	0.032	19.13*		0.028
47.32*		0.032	18.12	0.028	0.032
46.33	0.033	0.032	17.57*		0.032
45.31*		0.032	17.02	0.028	0.032
44.30	0.033	0.037	16.56*		0.042
43.47*		0.037	16.10	0.028	0.036
42.64	0.033	0.043	15.00*		0.030
41.45*		0.025	13.91	0.028	0.026
40.27	0.033	0.037	12.98*		0.026
39.77*		0.020	12.06	0.028	0.026
39.27	0.033	0.024	11.06*		0.026
37.42*		0.031	10.06	0.028	0.036
35.58	0.033	0.031	9.05*		0.031
34.75*		0.029	8.04	0.028	0.030
33.92	0.039	0.030	7.04*		0.032
33.23*		0.037	6.03	0.028	0.032
32.54	0.039	0.037	5.79*		0.032
31.38*		0.037	5.56	0.028	0.032
30.22	0.035	0.032	4.79*		0.032
29.35*		0.032	4.02	0.036	0.036
28.48	0.035	0.031	3.02*		0.036
27.51*		0.035	2.02	0.036	0.036
26.54	0.035	0.035	1.01*		0.036
25.34*		0.035	0.00	0.036	0.036
24.15	0.030	0.028			

*Interpolated section in SOCH

Table 41. SOCH Manning's *n* Values for French Broad River Compared to HEC-RAS Manning's *n* Values

French Broad River Mile	HEC-RAS Manning's *n*	SOCH Manning's *n*
32.30	0.039	0.036
31.53*		0.036
30.75	0.039	0.036
29.80*		0.036
28.85	0.039	0.036
28.54*		0.036
28.23	0.038	0.037
27.54*		0.037
26.84	0.038	0.037
26.57*		0.044
26.30	0.038	0.044
25.98*		0.044
25.65	0.038	0.044
25.22*		0.049
24.78	0.038	0.049
24.14*		0.049
23.50	0.038	0.049
22.94*		0.049
22.38	0.042	0.045
21.97*		0.045
21.56	0.042	0.045
20.63*		0.045
19.70	0.042	0.035
18.94*		0.030
18.18	0.034	0.025

French Broad River Mile	HEC-RAS Manning's *n*	SOCH Manning's *n*
17.77*		0.050
17.35	0.029	0.050
16.56*		0.030
15.76	0.029	0.030
15.37*		0.030
14.97	0.029	0.030
14.62*		0.030
14.26	0.029	0.030
13.95*		0.030
13.63	0.029	0.030
12.53*		0.030
11.42	0.034	0.030
10.75*		0.025
10.07	0.039	0.025
9.24*		0.030
8.40	0.034	0.030
7.23*		0.030
6.06	0.034	0.027
4.85*		0.040
3.90	0.031	0.035
2.96*		0.035
2.02	0.031	0.035
0.73*		0.047
0.00	0.034	0.050

*Interpolated section in SOCH

6.3.1 SOCH Steady-State Profiles for Fort Loudoun Reservoir

The Fort Loudoun Reservoir SOCH model was calibrated to the HEC-RAS steady-state 600,000 cfs profile by adjusting the Manning's *n* values and profiles were run up to 1,400,000 cfs. The profile at 1,400,000 cfs is above the expected PMF and will allow the model to be tested at higher flows in the range of those expected from the seismic failure of the upstream dams (Douglas and Cherokee). Steady-state profiles were then run in 100,000 or 200,000 cfs increments (Figures 29 through 32, and Tables 42 through 45) at profiles ranging from 100,000 cfs to 1,400,000 cfs. No tailwater curve is provided for Fort Loudoun since there is no dam at the upstream boundary.

6.3.2 SOCH Steady-State Profiles for Tellico Reservoir

The Tellico Reservoir SOCH model was calibrated to the HEC-RAS steady-state 200,000 cfs profile by adjusting the Manning's *n* values and profiles were run up to 600,000 cfs. The profile at 600,000 cfs is larger than the expected PMF and should allow the model to be tested at higher flows in the range of those expected from the seismic failure of

and 47) at profiles ranging from 100,000 cfs to 600,000 cfs. Figure 34 and Table 48 show the elevations of the HEC-RAS and SOCH steady-state profiles at Chilhowee Dam, LTRM 33.60, compared to the tailwater rating curve for Chilhowee Dam (Attachment 2).

6.3.3 SOCH Steady-State Profiles for Holston River

The Holston River SOCH model was calibrated to the HEC-RAS steady-state 250,000 cfs profile by adjusting the Manning's *n* values and profiles were run up to 490,000 cfs. The profile at 490,000 cfs is above the expected PMF and should allow the model to be tested at higher flows in the range of those expected from the seismic failure of the upstream dam (Cherokee). Steady-state profiles were then run at profiles ranging from 35,000 cfs to 490,000 cfs (Figures 35 through 37, and Tables 49 through 52). Figure 38 and Table 53 show the elevations of the HEC-RAS and SOCH steady-state profiles at Cherokee Dam, Holston River Mile 52.30, compared to the tailwater rating curve for Cherokee Dam (Attachment 2).

6.3.4 SOCH Steady-State Profiles for French Broad River

The French Broad River SOCH model was calibrated to the HEC-RAS steady-state 325,000 cfs profile by adjusting the Manning's *n* values and profiles were run up to 845,000 cfs. The profile at 845,000 cfs flow is above the expected PMF and should allow the model to be tested at higher flows in the range of those expected from the seismic failure of the upstream dam (Douglas). Steady-state profiles were then run at profiles ranging from 65,000 cfs to 845,000 cfs (Figures 39 through 41, and Tables 54 through 57). Figure 42 and Table 58 show the elevations of the HEC-RAS and SOCH steady-state profiles at Douglas Dam, FBRM 32.30, compared to the tailwater rating curve for Douglas Dam (Attachment 2).

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Subject: SOCH Model Calibration, Fort Loudoun-Tellico		Prepped	JAW
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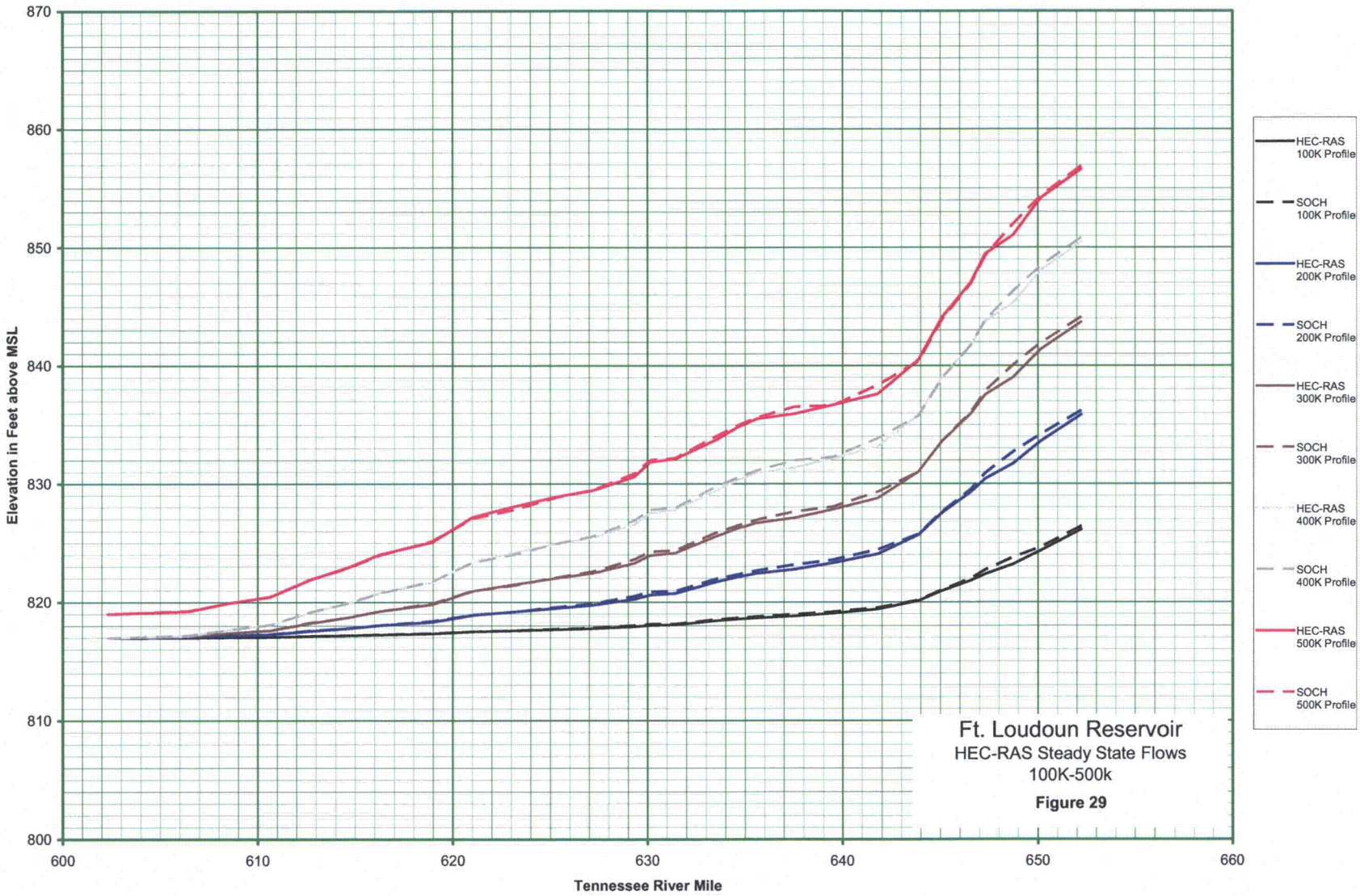
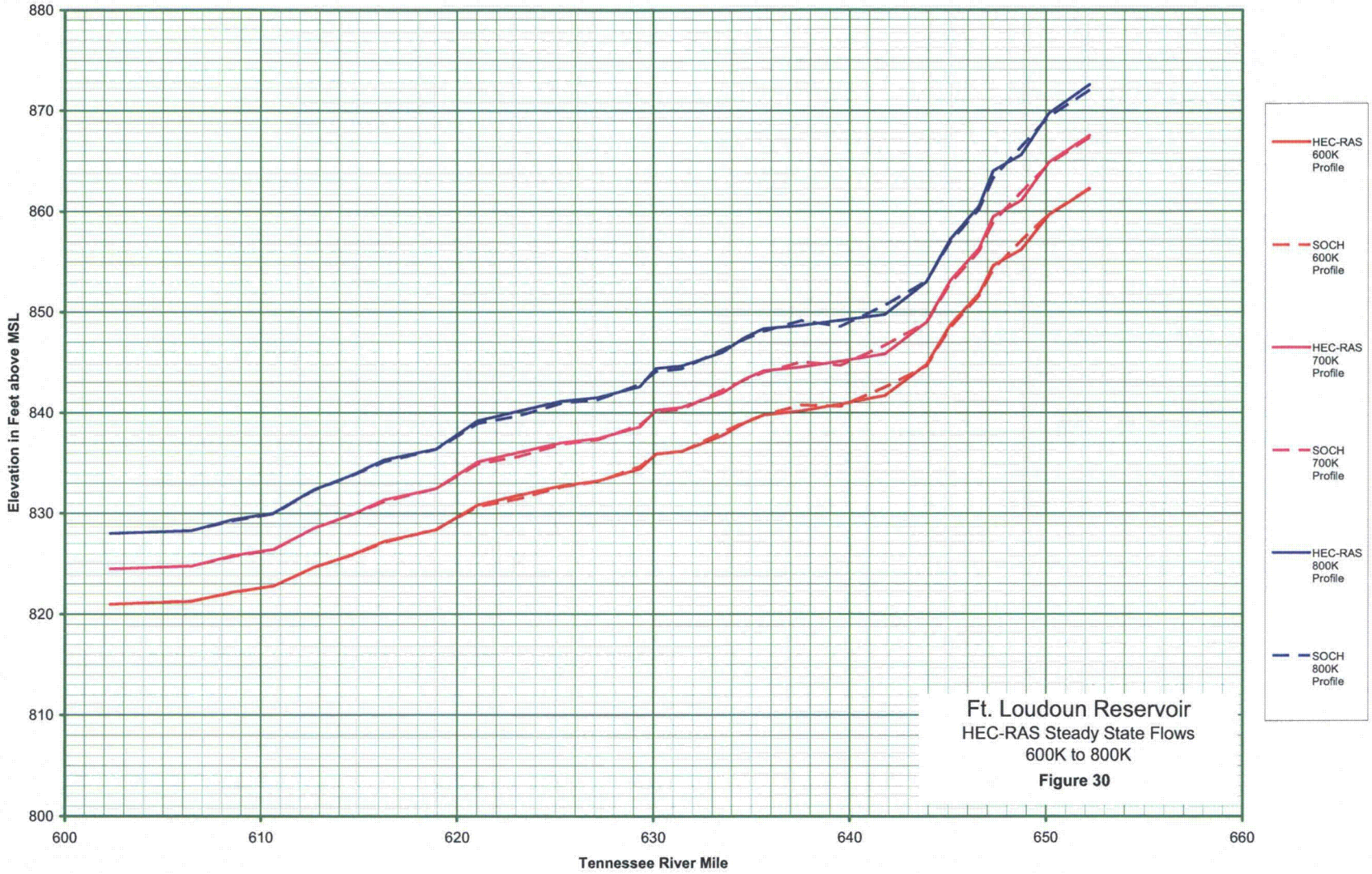
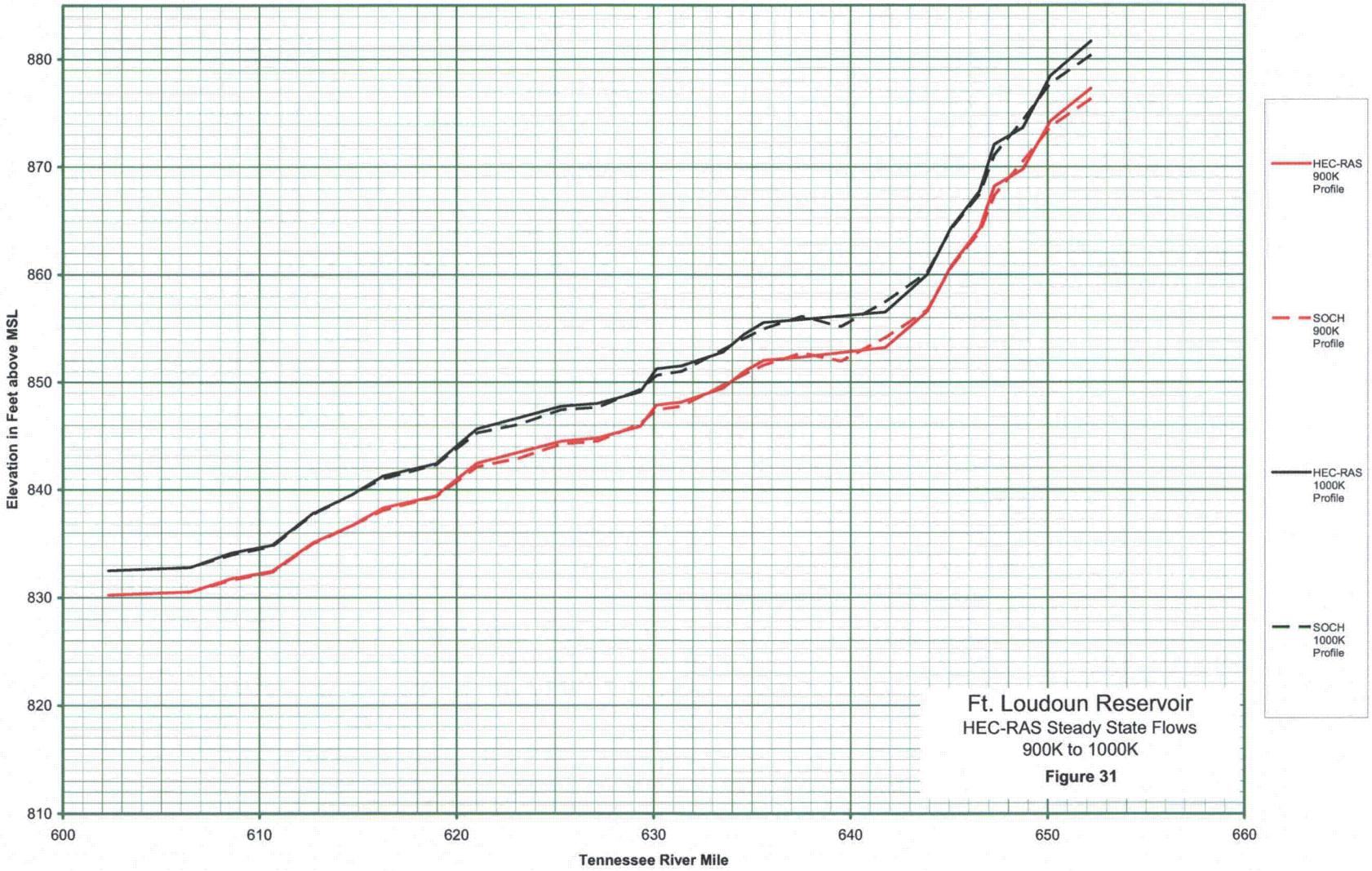



Ft. Loudoun Reservoir
HEC-RAS Steady State Flows
600K to 800K
Figure 30
Elevation in Feet above MSL
Tennessee River Mile
880
870
860
850
840
830
820
810
800
600
610
620
630
640
650
660
HEC-RAS 600K Profile
SOCH 600K Profile
HEC-RAS 700K Profile
SOCH 700K Profile
HEC-RAS 800K Profile
SOCH 800K Profile


Ft. Loudoun Reservoir
HEC-RAS Steady State Flows
900K to 1000K
Figure 31
Elevation in Feet above MSL
Tennessee River Mile
880
870
860
850
840
830
820
810
600
610
620
630
640
650
660
HEC-RAS 900K Profile
SOCH 900K Profile
HEC-RAS 1000K Profile
SOCH 1000K Profile

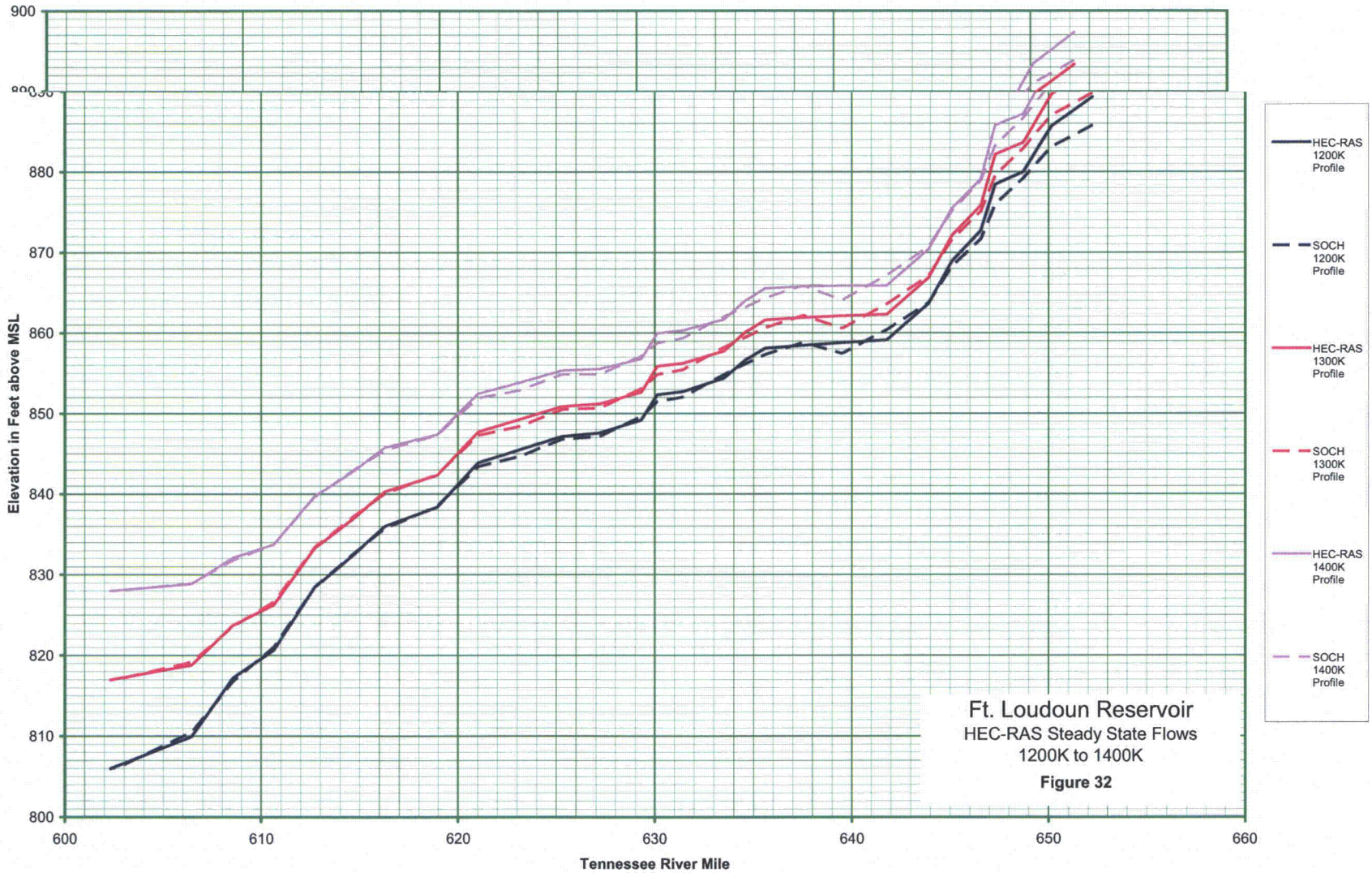

Ft. Loudoun Reservoir
HEC-RAS Steady State Flows
1200K to 1400K
Figure 32
Elevation in Feet above MSL
Tennessee River Mile
900
880
870
860
850
840
830
820
810
800
600
610
620
630
640
650
660
HEC-RAS 1200K Profile
SOCH 1200K Profile
HEC-RAS 1300K Profile
SOCH 1300K Profile
HEC-RAS 1400K Profile
SOCH 1400K Profile

Table 42. Fort Loudoun Reservoir, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 100K – 400K

Tennessee River Mile	HEC-RAS 100K Profile	SOCH 100K Profile*	HEC-RAS 200K Profile	SOCH 200K Profile*	HEC-RAS 300K Profile	SOCH 300K Profile*	HEC-RAS 400K Profile	SOCH 400K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
652.22	826.14	826.43	835.85	836.20	843.70	844.13	850.46	850.85
650.14	824.36	824.66	833.61	834.20	841.39	841.93	848.10	848.46
648.73	823.21	823.80	831.71	832.71	839.02	840.08	845.32	846.34
647.29	822.37	822.73	830.42	830.91	837.55	837.88	843.77	843.86
646.55	821.83	822.00	829.29	829.53	835.94	836.09	841.73	841.74
645.09	820.96	821.05	827.54	827.64	833.61	833.63	839.01	838.93
643.89	820.12	820.18	825.69	825.75	831.03	831.03	835.84	835.76
641.77	819.41	819.54	824.05	824.42	828.77	829.32	833.15	833.83
639.50	819.06	819.19	823.31	823.56	827.84	828.06	832.16	832.28
637.52	818.83	818.98	822.76	823.15	827.12	827.65	831.39	831.98
635.59	818.67	818.78	822.42	822.66	826.69	826.95	830.92	831.13
634.60	818.56	818.65	822.11	822.32	826.22	826.46	830.31	830.51
633.50	818.42	818.52	821.71	821.96	825.55	825.87	829.41	829.74
631.41	818.06	818.13	820.73	820.92	824.14	824.36	827.77	827.94
630.12	818.01	818.12	820.59	820.86	823.93	824.25	827.50	827.78
629.31	817.91	818.01	820.24	820.50	823.27	823.60	826.53	826.86
627.15	817.75	817.80	819.73	819.86	822.43	822.57	825.43	825.53
625.28	817.67	817.71	819.48	819.56	822.01	822.07	824.91	824.91
623.10	817.58	817.59	819.18	819.17	821.47	821.39	824.16	823.97
621.02	817.50	817.52	818.89	818.93	820.94	820.95	823.40	823.35
618.94	817.34	817.37	818.31	818.38	819.80	819.89	821.67	821.76
616.27	817.26	817.28	818.03	818.05	819.24	819.24	820.79	820.77
614.68	817.20	817.21	817.79	817.80	818.72	818.72	819.96	819.93
612.68	817.14	817.15	817.55	817.59	818.22	818.27	819.13	819.17
610.63	817.07	817.08	817.27	817.29	817.61	817.63	818.07	818.10
608.54	817.04	817.05	817.18	817.18	817.40	817.40	817.70	817.69
606.43	817.01	817.01	817.04	817.05	817.09	817.12	817.17	817.20
602.70**		817.00		817.00		817.01		817.01
602.50**		817.00		817.00		817.00		817.01
602.30	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation.
**Sections added for junction points or to maintain a minimum of 5 sections per segment (Section 6.4).

Table 43. Fort Loudoun Reservoir, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 500K – 800K

Tennessee River Mile	HEC-RAS 500K Profile	SOCH 500K Profile*	HEC-RAS 600K Profile	SOCH 600K Profile*	HEC-RAS 700K Profile	SOCH 700K Profile*	HEC-RAS 800K Profile	SOCH 800K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
652.22	856.63	856.90	862.26	862.33	867.55	867.35	872.59	872.03
650.14	854.19	854.37	859.70	859.72	864.89	864.74	869.73	869.42
648.73	851.06	852.02	856.24	857.15	861.10	861.95	865.61	866.43
647.29	849.48	849.34	854.64	854.30	859.51	858.99	864.04	863.37
646.55	847.05	846.95	851.83	851.65	856.33	856.09	860.50	860.23
645.09	844.10	843.94	848.72	848.49	853.14	852.86	857.21	856.96
643.89	840.52	840.39	844.79	844.65	849.00	848.97	853.00	853.07
641.77	837.61	838.37	841.71	842.54	845.84	846.71	849.77	850.67
639.50	836.69	836.64	840.86	840.64	845.13	844.71	849.19	848.58
637.52	835.95	836.54	840.18	840.76	844.54	845.05	848.67	849.14
635.59	835.51	835.62	839.77	839.78	844.17	844.03	848.35	848.09
634.60	834.80	834.93	838.97	839.03	843.30	843.25	847.42	847.27
633.50	833.73	834.04	837.74	838.05	841.96	842.24	845.98	846.25
631.41	832.10	832.17	836.17	836.13	840.52	840.35	844.65	844.37
630.12	831.83	831.99	835.89	835.91	840.24	840.10	844.39	844.08
629.31	830.60	830.87	834.41	834.65	838.59	838.80	842.58	842.81
627.15	829.43	829.46	833.20	833.17	837.43	837.31	841.49	841.28
625.28	828.90	828.86	832.71	832.61	837.00	836.85	841.12	840.92
623.10	828.05	827.79	831.77	831.43	836.05	835.64	840.14	839.67
621.02	827.19	827.09	830.83	830.68	835.10	834.88	839.19	838.92
618.94	825.07	825.15	828.37	828.42	832.46	832.47	836.40	836.37
616.27	824.04	823.98	827.22	827.12	831.33	831.19	835.30	835.12
614.68	822.96	822.93	825.93	825.90	829.92	829.90	833.81	833.79
612.68	821.89	821.92	824.63	824.65	828.51	828.50	832.32	832.28
610.63	820.44	820.46	822.79	822.80	826.42	826.40	830.00	829.95
608.54	819.95	819.94	822.20	822.16	825.80	825.72	829.37	829.26
606.43	819.22	819.26	821.27	821.30	824.77	824.79	828.27	828.28
602.70**		819.01		821.02		824.52		828.02
602.50**		819.01		821.01		824.51		828.01
602.30	819.00	819.00	821.00	821.00	824.50	824.50	828.00	828.00

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation

**Sections added for junction points or to maintain a minimum of 5 sections per segment (Section 6.4).

Table 44. Fort Loudoun Reservoir, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 900K – 1000K

Tennessee River Mile	HEC-RAS 900K Profile	SOCH 900K Profile*	HEC-RAS 1000K Profile	SOCH 1000K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
652.22	877.30	876.34	881.68	880.39
650.14	874.24	873.72	878.46	877.75
648.73	869.78	870.51	873.63	874.33
647.29	868.22	867.37	872.10	871.11
646.55	864.28	863.97	867.75	867.45
645.09	860.79	860.68	864.31	864.21
643.89	856.59	856.73	860.00	860.21
641.77	853.22	854.16	856.51	857.49
639.50	852.75	851.95	856.15	855.16
637.52	852.32	852.71	855.80	856.11
635.59	852.02	851.60	855.53	854.96
634.60	851.01	850.75	854.44	854.06
633.50	849.44	849.71	852.76	853.02
631.41	848.16	847.77	851.52	851.01
630.12	847.89	847.44	851.24	850.64
629.31	845.90	846.14	849.09	849.33
627.15	844.83	844.54	848.04	847.67
625.28	844.51	844.25	847.77	847.46
623.10	843.48	842.93	846.69	846.07
621.02	842.49	842.17	845.68	845.32
618.94	839.46	839.40	842.44	842.34
616.27	838.34	838.13	841.31	841.06
614.68	836.71	836.70	839.55	839.56
612.68	835.08	835.01	837.79	837.71
610.63	832.45	832.37	834.86	834.75
608.54	831.76	831.62	834.14	833.96
606.43	830.53	830.54	832.79	832.80
602.70**		830.28		832.53
602.50**		830.26		832.51
602.30	830.25	830.25	832.50	832.50

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation
**Sections added for junction points or to maintain a minimum of 5 sections per segment (Section 6.4).

Table 45. Fort Loudoun Reservoir, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 1200K – 1400K

Tennessee River Mile	HEC-RAS 1200K Profile	SOCH 1200K Profile*	HEC-RAS 1300K Profile	SOCH 1300K Profile*	HEC-RAS 1400K Profile	SOCH 1400K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
652.22	889.31	885.79	893.39	889.84	897.35	893.89
650.14	885.70	883.13	889.66	887.08	893.49	891.04
648.73	880.02	879.24	883.68	882.98	887.21	886.73
647.29	878.47	875.99	882.19	879.61	885.80	883.28
646.55	872.71	871.66	875.85	875.16	879.10	878.93
645.09	868.95	868.33	872.16	871.68	875.50	875.18
643.89	863.64	863.75	866.87	867.13	870.38	870.74
641.77	859.13	860.41	862.32	863.65	865.90	867.19
639.50	858.79	857.45	862.14	860.60	865.88	864.11
637.52	858.44	858.84	861.91	862.20	865.79	865.90
635.59	858.12	857.35	861.63	860.69	865.56	864.39
634.60	856.67	856.18	860.13	859.51	864.04	863.23
633.50	854.37	854.83	857.77	858.23	861.68	862.05
631.41	852.71	852.04	856.24	855.46	860.32	859.37
630.12	852.33	851.49	855.87	854.87	859.97	858.75
629.31	849.17	849.63	852.64	853.10	856.77	857.13
627.15	847.58	847.14	851.19	850.68	855.53	854.86
625.28	847.16	846.80	850.88	850.51	855.35	854.88
623.10	845.49	844.66	849.26	848.41	853.82	852.87
621.02	843.88	843.41	847.75	847.31	852.47	851.95
618.94	838.35	838.50	842.34	842.46	847.40	847.34
616.27	835.99	835.74	840.30	840.08	845.78	845.42
614.68	832.43	832.57	836.95	837.21	842.81	842.97
612.68	828.39	828.45	833.28	833.40	839.69	839.62
610.63	820.62	821.01	826.25	826.62	833.74	833.72
608.54	817.17	816.74	823.73	823.60	832.09	831.79
606.43	809.93	810.49	818.80	819.17	828.84	828.92
602.70**		806.17		817.10		828.07
602.50**		806.09		817.05		828.03
602.30	806.00	806.00	817.00	817.00	828.00	828.00

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation
**Sections added for junction points or to maintain a minimum of 5 sections per segment (Section 6.4).

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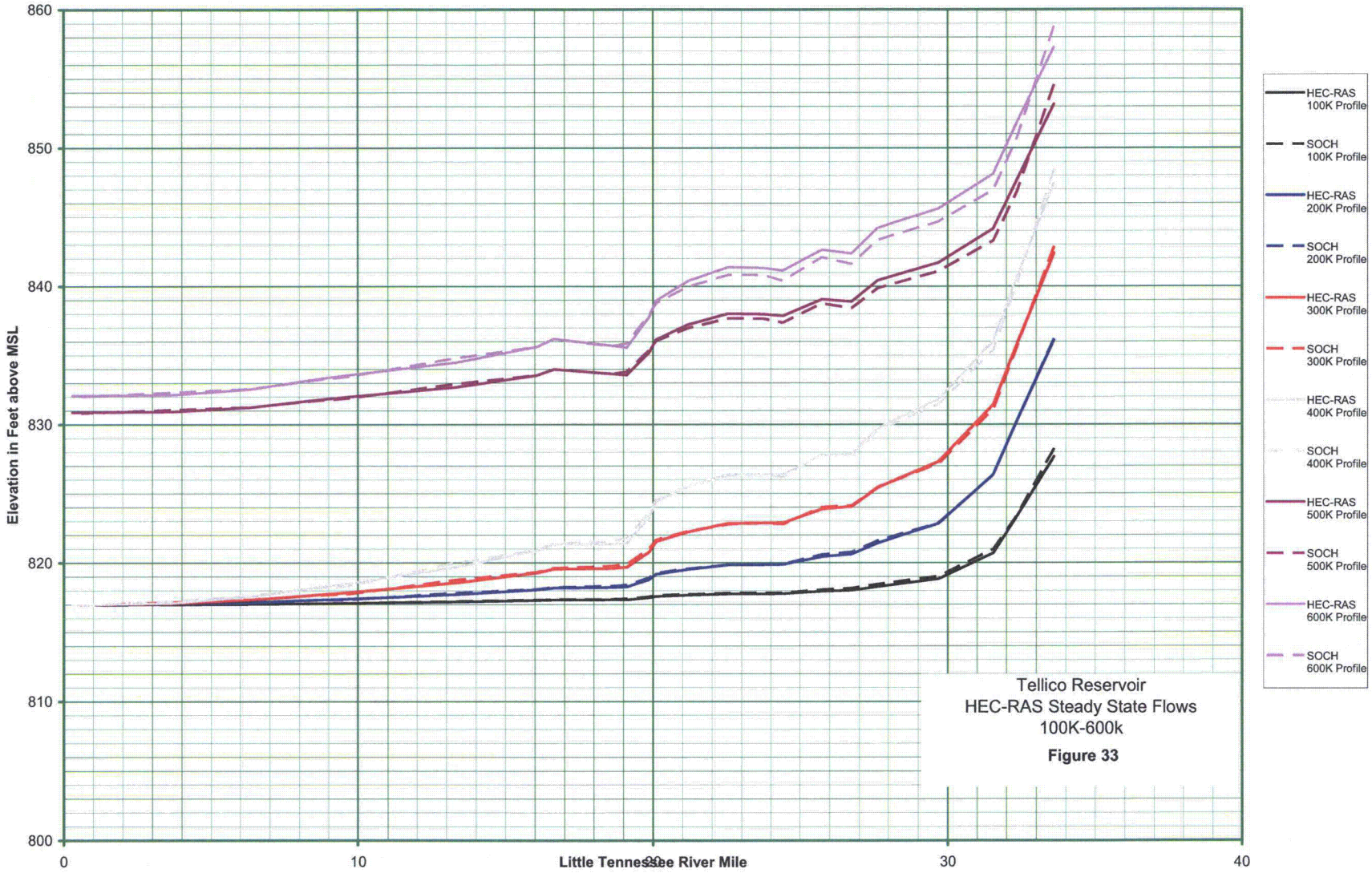
		Checked	JCT



Tellico Reservoir
HEC-RAS Steady State Flows
100K-600k

Figure 33

Table 46. Tellico Reservoir, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 100K-300K

Tellico Reservoir Mile	HEC-RAS 100K Profile	SOCH 100K Profile*	HEC-RAS 200K Profile	SOCH 200K Profile*	HEC-RAS 300K Profile	SOCH 300K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
33.60	827.67	828.25	836.10	836.21	842.40	842.89
32.34	823.34	823.42	830.22	830.22	835.79	835.62
31.55	820.70	820.99	826.36	826.35	831.45	831.13
29.68	818.83	819.00	822.83	822.85	827.31	827.15
27.62	818.27	818.44	821.42	821.57	825.42	825.44
26.73	818.02	818.16	820.62	820.75	824.06	824.10
25.74	817.94	818.06	820.44	820.57	823.88	823.97
24.41	817.77	817.83	819.88	819.87	822.87	822.76
23.73	817.76	817.82	819.85	819.87	822.86	822.82
22.54	817.75	817.80	819.83	819.82	822.84	822.75
21.17	817.66	817.72	819.51	819.55	822.23	822.24
20.10	817.57	817.63	819.17	819.24	821.54	821.62
19.87	817.47	817.54	818.79	818.91	820.79	820.99
19.11	817.33	817.39	818.26	818.37	819.68	819.85
18.59	817.32	817.36	818.22	818.29	819.60	819.70
16.64	817.30	817.33	818.18	818.20	819.55	819.56
16.05	817.27	817.29	818.05	818.05	819.27	819.26
13.31	817.18	817.22	817.71	817.79	818.56	818.70
9.66	817.10	817.09	817.39	817.32	817.87	817.71
8.43	817.08	817.07	817.31	817.27	817.68	817.61
6.33	817.04	817.04	817.14	817.13	817.32	817.29
3.68	817.01	817.01	817.03	817.05	817.06	817.10
0.60**		817.00		817.01		817.01
0.45**		817.00		817.00		817.01
0.30	817.00	817.00	817.00	817.00	817.00	817.00

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation.
**Sections added for junction points or to maintain a minimum of 5 sections per segment (Section 6.4).

Table 47. Tellico Reservoir, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 400K-600K

Tellico Reservoir Mile	HEC-RAS 400K Profile	SOCH 400K Profile*	HEC-RAS 500K Profile	SOCH 500K Profile*	HEC-RAS 600K Profile	SOCH 600K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
33.60	847.48	848.51	853.16	854.58	857.27	858.83
32.34	840.67	840.19	847.65	846.79	851.79	850.68
31.55	836.05	835.42	844.16	843.27	848.11	846.92
29.68	831.81	831.44	841.70	841.04	845.61	844.62
27.62	829.71	829.53	840.41	839.82	844.21	843.30
26.73	827.88	827.75	838.89	838.37	842.37	841.55
25.74	827.77	827.80	839.05	838.70	842.63	842.04
24.41	826.37	826.13	837.85	837.31	841.13	840.33
23.73	826.40	826.29	837.98	837.60	841.32	840.74
22.54	826.39	826.22	838.02	837.61	841.38	840.77
21.17	825.49	825.46	837.22	836.93	840.37	839.90
20.10	824.42	824.50	836.14	836.00	838.95	838.70
19.87	823.26	823.55	835.21	835.32	837.77	837.85
19.11	821.42	821.69	833.58	833.75	835.55	835.78
18.59	821.32	821.46	833.67	833.59	835.71	835.57
16.64	821.31	821.32	833.99	833.92	836.19	836.08
16.05	820.85	820.82	833.55	833.49	835.61	835.51
13.31	819.68	819.92	832.69	832.86	834.48	834.70
9.66	818.52	818.25	832.00	831.83	833.58	833.35
8.43	818.20	818.07	831.75	831.62	833.24	833.07
6.33	817.57	817.52	831.24	831.18	832.55	832.46
3.68	817.11	817.18	830.94	830.99	832.15	832.21
0.60**		817.02		830.92		832.12
0.45**		817.01		830.91		832.11
0.30	817.00	817.00	830.90	830.90	832.10	832.10

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation.
**Sections added for junction points or to maintain a minimum of 5 sections per segment (Section 6.4).

TVA

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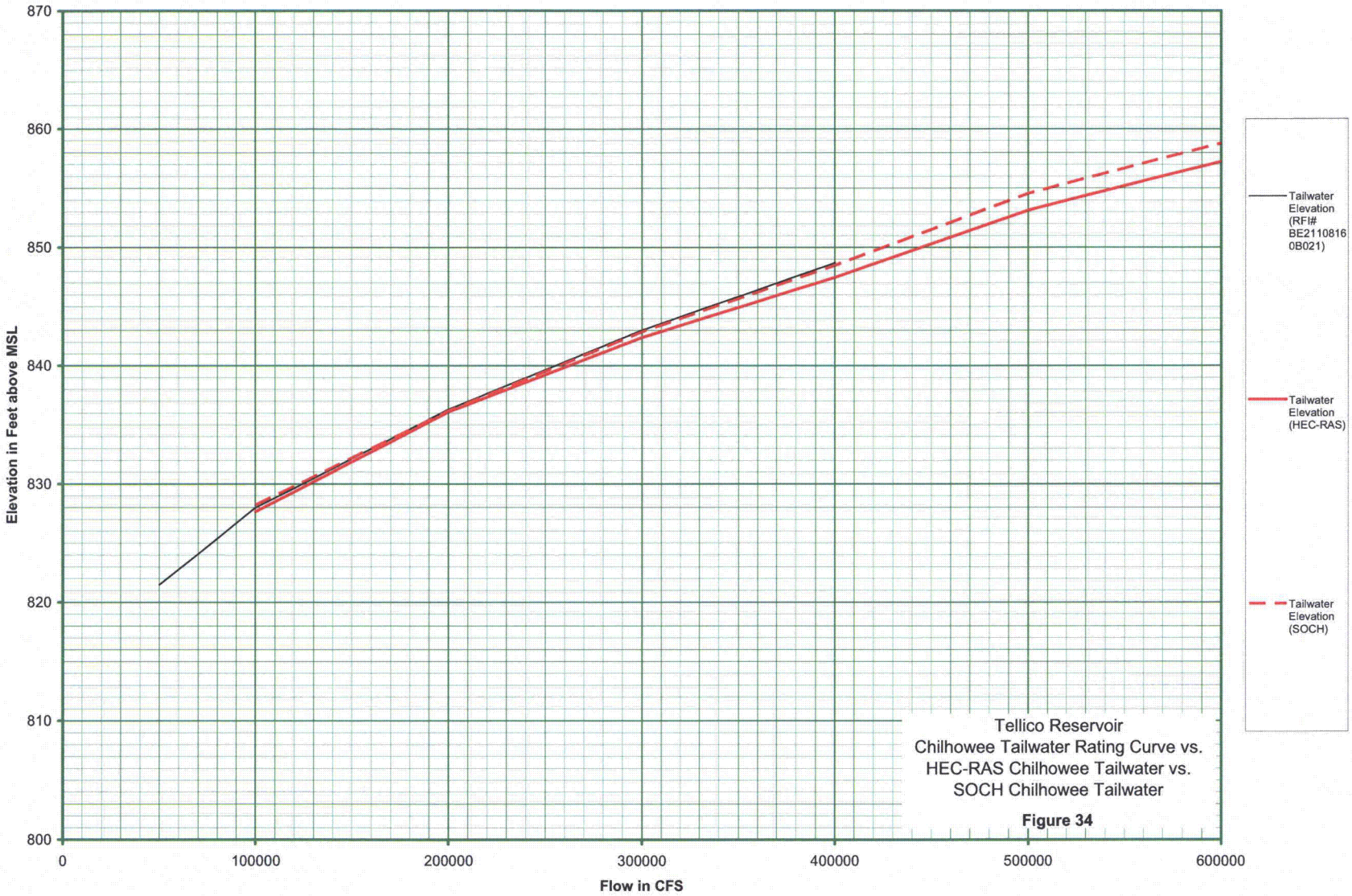

Tellico Reservoir
Chilhowee Tailwater Rating Curve vs.
HEC-RAS Chilhowee Tailwater vs.
SOCH Chilhowee Tailwater

Figure 34

Table 48. Little Tennessee, HEC-RAS and SOCH Chilhowee Dam Tailwater vs. Chilhowee Dam Tailwater Rating Curve

Discharge (Dam Rating Curve)	Tailwater Profile (Dam Rating Curve)	Discharge (HEC-RAS)	Tailwater Profile (HEC-RAS)	Tailwater Profile (SOCH)
1000 cfs	Elevation (ft)	1000 cfs	Elevation (ft)	Elevation (ft)
50	821.50			
100	828.00	100	827.67	828.25
200	836.30	200	836.10	836.21
300	843.00	300	842.40	842.89
400	848.70	400	847.48	848.51
		500	853.16	854.58
		600	857.27	858.83

TVA

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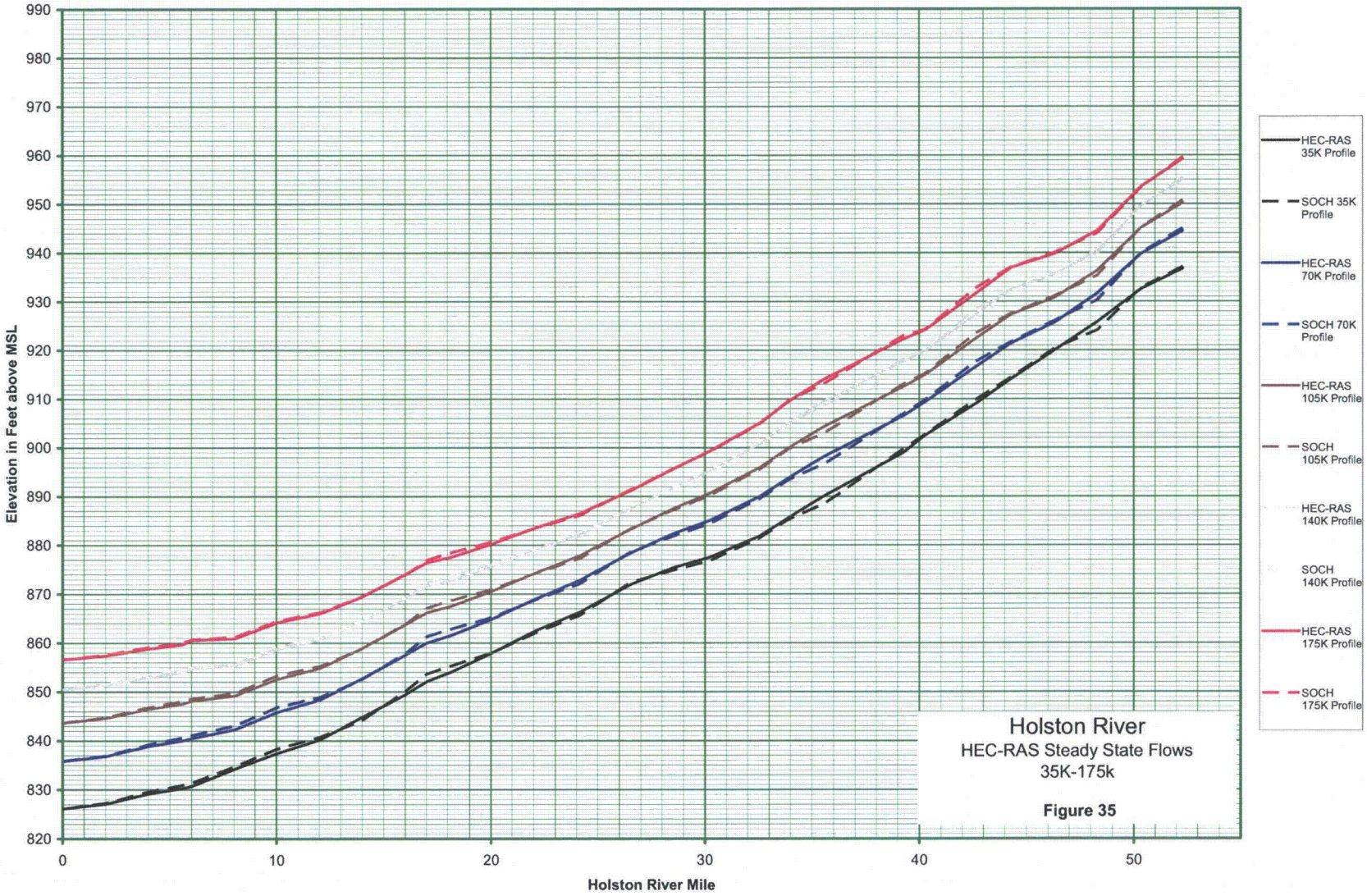

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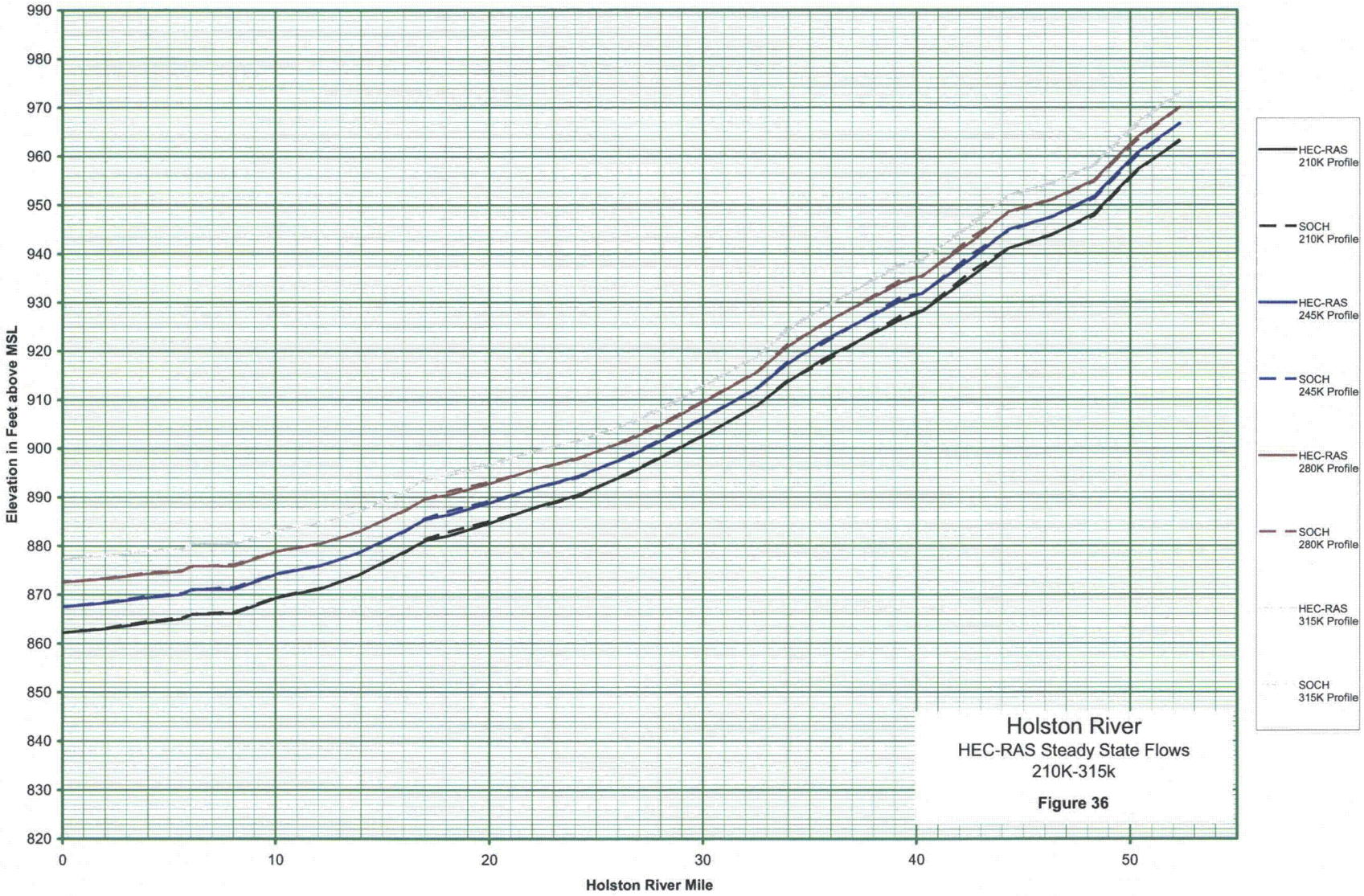


Holston River
HEC-RAS Steady State Flows
210K-315k

Figure 36

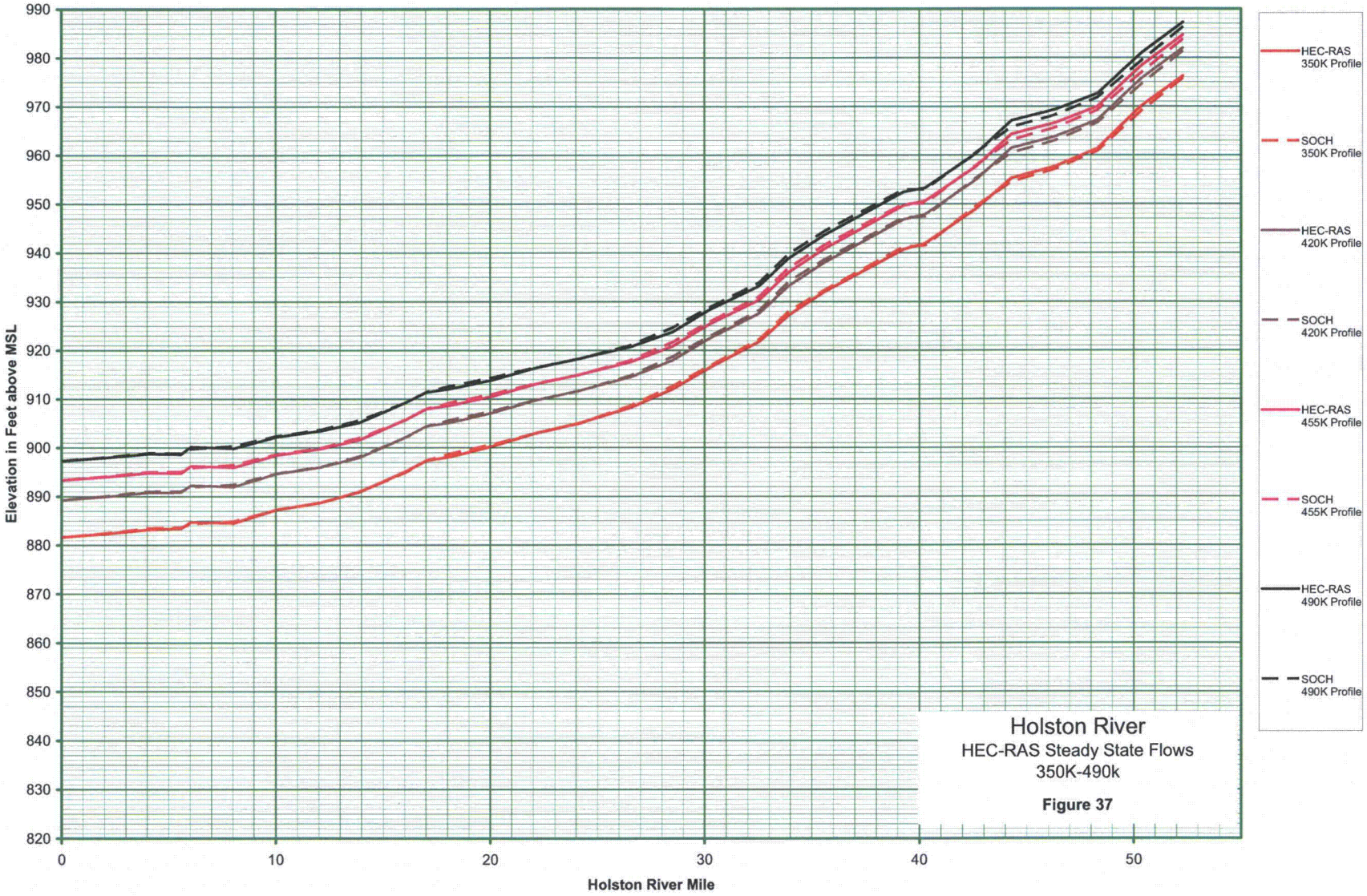

Holston River
HEC-RAS Steady State Flows
350K-490k
Figure 37
Elevation in Feet above MSL
Holston River Mile
990
980
970
960
950
940
930
920
910
900
890
880
870
860
850
840
830
820
0
10
20
30
40
50
HEC-RAS 350K Profile
SOCH 350K Profile
HEC-RAS 420K Profile
SOCH 420K Profile
HEC-RAS 455K Profile
SOCH 455K Profile
HEC-RAS 490K Profile
SOCH 490K Profile

Table 49. Holston River, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 35K – 140K

Holston River Mile	HEC-RAS 35K Profile	SOCH 35K Profile*	HEC-RAS 70K Profile	SOCH 70K Profile*	HEC-RAS 105K Profile	SOCH 105K Profile*	HEC-RAS 140K Profile	SOCH 140K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
52.30	936.75	937.13	944.48	945.04	950.21	950.81	955.01	955.52
50.34	932.59	932.89	939.80	940.00	945.12	945.25	949.60	949.60
48.31	925.81	924.13	931.63	930.30	936.35	935.34	940.61	939.89
46.33	920.06	920.48	925.69	926.13	930.86	931.21	935.56	935.84
44.30	914.12	914.44	921.43	921.68	927.33	927.55	932.42	932.56
42.64	909.04	909.88	916.58	917.69	922.39	923.51	927.31	928.39
40.27	902.56	902.77	909.40	909.80	914.97	915.27	919.84	920.01
39.27	899.02	899.81	906.53	906.99	912.53	913.08	917.70	918.36
35.58	890.14	888.54	898.26	896.74	904.41	903.08	909.60	908.47
33.92	885.59	885.30	893.80	893.47	899.96	899.77	905.08	905.05
32.54	881.83	881.46	889.93	889.51	895.88	895.53	900.77	900.52
30.22	877.51	876.83	885.08	884.44	890.62	890.17	895.23	894.99
28.48	875.32	874.84	882.27	881.82	887.40	887.12	891.73	891.60
26.54	871.99	872.43	878.44	878.67	883.27	883.46	887.44	887.62
24.15	866.24	865.64	872.78	872.12	877.80	877.24	882.29	881.83
22.14	862.59	862.20	869.07	868.95	874.39	874.34	879.18	879.14
20.14	858.16	858.17	865.04	865.40	870.74	871.16	875.77	876.19
18.12	853.98	855.29	861.48	862.82	867.47	868.67	872.70	873.77
17.021	852.13	853.69	860.00	861.32	866.19	867.18	871.54	872.28
16.10	849.68	850.45	857.73	858.11	863.97	864.12	869.33	869.35
13.91	844.63	843.98	852.44	852.29	858.68	858.70	864.19	864.22
12.06	840.31	840.88	848.37	848.92	854.86	855.32	860.68	861.01
10.06	837.51	838.47	845.86	846.86	852.64	853.39	858.66	859.16
8.04	834.30	834.80	842.29	843.06	849.18	849.75	855.29	855.71
6.03	830.81	831.50	840.50	841.10	848.14	848.63	854.66	854.96
5.56	830.31	830.97	839.99	840.60	847.52	848.08	853.92	854.36
4.02	829.22	829.67	838.89	839.24	846.48	846.85	852.97	853.30
2.02	827.14	827.36	836.84	836.96	844.63	844.78	851.33	851.51
0.00	826.14	826.14	835.85	835.85	843.70	843.70	850.46	850.46

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation

Table 50. Holston River, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 175K – 280K

Holston River Mile	HEC-RAS 175K Profile	SOCH 175K Profile*	HEC-RAS 210K Profile	SOCH 210K Profile*	HEC-RAS 245K Profile	SOCH 245K Profile*	HEC-RAS 280K Profile	SOCH 280K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
52.30	959.26	959.65	963.13	963.38	966.71	966.77	970.07	970.06
50.34	953.61	953.49	957.29	957.05	960.73	960.27	963.98	963.47
48.31	944.56	944.10	948.27	947.89	951.78	951.43	955.13	954.87
46.33	939.87	940.15	943.87	944.02	947.62	947.60	951.17	951.11
44.30	936.97	937.09	941.12	941.11	944.99	944.76	948.63	948.38
42.64	931.65	932.80	935.60	936.66	939.27	940.12	942.73	943.62
40.27	924.21	924.33	928.21	928.26	931.96	931.87	935.49	935.31
39.27	922.30	923.03	926.48	927.25	930.39	931.08	934.05	934.68
35.58	914.13	913.26	918.22	917.55	921.99	921.50	925.52	925.23
33.92	909.53	909.70	913.56	913.86	917.28	917.68	920.77	921.25
32.54	905.03	904.88	908.84	908.79	912.36	912.43	915.67	915.82
30.22	899.32	899.26	903.10	903.16	906.65	906.79	910.03	910.20
28.48	895.59	895.63	899.17	899.34	902.57	902.85	905.82	906.18
26.54	891.23	891.45	894.85	895.11	898.34	898.65	901.75	902.05
24.15	886.46	886.11	890.44	890.13	894.26	894.05	897.98	897.84
22.14	883.63	883.59	887.84	887.77	891.86	891.81	895.73	895.69
20.14	880.41	880.83	884.79	885.16	888.93	889.30	892.91	893.27
18.12	877.52	878.48	882.05	882.89	886.35	887.10	890.46	891.15
17.02	876.45	876.99	881.06	881.42	885.42	885.66	889.59	889.73
16.10	874.25	874.18	878.87	878.72	883.23	883.07	887.42	887.26
13.91	869.28	869.30	874.08	874.07	878.59	878.60	882.90	882.94
12.06	866.06	866.29	871.12	871.26	875.86	875.94	880.38	880.44
10.06	864.20	864.52	869.39	869.56	874.23	874.31	878.84	878.87
8.04	860.92	861.26	866.15	866.5	871.09	871.47	875.83	876.23
6.03	860.56	860.71	865.99	866.01	871.05	870.97	875.89	875.72
5.56	859.70	860.07	865.04	865.32	870.01	870.26	874.77	874.99
4.02	858.85	859.16	864.28	864.59	869.40	869.69	874.31	874.58
2.02	857.44	857.60	863.02	863.17	868.28	868.41	873.28	873.41
0.00	856.63	856.63	862.26	862.26	867.55	867.55	872.59	872.59

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation

Table 51. Holston River, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 315K – 350K

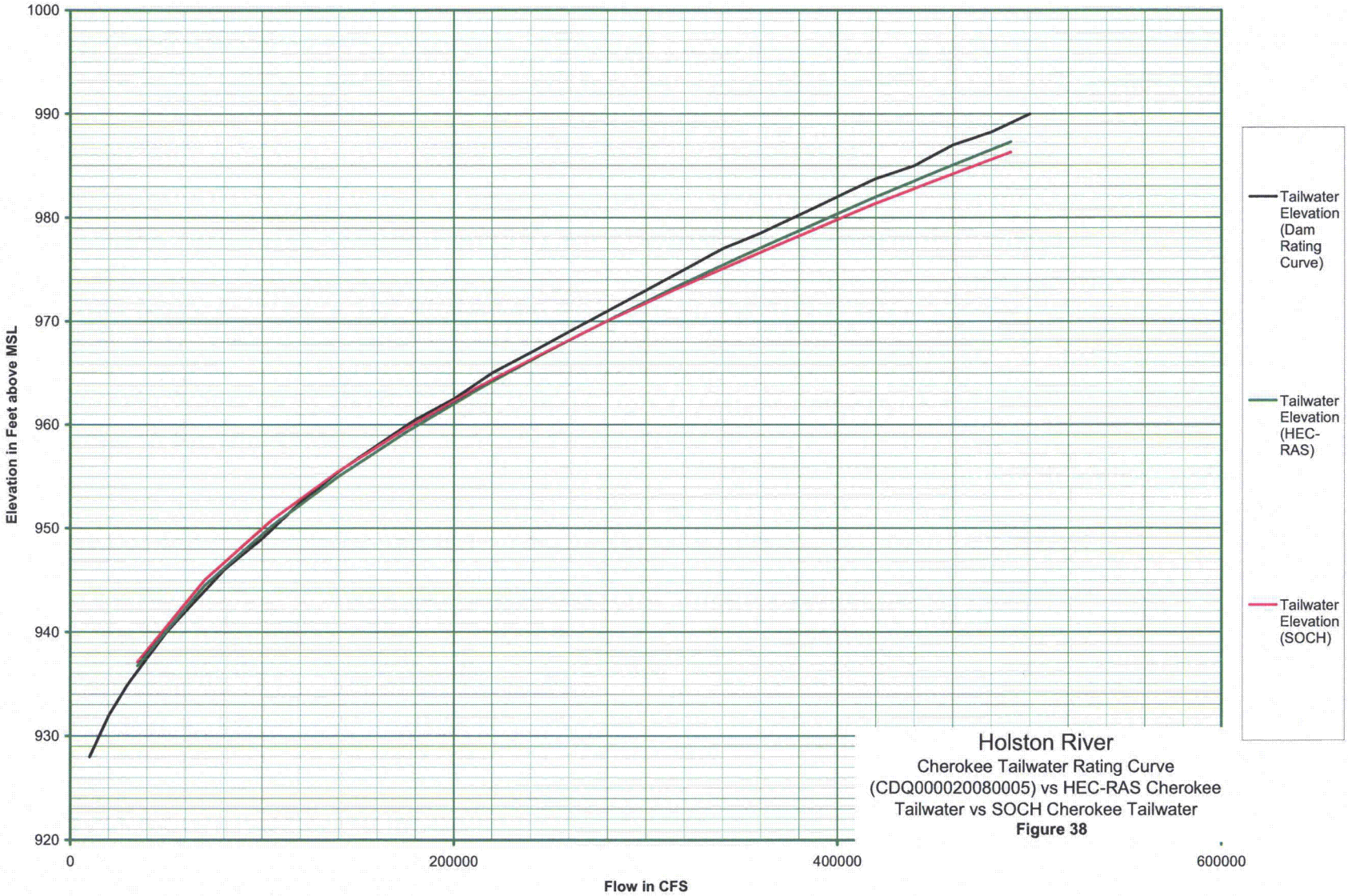
Holston River Mile	HEC-RAS 315K Profile	SOCH 315K Profile*	HEC-RAS 350K Profile	SOCH 350K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
52.30	973.25	973.06	976.29	975.88
50.34	967.08	966.39	970.06	969.10
48.31	958.33	958.04	961.42	960.95
46.33	954.53	954.32	957.76	957.28
44.30	952.06	951.65	955.35	954.65
42.64	945.99	946.75	949.12	949.66
40.27	938.81	938.53	941.97	941.58
39.27	937.49	938.06	940.76	941.23
35.58	928.84	928.79	932.01	932.30
33.92	924.06	924.67	927.21	927.99
32.54	918.82	919.09	921.85	922.30
30.22	913.26	913.52	916.39	916.76
28.48	908.95	909.43	912.00	912.62
26.54	905.05	905.39	908.28	908.65
24.15	901.57	901.47	905.07	905.01
22.14	899.46	899.41	903.05	903.03
20.14	896.73	897.07	900.39	900.77
18.12	894.40	895.03	898.18	898.79
17.02	893.56	893.63	897.38	897.43
16.10	891.43	891.26	895.28	895.11
13.91	887.02	887.05	890.93	891.01
12.06	884.67	884.67	888.73	888.73
10.06	883.21	883.16	887.32	887.28
8.04	880.32	880.68	884.53	884.89
6.03	880.45	880.18	884.73	884.41
5.56	879.25	879.42	883.46	883.63
4.02	878.91	879.16	883.22	883.45
2.02	877.97	878.09	882.33	882.45
0.00	877.30	877.30	881.68	881.68

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation

Table 52. Holston River, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 420K – 490K

Holston River Mile	HEC-RAS 420K Profile	SOCH 420K Profile*	HEC-RAS 455K Profile	SOCH 455K Profile*	HEC-RAS 490K Profile	SOCH 490K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
52.30	982.01	981.39	984.70	983.87	987.30	986.32
50.34	975.68	974.52	978.33	976.94	980.90	979.34
48.31	967.26	966.71	970.03	969.33	972.70	971.90
46.33	963.84	963.08	966.69	965.72	969.43	968.32
44.30	961.49	960.54	964.37	963.20	967.13	965.83
42.64	954.98	955.38	957.72	957.99	960.34	960.61
40.27	947.87	947.46	950.65	950.16	953.30	952.96
39.27	946.85	947.27	949.71	950.05	952.44	952.93
35.58	937.98	938.60	940.84	941.64	943.62	944.44
33.92	933.17	934.06	936.03	936.95	938.83	939.74
32.54	927.61	928.23	930.41	931.11	933.17	933.91
30.22	922.40	922.84	925.36	925.83	928.28	928.76
28.48	917.88	918.65	920.82	921.67	923.72	924.61
26.54	914.52	914.87	917.63	917.99	920.71	921.06
24.15	911.72	911.68	915.03	915.01	918.27	918.26
22.14	909.78	909.81	913.13	913.22	916.41	916.52
20.14	907.23	907.62	910.63	911.09	913.96	914.44
18.12	905.18	905.75	908.68	909.28	912.09	912.68
17.02	904.43	904.45	907.96	908.02	911.40	911.48
16.10	902.31	902.23	905.89	905.87	909.41	909.38
13.91	897.99	898.27	901.63	902.02	905.20	905.64
12.06	896.01	896.12	899.78	899.96	903.47	903.68
10.06	894.67	894.75	898.50	898.64	902.24	902.41
8.04	892.00	892.43	895.97	896.47	899.85	900.36
6.03	892.28	891.93	896.28	895.91	900.18	899.77
5.56	890.85	891.08	894.80	895.05	898.65	898.89
4.02	890.78	891.02	894.81	895.03	898.74	898.93
2.02	889.95	890.08	894.02	894.14	897.97	898.08
0.00	889.31	889.31	893.39	893.39	897.35	897.35

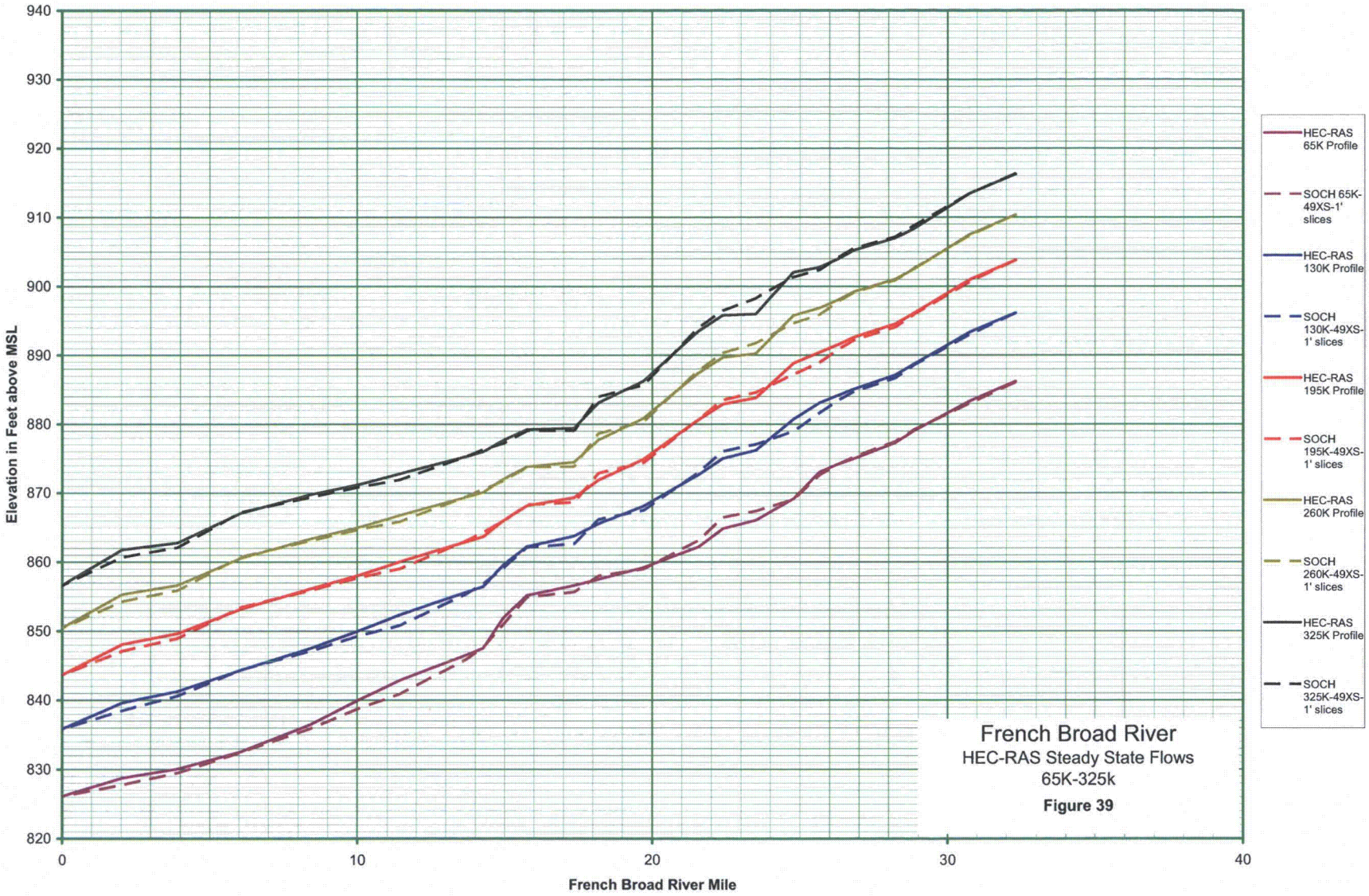
*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation



Holston River
Cherokee Tailwater Rating Curve (CDQ000020080005) vs HEC-RAS Cherokee Tailwater vs SOCH Cherokee Tailwater
Figure 38

Table 53. Holston River, HEC-RAS and SOCH Cherokee Dam Tailwater vs. Cherokee Dam Tailwater Rating Curve

Discharge (Dam Rating Curve)	Tailwater Profile (Dam Rating Curve)	Discharge (HEC-RAS)	Tailwater Profile (HEC-RAS)	Tailwater Profile (SOCH)
1000 cfs	Elevation (ft)	1000 cfs	Elevation (ft)	Elevation (ft)
10	928.00			
20	932.00			
30	935.00			
		35	936.75	937.13
40	937.50			
50	940.00			
60	942.00			
		70	944.48	945.04
80	946.00			
100	949.00			
		105	950.21	950.81
120	952.50			
140	955.50	140	955.01	955.52
160	958.00			
180	960.50			
		175	959.26	959.65
200	962.50			
		210	963.13	963.38
220	965.00			
240	967.00			
		245	966.71	966.77
260	969.00			
280	971.00	280	970.07	970.06
300	973.00			
		315	973.25	973.06
320	975.00			
340	977.00			
		350	976.29	975.88
360	978.50			
380	980.25			
400	982.00			
420	983.75	420	982.01	981.39
440	985.00			
		455	984.70	983.87
460	987.00			
480	988.25			
		490	987.30	986.32
500	990.00			



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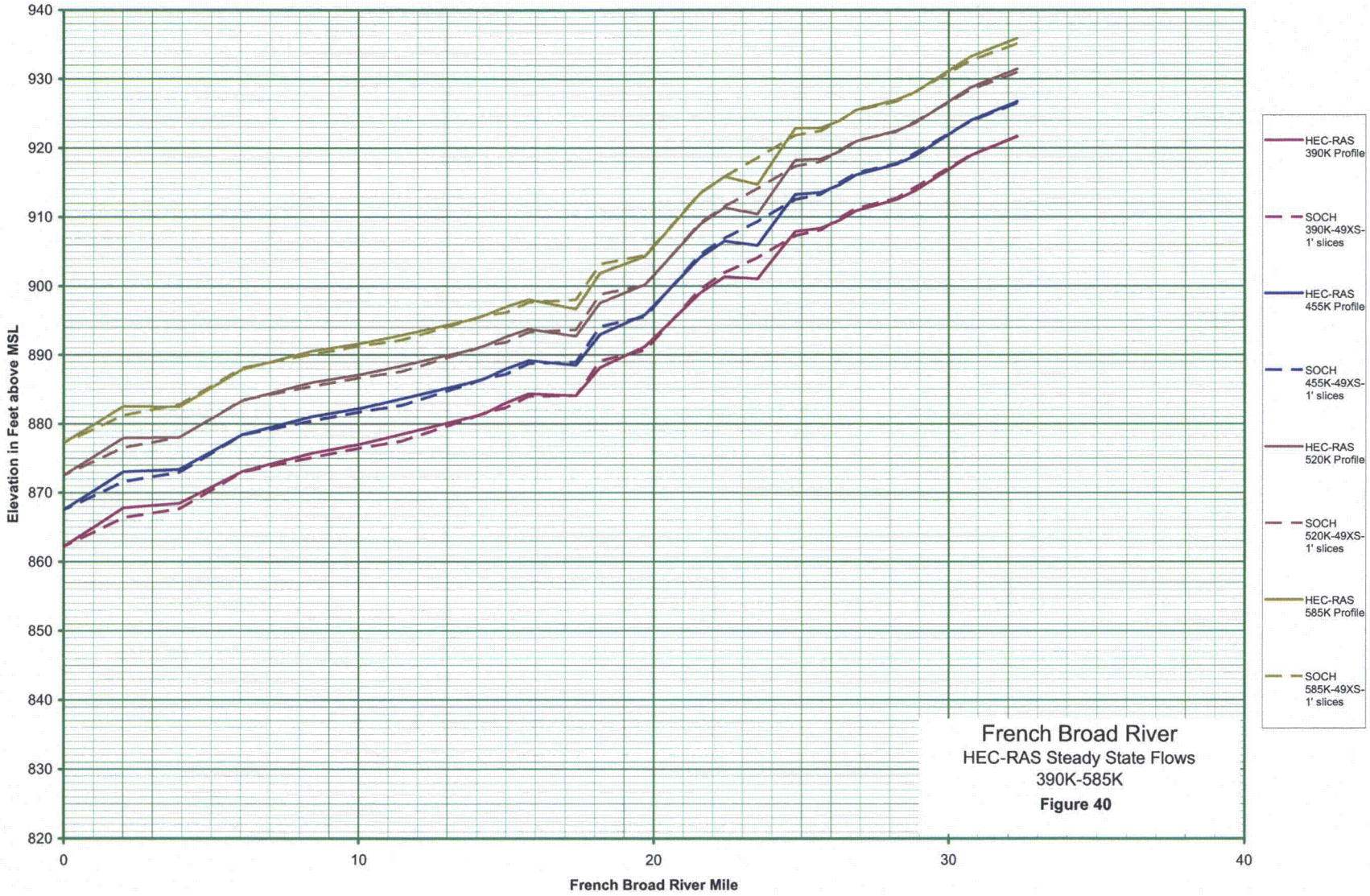
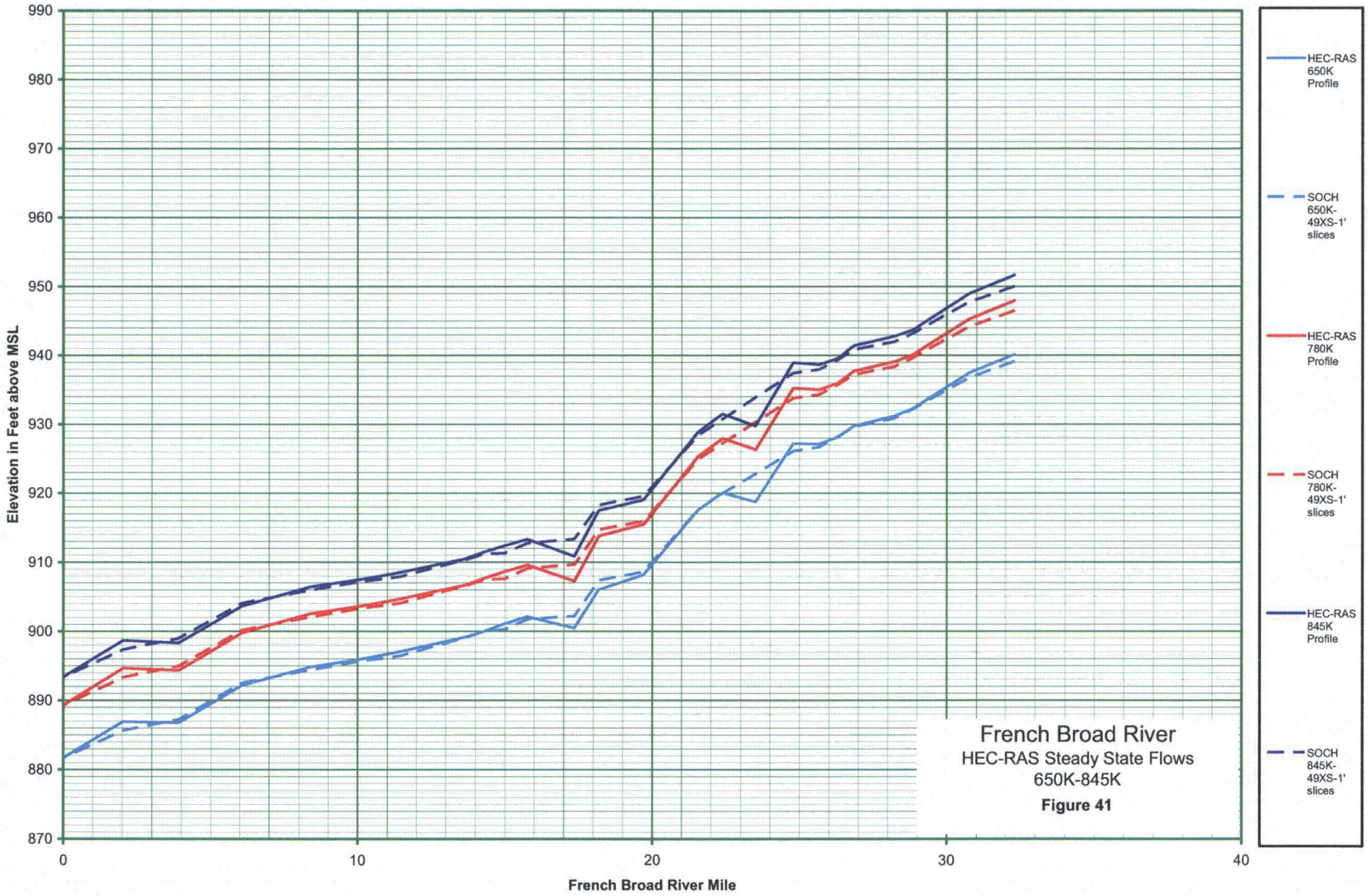
		Checked	JCT



French Broad River
HEC-RAS Steady State Flows
390K-585K
Figure 40



French Broad River
HEC-RAS Steady State Flows
650K-845K
Figure 41

TVA

Calculation No. CDQ000020080036	Rev: 0	Plant: GEN	Page: 125
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		Checked	JCT

Table 54. French Broad River, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 65K – 260K

French Broad River Mile	HEC-RAS 65K Profile	SOCH 65K Profile*	HEC-RAS 130K Profile	SOCH 130K Profile*	HEC-RAS 195K Profile	SOCH 195K Profile*	HEC-RAS 260K Profile	SOCH 260K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
32.30	886.24	886.11	896.15	896.13	903.80	903.83	910.35	910.41
30.75	883.36	883.02	893.36	892.99	900.98	900.68	907.53	907.38
28.85	879.04	879.21	888.73	888.57	896.10	895.94	902.51	902.62
28.23	877.30	877.50	887.12	886.71	894.55	894.10	901.05	900.90
26.84	875.02	875.29	885.13	884.76	892.66	892.26	899.25	899.18
26.30	874.24	874.23	884.22	883.48	891.59	890.89	898.06	897.82
25.65	873.05	872.59	883.09	881.63	890.43	888.95	896.85	895.88
24.78	869.18	869.09	880.73	879.00	888.87	887.25	895.78	894.69
23.50	866.05	867.39	876.22	877.09	883.81	884.61	890.24	891.77
22.38	864.82	866.47	875.03	876.07	882.92	883.52	889.69	890.34
21.56	862.18	863.10	872.66	873.00	880.63	880.71	887.40	887.76
19.70	859.19	858.97	868.11	867.50	874.92	874.42	880.82	880.36
18.18	857.50	857.98	865.54	866.17	871.90	872.90	877.68	878.63
17.35	856.61	855.65	863.77	862.63	869.35	868.65	874.49	873.86
15.76	855.17	854.92	862.24	862.10	868.18	868.32	873.83	873.76
14.97	851.99	851.07	859.61	859.18	866.07	865.98	872.06	871.79
14.26	847.54	847.67	856.45	856.85	863.68	864.34	870.11	870.59
13.63	846.44	845.77	855.55	855.26	862.87	862.97	869.33	869.39
11.42	842.87	840.90	852.33	850.80	860.05	859.05	866.76	865.85
10.07	840.10	838.87	850.08	849.33	858.13	857.78	865.07	864.74
8.40	836.47	835.90	847.50	847.11	856.12	855.92	863.37	863.08
6.06	832.56	832.50	844.34	844.38	853.20	853.44	860.55	860.76
3.90	830.09	829.51	841.27	840.61	849.69	848.97	856.64	855.89
2.02	828.77	827.79	839.62	838.50	848.11	847.13	855.31	854.29
0.00	826.14	826.14	835.85	835.85	843.70	843.70	850.46	850.46

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation

Table 55. French Broad River, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 325K – 520K

French Broad River Mile	HEC-RAS 325K Profile	SOCH 325K Profile*	HEC-RAS 390K Profile	SOCH 390K Profile*	HEC-RAS 455K Profile	SOCH 455K Profile*	HEC-RAS 520K Profile	SOCH 520K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
32.30	916.24	916.34	921.69	921.74	926.72	926.55	931.46	930.97
30.75	913.44	913.45	918.93	918.98	924.00	923.90	928.77	928.43
28.85	908.34	908.78	913.82	914.32	918.87	919.26	923.62	923.84
28.23	906.99	907.16	912.56	912.77	917.69	917.77	922.49	922.39
26.84	905.25	905.55	910.90	911.25	916.09	916.34	920.94	921.03
26.30	903.98	904.21	909.57	909.91	914.69	914.99	919.48	919.67
25.65	902.75	902.36	908.39	908.15	913.56	913.30	918.39	918.03
24.78	902.02	901.35	907.91	907.29	913.26	912.53	918.23	917.35
23.50	895.95	898.26	901.05	904.13	905.88	909.33	910.42	914.11
22.38	895.77	896.47	901.35	901.98	906.52	906.93	911.35	911.53
21.56	893.46	893.99	899.01	899.55	904.14	904.55	908.93	909.16
19.70	886.21	885.63	891.22	890.69	895.83	895.55	900.19	900.12
18.18	883.06	883.97	888.17	889.14	892.95	894.11	897.54	898.79
17.35	879.38	879.02	884.09	884.08	888.50	888.97	892.70	893.64
15.76	879.21	879.02	884.37	883.97	889.18	888.74	893.75	893.30
14.97	877.68	877.24	883.01	882.31	887.93	887.16	892.58	891.78
14.26	875.99	876.31	881.51	881.59	886.56	886.58	891.31	891.32
13.63	875.23	875.23	880.76	880.58	885.79	885.60	890.53	890.38
11.42	872.80	871.93	878.45	877.46	883.57	882.64	888.37	887.56
10.07	871.27	870.92	877.06	876.52	882.26	881.75	887.14	886.71
8.40	869.78	869.40	875.72	875.11	881.02	880.41	885.97	885.43
6.06	867.08	867.23	873.11	873.02	878.42	878.38	883.36	883.45
3.90	862.78	862.10	868.46	867.69	873.39	872.96	878.06	878.05
2.02	861.77	860.70	867.82	866.40	873.05	871.62	877.97	876.60
0.00	856.63	856.63	862.26	862.26	867.55	867.55	872.59	872.59

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation

Table 56. French Broad River, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 585K – 650K

French Broad River Mile	HEC-RAS 585K Profile	SOCH 585K Profile*	HEC-RAS 650K Profile	SOCH 650K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
32.30	935.91	935.12	940.13	939.14
30.75	933.24	932.67	937.47	936.76
28.85	928.07	928.11	932.28	932.21
28.23	926.97	926.72	931.22	930.87
26.84	925.47	925.41	929.75	929.61
26.30	923.93	924.03	928.15	928.21
25.65	922.89	922.45	927.13	926.68
24.78	922.85	921.82	927.19	926.10
23.50	914.70	918.55	918.75	922.80
22.38	915.84	915.83	920.07	919.97
21.56	913.38	913.48	917.57	917.64
19.70	904.28	904.44	908.15	908.60
18.18	901.88	903.19	906.02	907.38
17.35	896.66	898.03	900.44	902.19
15.76	898.04	897.62	902.11	901.74
14.97	896.94	896.12	901.06	900.25
14.26	895.75	895.75	899.93	899.95
13.63	894.94	894.84	899.10	899.05
11.42	892.84	892.13	897.04	896.43
10.07	891.66	891.31	895.91	895.63
8.40	890.54	890.07	894.82	894.41
6.06	887.90	888.13	892.13	892.48
3.90	882.50	882.80	886.75	887.23
2.02	882.58	881.27	886.92	885.64
0.00	877.30	877.30	881.68	881.68

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation

Table 57. French Broad River, Steady-State Profile Comparisons, HEC-RAS vs. SOCH*, 780K – 845K

French Broad River Mile	HEC-RAS 780K Profile	SOCH 780K Profile*	HEC-RAS 845K Profile	SOCH 845K Profile*
	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
32.30	948.01	946.55	951.67	950.05
30.75	945.32	944.24	948.97	947.78
28.85	940.11	939.68	943.70	943.22
28.23	939.13	938.43	942.79	942.02
26.84	937.74	937.23	941.42	940.85
26.30	935.98	935.78	939.59	939.38
25.65	935.03	934.32	938.66	937.95
24.78	935.26	933.8	938.96	937.45
23.50	926.31	930.35	929.76	933.93
22.38	927.91	927.27	931.48	930.75
21.56	925.36	924.95	928.89	928.43
19.70	915.46	915.93	919.02	919.55
18.18	913.80	914.73	917.48	918.29
17.35	907.26	909.66	910.83	913.34
15.76	909.60	909.1	913.31	912.75
14.97	908.63	907.62	912.37	911.29
14.26	907.63	907.46	911.44	911.19
13.63	906.67	906.57	910.44	910.32
11.42	904.68	904.06	908.50	907.89
10.07	903.61	903.29	907.46	907.14
8.40	902.55	902.08	906.44	905.96
6.06	899.74	900.15	903.59	904.05
3.90	894.35	894.97	898.30	898.98
2.02	894.66	893.33	898.67	897.35
0.00	889.31	889.31	893.39	893.39

*SOCH Model results taken from odd nodes only (every other cross-section). Even node points used to advance computation

TVA

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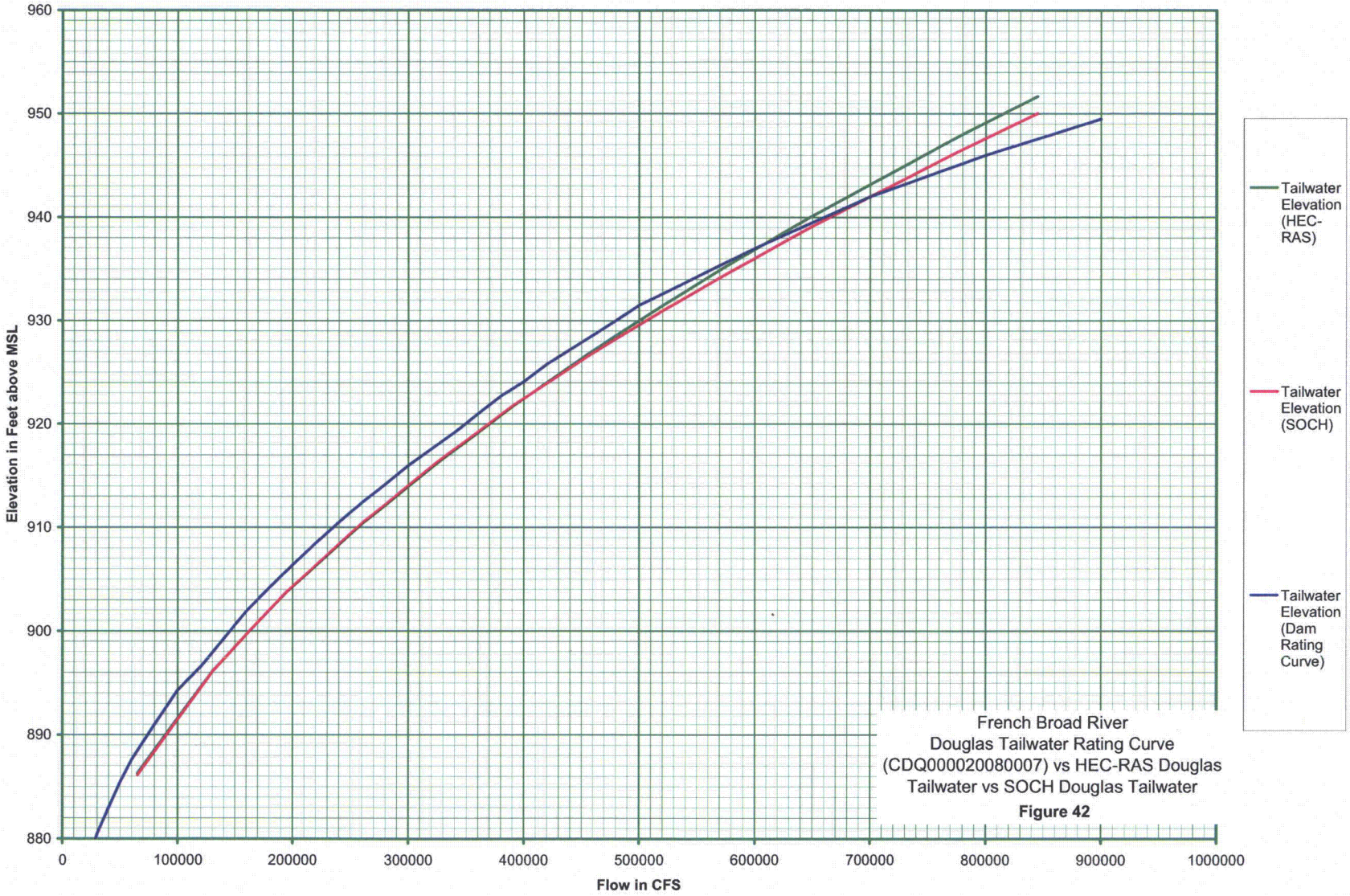


French Broad River
Douglas Tailwater Rating Curve
(CDQ000020080007) vs HEC-RAS Douglas
Tailwater vs SOCH Douglas Tailwater

Figure 42

Table 58. French Broad River, HEC-RAS and SOCH Douglas Dam Tailwater vs. Douglas Dam Tailwater Rating Curve

Discharge (Dam Rating Curve)	Tailwater Profile (Dam Rating Curve)	Discharge (HEC-RAS)	Tailwater Profile (HEC-RAS)	Tailwater Profile (SOCH)
1000 cfs	Elevation (ft)	1000 cfs	Elevation (ft)	Elevation (ft)
16.4	875.50			
30	880.50			
40	883.00			
50	885.50			
60	887.60			
		65	886.24	886.11
80	891.00			
100	894.30			
120	896.60			
		130	896.15	896.13
140	899.30			
160	901.90			
180	904.20			
		195	903.80	903.83
200	906.40			
220	908.50			
240	910.50			
260	912.40	260	910.35	910.41
280	914.20			
300	916.00			
320	917.60			
		325	916.24	916.34
340	919.20			
360	921.00			
380	922.70			
		390	921.69	921.74
400	924.10			
420	925.80			
440	927.20			
		455	926.72	926.55
460	928.60			
480	930.00			
500	931.50			
		520	931.46	930.97
		585	935.91	935.12
600	937.00			
		650	940.13	939.14
700	942.00			
		780	948.01	946.55
800	946.00			
		845	951.67	950.05
900	949.50			

6.4 SOCH Unsteady-State Historic Flood Calibration

The calibrated SOCH model of Fort Loudoun-Tellico Reservoir, the Holston and French Broad Rivers, and Canal with the revised Manning's *n* values were combined into a single model, run under unsteady-flow conditions and compared to available 2003 flood observed data. The model was configured with 7 channels as depicted in Figure 3. Recorded Cherokee, Douglas and Chilhowee discharges were used as the upstream boundary flows (upstream boundary conditions). Recorded Ft. Loudoun elevations and Tellico discharges were used as the downstream boundary conditions (Attachment 5). However, Douglas and Cherokee Dams are tributary projects that are frequently operated at zero discharge during a flood event in an effort to reduce flows on the Tennessee River until the peak has passed. When there is zero discharge below Douglas and Cherokee, the SOCH model will not run in a dry channel condition. To overcome this problem, a baseflow of 5,000 cfs was added at HRM 52.29, 0.01 mile below Cherokee Dam, on the Holston River and at FBRM 32.29, 0.01 mile, below Douglas Dam on the French Broad River. This baseflow was removed at Holston RM 5.60 and French Broad RM 7.50, which is 0.10 mile upstream of the gages on these rivers.

A double node was used at the connection point between the Canal and Fort Loudoun Reservoir and between the Canal and Tellico Reservoir. Because there was not a section at Tennessee RM 602.70 (Fort Loudoun/Canal Junction) or Little Tennessee RM 0.60 (Tellico/Canal Junction), the locations where the Canal connects to the reservoirs, an additional section had to be added to each junction. To accomplish this, the section at Little Tennessee RM 0.30 was considered representative for use at RM 0.60 and the channel bottom elevation was interpolated based on the channel elevations at RM 0.30 and 3.68. On Fort Loudoun, the section at RM 602.30 was considered representative for use at RM 602.70 and the channel bottom elevation was interpolated based on channel elevations at RM 602.30 and 604.36. Because the SOCH model requires a minimum of five sections for any river segment, the segment from Fort Loudoun dam (Tennessee River Mile 602.30) to the junction with the Canal (Tennessee River Mile 602.70) will have five sections and the segment from Tellico dam (Little Tennessee River Mile 0.30) to the junction with the Canal (Little Tennessee River Mile 0.60) will have five sections. To accomplish this, three of the five sections on the segment from Fort Loudoun dam to junction with the Canal are interpolated sections (Tennessee River Mile 602.40, 602.50 and 602.60) and three of the five sections on the segment from Tellico dam to the junction with the Canal are interpolated sections (Little Tennessee River Mile 0.38, 0.45, and 0.53).

A separate model was built to simulate the 1973 event because the Tellico Dam and Canal had not been constructed in 1973. The 1973 model consisted of three channels: the Ft. Loudoun Reservoir, the Holston River and the French Broad River, with the revised Manning's *n* values. Recorded Cherokee and Douglas discharges were used as the upstream boundary flows (upstream boundary conditions) and recorded Ft. Loudoun elevations were used as the downstream boundary conditions (Attachment 4).

The SOCH model accounts for reservoir storage in the weighted-width value in the SOCH geometry (References 2.10 and 2.11). The initial SOCH geometry was developed in a separate calculation (References 2.10 and 2.11) and was updated to include a revised $R^{2/3}$ term in Section 6.1.

The local inflow hydrographs developed from unit hydrographs (Attachments 6 and 7) were input to account for local inflow. The inflow hydrographs were developed in a separate calculation (Reference 2.12) and are validated in this calculation (Section 6.5). These local inflow hydrographs were developed to be input at a point along their associated water bodies. During this step it was determined that the local hydrographs for the French Broad and Holston Rivers should be modified to be distributed along their respective rivers (Appendix C). This was determined because of some timing inconsistencies between the observed gage data and computed results that arose during the calibration process. The local hydrographs to Tellico and Ft. Loudoun were uniformly distributed over the length of the reservoirs with no significant difference between a point inflow or distributed inflow due to reservoir effects.

For the 1973 event, six hydrographs comprise the local inflows. "Subbasin 8 Direct Runoff + Baseflow" is the inflow hydrograph that drains to the French Broad River and was evenly distributed from French Broad River Miles 32.30 to 7.40. "Subbasin 16 Direct Runoff + Baseflow" is the inflow hydrograph that drains to the Holston River and was evenly

distributed from Holston River Miles 52.30 to 5.50. "Subbasin 17 Direct Runoff + Baseflow" is the inflow hydrograph that drains to the Tennessee River from the Little River and is used as a point local at Tennessee River Mile 635.60. "Subbasin 18 Direct Runoff + Baseflow" is the inflow hydrograph that drains to the Ft. Loudoun Reservoir and lower ends of the Holston and French Broad Rivers and was distributed based on drainage area from Tennessee River Mile 602.30 to River Mile 5.50 on the Holston River and River Mile 7.40 on the French Broad River (Attachment 12, Sheet "TRM 652.22 to 602.3"). "Fort Loudoun Additional Reservoir Runoff" is the Ft. Loudoun rain-on-reservoir hydrograph was evenly distributed from Tennessee RM 602.30 to River Mile 9.60 on the Holston River and River Mile 9.50 on the French Broad. Holston River Mile 9.60 and French Broad River Mile 9.50 are where the 820 ft contour crosses the water surface. Holston River transitions from flat pool storage to a sloping river between River Miles 8.04 and 10.06 and French Broad River transitions from flat pool storage to a sloping river between River Miles 8.40 and 10.07 (Reference 2.10). The 820 ft contour serves as the break line between the flat pool storage portion and the sloping river portion and the upstream boundary for the rain-on-reservoir inflow. The proportion results in 95% of the runoff being apportioned to Fort Loudoun, 2% to the Holston River and 3% to the French Broad River (Attachment 12, Sheet "TRM 652.21 to 602.30"). Any small changes in the upstream river mile boundary for the rain-on-reservoir hydrograph will have little to no impact on the results given the small portion of inflow to these reaches.

For the 2003 event, eight hydrographs comprise the local inflows. "Subbasin 8 Direct Runoff + Baseflow" is the inflow hydrograph that drains to the French Broad River and was evenly distributed from French Broad River Miles 32.30 to 7.40. "Subbasin 16 Direct Runoff + Baseflow" is the inflow hydrograph that drains to the Holston River and was evenly distributed from Holston River Miles 52.30 to 5.50. "Subbasin 17 Direct Runoff + Baseflow" is the inflow hydrograph that drains to the Tennessee River from the Little River and is used as a point local at Tennessee River Mile 635.60. "Subbasin 18 Direct Runoff + Baseflow" should be distributed based on reservoir drainage area (Reference 2.1) from Tennessee River Mile 602.30 to River Mile 5.50 on the Holston River and River Mile 7.40 on the French Broad River. This results in 92.60% of the hydrograph being distributed between Tennessee River Miles 602.30 to 652.22, 4.10% of the hydrograph between Holston River Miles 0.00 to 5.50 and 3.30% of the hydrograph between French Broad River Miles 0.00 to 7.40 (Attachment 12 and 13, Sheet "TRM 652.22 to 602.3"). "Subbasin 24 Direct Runoff + Baseflow" is the inflow hydrograph that drains to the Tellico Reservoir and was evenly distributed from Little Tennessee River Miles 33.60 to 0.60. "Fort Loudoun Additional Reservoir Runoff" is the Ft. Loudoun rain-on-reservoir hydrograph and was distributed based on normal pool surface area (Reference 2.10) from Tennessee River Mile 602.30 to River Mile 9.60 on the Holston River and River Mile 9.50 on the French Broad (Section 6.4). This results in 95.10% of the hydrograph being distributed between Tennessee River Miles 602.30 to 652.21, 2.10% of the hydrograph between Holston River Miles 0.00 to 9.60 and 2.90% of the hydrograph between French Broad River Miles 0.00 to 9.50 (Attachments 12 and 13, Sheet "TRM 652.21 to 602.3"). "Tellico Additional Reservoir Runoff" is the Tellico rain-on-reservoir hydrograph was evenly distributed over the entire reach, from Little Tennessee River Mile 0.60 to 33.59, since the entire reach consists of flat pool storage (Reference 2.11).

Calculated flood elevations were compared to the measured elevations at gage stations, Tellico Dam headwater gage and calculated flow was compared to measured flow at Ft. Loudoun Dam.

After completion of the two unsteady-state historic runs, the annotation in the SOCH geometry files was updated to include the final Manning's *n* values for the SOCH model. These geometry files were then considered the final SOCH geometry files for Ft. Loudoun Reservoir, Tellico Reservoir, Holston and French Broad Rivers and the Canal.

6.4.1 SOCH 1973 Flood Event Simulation

The calibrated SOCH model was run under unsteady conditions and compared to the observed 1973 flood (results in Appendix A) at six gage locations. The modeled peak flood elevations were within one foot of the observed peak elevation at gage locations on the Tennessee River (Figures 43 and 44). The modeled peak flood elevation was within one foot of the observed peak elevation at gage location at RM 5.50 (Figure 45) on the Holston River, as well, but the computed elevations were low on both sides of the peak. It was determined that it would be better to match the peak elevation of the flood event, than to increase the Manning's *n* values to match either side of the peak and be extremely

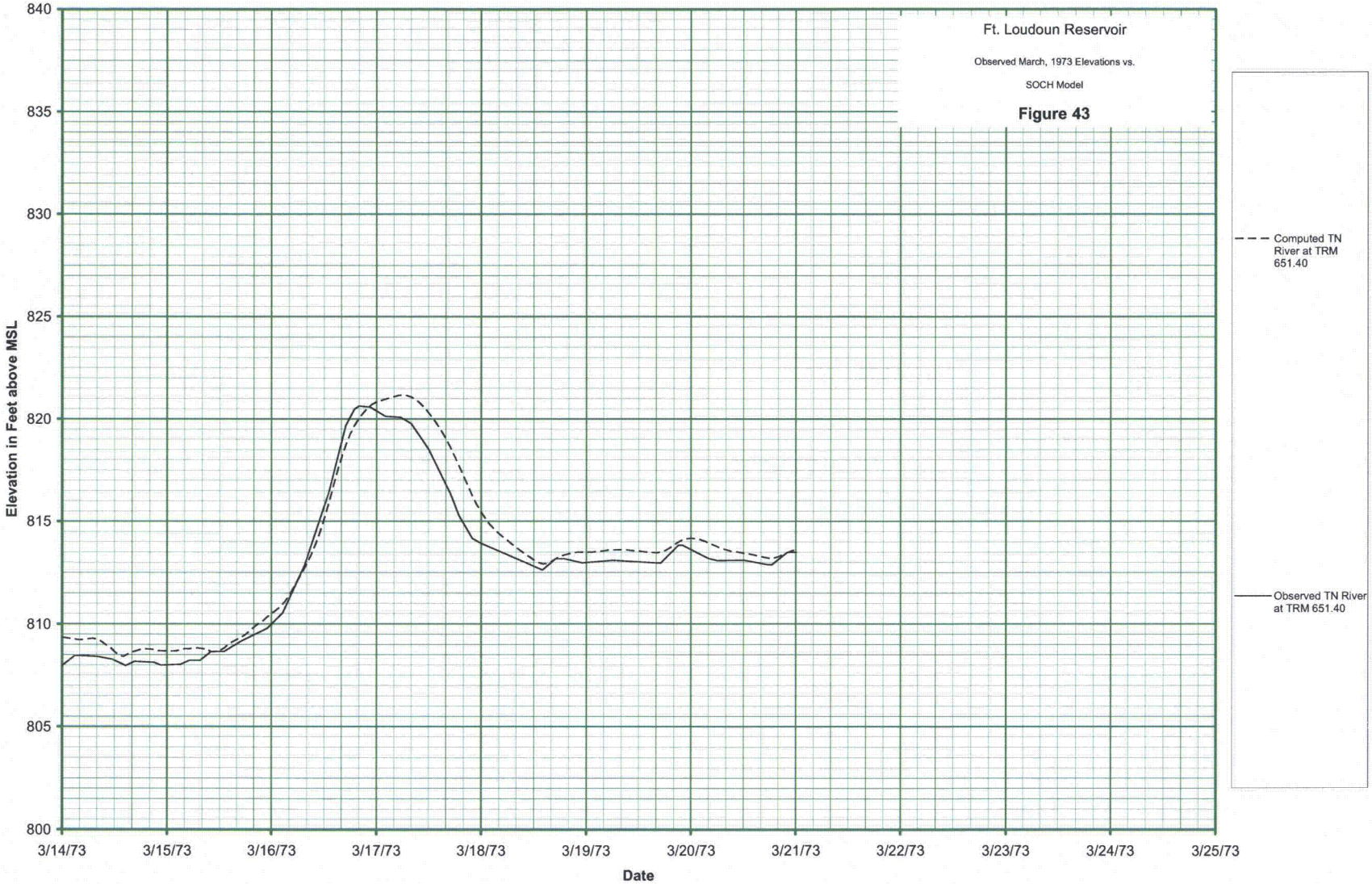
high at the peak elevation. The modeled peak flood elevations were within one and a half feet of the observed peak elevation at RM 7.40 on the French Broad River (Figure 46). The modeled peak flood elevations at the Cherokee Dam and Douglas Dam tailwaters vary between one and six feet higher than the observed elevations because the baseflow was added in these locations, however the computed elevations appear to track the changes in the observed elevations well (Figures 45 and 46). A comparison of the observed discharge to computed discharge at Fort Loudoun Dam, TRM 602.30, is shown in Figure 47.

6.4.2 SOCH 2003 Flood Event Simulation

The calibrated SOCH model was run under unsteady conditions and compared to the observed 2003 flood (results in Appendix A) at five gage locations. The modeled peak flood elevations were within one foot of the peak elevation at gage locations on the Tennessee River and RM 0.30 on the Tellico Reservoir (Figures 48 and 51). The modeled peak flood elevations were within two feet of the peak elevation at the Chilhowee Dam tailwater location on the Tellico Reservoir (Figures 50). The modeled peak flood elevations at the Cherokee Dam and Douglas Dam tailwaters vary between three and six feet higher than the observed elevations because the baseflow was added in these locations, however the computed elevations appear to track the changes in the observed elevations well (Figure 49). A comparison of the observed discharge to computed discharge at Fort Loudoun Dam, Tennessee River Mile 602.30, is shown in Figure 52 and the observed discharge at Tellico Dam, Little Tennessee River Mile 0.30, is shown in Figure 53.

6.5 Validation of Local Inflows Developed from Unit Hydrographs (Subbasins 8, 16, 17, 18 and 24)

The local inflows to Fort Loudoun Reservoir from subbasins 17 and 18, and to Tellico Reservoir from subbasin 24 (Reference 2.12) and modified local inflows to French Broad River from subbasin 8 and to Holston River from subbasin 16 (Appendix C), when combined with the observed data for the floods, reproduce the observed elevations at gage locations along the reservoir as shown in Figures 43 through 46 and Figures 48 through 51 for the 1973 and 2003 floods respectively. It is thus concluded that use of these local inflows in combination with the observed data (Douglas Dam, Cherokee Dam and Chilhowee Dam observed discharges and tailwater elevations and Ft. Loudoun Dam and Tellico Dam observed discharges and headwater elevations confirms the SOCH model's replication of these events. As a result, the unit hydrographs developed for subbasins 17, 18 and 24 (Reference 2.12) and subbasins 8 and 16 (Appendix C) have been indirectly validated by this study and are adequate for use in developing local inflows for other events including the PMF for the TVA Nuclear Plant sites.



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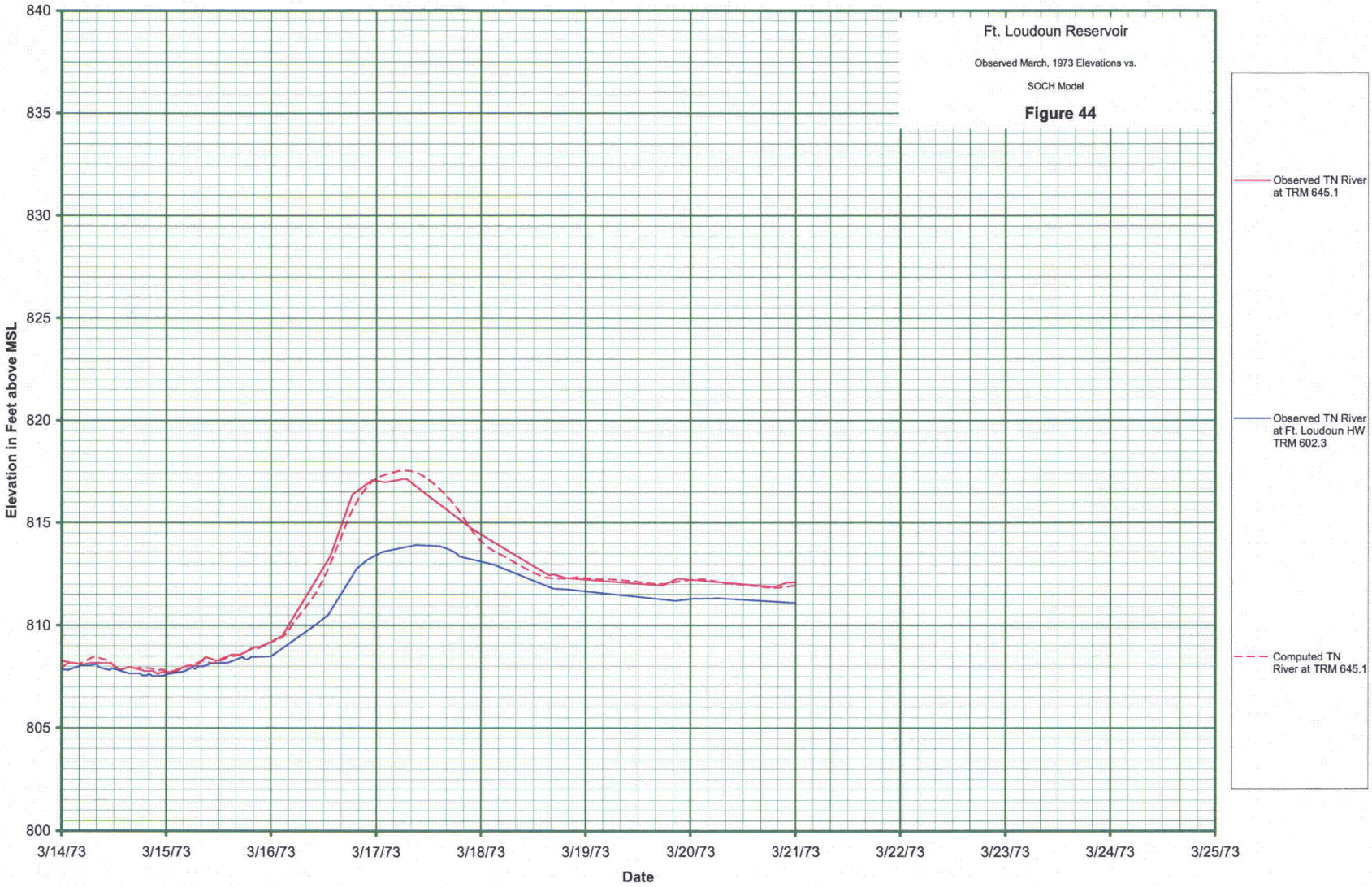
Ft. Loudoun Reservoir
Observed March, 1973 Elevations vs.
SOCH Model
Figure 44
Elevation in Feet above MSL
840
835
830
825
820
815
810
805
800
3/14/73
3/15/73
3/16/73
3/17/73
3/18/73
3/19/73
3/20/73
3/21/73
3/22/73
3/23/73
3/24/73
3/25/73
Date
Observed TN River at TRM 645.1
Observed TN River at Ft. Loudoun HW TRM 602.3
Computed TN River at TRM 645.1

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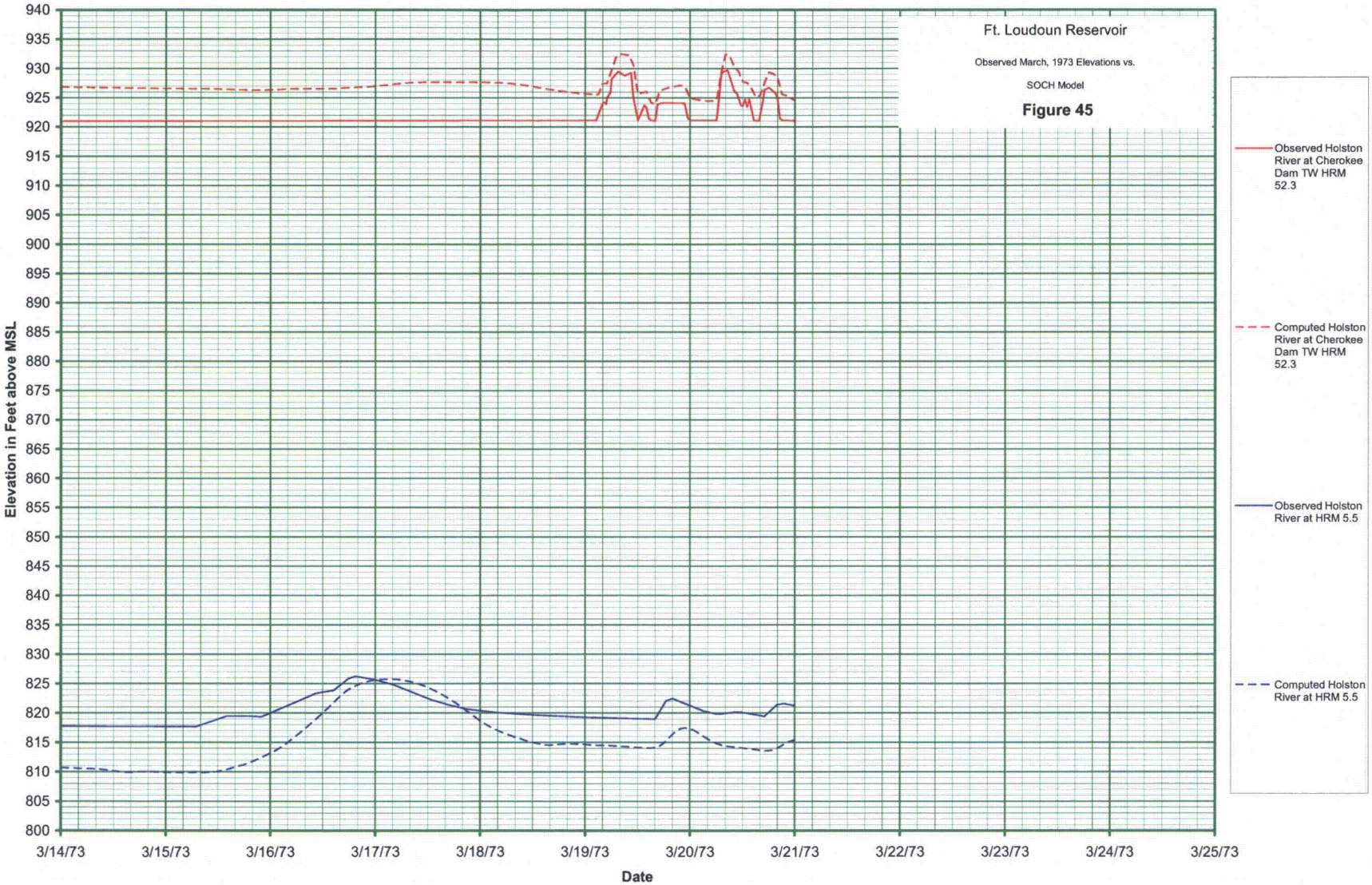

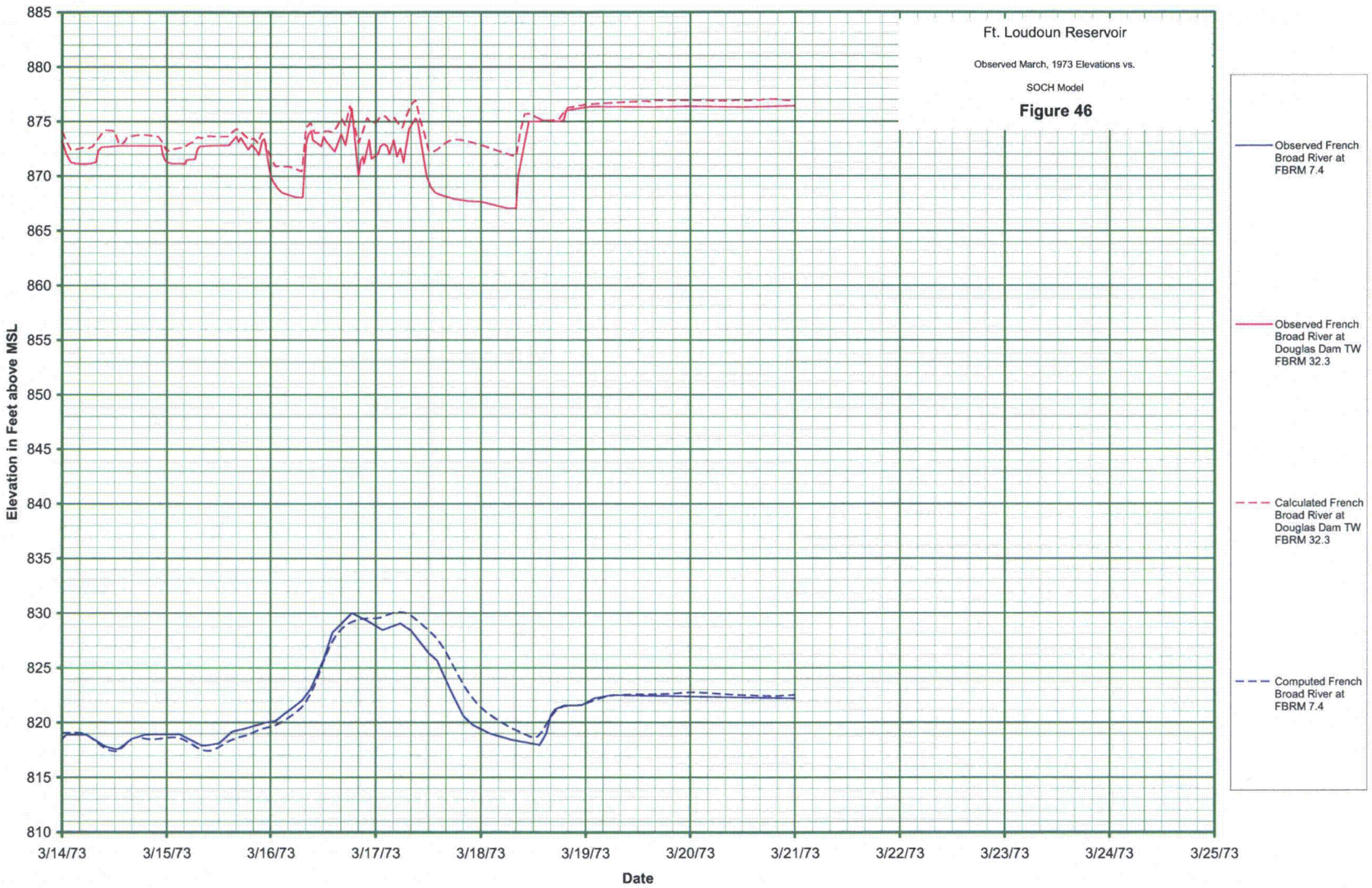

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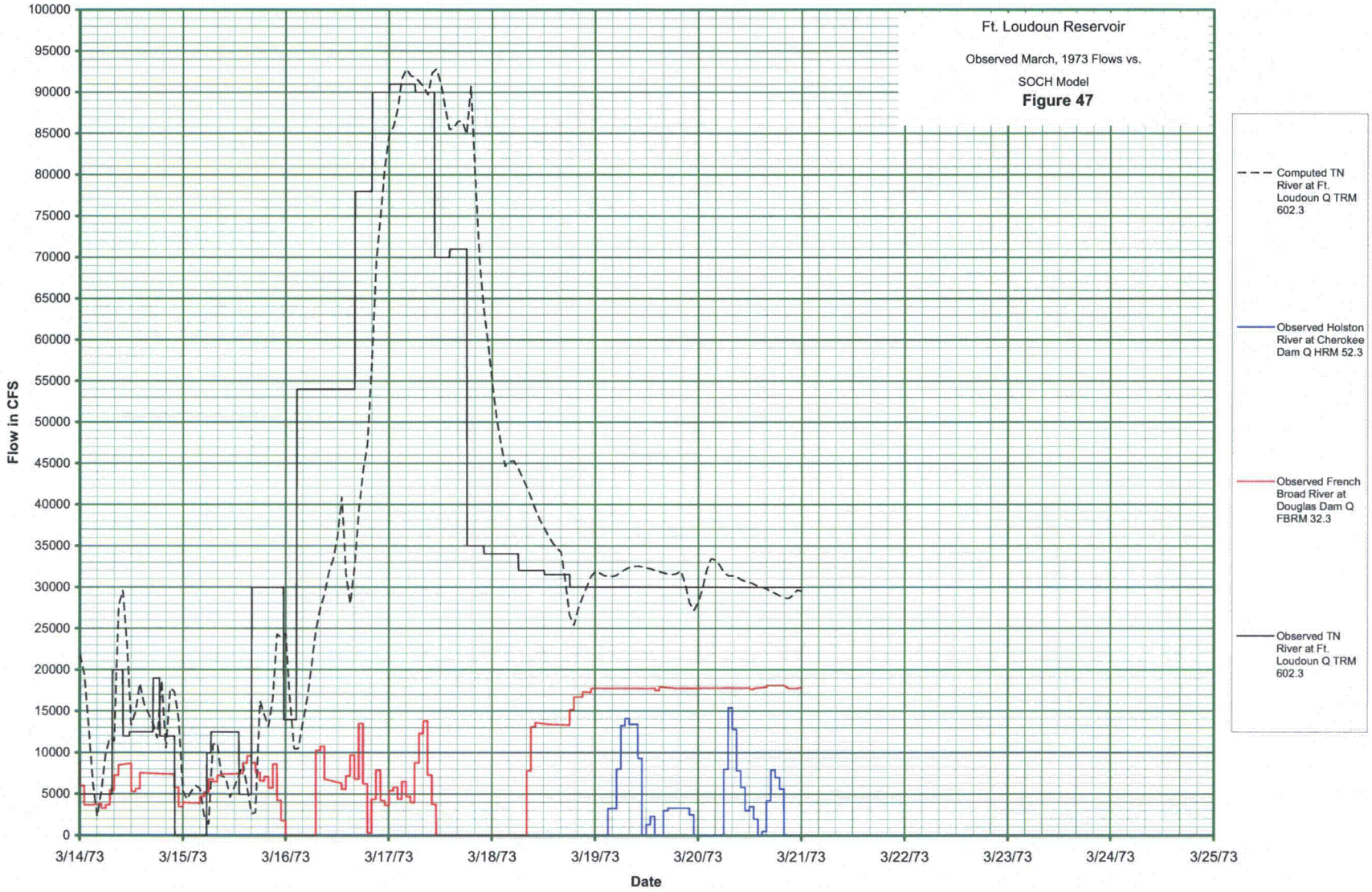
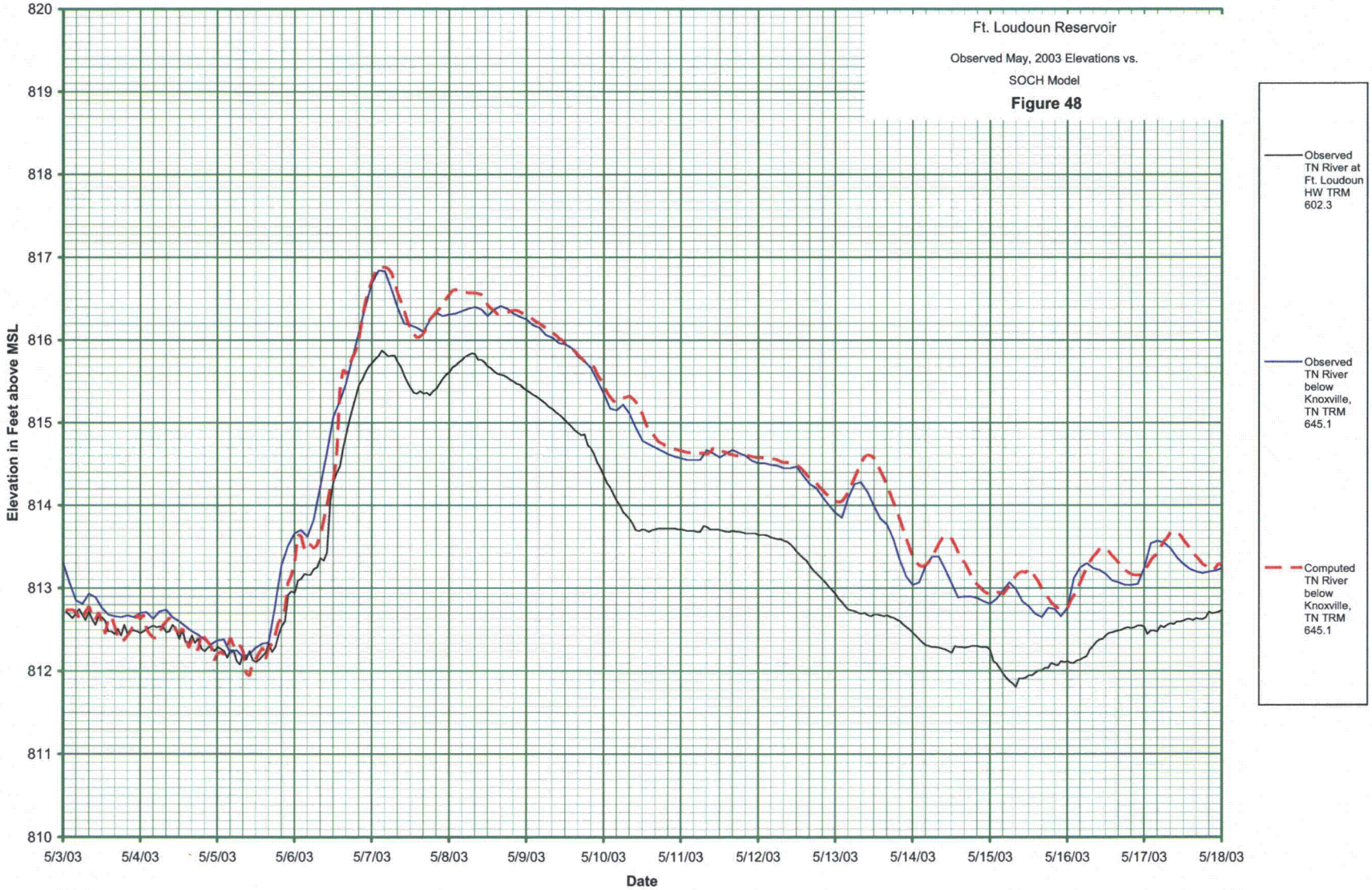
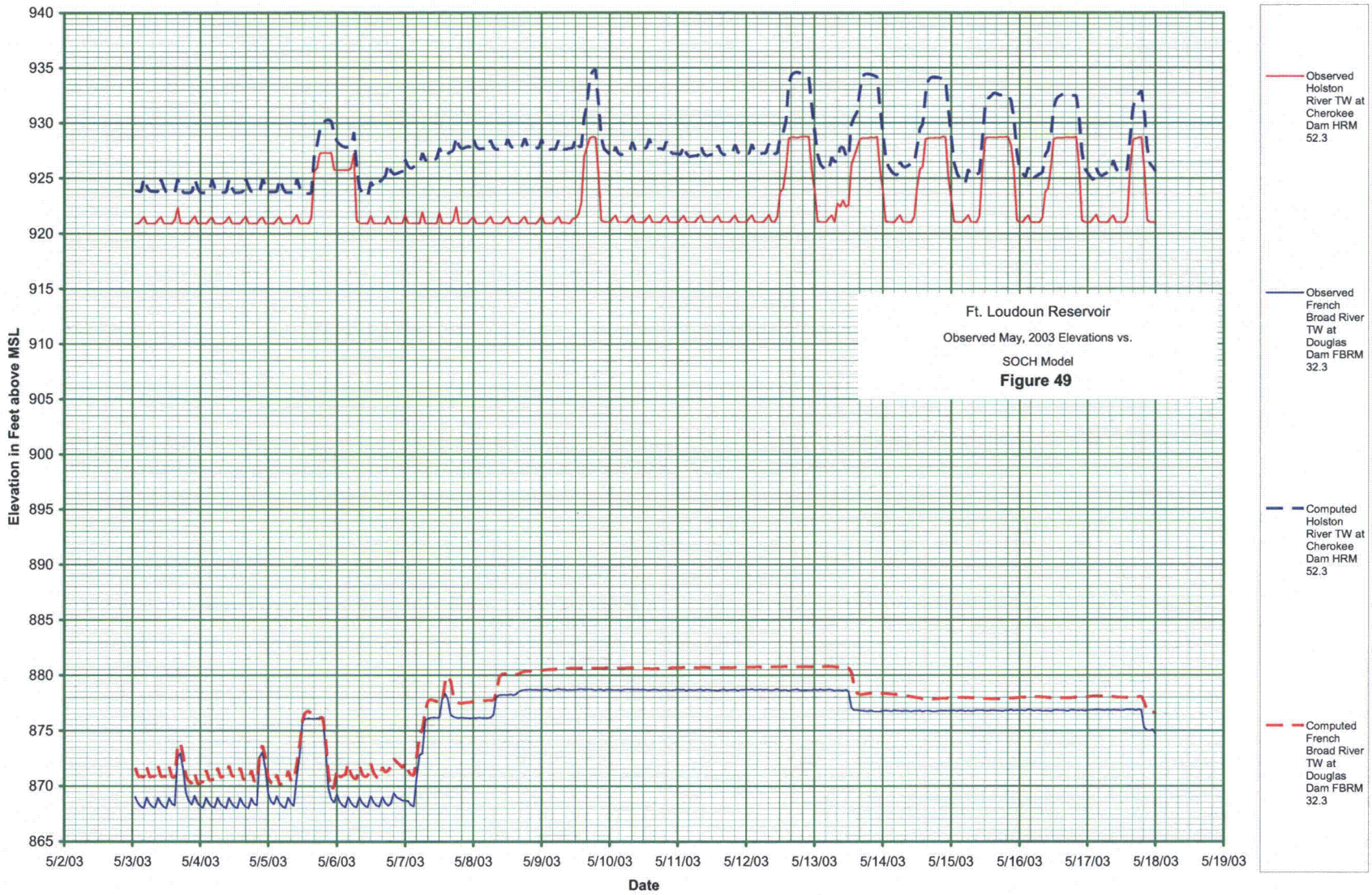

Ft. Loudoun Reservoir
Observed March, 1973 Flows vs.
SOCH Model
Figure 47
Flow in CFS
100000
95000
90000
85000
80000
75000
70000
65000
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
3/14/73
3/15/73
3/16/73
3/17/73
3/18/73
3/19/73
3/20/73
3/21/73
3/22/73
3/23/73
3/24/73
3/25/73
Date
Computed TN River at Ft. Loudoun Q TRM 602.3
Observed Holston River at Cherokee Dam Q HRM 52.3
Observed French Broad River at Douglas Dam Q FBRM 32.3
Observed TN River at Ft. Loudoun Q TRM 602.3


Ft. Loudoun Reservoir
Observed May, 2003 Elevations vs.
SOCH Model
Figure 48
Elevation in Feet above MSL
820
819
818
817
816
815
814
813
812
811
810
5/3/03
5/4/03
5/5/03
5/6/03
5/7/03
5/8/03
5/9/03
5/10/03
5/11/03
5/12/03
5/13/03
5/14/03
5/15/03
5/16/03
5/17/03
5/18/03
Date
Observed TN River at Ft. Loudoun HW TRM 602.3
Observed TN River below Knoxville, TN TRM 645.1
Computed TN River below Knoxville, TN TRM 645.1



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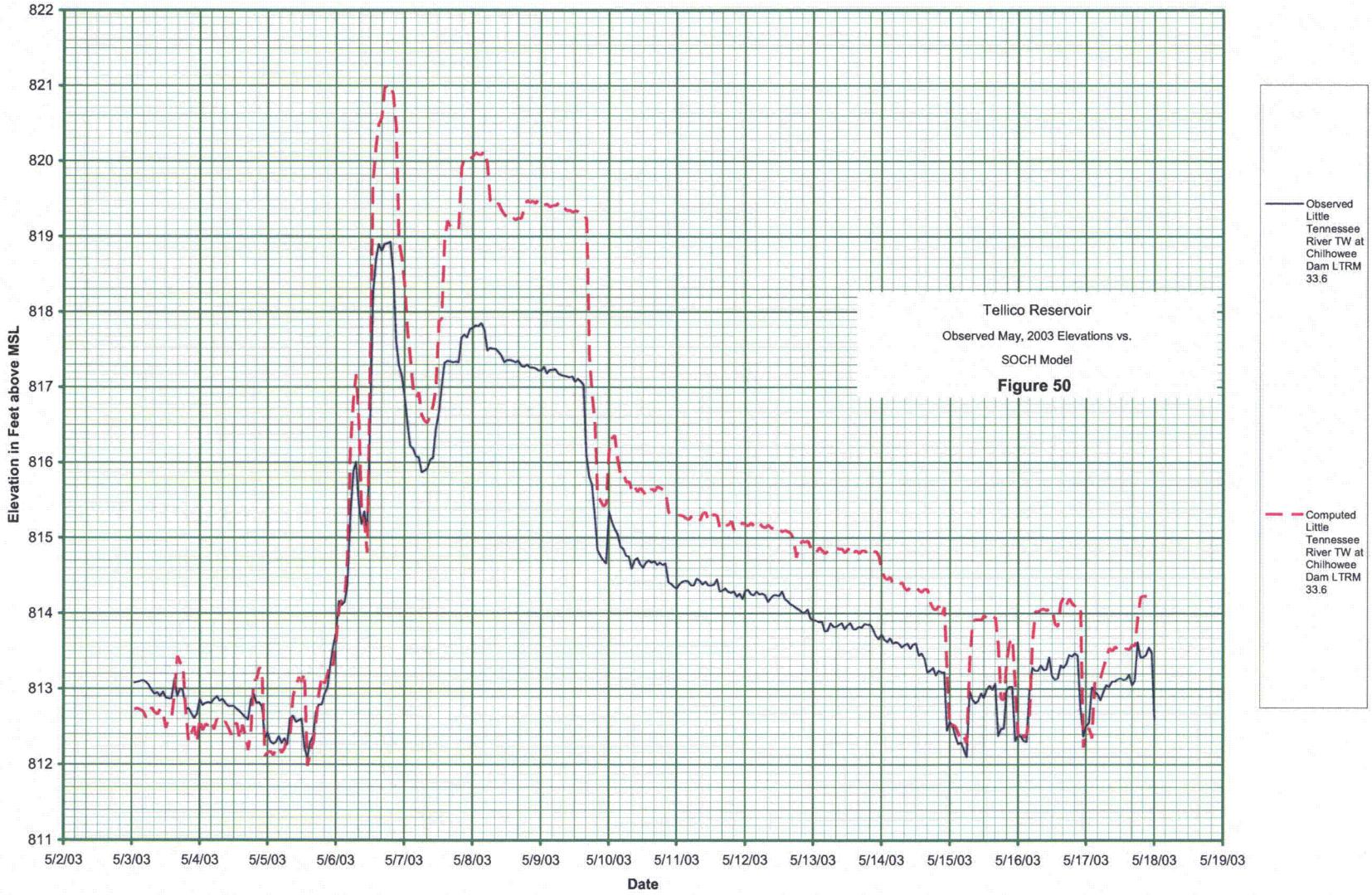
Tellico Reservoir
Observed May, 2003 Elevations vs.
SOCH Model
Figure 50
Elevation in Feet above MSL
822
821
820
819
818
817
816
815
814
813
812
811
5/2/03
5/3/03
5/4/03
5/5/03
5/6/03
5/7/03
5/8/03
5/9/03
5/10/03
5/11/03
5/12/03
5/13/03
5/14/03
5/15/03
5/16/03
5/17/03
5/18/03
5/19/03
Date
Observed Little Tennessee River TW at Chilhowee Dam LTRM 33.6
Computed Little Tennessee River TW at Chilhowee Dam LTRM 33.6

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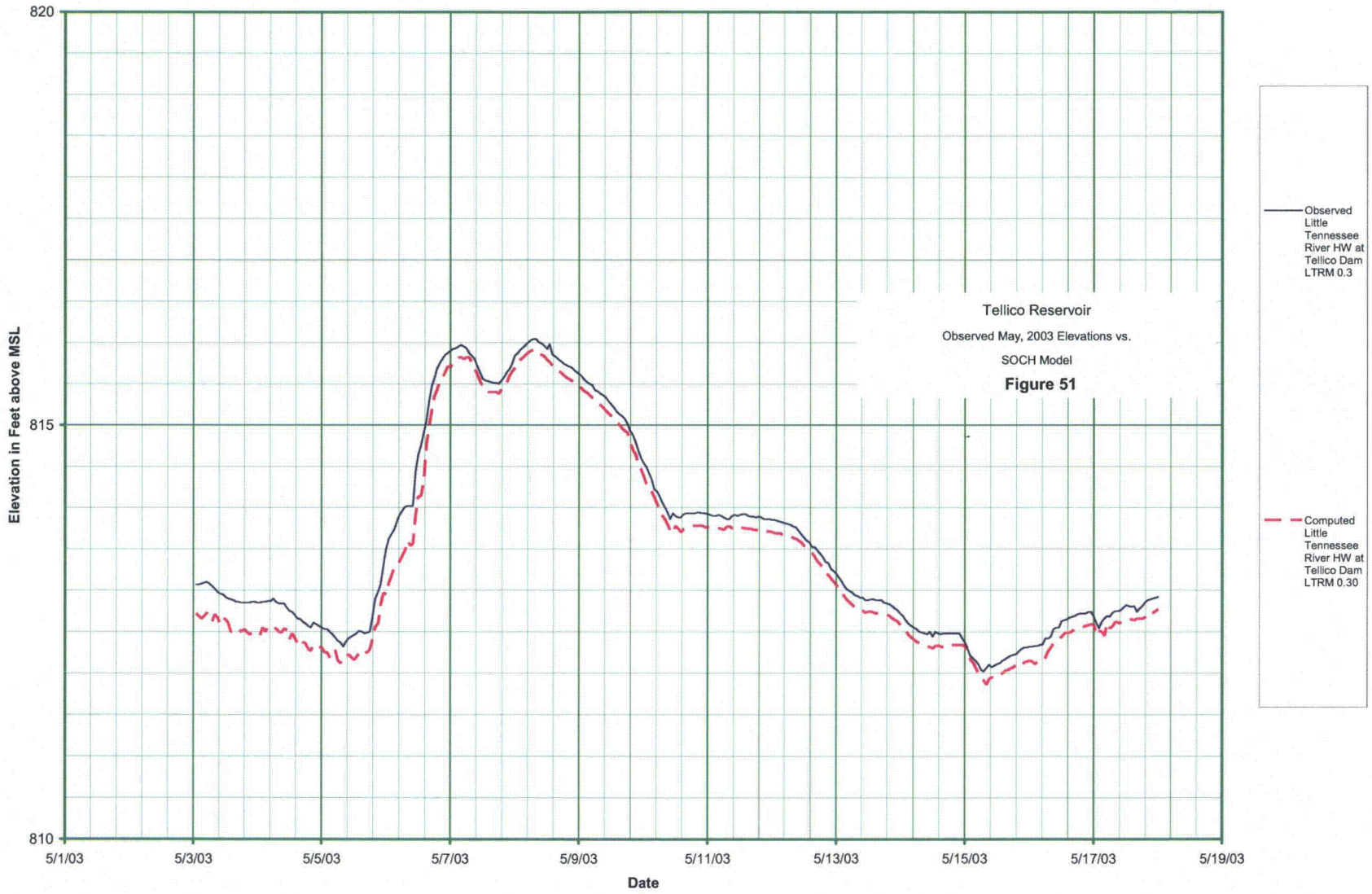

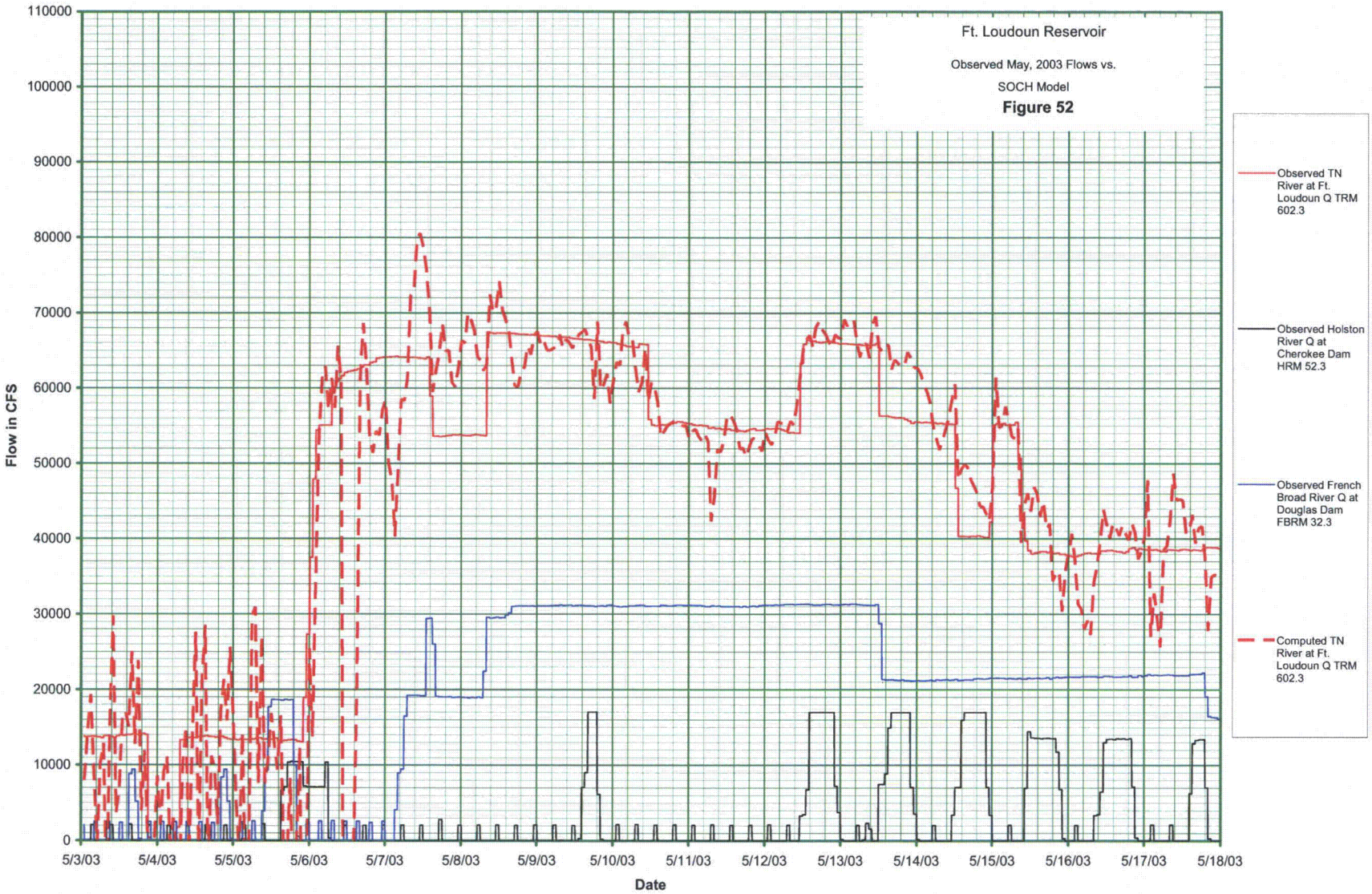

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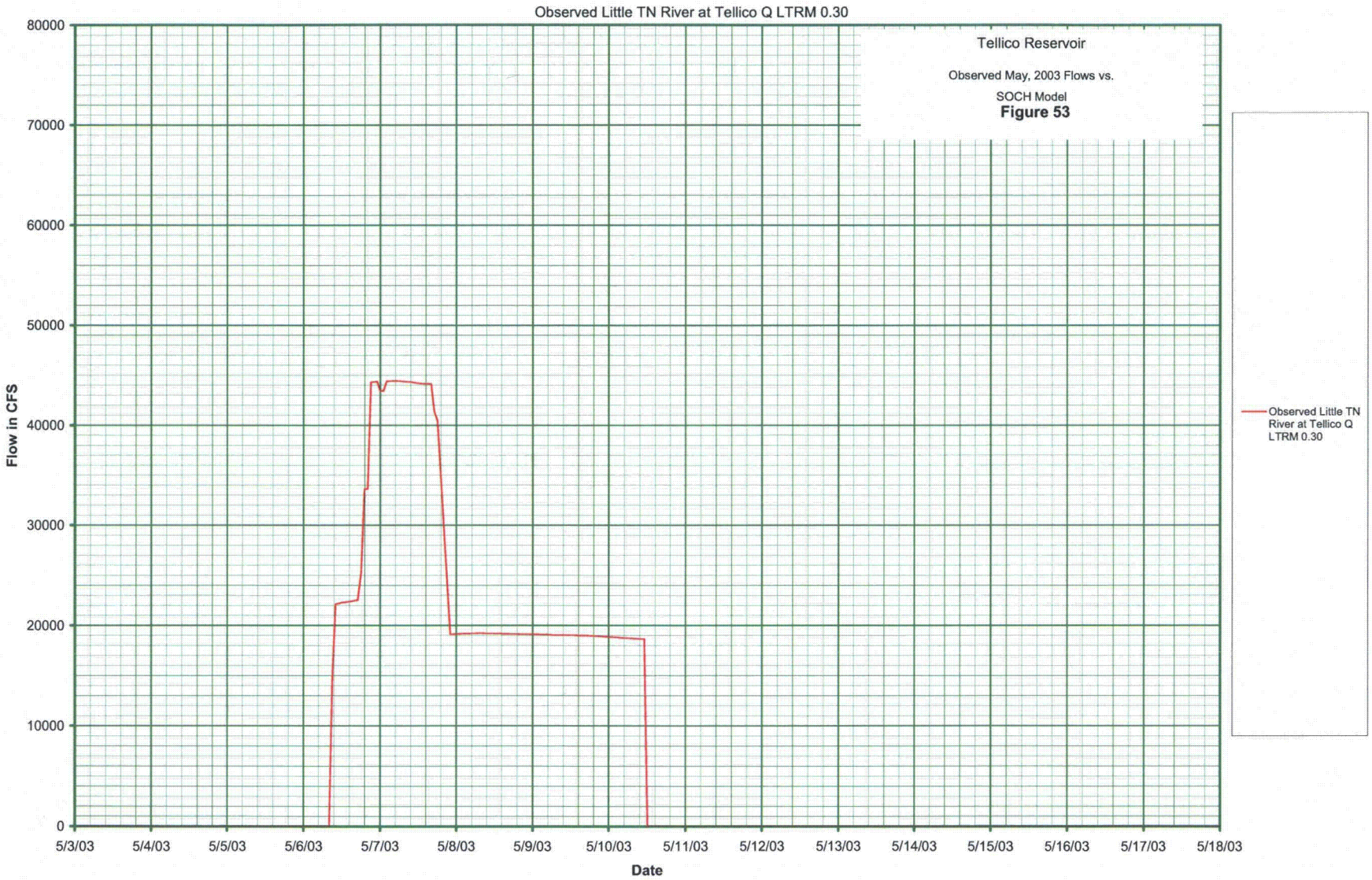

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7. Results/Conclusions

This calibration process provided model results that satisfactorily reproduced the historic floods (1973 and 2003). The SOCH model accurately replicated observed elevations and discharges for two large historic flood events. Because the model accurately replicated two historic floods that occurred 30 years apart, it is shown that the SOCH model performs well in predicting flood elevations and discharges. The SOCH model can thus be used to reliably predict flood elevations and discharges for events of other magnitudes and is adequate for use in predicting flood elevations and discharges for the PMF.

A verification of the time-step was conducted as described in Section 4 of Reference 2.9. A 5-second time-step was the longest stable time-step which is what was used in the calibration.

The local inflows to Ft. Loudoun-Tellico Reservoir for subbasins 17, 18 and 24 and the modified local inflows for subbasins 8 and 16, when combined with observed flood data, reproduced the observed flood elevations. The unit hydrographs developed for subbasins 8, 16, 17, 18 and 24 have therefore been validated and are adequate for use in developing flood inflows for other events. When using the inflows developed from unit hydrographs, "Subbasin 8 Direct Runoff + Baseflow" should be evenly distributed as modified in Appendix B from French Broad River Miles 32.30 to 7.40. "Subbasin 16 Direct Runoff + Baseflow" should be evenly distributed as modified in Appendix B from Holston River Miles 52.30 to 5.50. "Subbasin 17 Direct Runoff + Baseflow" should be used as a point local at Tennessee River Mile 635.60. "Subbasin 18 Direct Runoff + Baseflow" should be distributed based on reservoir drainage area (Reference 2.1) from Tennessee River Mile 602.30 to River Mile 5.50 on the Holston River and River Mile 7.40 on the French Broad River. This results in 92.60% of the hydrograph being distributed between Tennessee River Miles 602.30 to 652.22, 4.10% of the hydrograph between Holston River Miles 0.00 to 5.50 and 3.30% of the hydrograph between French Broad River Miles 0.00 to 7.40 (Attachment 12, Sheet "TRM 652.22 to 602.3"). "Subbasin 24 Direct Runoff + Baseflow" should be evenly distributed from Little Tennessee RM 33.60 to 0.60. The Ft. Loudoun rain-on-reservoir hydrograph should be distributed based on normal pool surface area (Reference 2.10) from Tennessee River Mile 602.71 to River Mile 9.60 on the Holston River and River Mile 9.50 on the French Broad (Section 6.4). This results in 95.10% of the hydrograph being distributed between Tennessee River Miles 602.30 to 652.21, 2.10% of the hydrograph between Holston River Miles 0.00 to 9.60 and 2.90% of the hydrograph between French Broad River Miles 0.00 to 9.50 (Attachment 12, Sheet "TRM 652.21 to 602.3"). The Tellico rain-on-reservoir hydrograph should be evenly distributed from Little Tennessee River Miles 0.60 to 33.59 (Section 6.4).

The final Manning's *n* values for the SOCH model for Fort Loudoun Reservoir, Tennessee River Miles 602.30 to 652.22, determined by this calibration process are provided in Table 59. The final calibrated SOCH geometry file is named "FtLoudoun Rev3.geo" and is included in Appendix A. The final Manning's *n* values for the SOCH model for the Tellico Reservoir River Miles 0.30 to 33.60 determined by this calibration process are provided in Table 60. The final calibrated SOCH geometry file is named "Tellico Rev4.geo" and is included in Appendix A. The final Manning's *n* values for the SOCH model for the Holston River Miles 0.00 to 52.30 determined by this calibration process are provided in Table 61. The final calibrated SOCH geometry file is named "Holston Rev3.geo" and is included in Appendix A. The final Manning's *n* values for the SOCH model for the French Broad River Miles 0.00 to 32.30 determined by this calibration process are provided in Table 62. The final calibrated SOCH geometry file is named "French Broad Rev2.geo" and is included in Appendix A. The final Manning's *n* values for the SOCH model for the Canal Miles 0.00 to 1.44 were changed from 0.030 to 0.040. The 2003 model was run twice. Manning's *n* values of 0.030 were used in the Canal in one simulation and Manning's *n* values of 0.040 were used in the second simulation. The computed elevations at Tellico Reservoir were compared against the observed elevations for both cases. The Manning's *n* values of 0.040 yielded results that were closer to the observed data, therefore the value of 0.040 was chosen as the most appropriate value. The final calibrated SOCH geometry file is named "Canal Rev1.geo" and is included in Appendix A. The final Manning's *n* values and the "FtLoudoun Rev3.geo," "Tellico Rev4.geo," "Holston Rev3.geo," "French Broad Rev2.geo" and "Canal Rev1.geo" files are to be used in the SOCH PMF determination. In conjunction with using "FtLoudoun Rev3.geo," "Tellico Rev4.geo," "Holston Rev3.geo," "French Broad Rev2.geo" and "Canal Rev1.geo", interpolated sections should be computed internally within SOCH, as indicated by the asterisks in Tables 60 through 64, to be used as the even-numbered sections.

Table 59. Final Manning's *n*, Fort Loudoun Reservoir

Tennessee River Mile	Final SOCH Manning's *n*	Tennessee River Mile	Final SOCH Manning's *n*
652.22	0.026	629.31	0.021
651.18*	0.026	628.23*	0.024
650.14	0.026	627.15	0.024
649.44*	0.026	626.22*	0.024
648.73	0.035	625.28	0.024
648.01*	0.035	624.19*	0.024
647.29	0.045	623.10	0.024
646.92*	0.035	622.06*	0.024
646.55	0.028	621.02	0.024
645.82*	0.028	619.98*	0.033
645.09	0.028	618.94	0.033
644.49*	0.028	617.61*	0.033
643.89	0.023	616.27	0.033
642.83*	0.021	615.48*	0.033
641.77	0.021	614.68	0.033
640.64*	0.021	613.68*	0.033
639.50	0.025	612.68	0.033
638.51*	0.020	611.66*	0.033
637.52	0.020	610.63	0.033
636.56*	0.020	609.59*	0.033
635.59	0.020	608.54	0.029
635.10*	0.020	607.49*	0.029
634.60	0.020	606.43	0.023
634.05*	0.020	604.36	0.023
633.50	0.020	602.70	0.023
632.46*	0.020	602.60*	0.023
631.41	0.020	602.50*	0.023
630.77*	0.020	602.40*	0.023
630.12	0.025	602.30	0.023
629.72*	0.025		

*Interpolated section in SOCH

Table 60. Final Manning's *n*, Tellico Reservoir

Tellico Reservoir Mile	Final SOCH Manning's *n*	Tellico Reservoir Mile	Final SOCH Manning's *n*
33.60	0.042	19.49*	0.028
32.97*	0.042	19.11	0.028
32.34	0.040	18.85*	0.033
31.95*	0.029	18.59	0.033
31.55	0.029	17.62*	0.033
30.62*	0.029	16.64	0.033
29.68	0.029	16.35*	0.033
28.65*	0.029	16.05	0.025
27.62	0.029	14.68*	0.025
27.18*	0.029	13.31	0.025
26.73	0.033	11.49*	0.025
26.24*	0.033	9.66	0.025
25.74	0.035	9.05*	0.025
25.08*	0.035	8.43	0.025
24.41	0.035	7.38*	0.027
24.07*	0.035	6.33	0.027
23.73	0.035	5.01*	0.027
23.14*	0.035	3.68	0.027
22.54	0.028	2.02*	0.027
21.86*	0.028	0.60	0.027
21.17	0.028	0.53*	0.027
20.64*	0.028	0.45*	0.027
20.10	0.028	0.38*	0.027
19.99*	0.028	0.30	0.027
19.87	0.028		

*Interpolated section in SOCH

Table 61. Final Manning's *n*, Holston River

Holston River Mile	Final SOCH Manning's *n*	Holston River Mile	Final SOCH Manning's *n*
52.30	0.051	23.14*	0.028
51.32*	0.051	22.14	0.028
50.34	0.051	21.14*	0.028
49.33*	0.036	20.14	0.022
48.31	0.032	19.13*	0.028
47.32*	0.032	18.12	0.032
46.33	0.032	17.57*	0.032
45.31*	0.032	17.02	0.032
44.30	0.037	16.56*	0.042
43.47*	0.037	16.10	0.036
42.64	0.043	15.00*	0.030
41.45*	0.025	13.91	0.026
40.27	0.037	12.98*	0.026
39.77*	0.020	12.06	0.026
39.27	0.024	11.06*	0.026
37.42*	0.031	10.06	0.036
35.58	0.031	9.05*	0.031
34.75*	0.029	8.04	0.030
33.92	0.030	7.04*	0.032
33.23*	0.037	6.03	0.032
32.54	0.037	5.79*	0.032
31.38*	0.037	5.56	0.032
30.22	0.032	4.79*	0.032
29.35*	0.032	4.02	0.036
28.48	0.031	3.02*	0.036
27.51*	0.035	2.02	0.036
26.54	0.035	1.01*	0.036
25.34*	0.035	0.00	0.036
24.15	0.028		

*Interpolated section in SOCH

Table 62. Final Manning's *n*, French Broad River

French Broad River Mile	Final SOCH Manning's *n*	French Broad River Mile	Final SOCH Manning's *n*
32.30	0.036	17.77*	0.050
31.53*	0.036	17.35	0.050
30.75	0.036	16.56*	0.030
29.80*	0.036	15.76	0.030
28.85	0.036	15.37*	0.030
28.54*	0.036	14.97	0.030
28.23	0.037	14.62*	0.030
27.54*	0.037	14.26	0.030
26.84	0.037	13.95*	0.030
26.57*	0.044	13.63	0.030
26.30	0.044	12.53*	0.030
25.98*	0.044	11.42	0.030
25.65	0.044	10.75*	0.025
25.22*	0.049	10.07	0.025
24.78	0.049	9.24*	0.030
24.14*	0.049	8.40	0.030
23.50	0.049	7.23*	0.030
22.94*	0.049	6.06	0.027
22.38	0.045	4.85*	0.040
21.97*	0.045	3.90	0.035
21.56	0.045	2.96*	0.035
20.63*	0.045	2.02	0.035
19.70	0.035	0.73*	0.047
18.94*	0.030	0.00	0.050
18.18	0.025		

*Interpolated section in SOCH

Table 63. Final Manning's *n*, Canal

Canal River Mile	Final SOCH Manning's *n*
1.44	0.040
1.21	0.040
1.06	0.040
0.94	0.040
0.79	0.040
0.64	0.040
0.42	0.040
0.24	0.040
0.00	0.040

CDQ000020080036 Rev 0

Appendix A_Final Manning's n, Final Geometry, Profiles and Calibration Graphs with files:

FtLoudoun_FinalManningsn.xls
FtLoudoun Rev3.geo
Tellico Rev4.geo
Holston Rev3.geo
FrenchBroad Rev2.geo
Canal Rev1.geo
FtLoudounHEC_RAS_SteadyState_Profiles.xls
FtLoudoun_SOCH_SteadyState_Profiles.xls
LittleTNHEC_RAS_SteadyState_Profiles.xls
49XS_LittleTNSOCH_100Kto600K_SteadyState_Profiles.xls
HolstonHEC_RAS_SteadyState_Profiles.xls
HolstonSOCH_SteadyState_Profiles.xls
FrBroadHEC_RAS_SteadyState_Profiles.xls
FrBroadSOCH_SteadyState_Profiles.xls
Observed vs. SOCH Mar 1973 Hydrographs.xls
Remove7_45Observed vs. SOCH May 2003 Hydrographs.xls

1. Purpose

The purpose of this appendix is to describe the local inflow unit hydrograph modifications to Subbasin 8 and Subbasin 16 required for calibration of the Fort Loudoun-Tellico Reservoir SOCH model presented in the calculation entitled "SOCH Model Calibration, Fort Loudoun-Tellico" CDQ000020080036 (parent calculation).

2. References

2.1 The references of the parent calculation are applicable to this appendix.

3. Assumptions and Methodology

3.1 Assumptions

3.1.1 The assumptions of the parent calculation are applicable to this appendix.

3.2 Unverified Assumptions - None

3.3 Methodology

After initial SOCH simulations of the 1973 and 2003 floods (Section 6.4 of the parent calculation), it was determined that the local inflow unit hydrographs for Subbasin 8, French Broad Local, and Subbasin 16, Holston River Local (Cherokee Dam to Knoxville Gage) (Reference 2.12 of the parent calculation), required modification to be applied as distributed locals rather than point locals to better replicate the observed floods.

For the local to be applied as a distributed local inflow, the peak of the unit hydrograph needed to be higher and sooner than the peak of a point local inflow, however the volume must be preserved. First, an arbitrary run-off volume of 5 inches was applied to the unit hydrograph to produce a point local hydrograph and the volume of the point local hydrograph was calculated. The SOCH model was then run with the point local hydrograph and a hydrograph at a gage point in the river was produced.

The point local hydrograph was then adjusted manually to peak sooner and higher, but to preserve the volume from the 5-inch runoff. The revised hydrograph was run in the SOCH model as a distributed local inflow. The resulting hydrograph at a gage point in the river was compared to the hydrograph produced by running the point local. The distributed local hydrograph was then adjusted further, and the model re-run in an iterative process until the results of the SOCH model using the distributed local hydrograph matched the results of the SOCH model using the point local hydrograph.

After the final iteration, the 5-inch volume was divided out of the distributed local hydrograph to produce a new unit hydrograph. The 1973 and 2003 run-off was then applied to the unit hydrograph and the resulting distributed local inflows were used in the SOCH model to simulate the 1973 and 2003 floods.

This process was completed individually for the French Broad Local and the Holston River Local.

4. Design Input

4.1 The design inputs of the parent calculation are applicable to this appendix.

5. Special Requirements/Limiting Conditions

N/A

6. Calculations

After initial SOCH simulations of the 1973 and 2003 floods (Section 6.4 of the parent calculation), it was determined that the local inflow unit hydrographs for Subbasin 8, French Broad Local, and Subbasin 16, Holston River Local (Cherokee Dam to Knoxville Gage), required modification to be applied as distributed locals rather than point locals to better replicate the observed floods.

6.1 Subbasin 8, French Broad Local

For the French Broad Local (Reference 2.12 of the parent calculation) to be applied as a distributed local inflow, the peak of the unit hydrograph needed to be higher and sooner than the peak of a point local inflow, however the volume must be preserved. First, an arbitrary run-off volume of 5 inches was applied to the unit hydrograph to produce a point local hydrograph and the volume of the point local hydrograph was calculated as shown in Table 1. The SOCH model of the French Broad River was then run with the point local hydrograph and a hydrograph at the gage at French Broad River Mile 7.4 was produced.

Table 1. French Broad Point Local Hydrograph

Time(hrs)	Q (cfs)	Runoff (in)	Point Hydrograph (cfs)	Volume (acre-ft)
0	0	5	0	0
6	5,200	5	26000	6446
12	7,500	5	37500	15744
18	2,200	5	11000	12025
24	3,300	5	16500	6818
30	2,000	5	10000	6570
36	1,000	5	5000	3719
42	600	5	3000	1983
48	300	5	1500	1116
54	150	5	750	558
60	0	5	0	186
			TOTAL:	**55165**

The point local hydrograph was then adjusted manually to peak sooner and higher, but to preserve the volume from the 5-inch runoff. The revised hydrograph was run in the SOCH model as a distributed local inflow evenly distributed from FBRM 32.3 to FBRM 7.4. The resulting hydrograph at the gage at French Broad River Mile 7.4 was compared to the hydrograph produced by running the point local. The distributed local hydrograph was then adjusted further, and the model re-run in an iterative process until the results of the SOCH model using the distributed local hydrograph matched the results of the SOCH model using the point local hydrograph. The final iteration is shown in Figure 1 and tabulated in Table 2.

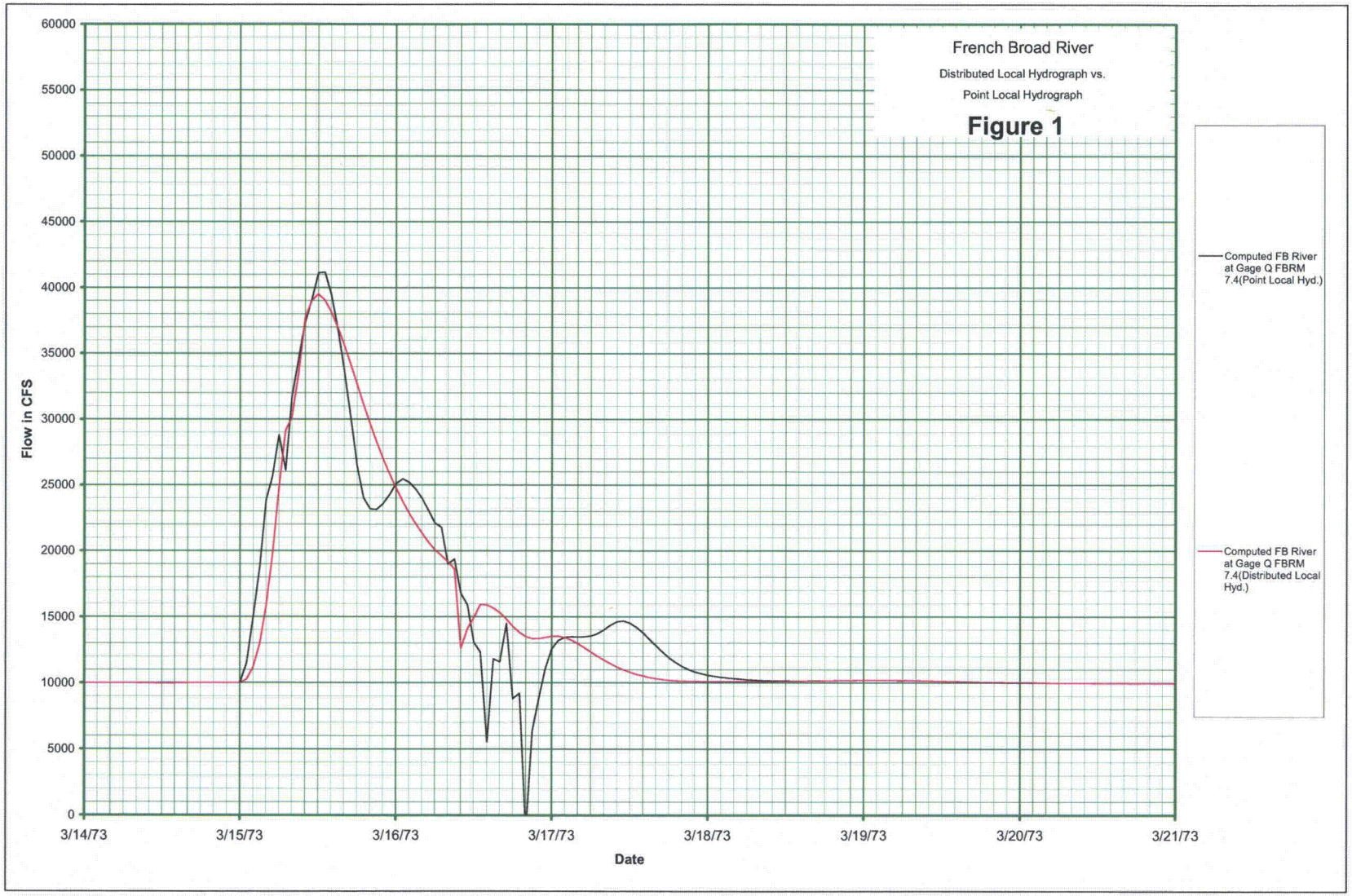
Table 2. French Broad Distributed Local Hydrograph

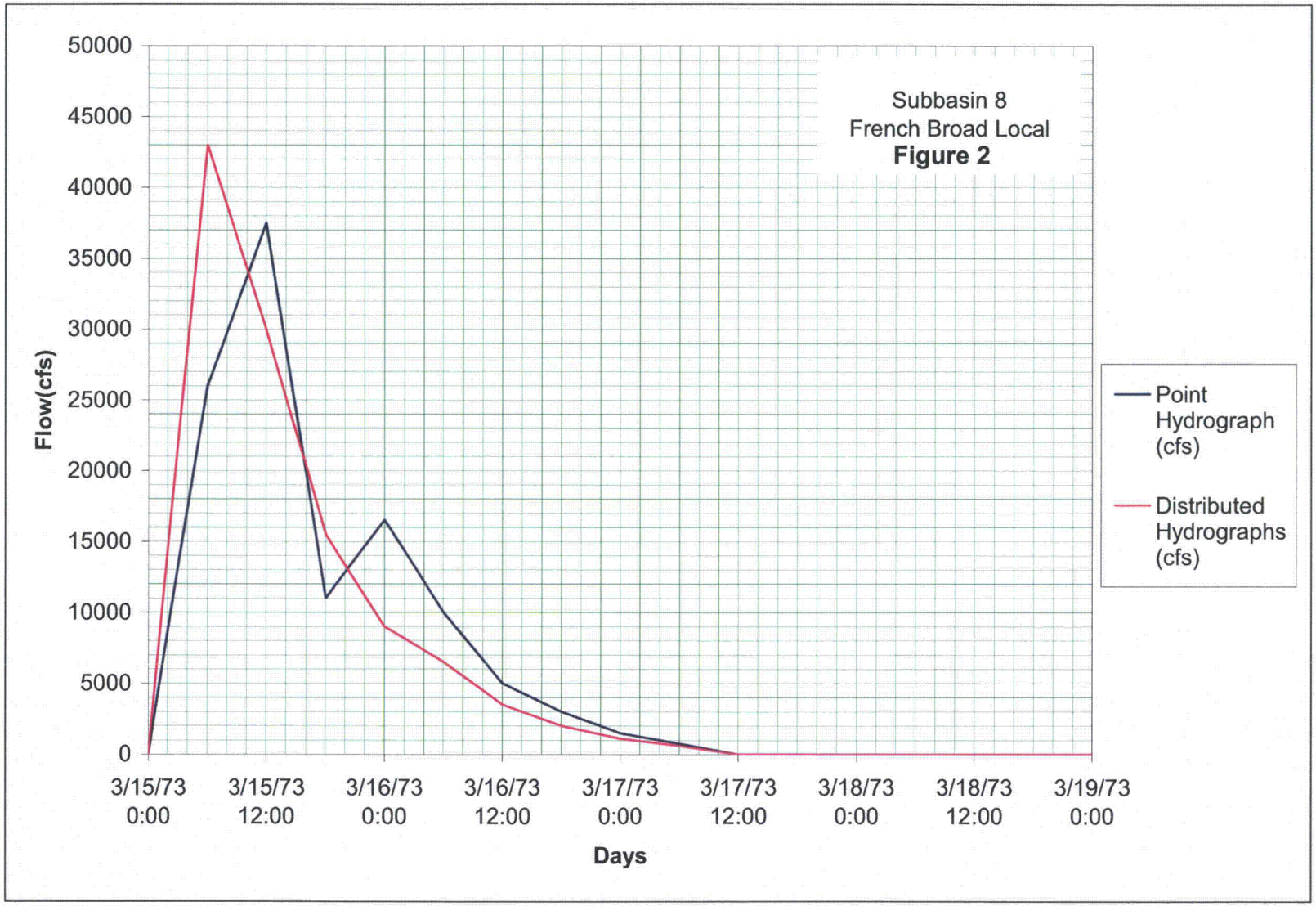
Date	Distributed Hydrograph (cfs)	Volume (acre-ft)
3/15/73 0:00	0	0
3/15/73 6:00	43000	10661
3/15/73 12:00	30000	18099
3/15/73 18:00	15500	11281
3/16/73 0:00	9000	6074
3/16/73 6:00	6500	3843
3/16/73 12:00	3500	2479
3/16/73 18:00	2000	1364
3/17/73 0:00	1100	769
3/17/73 6:00	600	421
3/17/73 12:00	0	149
3/17/73 18:00	0	0
3/18/73 0:00	0	0
3/18/73 6:00	0	0
3/18/73 12:00	0	0
3/18/73 18:00	0	0
3/19/73 0:00	0	0
3/19/73 6:00	0	0
3/19/73 12:00	0	0
3/19/73 18:00	0	0
3/20/73 0:00	0	0
3/20/73 6:00	0	0
3/20/73 12:00	0	0
	TOTAL:	**55140**

After the final iteration, the 5-inch volume was divided out of the distributed local hydrograph to produce a unit hydrograph (Table 3). The distributed unit hydrograph is compared to the point unit hydrograph in Figure 2. The 1973 and 2003 run-off was then applied to the unit hydrograph and the resulting distributed local inflows were used in the SOCH model to simulate the 1973 and 2003 floods (Section 6.4 of the parent calculation).

Table 3. French Broad Distributed Unit Hydrograph

Time (hrs)	Distributed Unit Graph
0	0
6	8600
12	6000
18	3100
24	1800
30	1300
36	700
42	400
48	220
54	120
60	0


French Broad River
Distributed Local Hydrograph vs.
Point Local Hydrograph
Figure 1
Flow in CFS
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
3/14/73
3/15/73
3/16/73
3/17/73
3/18/73
3/19/73
3/20/73
3/21/73
Date
Computed FB River at Gage Q FBRM 7.4(Point Local Hyd.)
Computed FB River at Gage Q FBRM 7.4(Distributed Local Hyd.)


Subbasin 8
French Broad Local
Figure 2
Flow(cfs)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
3/15/73 0:00
3/15/73 12:00
3/16/73 0:00
3/16/73 12:00
3/17/73 0:00
3/17/73 12:00
3/18/73 0:00
3/18/73 12:00
3/19/73 0:00
Days
Point Hydrograph (cfs)
Distributed Hydrographs (cfs)

6.2 Subbasin 16, Holston River Local (Cherokee Dam to Knoxville Gage)

For the Holston River Local (Reference 2.12 of the parent calculation) to be applied as a distributed local inflow, the peak of the unit hydrograph needed to be higher and sooner than the peak of a point local inflow, however the volume must be preserved. First, an arbitrary run-off volume of 5 inches was applied to the unit hydrograph to produce a point local hydrograph and the volume of the point local hydrograph was calculated as shown in Table 4. The SOCH model of the Holston River was then run with the point local hydrograph and a hydrograph at the gage at Holston River Mile 5.5 was produced.

Table 4. Holston Point Local Hydrograph

Time (hrs)	Q (cfs)	Runoff (in)	Point Hydrograph (cfs)	Volume (acre-ft)
0	0	5	0	
3	1000	5	5000	620
6	3000	5	15000	2479
9	4700	5	23500	4773
12	5800	5	29000	6508
15	6550	5	32750	7655
18	6800	5	34000	8275
21	6600	5	33000	8306
24	5450	5	27250	7469
27	4100	5	20500	5919
30	3050	5	15250	4432
33	2200	5	11000	3254
36	1625	5	8125	2371
39	1225	5	6125	1767
42	1050	5	5250	1410
45	990	5	4950	1264
48	950	5	4750	1202
51	870	5	4350	1128
54	820	5	4100	1048
57	750	5	3750	973
60	720	5	3600	911
63	630	5	3150	837
66	600	5	3000	762
69	500	5	2500	682
72	470	5	2350	601
75	380	5	1900	527
78	350	5	1750	452
81	260	5	1300	378
84	220	5	1100	298
87	140	5	700	223
90	100	5	500	149
93	40	5	200	87
			Total:	**76785**

The point local hydrograph was then adjusted manually to peak sooner and higher, but to preserve the volume from the 5-inch runoff. The revised hydrograph was run in the SOCH model as a distributed local inflow evenly distributed from HRM 52.3 to HRM 5.5. The resulting hydrograph at the gage at Holston River Mile 5.5 was compared to the hydrograph produced by running the point local. The distributed local hydrograph was then adjusted further, and the model re-run in an iterative process until the results of the SOCH model using the distributed local hydrograph matched the results of the SOCH model using the point local hydrograph. The final iteration is shown in Figure 3 and tabulated in Table 5.

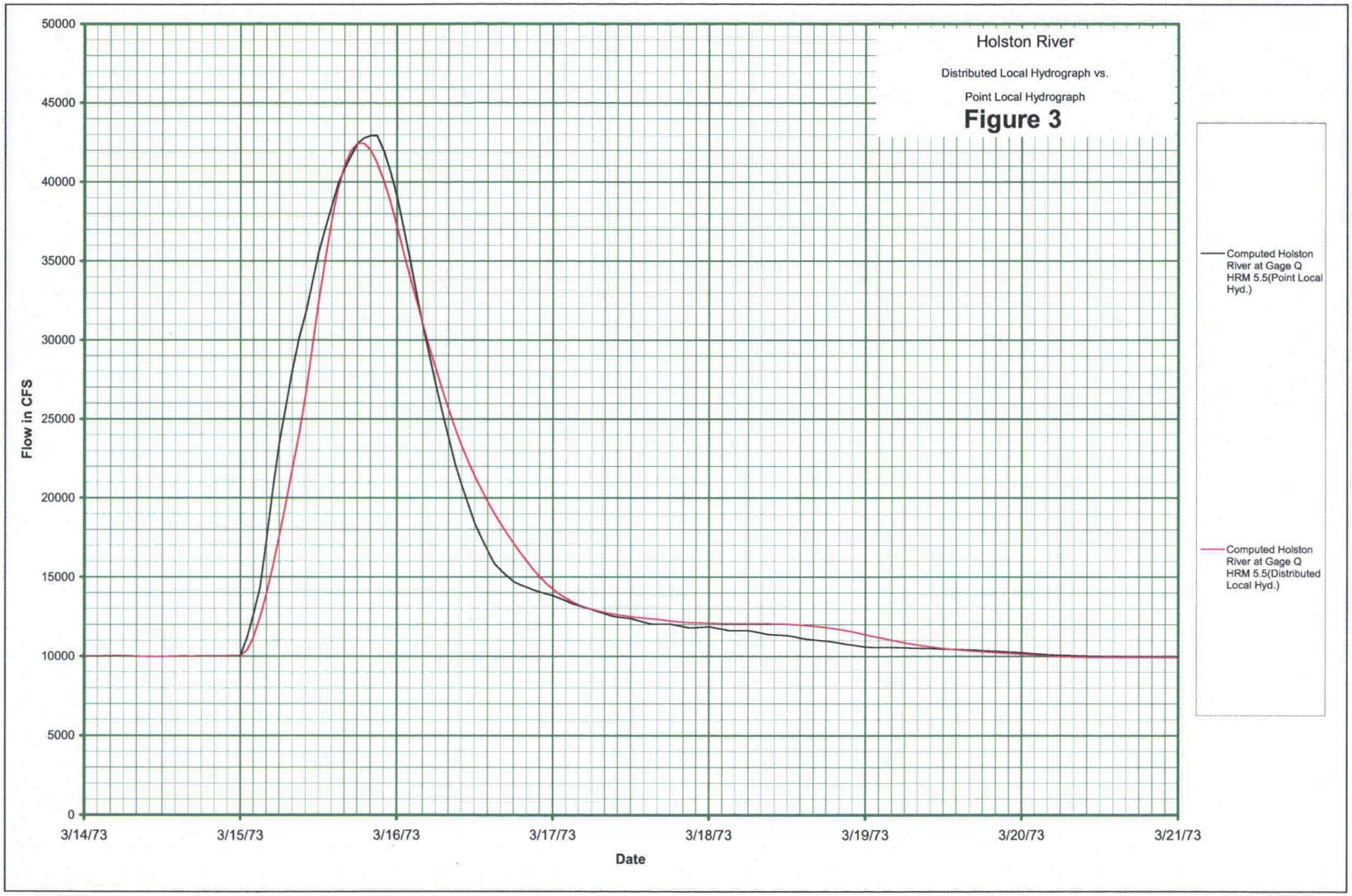
Table 5. Holston Distributed Local Hydrograph

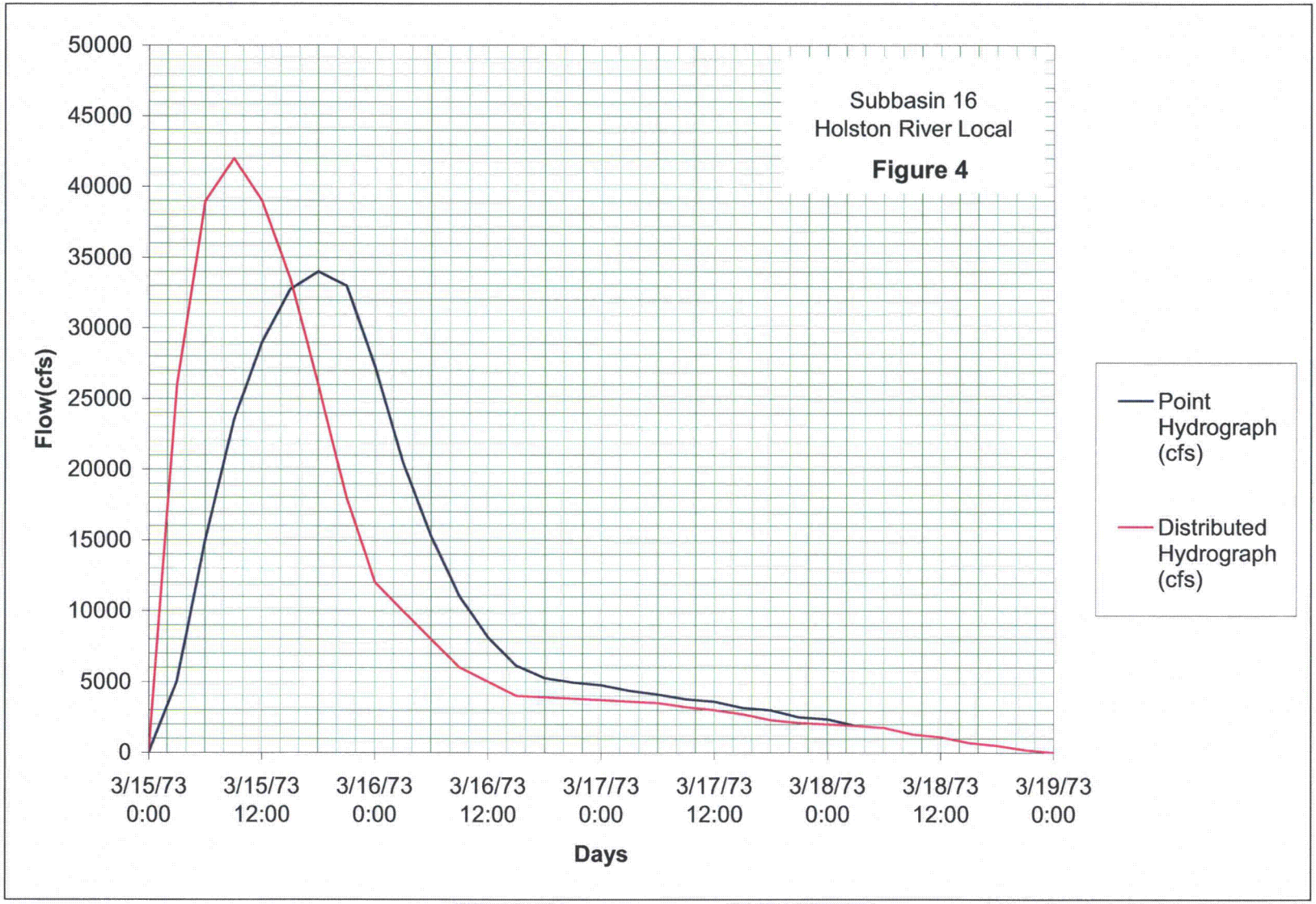
Date	Distributed Hydrograph (cfs)	Volume (acre-ft)
3/15/73 0:00	0	
3/15/73 3:00	26000	3223
3/15/73 6:00	39000	8058
3/15/73 9:00	42000	10041
3/15/73 12:00	39000	10041
3/15/73 15:00	33500	8988
3/15/73 18:00	26000	7376
3/15/73 21:00	18000	5455
3/16/73 0:00	12000	3719
3/16/73 3:00	10000	2727
3/16/73 6:00	8000	2231
3/16/73 9:00	6000	1736
3/16/73 12:00	5000	1364
3/16/73 15:00	4000	1116
3/16/73 18:00	3900	979
3/16/73 21:00	3800	955
3/17/73 0:00	3700	930
3/17/73 3:00	3600	905
3/17/73 6:00	3500	880
3/17/73 9:00	3200	831
3/17/73 12:00	3000	769
3/17/73 15:00	2700	707
3/17/73 18:00	2300	620
3/17/73 21:00	2100	545
3/18/73 0:00	2000	508
3/18/73 3:00	1900	483
3/18/73 6:00	1750	452
3/18/73 9:00	1300	378
3/18/73 12:00	1100	298
3/18/73 15:00	700	223
3/18/73 18:00	500	149
3/18/73 21:00	200	87
3/19/73 0:00	0	25
	TOTAL:	**76798**

After the final iteration, the 5-inch volume was divided out of the distributed local hydrograph to produce a unit hydrograph (Table 6). The distributed unit hydrograph is compared to the point unit hydrograph in Figure 4. The 1973 and 2003 run-off was then applied to the unit hydrograph and the resulting distributed local inflows were used in the SOCH model to simulate the 1973 and 2003 floods (Section 6.4 of the parent calculation).

Table 6. Holston Distributed Unit Hydrograph

Time (hrs)	Distributed Unit Graph
0	0
3	5200
6	7800
9	8400
12	7800
15	6700
18	5200
21	3600
24	2400
27	2000
30	1600
33	1200
36	1000
39	800
42	780
45	760
48	740
51	720
54	700
57	640
60	600
63	540
66	460
69	420
72	400
75	380
78	350
81	260
84	220
87	140
90	100
93	40
96	0


Holston River
Distributed Local Hydrograph vs.
Point Local Hydrograph
Figure 3
Flow in CFS
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
3/14/73
3/15/73
3/16/73
3/17/73
3/18/73
3/19/73
3/20/73
3/21/73
Date
Computed Holston River at Gage Q HRM 5.5(Point Local Hyd.)
Computed Holston River at Gage Q HRM 5.5(Distributed Local Hyd.)


Subbasin 16
Holston River Local
Figure 4
Flow(cfs)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
3/15/73 0:00
3/15/73 12:00
3/16/73 0:00
3/16/73 12:00
3/17/73 0:00
3/17/73 12:00
3/18/73 0:00
3/18/73 12:00
3/19/73 0:00
Days
Point Hydrograph (cfs)
Distributed Hydrograph (cfs)

7. Results/Conclusions

The local unit hydrographs for Subbasin 8 and Subbasin 16 have been modified to be applied as distributed local inflows. The revised hydrographs preserve volume. The French Broad Distributed Unit Hydrograph presented in Table 3 and the Holston Distributed Unit Hydrograph presented in Table 6 are to be use for subsequent SOCH modeling as distributed local hydrographs for Subbasin 8, French Broad Local, and Subbasin 16, Holston River Local, respectively.

1. Purpose

The purpose of this appendix is to describe cross-section modifications required for calibration of the Fort Loudoun-Tellico Reservoir SOCH model presented in the calculation entitled "SOCH Model Calibration, Fort Loudoun-Tellico" CDQ000020080036 (parent calculation).

2. References

2.1 The references of the parent calculation are applicable to this appendix.

3. Assumptions and Methodology

3.1 Assumptions

3.1.1 The assumptions of the parent calculation are applicable to this appendix.

3.2 Unverified Assumptions - None

3.3 Methodology

During the HEC-RAS calibration phase, the cross-sections in each geometry file were evaluated to ensure that the water-surface elevation of the PMF flow did not extend above the top of elevation of each cross-section. While HEC-RAS will automatically extend the sections vertically and continue to run, SOCH will stop running if this occurs. The cross-sections were also evaluated to determine whether additional sections would be required for the SOCH model to serve as nodes, whether cross-sections needed to be moved to serve as nodes, or whether cross-sections needed to be modified or removed to stabilize the SOCH model.

When extending cross-sections, the DRG maps (References 2.10 and 2.11 of the parent calculation) were examined to determine how best to extend the sections. If the slope appeared to be constant, then the slope was extended up at the same slope. If the slope flattened out or needed to be cut off for ineffective flow, the slope was extended vertically.

3.3.1 Holston River

The Holston River cross-section at River Mile 52.22 was moved to River Mile 52.3 to match the existing tailwater location. The cross-section at River Mile 0.08 was moved to River Mile 0.00 so it could serve as a junction section in later calibration steps

3.3.2 French Broad River

The French Broad cross-sections at River Miles 0.99, 7.45, 29.34, 30.01, 31.12 and 31.75 were removed from the geometry file because of oscillations in the model caused by the variation between cross-sections. Removal of these sections preserves the most restrictive sections eliminating oscillations and resulting in conservatively high water-surface elevations. The cross-section at River Mile 0.17 was moved to river mile 0.00 so it could serve as a junction section in later calibration steps and the cross-section at River Mile 32.23 was moved to River Mile 32.3. Section 22.38 was examined and it was found that the section underestimated flow area in the channel and overestimated flow area in the left overbank for the reach. It was determined that a section taken from River Mile 22.48 was more representative of the reach and this section was used at river mile 22.38.

Nine French Broad River cross-sections were modified from the original cross-sections to either eliminate ineffective flow areas or to extend the elevation of the cross-sections. Removal of ineffective flow area will result in a more restrictive cross-section and therefore conservatively high water-surface elevations. Cross-sections were extended up in elevation to be above the potential PMF elevation.

3.3.3 Fort Loudoun Reservoir

The Fort Loudoun cross-sections at Tennessee River Miles 645.89, 647.44, 647.68, and 648.68 were removed from the geometry file because of oscillations in the model caused by the variation between cross-sections. Removal of these sections preserves the most restrictive sections eliminating oscillations and resulting in conservatively high water-surface elevations. The cross-section at River Mile 652.04 was moved to River Mile 652.22 so it could serve as a junction section in later calibration steps. Additionally, a section was added at River Mile 602.7 to create a double-node when used in the SOCH model. The cross-section added at 602.7 was a copy of the cross-section at 602.3 except the channel bottom which was interpolated between cross-sections 602.3and the next upstream cross-section at River Mile 604.36. Because the SOCH model requires a minimum of five sections for any river segment, the segment from Fort Loudoun dam (TR mile 602.3) to the junction with the Canal (TR mile 602.7) will have five sections and the segment from Tellico dam (LTR mile 0.30) to the junction with the Canal (LTR mile 0.60) will have five sections. To accomplish this, three of the five sections on the segment from Fort Loudoun dam to junction with the Canal are interpolated sections (TR mile 602.4, 602.5 and 602.6) and three of the five sections on the segment from Tellico dam to the junction with the Canal are interpolated sections (LTR mile 0.38, 0.45, and 0.53).

Sixteen Fort Loudoun Reservoir cross-sections were modified from the original cross-sections. Cross-sections were modified to either eliminate ineffective flow areas or to extend the elevation of the cross-sections. Removal of ineffective flow area will result in a more restrictive cross-section and therefore conservatively high water-surface elevations. Cross-sections were extended up in elevation to be above the potential PMF elevation.

3.3.4 Little Tennessee River

Two cross-sections in the Little Tennessee River were moved to provide output at the upstream and downstream boundaries of the Tellico model. The cross-section at River Mile 33.57 was moved to River Mile 33.60, which is the Chilhowee tailwater location. The section at river mile 0.35 was moved to river mile 0.30, which is the location of Tellico Dam. This section was also extended in order to match the height of the section just upstream. Additionally a section was added at River Mile 0.60 to create a double-node when used in the SOCH model. The cross-section added at 0.60 was a copy of the cross-section at 0.30 except the channel bottom which was interpolated between cross-section 0.30 and the next upstream cross-section at River Mile 3.68.

Also, one modification was made to the cross-section at River Mile 29.68 in the SOCH geometry file. The original SOCH geometry file (Attachment 1 of parent calculation) had a weighted width term that was less at elevation 930 than at elevation 920. This occurred because of where contour areas were measured in Reference 2.11. No contour areas were measured downstream of this cross-section at elevations above 920 because the expected PMF elevation is not as high downstream of the cross-section at River Mile 29.68 as it is upstream. With no measured surface areas above elevation 920 downstream of River Mile 29.68 and consequently no weighted width values, the computed weighted width value at that section was averaged with zero, resulting in a significantly smaller weighted width value at 930 than at 920. To correct this, a weighted width value was linearly extrapolated at elevation 930 based on the rate of change between the weighted width values at elevations 910 and 920.

3.3.5 Canal

One modification was made to the SOCH geometry file. Elevation 885 was replaced with 880.1 on cross-section 0.42. This was done because the cross-section values at 885 were zero. By changing the elevation to 880.1, it will prevent the SOCH program from trying to interpolate values above elevation 880.

4. Design Input

Sect.	Input Parameter	Source	Location	Description
4.0	Initial HEC-RAS Geometry	References 2.10 and 2.11	Attachment 1 of parent calculation	Initial HEC-RAS geometry was provided in the "SOCH Geometry Verification for Fort Loudoun Reservoir, French Broad River, and Holston River" and "SOCH Geometry Verification for Tellico Reservoir and Canal" calculations and used in the HEC-RAS steady-state model.

5. Special Requirements/Limiting Conditions

N/A

6. Calculations

During the HEC-RAS calibration phase, the cross-sections in each geometry file were evaluated to ensure that the water-surface elevation of the PMF flow did not extend above the top of elevation of each cross-section. While HEC-RAS will automatically extend the sections vertically and continue to run, SOCH will stop running if this occurs. The cross-sections were also evaluated to determine whether additional sections would be required for the SOCH model to serve as nodes, whether cross-sections needed to be moved to serve as nodes, or whether cross-sections needed to be modified or removed to stabilize the SOCH model.

When extending cross-sections, the DRG maps (References 2.10 and 2.11 of the parent calculation) were examined to determine how best to extend the sections. If the slope appeared to be constant, then the slope was extended up at the same slope. If the slope flattened out or needed to be cut off for ineffective flow, the slope was extended vertically. Tables C1 through C3 list the sections that were changed and describe the changes that were made. Figures C1 through C22 show the modified sections. The "Initial Cross-Section" plots and the ineffective flow areas were taken directly from References 2.10 and 2.11 of the parent calculation. The modifications to the sections are denoted by the thin blue line style.

6.1 Holston River

The Holston River cross-section at River Mile 52.22 was moved to River Mile 52.3 to match the existing tailwater gage location. The cross-section at River Mile 0.08 was moved to River Mile 0.00 so it could serve as a junction section in later calibration steps.

6.2 French Broad River

The French Broad cross-sections at River Miles 0.99, 7.45, 29.34, 30.01, 31.12 and 31.75 were removed from the geometry file because of oscillations in the model caused by the variation between cross-sections. Removal of these sections preserves the most restrictive sections eliminating oscillations and resulting in conservatively high water-surface

elevations. The cross-section at River Mile 0.17 was moved to river mile 0.00 so it could serve as a junction section in later calibration steps and the cross-section at River Mile 32.23 was moved to River Mile 32.3. Section 22.38 was examined and it was found that the section underestimated flow area in the channel and overestimated flow area in the left overbank for the reach. It was determined that a section taken from River Mile 22.48 was more representative of the reach and this section was used at river mile 22.38.

Nine French Broad River cross-sections were modified from the original cross-sections as shown in Figures C1 through Figure C9. Cross-sections were modified to either eliminate ineffective flow areas or to extend the elevation of the cross-sections. Removal of ineffective flow area will result in a more restrictive cross-section and therefore conservatively high water-surface elevations. Cross-sections were extended up in elevation to be above the potential PMF elevation. The modifications are listed in Table C1.

Table C1. French Broad River Cross Section Modifications

Cross-Section River Mile	Modification
0.17	Moved to River Mile 0.00
0.99	Removed
0.73	Eliminated ineffective flow area between station 2146 and station 2994
6.06	Eliminated ineffective flow area between station 1870 and station 3390. Extended cross section to elevation 910.
7.45	Removed
8.40	Eliminated ineffective flow area between station 2200 and station 3200. Extended cross section to elevation 920.
10.07	Extended cross section to elevation 920.
11.42	Extended cross section to elevation 920.
15.76	Eliminated ineffective flow area between station 3049.4 and station 3196.4.
19.70	Extended cross section to elevation 930.
21.56	Extended cross section to elevation 950.
22.38	Cross-section 22.48 used
23.50	Extended cross section to elevation 950.
29.34	Removed
30.01	Removed
31.12	Removed
31.75	Removed

32.23	Moved to River Mile 32.3

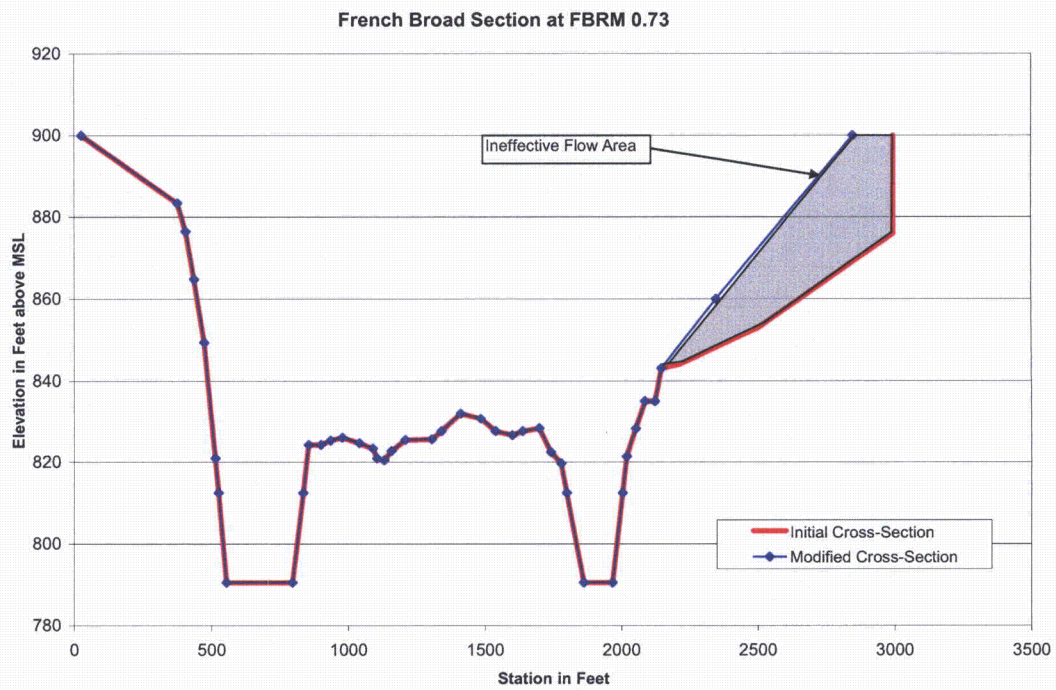


Figure C1

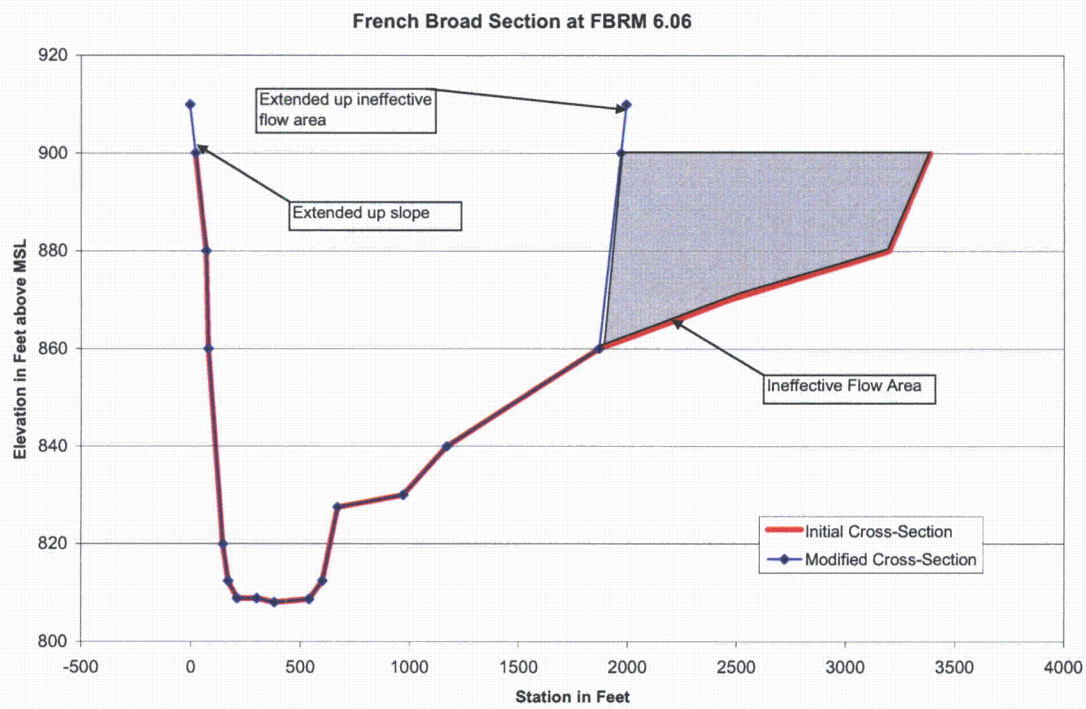


Figure C2

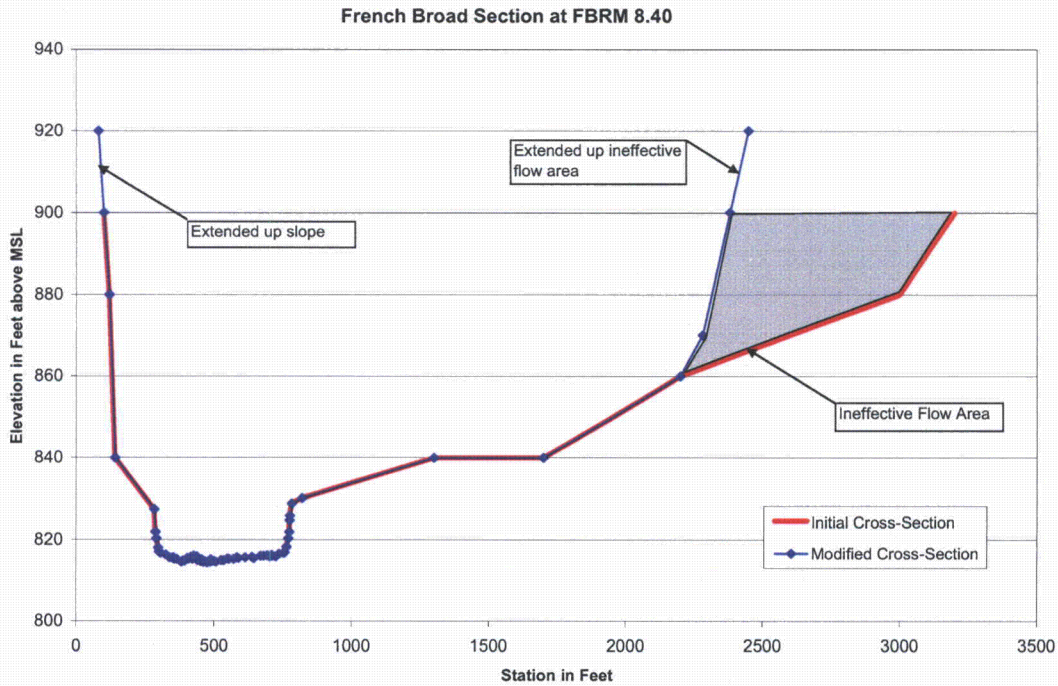


Figure C3

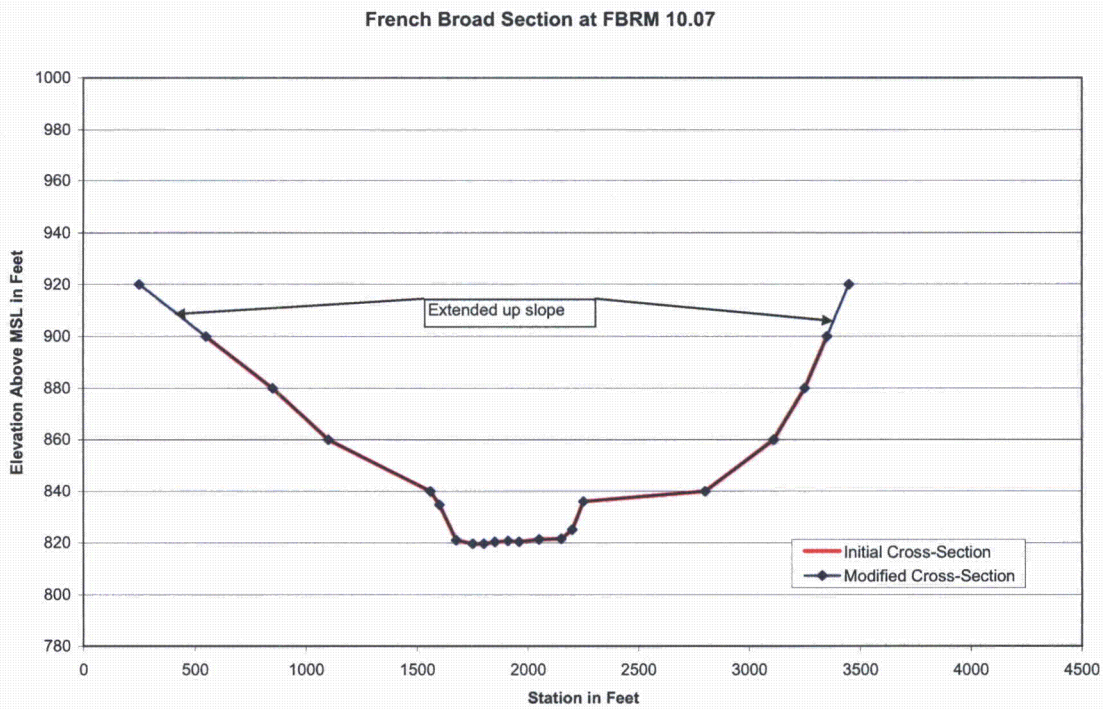


Figure C4

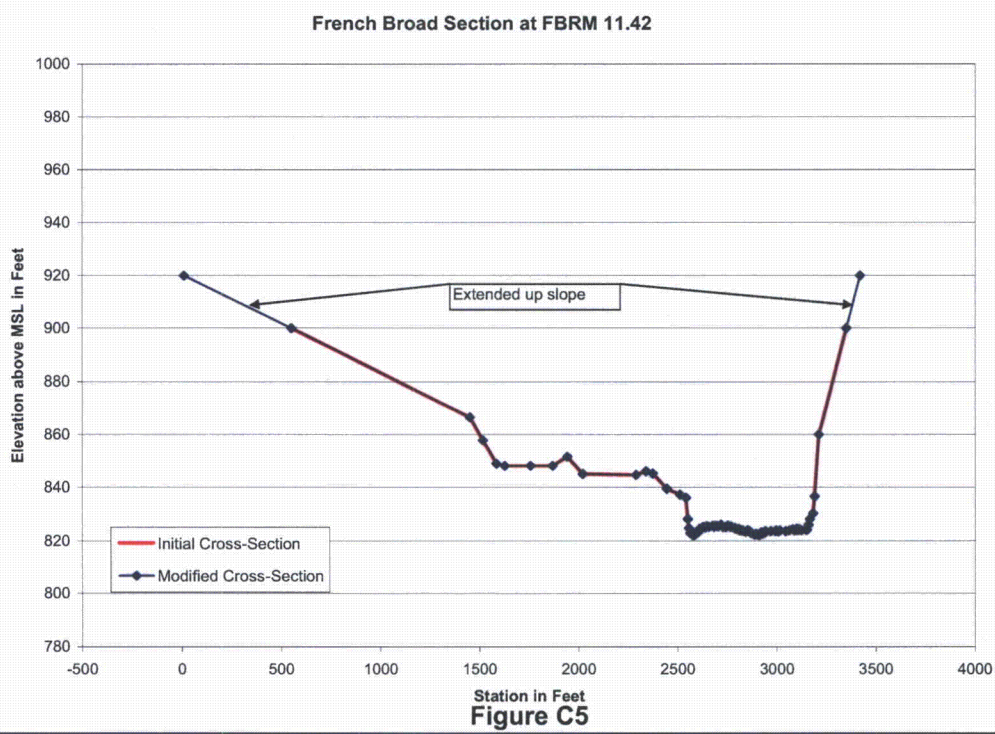


Figure C5

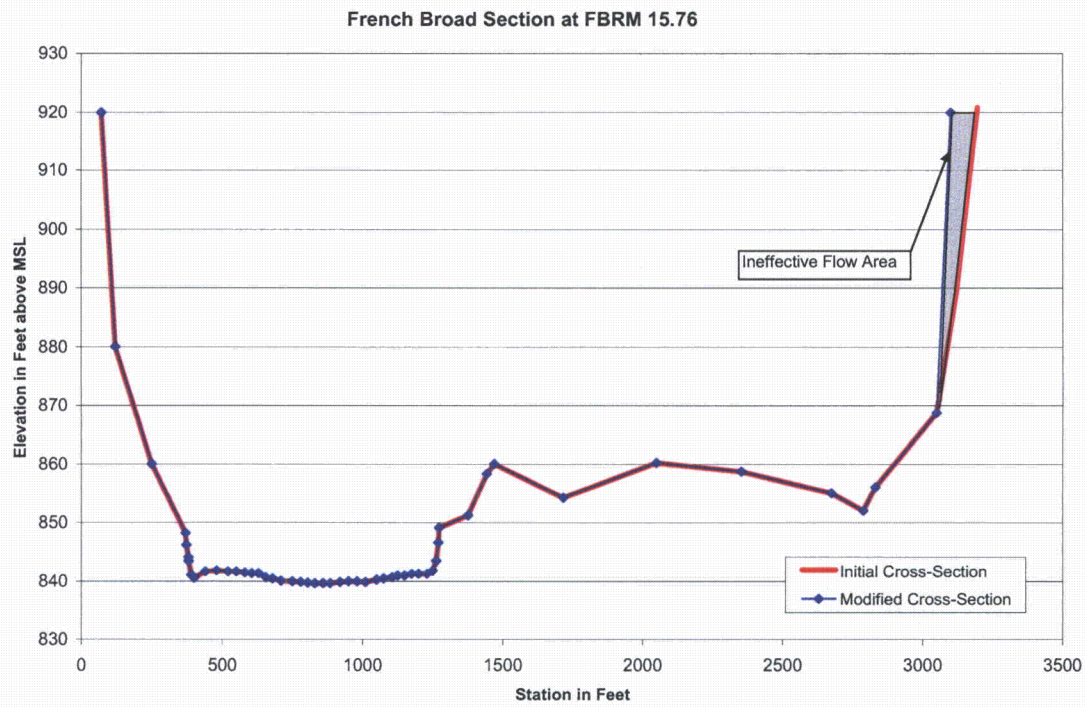


Figure C6

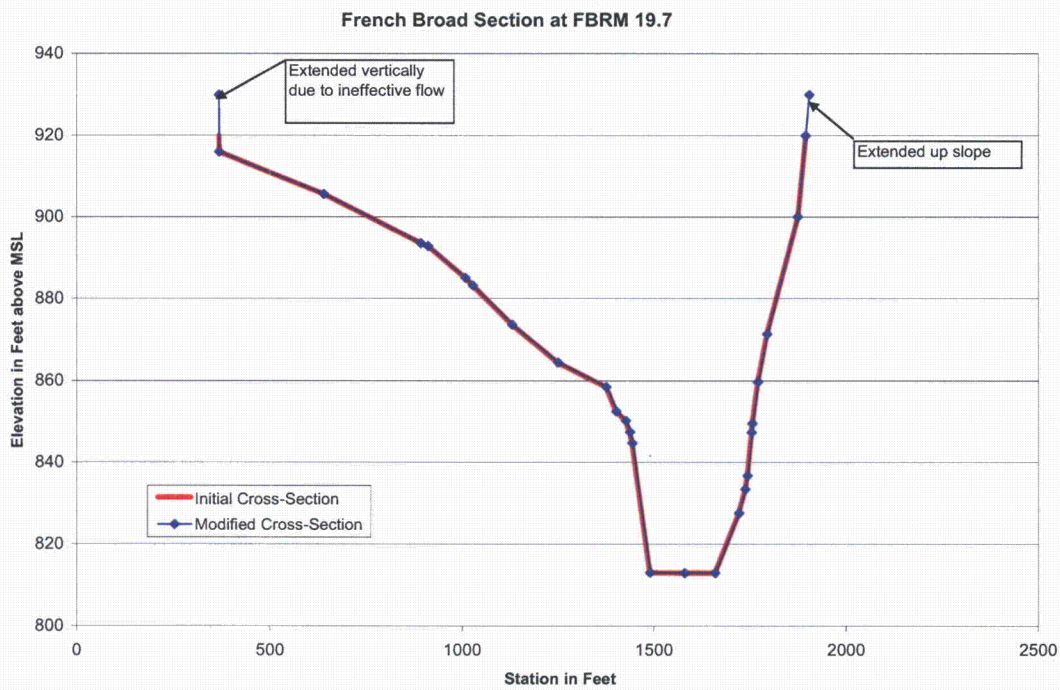


Figure C7

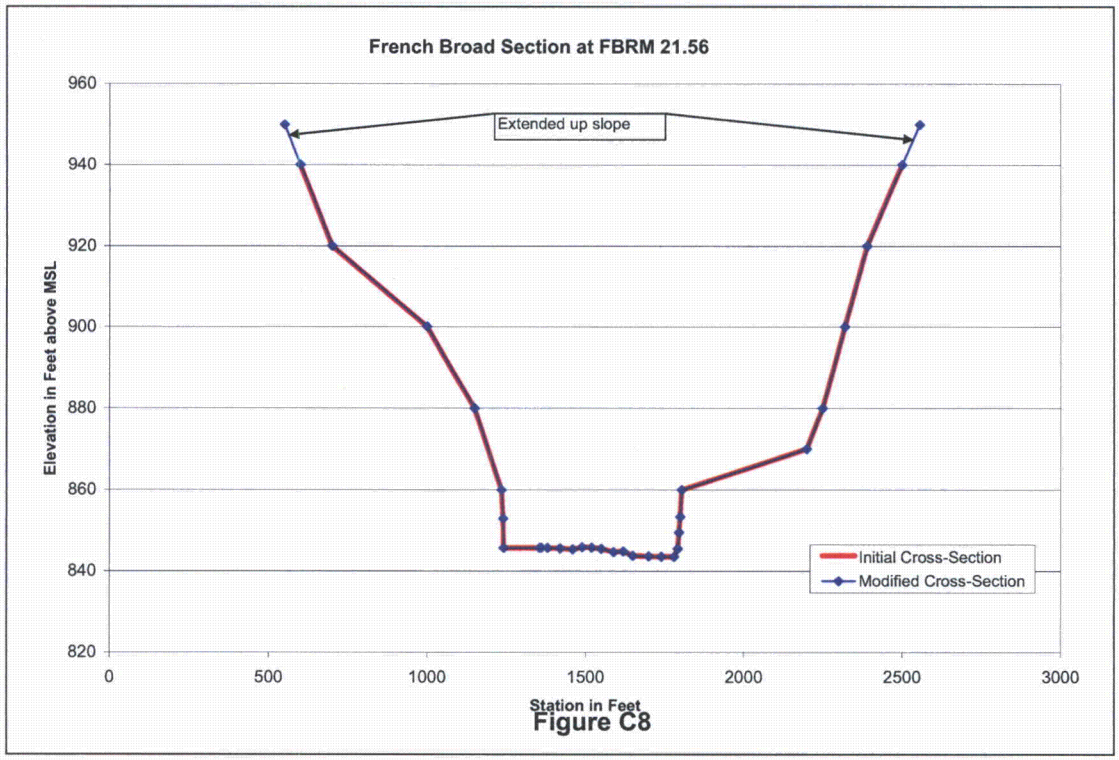


Figure C8

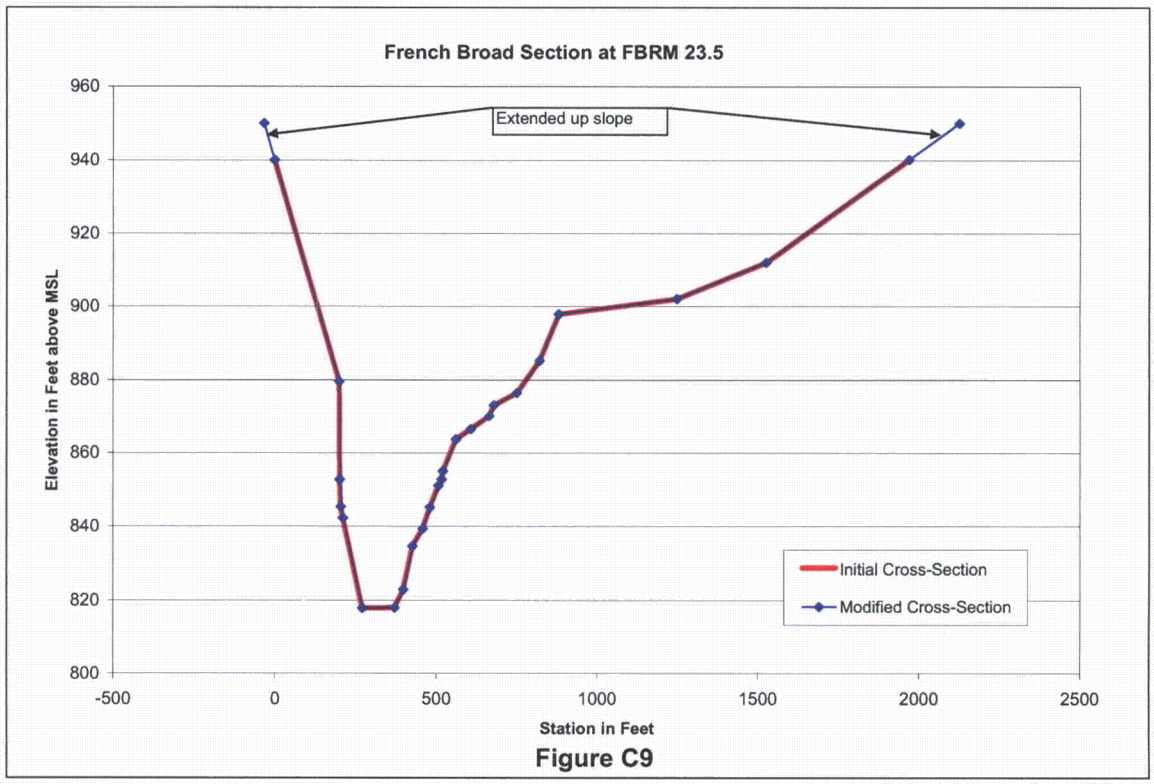


Figure C9

6.3 Fort Loudoun Reservoir

The Fort Loudoun cross-sections at Tennessee River Miles 645.89, 647.44, 647.68, and 648.68 were removed from the geometry file because of oscillations in the model caused by the variation between cross-sections. Removal of these sections preserves the most restrictive sections eliminating oscillations and resulting in conservatively high water-surface elevations. The cross-section at River Mile 652.04 was moved to River Mile 652.22 so it could serve as a junction section in later calibration steps. Additionally, a section was added at River Mile 602.7 to create a double-node when used in the SOCH model. The cross-section added at 602.7 was a copy of the cross-section at 602.3 except the channel bottom which was interpolated between cross-sections 602.3and the next upstream cross-section at River Mile 604.36.

Sixteen Fort Loudoun Reservoir cross-sections were modified from the original cross-sections as shown in Figures C10 through C25. Cross-sections were modified to either eliminate ineffective flow areas or to extend the elevation of the cross-sections. Removal of ineffective flow area will result in a more restrictive cross-section and therefore conservatively high water-surface elevations. Cross-sections were extended up in elevation to be above the potential PMF elevation. The modifications are listed in Table C2.

Table C2. Fort Loudoun Reservoir Cross-Section Modifications

Cross-Section River Mile	Modification
602.7	Added
604.36	Extended cross-section to elevation 850.
612.68	Eliminated ineffective flow area between station 6100 and station 6600 and extended cross-section to elevation 860.
614.68	Extended cross-section to elevation 860.
623.10	Eliminated ineffective flow area between station 1800 and station 3747.
625.28	Eliminated ineffective flow area between station 2300 and station 3676 and between station 5638 and station 7400.
627.15	Eliminated ineffective flow area between station 2350 and station 3550.
629.31	Eliminated ineffective flow area between station 6450 and station 7600.
631.41	Eliminated ineffective flow area between station 6220 and station 9020.
634.60	Extended cross-section to elevation 880.
635.59	Eliminated ineffective flow area between station 2600 and station 4450.
637.52	Extended cross-section to elevation 880.
643.89	Extended cross-section to elevation 900.
645.09	Extended cross-section to elevation 900.
645.89	Removed
646.55	Extended cross-section to elevation 900.
647.44	Removed
647.68	Removed
648.73	Eliminated ineffective flow area between station 5600 and station 6600. Extended cross section to elevation 900.
648.68	Removed
650.14	Eliminated ineffective flow area between station 2000 and station 3800. Extended cross section to elevation 900.
652.04	Moved to 652.22

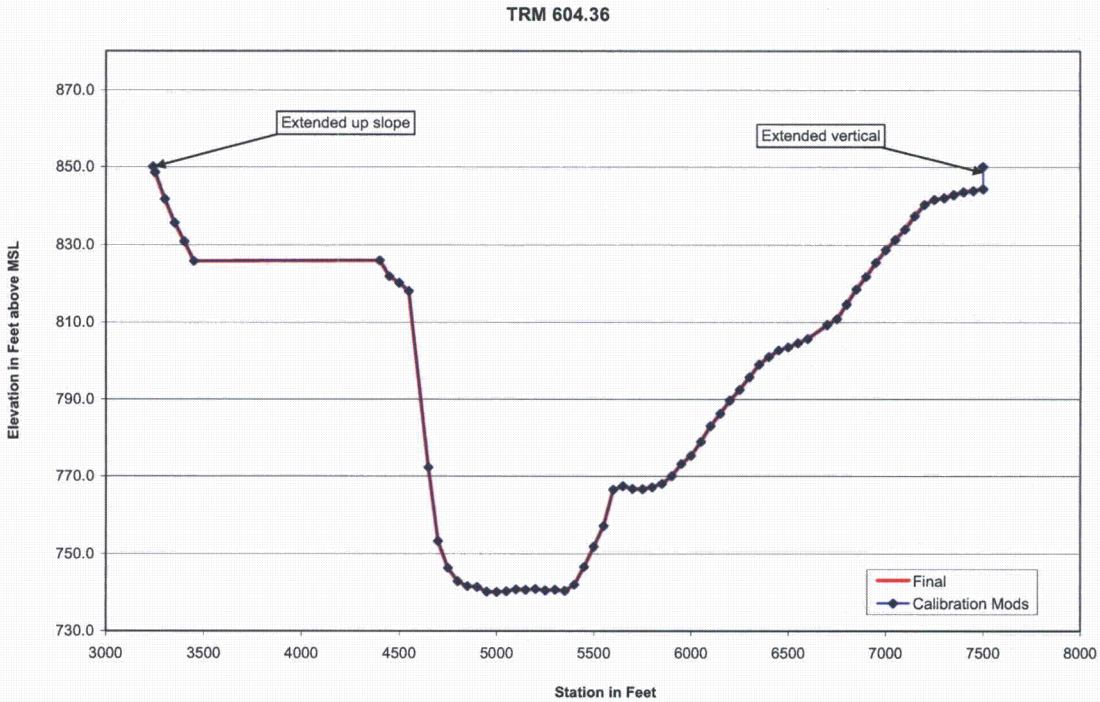


Figure C10

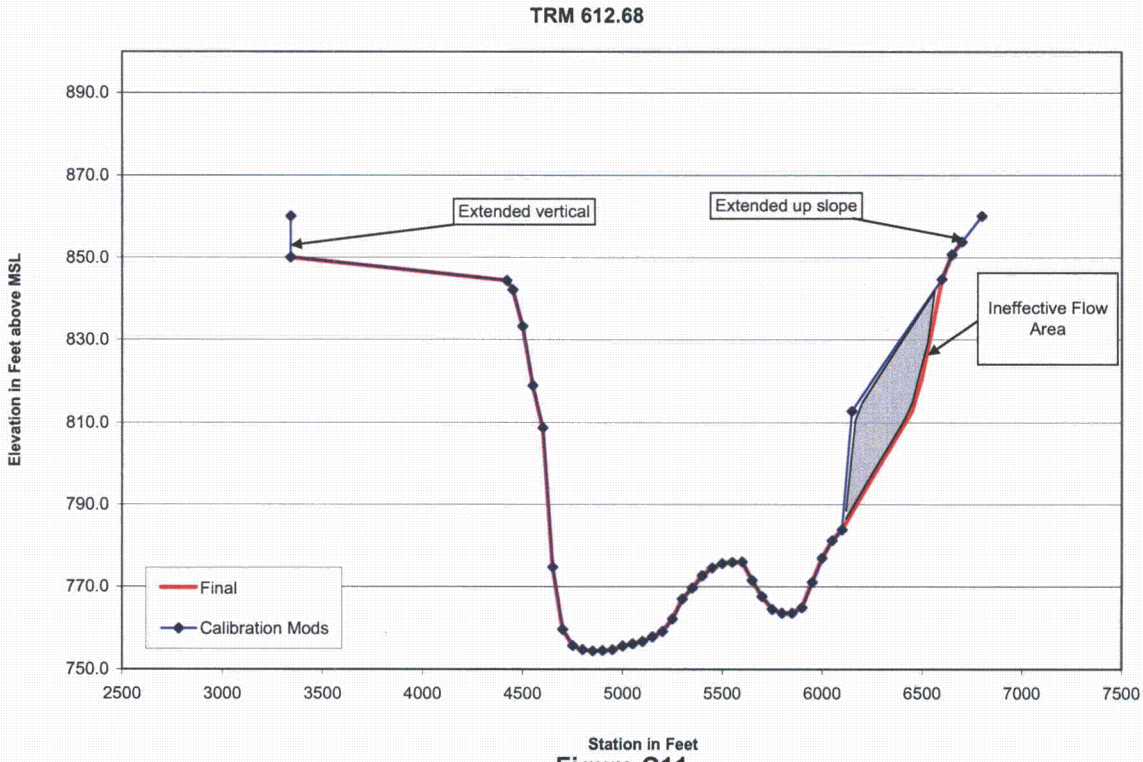


Figure C11

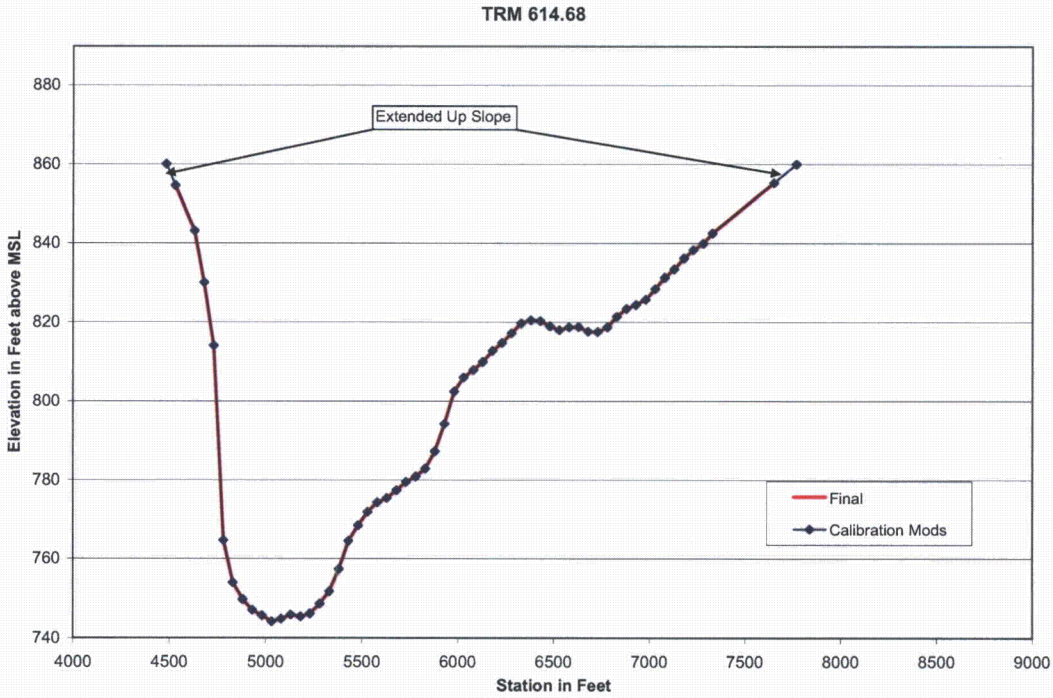


Figure C12

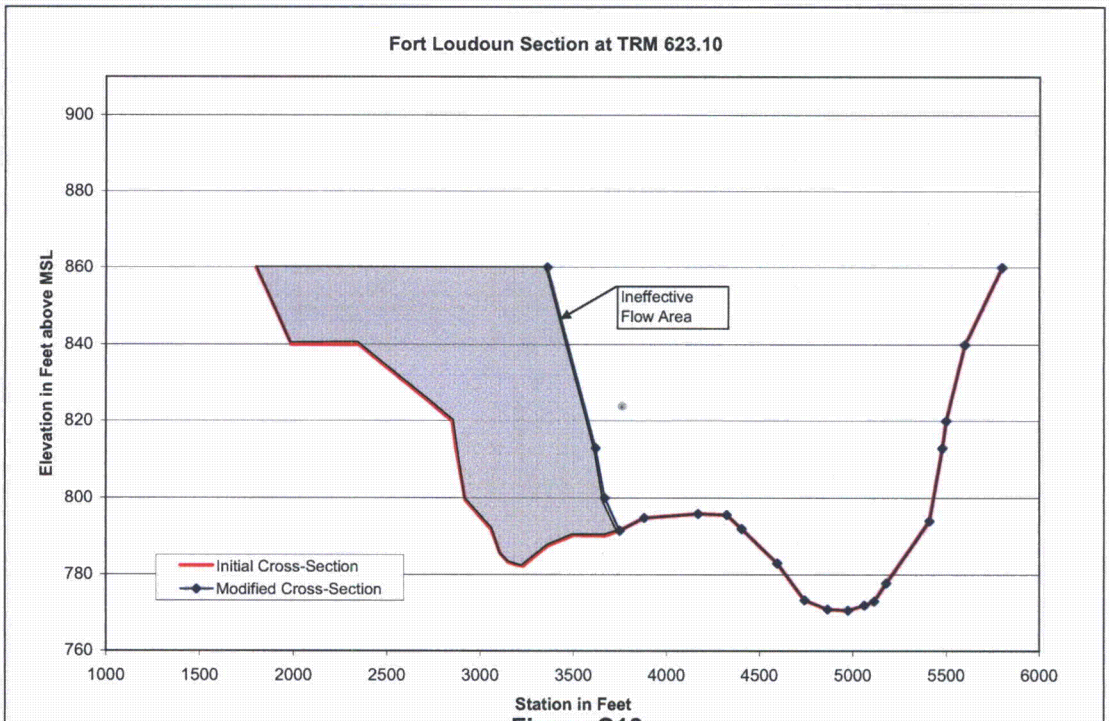


Figure C13

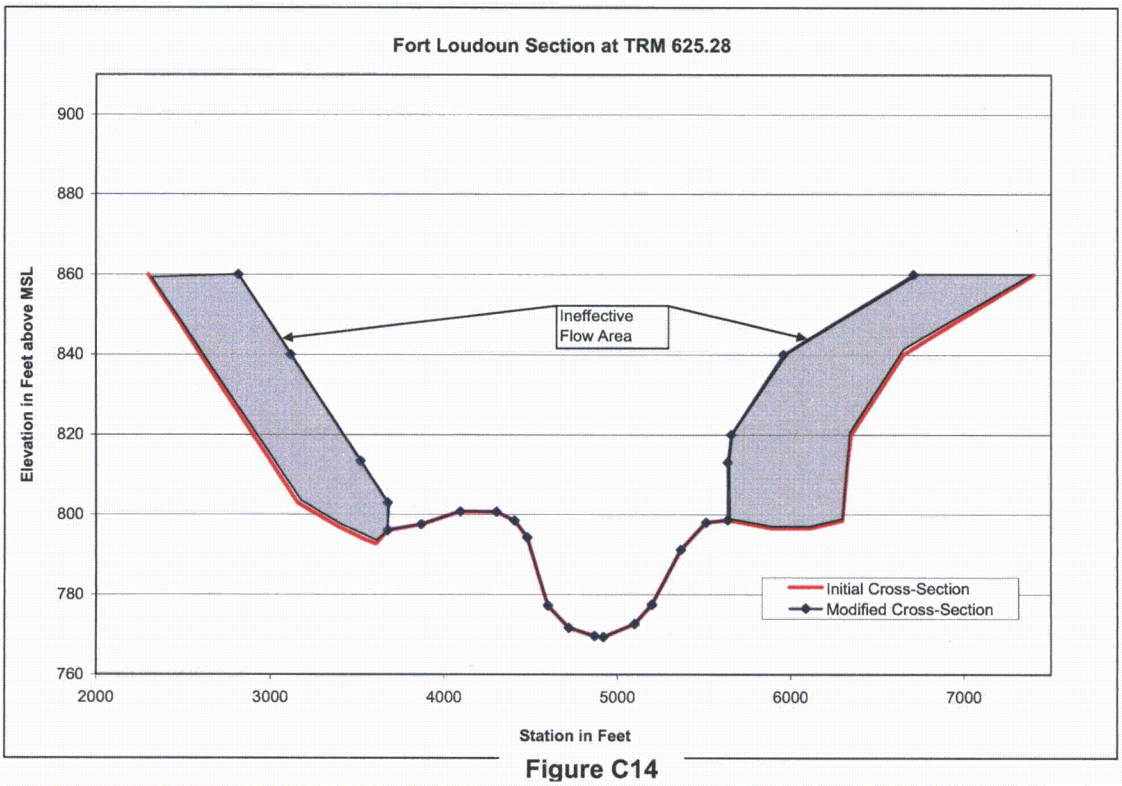


Figure C14

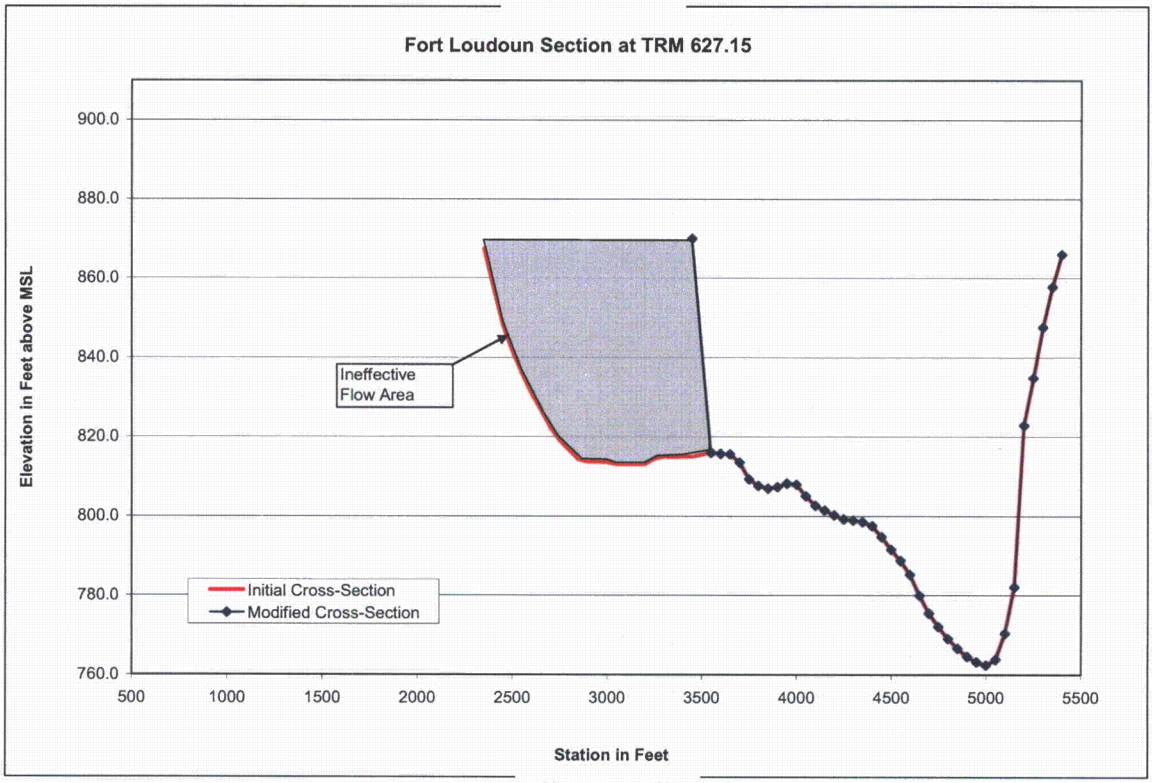


Figure C15

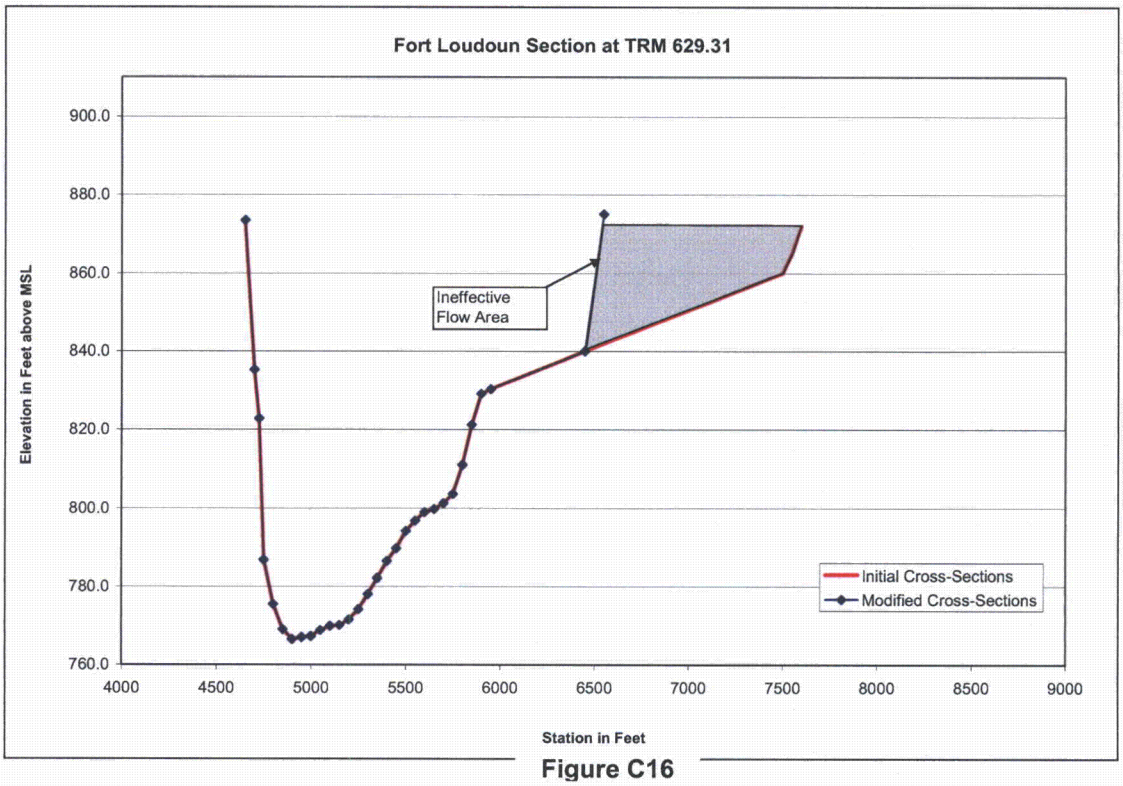


Figure C16

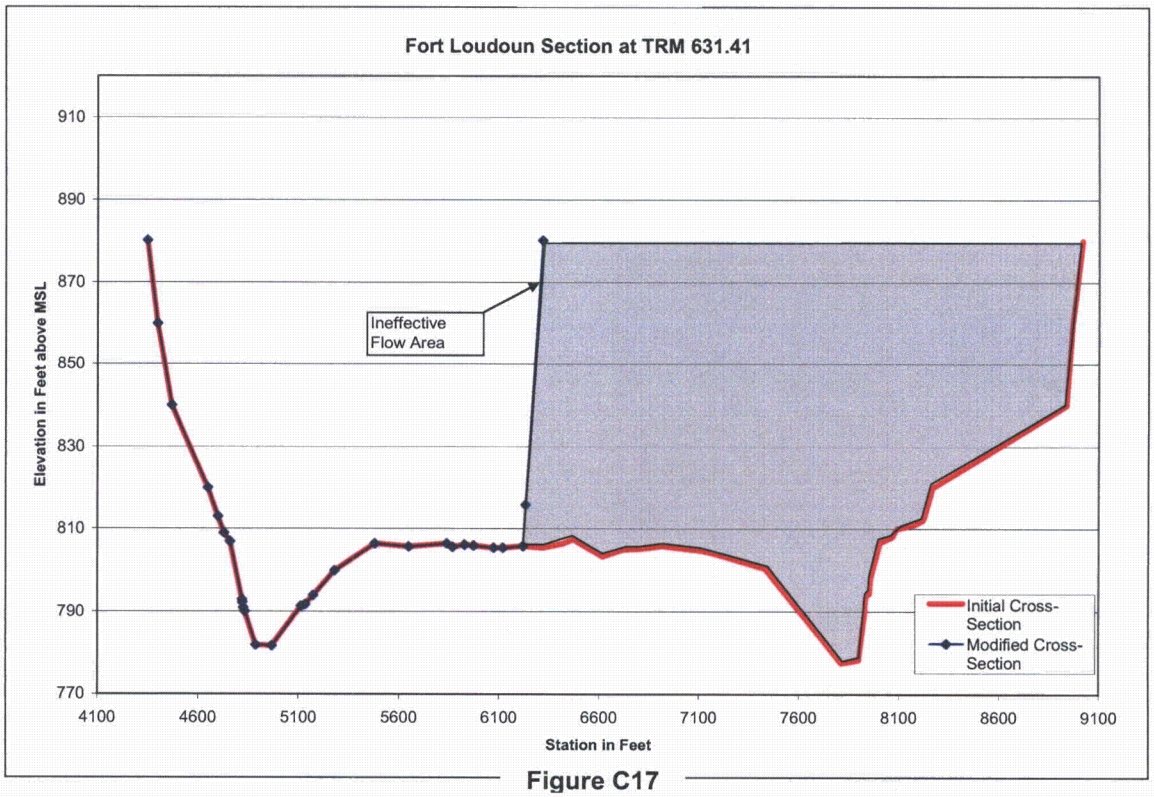


Figure C17

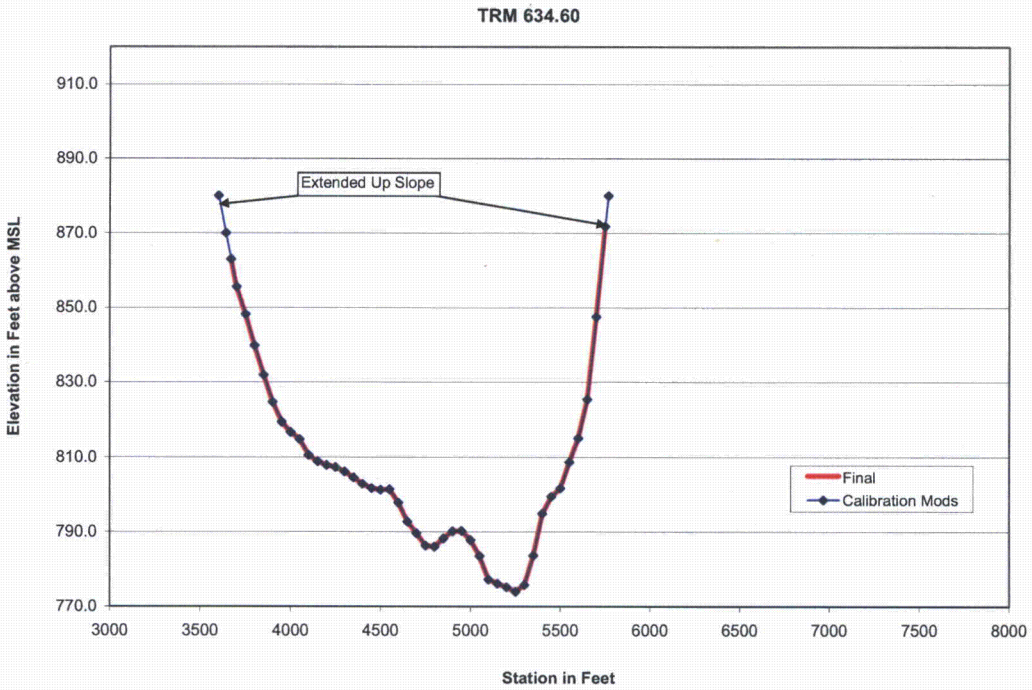


Figure C18

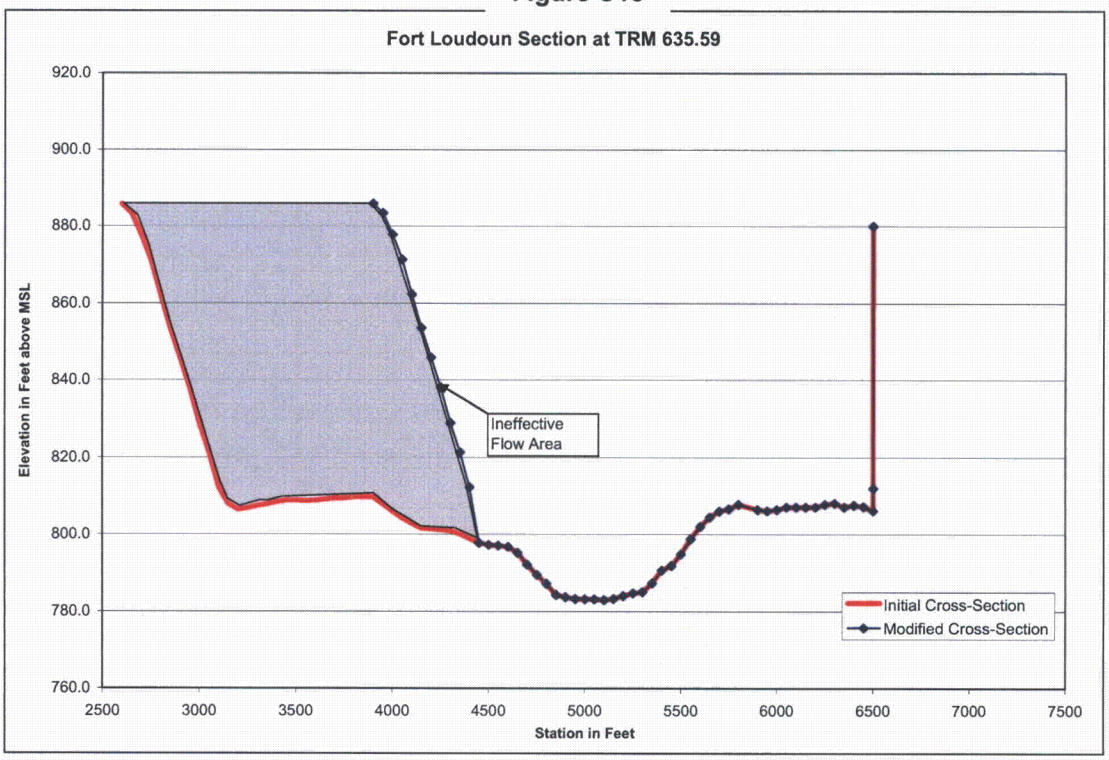


Figure C19

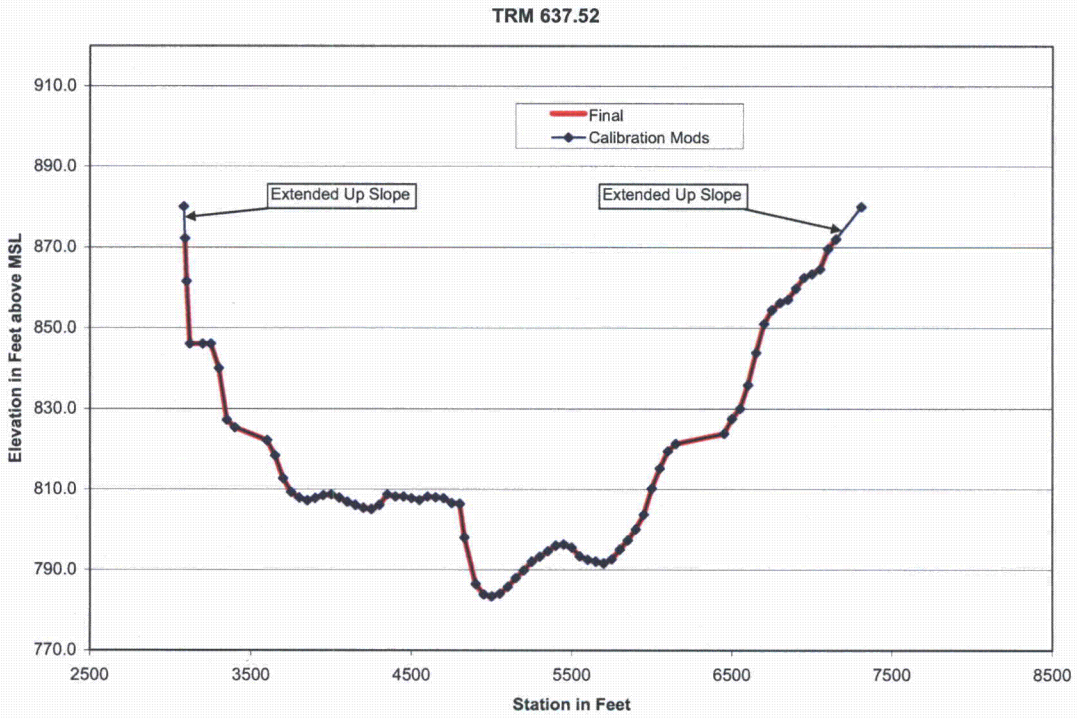


Figure C20

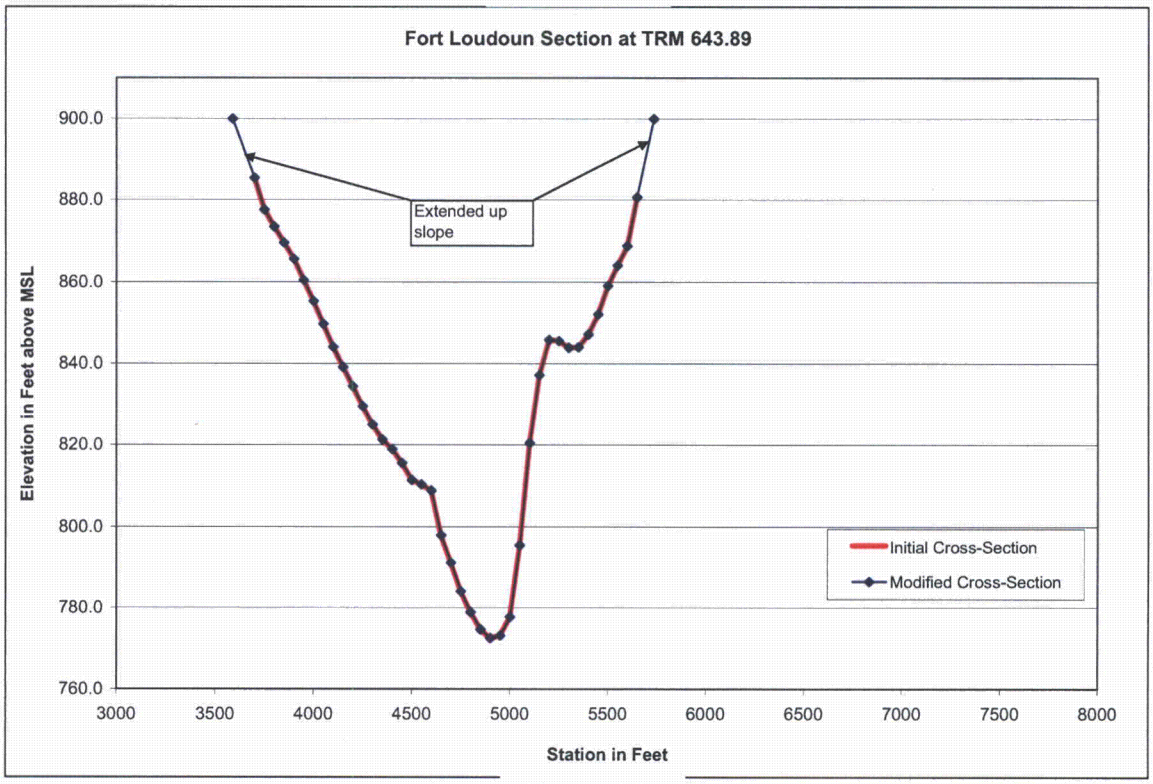


Figure C21

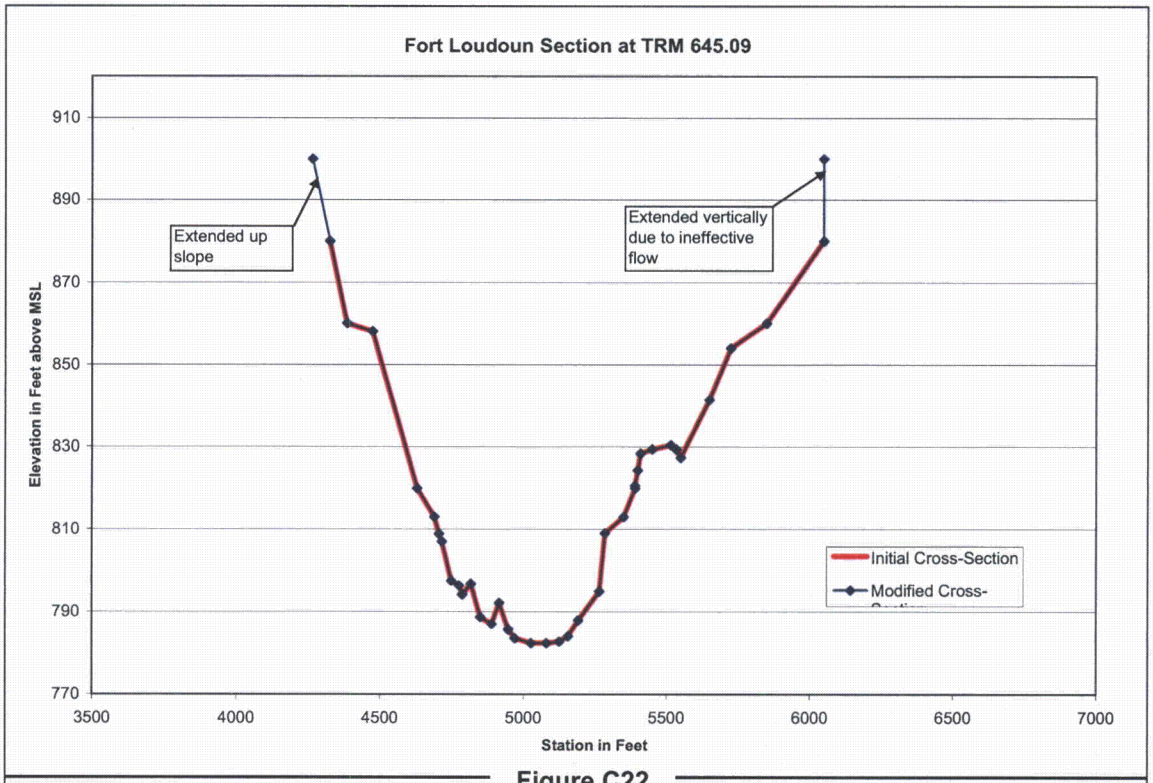


Figure C22

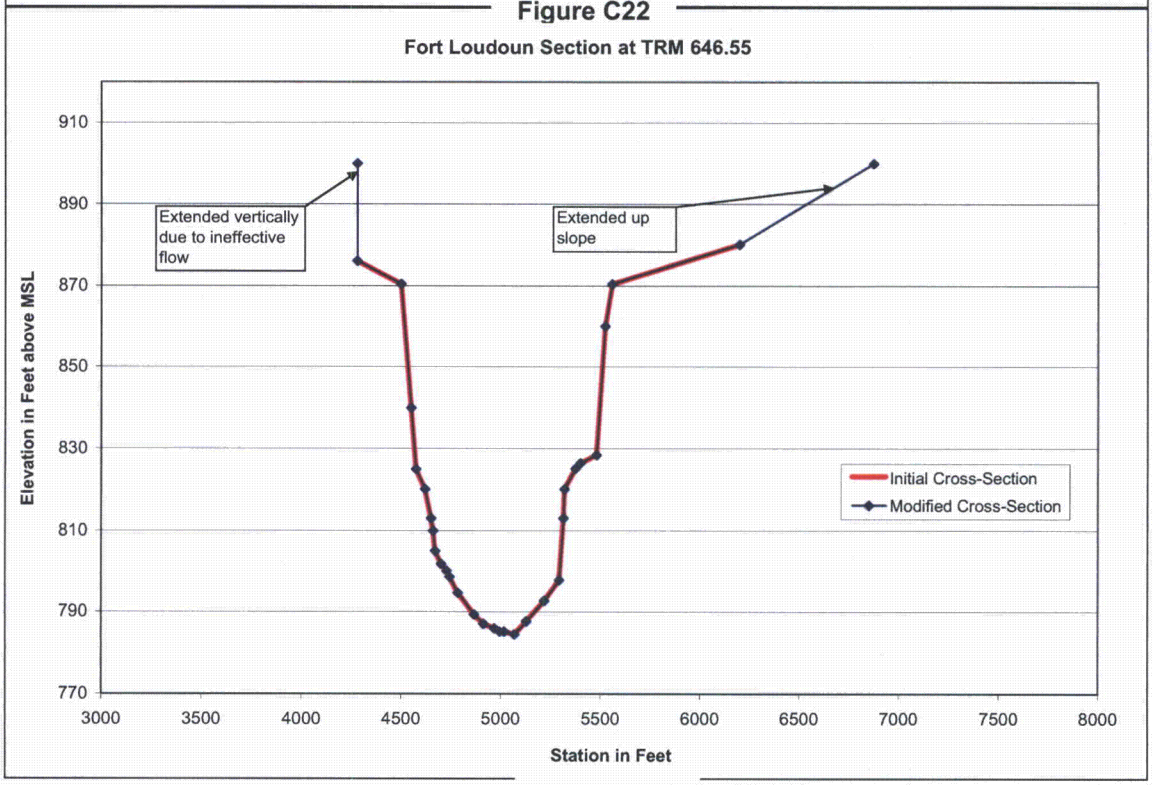


Figure C23

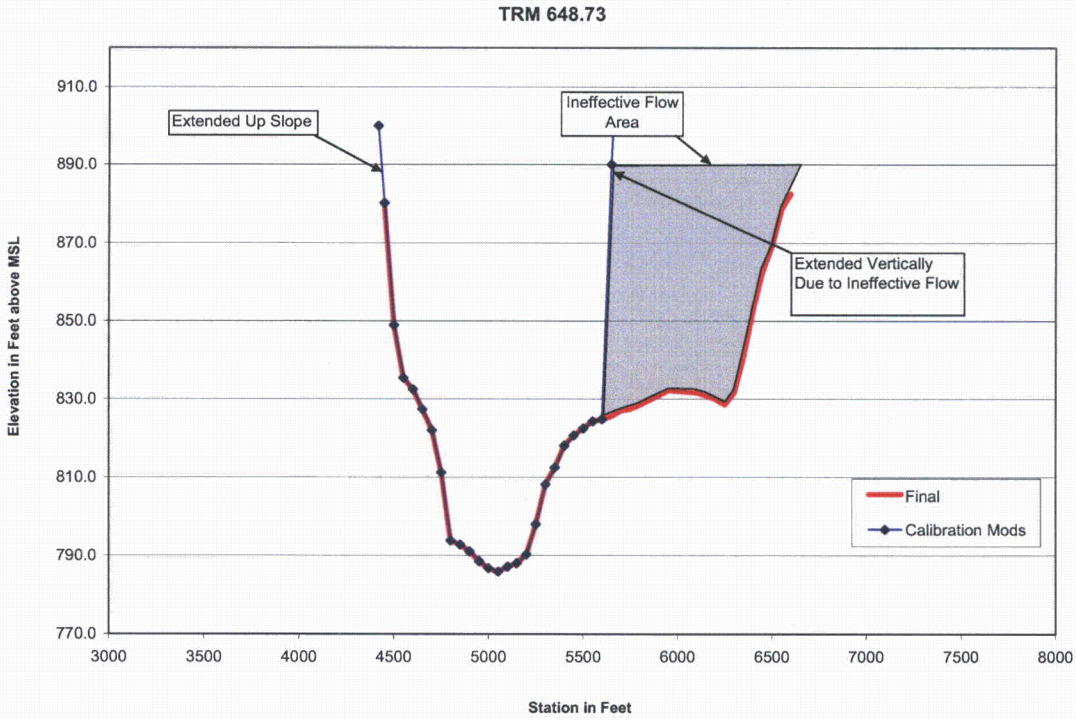


Figure C24

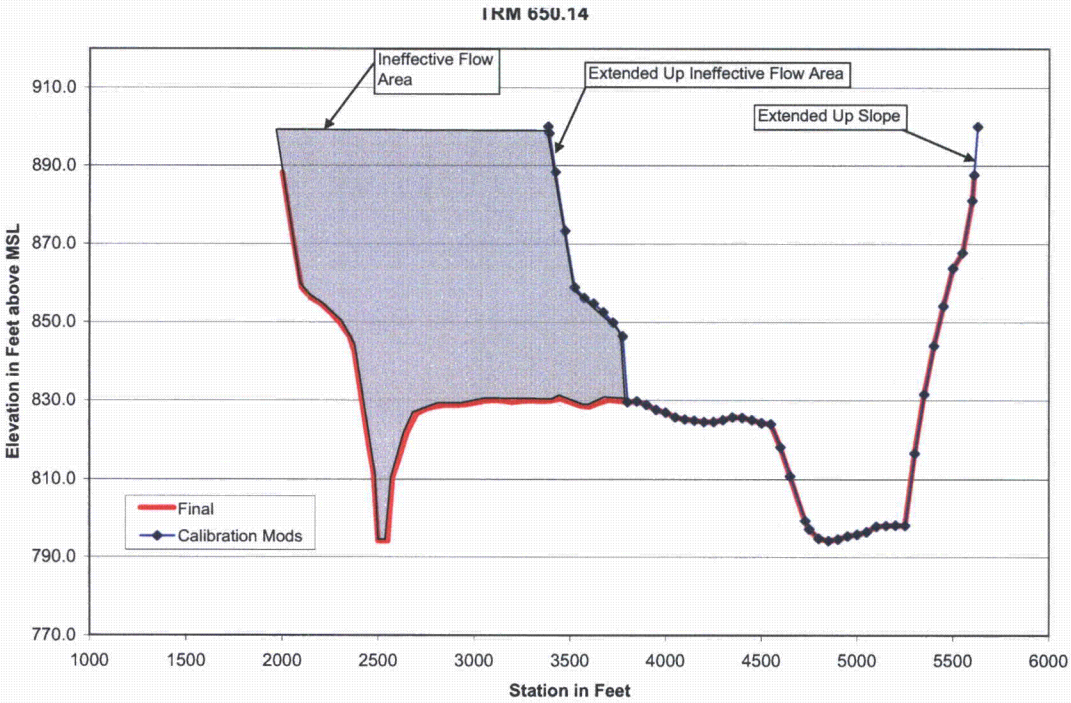


Figure C25

6.4 Little Tennessee River

Two cross-sections in the Little Tennessee River were moved to provide output at the upstream and downstream boundaries of the Tellico model. The cross-section at River Mile 33.57 was moved to River Mile 33.6, which is the Chilhowee tailwater location. The section at river mile 0.35 was moved to river mile 0.30, which is the location of Tellico Dam. This section was also extended in order to match the height of the section just upstream as shown in Figure C22. Additionally a section was added at River Mile 0.6 to create a double-node when used in the SOCH model. The cross-section added at 0.6 was a copy of the cross-section at 0.3 except the channel bottom which was interpolated between cross-section 0.3 and the next upstream cross-section at River Mile 3.68.

Also, one modification was made to the cross-section at River Mile 29.68 in the SOCH geometry file. The original SOCH geometry file (Attachment 1 of parent calculation) had a weighted width term that was less at elevation 930 than at elevation 920. This occurred because of where contour areas were measured in Reference 2.11. No contour areas were measured downstream of this cross-section at elevations above 920 because the expected PMF elevation is not as high downstream of the cross-section at River Mile 29.68 as it is upstream. With no measured surface areas above elevation 920 downstream of River Mile 29.68 and consequently no weighted width values, the computed weighted width value at that section was averaged with zero, resulting in a significantly smaller weighted width value at 930 than at 920. To correct this, a weighted width value was linearly extrapolated at elevation 930 based on the rate of change between the weighted width values at elevations 910 and 920. The modifications are listed in Table C3.

Table C3. Little Tennessee River Cross Section Modifications

Cross-Section River Mile	Modification
0.35	Moved to 0.3, Extended cross-section to elevation 860.
0.60	Added, cross-section at 0.3 used, channel bottom interpolated
29.68	Weighted width value linearly extrapolated to 930.
33.57	Moved to 33.6

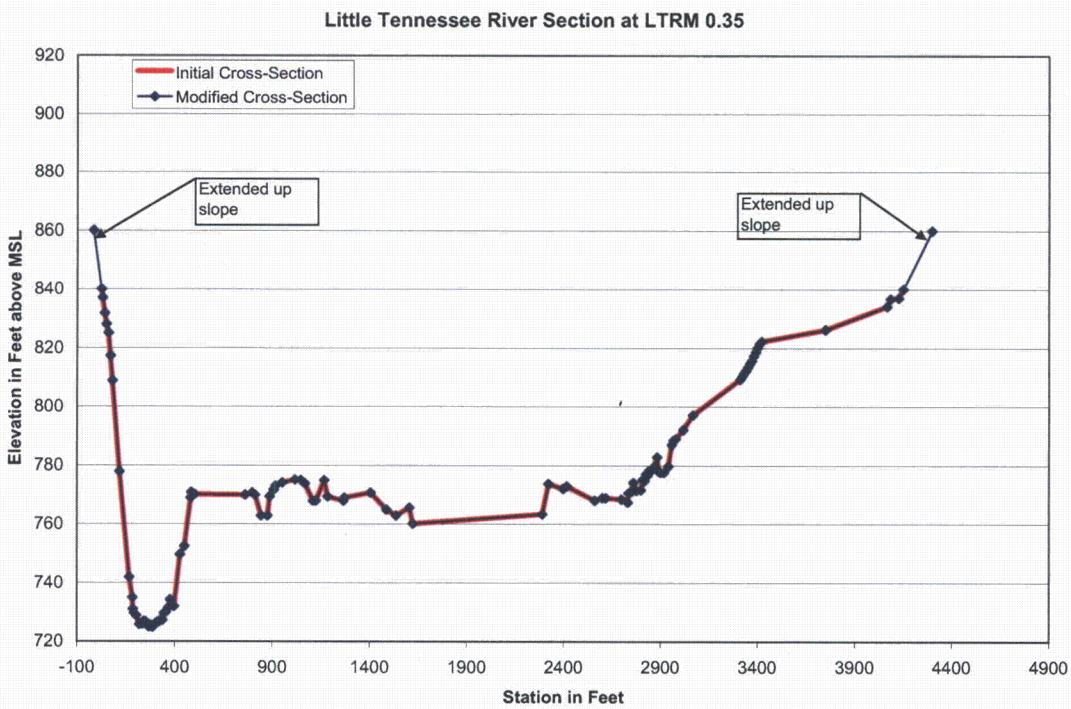


Figure C26

6.5 Canal

One modification was made to the SOCH geometry file. Elevation 885 was replaced with 880.1 on cross-section 0.42. This was done because the cross-section values at 885 were zero. By changing the elevation to 880.1, it will prevent the SOCH program from trying to interpolate values above elevation 880.

7. Results/Conclusions

The cross-sections modified as described in Section 6.4, Section 6.5, and Tables C1 through C3 and shown in Figures C1 through C26 were modified to improve the SOCH model calibration. The modified cross-sections are adequate for use in the parent calculation for SOCH model calibration.

CDQ000020080036 Rev 0

Appendix D: SOCH Input Files, Steady-State
with files:

1footslices_FB and Holston 100Kto1400K-59 Cross-sections.bnd
1footslices_FtLoudoun_Calibrate_100Kto1400K-59 Cross-sections.dat
1ftsections_49XS_FrenchBroad_Calibrate_65Kto845K.dat
1ftsections_49XS_Douglas65Kto845K.bnd
Cherokee35Kto490K.bnd
Holston_Calibrate_35Kto490K.dat
49XS_LittleTN_Calibrate_100Kto600K.dat
49XS_Chilhowee100Kto600K.bnd

CDQ000020080036 Rev 0

Appendix E: SOCH Input Files, March 1973
with files:

FtLoudoun_Holston_FBroad1973.loc
FtLoudoun_Holston_FBroad1973.dat
FtLoudoun_Holston_FBroad1973.bnd

CDQ000020080036 Rev 0

Appendix F: SOCH Input Files, May 2003

with files:

DistLocalRemove7_45_FtLoudoun_EL_LittleT_Q_2003.dat
DistLocalRemove7_45_FtLoudoun_EL_LittleT_Q_2003.bnd
DistLocalRemove7_45_FtLoudoun_EL_LittleT_Q_2003.loc

CDQ000020080036 Rev 0

Appendix G: SOCH Output Files, Steady-State
with files:

1footslices_FtLoudoun_Calibrate_100Kto1400K-59 Cross-sections.out
1ftsections_49XS_FrenchBroad_Calibrate_65Kto845K.out
Holston_Calibrate_35Kto490K.out
49XS_LittleTN_Calibrate_100Kto600K.out

CDQ000020080036 Rev 0

Appendix H: SOCH Output Files, March 1973
with files:

FtLoudoun_Holston_FBroad1973.out
FtLoudoun_Holston_FBroad1973.prt

CDQ000020080036 Rev 0

Appendix I: SOCH Output Files, May 2003

with files:

DistLocalRemove7_45_FtLoudoun_EL_LittleT_Q_2003.out

DistLocalRemove7_45_FtLoudoun_EL_LittleT_Q_2003.prt

CDQ000020080036 Rev 0

Appendix J - Calibrated Steady-State HEC-RAS Model
with files:

Fort Loudoun100K.prj
Fort Loudoun100K.p60
Fort Loudoun100K.g12
Fort Loudoun100K.f06
Fort Loudoun100K.f08
LittleTNRiver.g06
LittleTNRiver.p22
LittleTNRiver.prj
LittleTNRiver.f06
LittleTNRiver.f04
LittleTNRiver.f05
Holston.g06
Holston.f04
Holston.prj
Holston.p42
Holston.f03
Holston.f02
FrBroadR.f03
FrBroadR.g17
FrBroadR.p63
FrBroadR.prj
FrBroadR.f02

CDQ000020080036 Rev 0

Appendix K - Convey and SOCH Geometry Files
with files:

Tellico Rev4.geo
Tellico Merge 20090811.xls
Tellico CONVEY20090723.xls
Tellico CONVEY20090723.prt
Tellico CONVEY20090723.out
Tellico CONVEY20090723.dat
Tellico20090716.geo
Holston Rev3.geo
Holston CONVEY 200900723.xls
Holston CONVEY 200900723.prt
Holston CONVEY 200900723.out
Holston CONVEY 200900723.dat
Holston Merge 20090811.xls
Holston20090720.geo
FtLoudoun Rev3.geo
FtLoudoun CONVEY 20090803cal B.prt
FtLoudoun CONVEY 20090803cal B.out
FtLoudoun CONVEY 20090803cal B.dat
FtLoudoun CONVEY 20090803cal A.prt
FtLoudoun CONVEY 20090803cal A.out
FtLoudoun CONVEY 20090803cal A.dat
FtLoudoun CONVEY 20090803cal.xls
FtLoudoun Combined Merge 20090803cal.xls
FtLoudoun20090720.geo
French Broad Rev2.geo
FrenchBroad20090720.geo
French Broad CONVEY20090721cal.xls
French Broad CONVEY20090721cal b.prt
French Broad CONVEY20090721cal b.out
French Broad CONVEY20090721cal b.dat
French Broad CONVEY20090721cal a.prt
French Broad CONVEY20090721cal a.out
French Broad CONVEY20090721cal a.dat
Canal20090713.geo
Canal Rev1.geo
FrBroadR.g16
Fort Loudoun100K.g10

CDQ000020080036 Rev 0

Appendix L – Flow Distribution for Ft Loudoun-Tellico

FinalFtLoudoun_FB_Holston_TellicoFlowDist.xls

Tellico20090716.geo

790.4	0	0	5	33.57	#01
795	459	2.44	64	0.04	
800	1090	3.94	127		
805	1799	4.98	191		
810	3240	3.37	577		
815	5920	4.88	704		
820	8762	6.12	1006		
830	14923	8.05	1402		
840	25007	8.44	1798		
850	36970	8.9	1985		
860	49457	9.52	2173		
870	62459	10.16	2358		
880	75999	10.76	2542		
890	90154	11.36	2720		
900	104599	11.95	2898		
910	119328	12.53	3099		
920	134341	13.09	3300		
930	149635	13.63	3531		
940	165210	14.15	3763		
950	181066	14.65	4048		
960	0	0	4333		
799.5	0	0	133	32.34	#02
800	8	0.4	140	0.04	
805	1186	1.72	210		
810	3845	3.68	653		
815	7614	4.56	792		
820	13714	4.73	1119		
825	20918	4.99	1279		
830	29214	5.2	1440		
840	50031	5.62	1760		
850	72238	6.22	1911		
860	95492	6.83	2063		
870	119569	7.44	2205		
880	144041	8.07	2348		
890	168682	8.68	2487		
900	193490	9.27	2626		
910	218466	9.84	2785		
920	243601	10.39	2945		
930	268801	10.93	3122		
940	294001	11.46	3300		
950	0	0	3519		
960	0	0	3737		
800.2	0	0	1038	31.55	#03
805	2102	2.05	1318	0.035	

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820	16384	6.11	2605		
825	22379	6.98	2832		
830	28763	7.74	3058		
835	35335	8.45	3284		
840	42113	9.09	3511		
845	49247	9.69	3761		
850	56520	10.26	4012		
855	63930	10.81	4262		
860	71478	11.33	4513		
870	87006	12.31	4979		
880	103159	13.21	5446		
890	119940	14.03	5963		
900	137306	14.79	6479		
910	155334	15.48	7048		
920	174013	16.13	7617		
930	193315	16.74	8225		
940	213012	17.36	8833		
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795	2530	3.1	1171		
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805	9696	3.35	1716		
810	17833	4.86	2290		
815	26124	6.24	2514		
820	34545	7.42	3031		
825	43094	8.56	3324		
830	51711	9.62	3616		
835	60396	10.61	3908		
840	69148	11.55	4201		
850	86860	13.29	4841		
860	104861	14.9	5481		
870	123149	16.39	6196		
880	141728	17.78	6911		
890	160598	19.09	7752		
900	179772	20.34	8594		
910	199363	21.49	9550		
920	219396	22.6	10507		
930	239491	23.68	7983		
775.6	0	0	135	27.62	#05
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795	8235	4.53	1132		
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805	19624	5.85	1432		
810	27304	6.29	1837		
815	35965	7.5	2014		
820	44805	8.46	2419		
825	53995	9.53	2650		
830	63332	10.52	2882		
840	82428	12.33	3345		
850	102125	13.94	3815		
860	122479	15.39	4284		
870	143437	16.73	4883		
880	164908	17.98	5481		
890	186671	19.16	6203		
900	208716	20.29	6924		
910	231512	21.33	7749		
920	254512	22.34	8574		
776.9	0	0	257	26.73	#06
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785	2688	2.97	728		
790	5496	4.34	1084		
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800	12754	5.92	1417		
805	17405	6.83	1583		
810	22357	7.83	2027		
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820	32826	9.93	2304		
825	38307	10.84	2392		
830	43956	11.68	2479		
840	55767	13.18	2655		
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860	83554	15.27	2980		
870	99222	16.12	3146		
880	115073	16.98	3313		
890	130973	17.86	3471		
900	146873	18.73	3629		
910	162773	19.59	3765		
920	178673	20.44	3901		
773.2	0	0	233	25.74	#07
775	76	0.91	331	0.03	
780	1781	2.62	601		
785	3930	4.27	909		
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795	11650	4.69	1402		
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805	25616	5.19	1932		
810	37868	5.88	2276		
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820	65575	8.19	2514		
825	79797	9.26	2622		
830	94156	10.27	2729		
835	108648	11.22	2837		
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850	152934	13.79	3165		
860	182963	15.35	3385		
870	213298	16.81	3632		
880	243698	18.22	3880		
890	274098	19.57	4125		
900	304498	20.87	4370		
767.1	0	0	58	24.41	#08
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775	2625	2.79	332		
780	5514	4.41	583		
785	8657	5.3	780		
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795	17729	6.66	1126		
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805	28126	8.84	1553		
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820	44500	11.7	1962		
825	50286	12.55	2083		
830	56246	13.34	2204		
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870	108269	18.43	3384		
880	121953	19.52	3723		
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768.8	0	0	128	23.73	#09
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825	88289	11.25	4952		
830	100277	12.16	5466		

840	124763	13.84	6494		
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860	176065	16.73	9124		
870	203164	17.98	10659		
880	231183	19.13	12194		
890	259833	20.22	13895		
900	289000	21.26	15596		
767.9	0	0	698	22.54	#10
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775	2627	2.87	1416		
780	5808	4.15	1975		
785	10665	4.99	2655		
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795	35416	5.48	3843		
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815	121442	9.33	6568		
820	143689	10.33	6906		
825	166123	11.28	7452		
830	188797	12.19	7999		
840	234923	13.89	9091		
850	281997	15.46	10321		
860	330060	16.92	11550		
870	379155	18.28	12992		
880	429406	19.57	14434		
890	480306	20.8	15994		
900	531726	21.99	17554		
758.2	0	0	194	21.17	#11
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765	1869	2.98	720		
770	3771	4.46	1204		
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780	8640	6.05	1951		
785	11702	6.81	2622		
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795	21206	6.77	3793		
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805	33761	8.69	5220		
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820	54426	11.47	6515		
830	69032	13.19	7072		
840	84376	14.7	7628		
850	100417	16.04	8176		
860	117179	17.24	8723		
870	134544	18.35	9489		

880	152194	19.42	10255		
890	169844	20.47	11021		
900	0	0	11787		
755.6	0	0	171	20.1	#12
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765	3599	3.26	616		
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775	10387	5.88	1218		
780	14068	7.05	1510		
785	17841	8.12	2028		
790	21689	9.11	2545		
795	25620	10	2932		
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805	33667	11.73	4036		
810	37766	12.51	4753		
820	46222	14.18	5673		
830	55158	15.67	6828		
840	65071	16.85	7983		
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860	89638	18.26	13460		
870	102786	18.9	17557		
880	116438	19.51	21653		
890	130762	20.04	26882		
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755.1	0	0	1173	19.87	#13
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765	2626	4.24	3754		
770	4155	5.52	5208		
775	5757	6.62	6825		
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785	9558	6.71	11338		
790	12497	7.37	14233		
795	15566	8.34	16400		
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805	22074	9.73	22587		
810	25877	9.76	26608		
815	30143	10.71	30383		
820	34722	11.52	34158		
825	39559	12.24	41606		
830	44609	12.89	49054		
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870	93909	16.37	135492		
880	107409	17.14	161325		
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755	17	0.64	928	0.03	
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780	8454	6.57	6677		
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870	86555	15.56	97940		
880	102053	15.74	115049		
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770	4702	4.67	621		
775	7059	5.85	813		
780	9577	6.85	1005		
785	12734	6.83	1351		
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860	76258	18.27	6296		
870	85858	19.41	7011		
880	95458	20.53	7726		
742.3	0	0	114	16.64	#16
745	242	1.6	248	0.03	
750	1326	3.01	497		
755	2686	4.43	590		
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765	5731	6.66	807		
770	7440	7.38	932		
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780	11803	7.08	1510		
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870	242053	17.14	13736		
880	277740	17.95	15759		
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765	10220	7	674		
770	13023	7.9	795		
775	16002	8.59	1042		
780	19746	8.15	1288		
785	24509	7.97	1731		
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810	54042	11.94	4061		
820	67733	13.61	5007		
830	83694	14.81	6938		
840	100507	15.91	8869		
850	117633	16.96	12797		
860	135072	17.98	16725		
870	152816	18.95	21879		
880	170872	19.88	27032		
750.9	0	0	325	13.31	#18
755	925	1.73	396	0.03	
760	3037	3.62	482		
765	5660	4.59	580		
770	8627	5.8	679		
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780	17657	6.52	1100		
785	22987	7.64	1478		
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795	33992	9.63	2139		
800	39658	10.53	2421		
805	45430	11.38	2945		
810	51311	12.2	3469		
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820	67808	13.07	4258		
825	77642	13.33	4884		
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850	130016	14.87	8990		
860	153453	15.42	11217		
737.8	0	0	75	9.66	#19
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745	1476	3.46	292		
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755	3919	5.95	503		
760	5254	6.93	517		
765	6736	7.43	612		
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775	12705	6.82	926		
780	16286	7.66	1145		
785	20115	8.45	1539		
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805	41698	8.99	3067		
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850	136084	14.6	7698		
860	161633	15.5	9006		
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755	7819	5.03	337		
760	11389	6.15	369		
765	15367	6.57	436		
770	20231	7.36	503		
775	25362	8.31	660		
780	30732	9.07	818		
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790	42570	10.49	1380		
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805	61716	12.8	2189		
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820	82067	15.18	3070		
830	96181	16.71	3782		
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741.9	0	0	188	6.33	#21
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760	10195	5.72	405		
765	14173	6.23	479		
770	19036	7.07	552		
775	24168	8.05	724		
780	29483	9	896		
785	34961	9.88	1205		
790	40598	10.7	1513		
795	46394	11.47	1743		
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805	58462	12.9	2399		
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755	9568	6.54	404		
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775	29499	8.17	743		
780	35895	9	919		
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755	6641	7.54	398		
760	8212	8.35	409		
765	12191	4.7	483		
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785	58665	7.45	1214		
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820	166769	13.64	2743		
830	202576	15.11	2925		
840	242836	16.26	3107		
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796	0	0	163	652.04	#01
800	1252	2.4	366	0.041	
805	3154	3.82	537		
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815	7886	6.2	710		
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825	13906	8.18	1227		
830	17488	8.92	1663		
835	21894	9.34	2099		
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845	34703	9.54	2792		
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865	79384	9.85	3793		
870	92850	10.21	4025		
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880	120663	11.03	4490		

885	135306	11.3	4746		
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815	12749	6.23	693		
820	17089	7.18	768		
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870	158264	9.41	4248		
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815	12963	7.66	703		
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805	6580	5.3	575		
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815	12501	7.34	725		
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830	23480	9.99	1108		
835	28157	10.47	1296		
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845	38972	11.17	1634		
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865	66947	11.71	2241		
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890	118518	12.01	3940		
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805	6842	4.3	588		
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815	14989	6.78	720		
820	19328	7.95	692		
825	24094	8.9	792		
830	29351	9.66	892		
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845	46492	11.53	1218		
850	52851	12.02	1344		
855	59367	12.5	1470		
860	66039	12.95	1597		
865	72836	13.39	1746		
870	79728	13.82	1896		
875	86714	14.24	2046		
880	93793	14.65	2196		
890	108352	15.42	3992		
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805	7759	4.19	711		
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815	17084	6.84	852		
820	21969	8.01	762		
825	26973	9.06	799		
830	32064	10.04	836		
835	37705	10.81	873		
840	43659	11.5	910		
845	49757	12.15	947		
850	55999	12.77	984		
855	62384	13.35	1021		
860	68912	13.91	1058		
865	75562	14.44	1137		
870	82312	14.95	1216		
875	89162	15.45	1296		
880	96112	15.93	1375		
890	110637	16.77	1661		
900	126212	17.49	1946		
792.84	0	0	286	647.29	#07
795	340	0.9	369	0.025	
800	3564	2.66	494		
805	7785	4.31	604		
810	12233	5.63	704		
815	16897	6.84	750		
820	21656	8.04	723		
825	26479	9.13	1001		
830	31588	10.07	1279		
835	36929	10.92	1557		
840	42376	11.71	1835		
845	48014	12.43	2364		
850	53926	13.07	2892		
855	60114	13.66	3421		
860	66576	14.18	3949		
865	73343	14.65	4677		
870	80439	15.07	5404		
875	87857	15.45	6132		
880	95596	15.79	6860		
890	112521	16.3	9511		
900	131696	16.61	12162		
784.5	0	0	101	646.55	#08
785	11	0.4	112	0.021	
790	1042	2.23	224		
795	3011	3.45	376		
800	5646	4.62	454		
805	8663	5.7	534		
810	11872	6.89	622		
815	15185	7.98	667		
820	18622	9.06	654		

825	22375	9.94	900		
830	26713	10.57	1146		
835	31330	11.13	1392		
840	36025	11.69	1638		
845	40796	12.24	2032		
850	45643	12.77	2425		
855	50568	13.28	2818		
860	55569	13.78	3212		
870	65898	14.69	4216		
880	81066	14.53	5221		
890	0	0	6933		
900	0	0	8645		
782.8	0	0	68	645.89	#09
785	287	1.27	121	0.022	
790	1659	2.94	243		
795	3515	4.16	356		
800	5749	5.21	424		
805	8294	6.25	497		
810	10954	7.37	579		
815	13718	8.42	624		
820	16916	9.27	616		
825	20692	9.84	829		
830	25109	10.22	1043		
835	30167	10.46	1256		
840	35866	10.61	1469		
845	42511	10.61	1858		
850	50227	10.58	2246		
855	58091	10.69	2635		
860	65972	10.87	3023		
870	81787	11.36	4405		
880	97672	11.92	5786		
890	0	0	7267		
900	0	0	8747		
782.4	0	0	161	645.09	#10
785	422	1.59	210	0.021	
790	1782	2.97	305		
795	3787	4.1	374		
800	6311	5.17	437		
805	9030	6.36	514		
810	11889	7.25	600		
815	15127	7.97	665		
820	18748	8.95	697		
825	22624	9.79	862		
830	26770	10.51	1027		
835	31801	10.95	1192		
840	37118	11.36	1357		

845	42709	11.75	1669		
850	48551	12.11	1980		
855	54652	12.44	2291		
860	61338	12.62	2603		
870	76638	12.98	3675		
880	93238	13.31	4748		
890	0	0	5926		
900	0	0	7103		
772.6	0	0	41	643.89	#11
775	191	1.34	80	0.022	
780	1073	2.89	159		
785	2315	4.09	290		
790	3826	5.12	420		
795	5586	5.98	470		
800	7585	6.83	543		
805	9761	7.67	638		
810	12122	8.07	744		
815	15078	8.19	864		
820	18450	9.08	1006		
825	22306	9.88	1133		
830	26550	10.55	1260		
835	31134	11.12	1387		
840	36064	11.61	1513		
850	48129	12.13	1845		
860	62840	12.4	2177		
870	79411	12.64	2563		
880	97832	12.88	2950		
890	0	0	3332		
900	0	0	3715		
776	0	0	41	641.77	#12
780	542	1.89	68	0.024	
785	1914	3.25	179		
790	3644	4.64	291		
795	5599	5.54	543		
800	7927	6.23	672		
805	10646	6.9	790		
810	13771	7.46	922		
815	17481	8.1	1075		
820	22371	8.77	1263		
825	28056	9.25	1420		
830	34000	9.73	1577		
835	40203	10.19	1734		
840	46666	10.63	1891		
845	53388	11.05	2118		
850	60370	11.44	2345		
860	75111	12.16	2800		

870	90913	12.8	3402		
880	107798	13.38	4005		
890	126266	13.83	4785		
900	146818	14.17	5565		
787.7	0	0	291	639.5	#13
790	380	1.04	379	0.024	
795	3130	2.74	796		
800	7235	3.9	992		
805	12353	5.12	1168		
810	17836	6.26	1362		
815	23684	7.36	1610		
820	29777	8.48	1945		
825	36029	9.5	2246		
830	42383	10.45	2547		
835	48841	11.33	2848		
840	55402	12.17	3149		
845	62066	12.96	3569		
850	68833	13.71	3990		
855	75704	14.42	4411		
860	82677	15.11	4832		
865	89838	15.74	5338		
870	97271	16.32	5845		
880	112952	17.36	6858		
890	129946	18.21	8115		
900	148477	18.91	9372		
783.3	0	0	423	637.52	#14
785	168	1.07	640	0.025	
790	1399	2.64	1281		
795	4106	2.96	1984		
800	9073	4.14	2398		
805	14672	5.43	2820		
810	23366	5.9	3285		
815	34961	6.22	3978		
820	47075	6.65	5024		
825	60781	6.94	6592		
830	76501	7.18	8160		
835	92714	7.48	9729		
840	109219	7.8	11297		
845	126035	8.12	13935		
850	143690	8.38	16574		
855	161748	8.68	19212		
860	180453	8.96	21851		
870	219726	9.48	29351		
880	0	0	36851		
890	0	0	46607		
900	0	0	56364		

783	0	0	616	635.59	#15
785	601	1.19	911	0.025	
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795	7190	4.15	2370		
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805	19674	5.24	3338		
810	31767	4.45	3889		
815	48761	5.89	4658		
820	65909	7.18	5764		
825	83202	8.34	7619		
830	100658	9.42	9473		
835	118261	10.43	11328		
840	136003	11.38	13183		
845	153901	12.28	16386		
850	171960	13.14	19588		
855	190179	13.96	22791		
860	208546	14.75	25993		
870	245710	16.24	35310		
880	283519	17.63	44626		
890	0	0	56878		
900	0	0	69130		
774	0	0	235	634.6	#16
775	34	0.63	286	0.025	
780	987	2.51	541		
785	2407	3.81	738		
790	4731	3.83	936		
795	8393	4.88	1051		
800	12547	5.79	1213		
805	17877	6.08	1427		
810	24449	6.59	1664		
815	31958	7.51	1870		
820	40077	8.6	2037		
825	48653	9.54	2204		
830	57523	10.4	2370		
835	66621	11.2	2537		
840	75932	11.94	2704		
850	95181	13.3	3114		
860	115268	14.51	3525		
870	135909	15.65	4022		
880	0	0	4520		
890	0	0	5066		
900	0	0	5613		
768.9	0	0	18	633.5	#17
770	83	0.67	21	0.025	
775	1453	2.61	154		
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785	5778	5.03	516		
790	8515	5.95	745		
795	11639	6.69	838		
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805	19373	7.28	1136		
810	24777	7.82	1324		
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820	36673	9.78	1681		
825	43146	10.68	1813		
830	50263	11.4	1945		
840	66433	12.49	2209		
850	85433	13.19	2470		
860	107513	13.62	2731		
870	132548	13.92	3039		
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890	190608	14.33	3675		
900	222633	14.54	4003		
777.5	0	0	370	631.41	#18
780	242	1.49	474	0.03	
785	1517	2.51	724		
790	3922	3.55	974		
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805	18457	4.79	1482		
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815	51149	5.93	1929		
820	69088	7.2	2070		
825	87720	8.3	2175		
830	107413	9.26	2281		
835	128170	10.1	2387		
840	149988	10.84	2492		
845	172401	11.56	2589		
850	194938	12.25	2686		
860	240388	13.59	2880		
870	286338	14.86	3069		
880	332788	16.06	3259		
890	0	0	3439		
900	0	0	3620		
768.3	0	0	153	630.12	#19
770	170	0.81	185	0.035	
775	2407	2.78	550		
780	5126	4.32	915		
785	8115	5.51	1067		
790	11384	6.5	1218		
795	14963	7.3	1368		
800	19455	6.22	1579		

805	26449	6.89	1856		
810	33766	8.04	2161		
815	41141	9.13	2399		
820	48562	10.19	2542		
825	56028	11.18	2765		
830	63544	12.12	2988		
840	78769	13.88	3434		
850	94235	15.49	3899		
860	109954	16.99	4365		
870	125947	18.4	4917		
880	142312	19.7	5469		
890	0	0	6189		
900	0	0	6910		
766.6	0	0	216	629.31	#20
770	525	1.61	328	0.035	
775	2462	3.08	460		
780	4962	4.37	592		
785	7882	5.41	689		
790	11211	6.3	786		
795	14893	7.15	883		
800	19036	7.51	1019		
805	23943	8.12	1199		
810	29145	9.03	1397		
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820	40036	10.94	1825		
825	45704	11.82	2095		
830	51585	12.63	2365		
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870	141198	13.96	4506		
880	0	0	5075		
890	0	0	5701		
900	0	0	6328		
762.4	0	0	56	627.15	#21
765	267	1.36	117	0.038	
770	1496	2.83	233		
775	3325	4	566		
780	5596	5.04	899		
785	8215	6.03	1048		
790	11166	6.74	1198		
795	14556	7.36	1344		
800	18574	7.15	1551		
805	23869	7.6	1825		
810	30275	7.56	2127		
815	38299	8.41	2468		

820	50218	8.74	2876		
830	75606	9.65	3978		
840	102502	10.6	5079		
850	130649	11.53	6431		
860	159878	12.41	7783		
870	0	0	9461		
880	0	0	11139		
890	0	0	12954		
900	0	0	14770		
769.3	0	0	36	625.28	#22
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775	1850	2.38	569		
780	4806	3.79	1100		
785	8301	4.98	1305		
790	12273	5.96	1509		
795	17001	6.01	1694		
800	26773	4.57	1956		
805	42193	5.59	2300		
810	58333	6.82	2680		
815	74904	7.96	3070		
820	91921	9.06	3481		
825	109537	10.06	4072		
830	127906	10.95	4662		
840	166902	12.49	5842		
850	210027	13.73	7341		
860	258402	14.69	8841		
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880	0	0	12784		
890	0	0	14871		
900	0	0	16958		
770.6	0	0	274	623.1	#23
775	1335	2.14	565	0.042	
780	3823	3.55	895		
785	7358	4.03	1064		
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795	21589	4.82	1384		
800	33746	5.64	1597		
805	46414	6.91	1878		
810	59263	8.05	2188		
815	72292	9.14	2457		
820	85470	10.19	2669		
825	99095	11.15	2970		
830	113470	12	3272		
835	128595	12.76	3574		
840	144470	13.45	3875		
850	181545	14.44	4508		

860	220570	15.4	5142		
870	0	0	5852		
880	0	0	6563		
890	0	0	7186		
900	0	0	7808		
764	0	0	412	621.02	#24
765	88	0.59	444	0.035	
770	2565	2.37	605		
775	6312	3.98	725		
780	10505	5.22	845		
785	15094	6.27	985		
790	20078	7.11	1124		
795	26448	7.01	1262		
800	34350	7.5	1456		
805	42839	8.46	1726		
810	51689	9.33	1996		
815	60928	10.23	2197		
820	70789	11.15	2398		
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850	143564	14.73	4621		
860	176689	15.25	5462		
870	0	0	6309		
880	0	0	7157		
890	0	0	7805		
900	0	0	8452		
743.7	0	0	55	618.94	#25
745	50	0.75	75	0.04	
750	1054	2.46	149		
755	2572	3.89	471		
760	4398	4.98	792		
765	6501	5.93	1066		
770	8868	6.81	1339		
775	11424	7.71	1409		
780	14147	8.52	1480		
790	20515	9.05	1970		
800	30216	8.56	2550		
810	42638	10.21	3497		
820	56269	11.94	4337		
830	71110	13.5	5514		
840	86524	14.92	6692		
850	102799	16.17	8153		
860	120224	17.24	9613		
870	0	0	11395		
880	0	0	13176		
890	0	0	15593		

900	0	0	18011		
753.1	0	0	381	616.27	#26
755	278	1.09	519	0.04	
760	2200	2.67	883		
765	5134	4	1189		
770	8585	5.12	1495		
775	12528	6.06	1574		
780	16965	6.88	1652		
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795	37970	7.3	2470		
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810	68429	10.15	3905		
820	90104	12	4913		
830	113306	13.65	6119		
840	138313	15.05	7324		
850	164715	16.29	8663		
860	192100	17.44	10001		
870	221543	18.38	11596		
880	254120	19.14	13192		
890	288879	19.83	15625		
900	324873	20.49	18057		
744.2	0	0	77	614.68	#27
745	33	0.55	92	0.04	
750	1581	2.41	184		
755	4008	3.83	338		
760	6838	5.07	492		
765	9969	6.12	650		
770	13423	6.96	809		
775	17282	7.48	851		
780	21843	7.87	894		
790	32714	9.27	1193		
800	44560	10.89	1542		
810	57445	11.78	2114		
820	73088	12.93	2590		
830	95474	13.71	3102		
840	120463	14.38	3615		
850	148295	14.93	4148		
860	0	0	4681		
870	0	0	5229		
880	0	0	5777		
890	0	0	6223		
900	0	0	6669		
754.5	0	0	573	612.68	#28
755	57	0.48	596	0.04	
760	1977	2.45	821		

765	4931	3.49	1018		
770	9209	4.51	1214		
775	14539	5.29	1276		
780	21232	6.13	1338		
785	28406	7.15	1562		
790	35968	8.12	1786		
795	43869	9	2005		
800	52110	9.81	2313		
810	69614	11.3	3169		
820	88540	12.99	3954		
830	108443	14.6	5044		
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880	0	0	12499		
890	0	0	14159		
900	0	0	15820		
744.3	0	0	156	610.63	#29
745	77	0.6	181	0.035	
750	1689	2.52	363		
755	4234	3.85	657		
760	7190	5.09	951		
765	10497	6.07	1108		
770	14177	6.93	1265		
775	18232	7.71	1331		
780	22660	8.42	1397		
790	32631	9.86	1863		
800	43414	11.46	2413		
810	54768	12.93	3306		
820	66823	14.52	4117		
830	79598	16.02	5184		
840	92723	17.39	6251		
850	106223	18.67	7723		
860	120123	19.85	9195		
870	0	0	10828		
880	0	0	12461		
890	0	0	14089		
900	0	0	15717		
750.9	0	0	325	608.54	#30
755	1596	1.64	447	0.035	
760	6137	3.26	595		
765	11838	4.51	700		
770	18471	5.62	805		
775	25535	6.78	848		
780	32899	7.81	890		

785	40481	8.85	1038		
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795	56046	10.73	1334		
800	64029	11.59	1537		
810	80514	13.08	2106		
820	97760	14.7	2565		
830	115745	16.26	3179		
840	134468	17.66	3793		
850	155569	18.73	4729		
860	180689	19.4	5665		
870	0	0	6825		
880	0	0	7985		
890	0	0	9549		
900	0	0	11114		
732.9	0	0	62	606.43	#31
735	247	1.11	108	0.035	
740	1818	2.76	215		
745	4054	4.13	413		
750	6601	5.31	612		
755	9442	6.26	626		
760	12608	7.09	639		
770	19898	8.42	827		
780	30570	8.84	912		
790	42697	10.13	1216		
800	57749	10.55	1576		
810	75000	11.91	2159		
820	94371	13.54	2633		
830	116978	14.73	3280		
840	143225	15.55	3928		
850	173555	16.1	4864		
860	205581	16.65	5801		
870	0	0	6955		
880	0	0	8110		
890	0	0	9654		
900	0	0	11199		
740.1	0	0	434	604.36	#32
745	2577	2.47	679	0.03	
750	6151	4.03	929		
755	10144	5.28	949		
760	14447	6.43	969		
765	18961	7.48	1112		
770	24439	7.26	1254		
775	30897	8.05	1319		
780	37848	8.85	1384		
790	52937	10.28	1844		
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810	89581	11.94	3273		
820	112124	13.26	3646		
830	141451	14.38	4273		
840	178992	14.89	4900		
850	0	0	5544		
860	0	0	6189		
870	0	0	6803		
880	0	0	7417		
890	0	0	8136		
900	0	0	8855		
733.1	0	0	267	602.3	#33
735	711	1.25	431	0.03	
740	3694	3.2	861		
745	7106	4.57	1045		
750	11094	5.23	1229		
755	16657	5.67	1254		
760	23625	5.8	1278		
770	46058	7.19	1654		
780	71614	8.7	1826		
790	101847	9.58	2431		
800	136236	11.45	3149		
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820	208212	14.74	4630		
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840	285542	17.69	6276		
850	325426	19.02	7085		
860	0	0	7894		
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880	0	0	9311		
890	0	0	10306		
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Holston20090720.geo

919	0	0	246	52.22	#67
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935	10855	5.71	539		
940	14842	6.92	635		
945	18916	8.07	731		
950	23113	9.14	829		
955	27582	10.07	928		
960	32358	10.88	1020		
965	37462	11.58	1112		
970	42917	12.2	1198		

980	54876	13.24	1399
990	67996	14.14	1659
1000	82036	14.96	1954
1010	98774	15.32	2260
1020	119986	15.39	2591
1030	145074	15.3	2960
1040	173436	15.27	3348
1050	206436	15.05	3737
1060	245436	14.8	4101

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925	3423	4.28	460		
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935	7667	6.54	705		
940	10287	7.5	829		
945	14498	7.58	954		
950	19069	7.77	1080		
955	23997	7.99	1207		
960	29284	8.21	1329		
970	40734	8.68	1570		
980	53217	9.13	1827		
990	66767	9.54	2125		
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1020	113517	10.65	3286		
1030	132242	10.67	3742		
1040	154617	10.62	4210		
1050	178837	10.8	4674		
1060	203057	11.04	5124		

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920	4804	4.75	469		
925	7274	5.84	594		
930	10205	6.89	719		
935	13895	7.52	844		
940	17973	8.05	969		
950	26983	8.99	1187		
960	37251	9.72	1405		
970	49400	10.19	1635		
980	63257	10.58	1864		
990	78635	10.93	2137		
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1020	133133	11.43	3162		
1030	159631	11.38	3574		
1040	187760	11.51	3985		
1050	216252	11.74	4407		
1060	245083	12.02	4829		
905.2	0	0	117	46.33	#70
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915	3512	3.16	511		
920	6958	4.44	612		
925	10934	5.76	712		
930	15582	6.68	799		
935	20496	7.5	886		
940	25674	8.23	962		
945	31032	8.91	1038		
950	36485	9.56	1103		
955	42033	10.18	1168		
960	47676	10.77	1240		
965	53426	11.33	1312		
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990	83952	13.76	1719		
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1020	124938	16.01	2483		
1030	139938	16.63	2797		
1040	155338	17.23	3139		
902.5	0	0	211	44.3	#71
905	1135	1.51	423	0.038	
910	4371	3.45	524		
915	7923	4.89	625		
920	11797	6.19	727		
925	16418	7.08	803		
930	21333	7.87	880		
935	26542	8.57	956		
940	32045	9.2	1033		
945	37801	9.78	1099		
950	43770	10.32	1165		
955	49951	10.83	1231		
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970	69670	12.21	1459		
980	83645	13.03	1621		
990	98270	13.79	1786		
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1020	147345	15.51	2589		
1030	165795	16.03	2873		

1040	184745	16.54	3157		
888.4	0	0	0	42.64	#72
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895	1105	2.55	148		
900	2570	4.18	334		
905	4333	5.22	417		
910	6507	5.88	500		
915	9091	6.33	582		
920	12086	6.68	665		
925	15423	6.99	744		
930	19036	7.28	822		
940	27086	7.79	979		
950	36261	8.22	1137		
960	46586	8.59	1296		
970	58036	8.93	1437		
980	70586	9.23	1578		
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1000	98686	9.83	2150		
1010	114011	10.16	2512		
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1030	146336	10.89	3163		
1040	162786	11.3	3451		
885	0	0	0	40.27	#73
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905	6644	6.39	504		
910	8886	7.45	591		
915	11673	8.1	679		
920	15056	8.47	766		
925	18825	8.81	847		
930	22771	9.17	928		
935	26894	9.52	1009		
940	31193	9.86	1089		
945	35844	10.09	1180		
950	41021	10.25	1271		
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970	66446	10.71	1583		
980	80943	10.99	1714		
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1020	147343	12.18	3099		
879.7	0	0	157	39.27	#74
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885	927	2.48	285		

890	2348	3.75	385		
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900	6501	4.99	503		
905	10000	6	601		
910	14306	6.67	699		
915	19416	7.11	797		
920	25332	7.44	895		
925	31848	7.76	985		
930	38727	8.08	1074		
940	53573	8.7	1252		
950	70037	9.22	1461		
960	88301	9.67	1669		
970	108293	10.08	1848		
980	129935	10.45	2026		
990	152771	10.89	2301		
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1020	226753	12.04	3238		
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875	1050	2.29	164		
880	2689	3.9	282		
885	4528	5.26	346		
890	6598	6.28	409		
895	8901	7.08	473		
900	11435	7.73	537		
905	14303	8.32	621		
910	17610	8.72	706		
915	21353	9.02	791		
920	25535	9.23	876		
925	30391	9.27	968		
930	36160	9.22	1060		
940	50435	8.98	1244		
950	67035	8.96	1440		
960	84635	9.1	1636		
970	103585	9.25	1830		
980	124235	9.41	2025		
990	146610	9.56	2322		
1000	170735	9.7	2620		
862	0	0	0	33.92	#76
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870	564	2.6	326		
875	1726	3.18	438		
880	3566	4.43	551		
885	6061	5.06	626		
890	9747	5.22	700		

895	14052	5.49	775		
900	18455	5.88	849		
905	22958	6.29	915		
910	27563	6.69	981		
915	32270	7.09	1047		
920	37078	7.48	1113		
930	46986	8.21	1274		
940	57280	8.9	1436		
950	67959	9.53	1600		
960	79017	10.12	1764		
970	90448	10.68	1981		
980	102253	11.21	2198		
990	114428	11.7	2464		
1000	126971	12.18	2730		
858.2	0	0	10	32.54	#77
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865	984	2.54	338		
870	2497	3.72	517		
875	4291	5.16	681		
880	6297	5.99	845		
885	8727	6.98	1107		
890	11463	7.74	1368		
895	14504	8.34	1629		
900	17852	8.82	1891		
905	21439	9.26	2220		
910	25202	9.68	2549		
915	29139	10.06	2877		
920	33252	10.42	3206		
925	37561	10.74	3846		
930	42089	11.03	4485		
940	51802	11.54	5764		
950	62664	11.88	7687		
960	74952	12.12	9610		
970	88639	12.31	11834		
980	103702	12.45	12946		
855.5	0	0	30	30.22	#78
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870	3787	4.41	582		
875	6001	5.69	707		
880	8621	6.57	833		
885	12240	6.94	1091		
890	16896	7.08	1348		
895	22590	7.14	1606		
900	29321	7.19	1863		
905	36740	7.36	2192		

910	44496	7.59	2521		
915	52590	7.84	2849		
920	61021	8.1	3178		
925	69777	8.37	3774		
930	78846	8.63	4370		
940	97921	9.14	5562		
950	119996	9.2	7332		
960	146821	9.26	9101		
970	176771	9.63	11083		
980	208221	10	12073		
852.4	0	0	0	28.48	#79
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860	2203	3.57	350		
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870	5887	6	966		
875	8164	6.99	1274		
880	10971	7.56	1583		
885	14818	7.73	1855		
890	18888	8	2126		
895	23180	8.29	2398		
900	27694	8.59	2670		
905	32403	8.89	3153		
910	37281	9.19	3636		
915	42328	9.48	4119		
920	47544	9.77	4603		
925	52916	10.05	5403		
930	58431	10.32	6204		
935	64091	10.58	7005		
940	69894	10.84	7806		
950	81906	11.33	9640		
960	94444	11.8	11474		
859	0	0	522	26.54	#80
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870	5837	4.45	1430		
875	9037	5.71	1835		
880	12416	6.9	2241		
885	16422	7.83	2531		
890	21298	8.42	2821		
895	27044	8.81	3111		
900	33659	9.07	3401		
905	40809	9.37	3873		
910	48159	9.7	4345		
915	55709	10.05	4817		
920	63459	10.4	5289		
925	71515	10.69	6066		

930	79984	10.97	6843		
935	88865	11.22	7620		
940	98159	11.46	8397		
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950	117259	12.05	10117		
960	136559	12.67	11838		
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870	8680	6.11	1444		
875	12605	6.81	1757		
880	18680	6.79	2070		
885	26367	6.75	2227		
890	35130	6.79	2383		
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900	55880	6.93	2696		
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910	79680	7.28	3085		
915	92255	7.48	3280		
920	105280	7.68	3474		
925	118580	7.93	3765		
930	131980	8.19	4057		
940	159080	8.71	4639		
950	186755	9.21	5182		
960	215180	9.68	5724		
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870	13152	6.09	1500		
875	18676	6.5	1750		
880	25251	6.76	2000		
885	32426	7.06	2192		
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895	47226	7.79	2575		
900	54851	8.16	2767		
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910	71076	8.77	3329		
915	79807	9.04	3610		
920	88951	9.29	3890		
925	98564	9.5	4262		
930	108701	9.7	4633		
940	130551	10.04	5376		

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870	13925	7.21	1383		
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880	23320	8.04	1777		
885	28798	8.35	2052		
890	34583	8.66	2326		
895	40673	8.94	2601		
900	47070	9.22	2875		
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895	47127	8.7	2611		
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865	15841	7.8	1072		
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885	34578	9.94	1818		
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870	17995	7.76	1819		
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860	15066	6.98	1311		
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880	34249	7.54	2628		
885	39738	7.71	3254		
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910	73183	8.28	6815		
920	90712	8.32	8501		
930	109738	8.63	10117		
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818.8	0	0	0	12.06	#88
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845	7162	6.47	759		
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870	26771	8.25	1640		
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880	38276	8.57	2031		
885	44694	8.73	2449		
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900	66572	9.16	3703		
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910	83643	9.37	4641		
920	103110	9.51	5580		
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850	15090	8.6	831		
855	18615	9.3	939		

860	22490	9.86	1047		
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875	37429	10.74	1867		
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885	50601	10.92	2490		
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870	29953	8.98	1779		
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880	43033	8.94	2151		
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880	89290	8.82	7623		
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800	64	1.1	98	0.05	
805	521	2.25	195		
810	1708	3.17	292		
815	3327	4.42	413		
820	5216	5.44	534		
825	7395	6.23	899		
830	10068	7.27	1264		
835	13510	7.93	1629		
840	17807	8.32	1993		
845	23575	8.47	2586		
850	31786	8.37	3179		
855	40541	8.7	3771		
860	49521	9.15	4364		
865	58729	9.65	4825		
870	68216	10.13	5287		
880	88339	11.07	6211		
890	110068	11.97	7512		
900	133280	12.78	8813		
910	157981	13.6	10011		
920	183842	14.41	11209		
797	0	0	0	0.08	#95
800	301	1.48	138	0.04	
805	2346	2.86	248		
810	4890	4.38	357		
815	7660	5.57	506		
820	10766	6.39	655		
825	14293	7.25	991		
830	18426	8.23	1327		
835	23596	8.87	1663		
840	29343	9.44	1999		
845	35491	9.99	2185		
850	41967	10.52	2371		
855	48736	11.05	2557		
860	55774	11.55	2743		
865	63081	12.04	2929		
870	70645	12.52	3115		
880	86370	13.47	3487		
890	102955	14.24	4038		
900	122507	14.77	4589		
910	143195	15.48	5075		
920	164514	16.2	5562		

FrenchBroad20090720.geo

866.5	0	0	132	32.23	#34
870	1409	1.76	439	0.03	
875	4583	3.65	488		
880	7980	5.04	439		
885	11588	6.23	505		
890	15403	7.44	570		
895	19370	8.5	636		
900	23407	9.48	702		
905	27515	10.4	728		
910	31696	11.25	755		
915	35951	12.06	781		
920	40278	12.82	807		
925	44786	13.51	829		
930	49578	14.11	851		
935	54657	14.64	873		
940	60021	15.11	895		
945	65671	15.53	922		
950	71607	15.91	948		
960	84336	16.55	1001		
970	97886	17.14	1053		
980	111936	17.73	1106		
865.1	0	0	8	31.76	#35
870	1902	2.58	421	0.03	
875	4279	4.22	525		
880	6815	5.51	550		
885	9665	6.53	634		
890	13095	7.4	717		
895	16844	8.15	801		
900	20732	8.85	884		
905	24865	9.46	922		
910	29493	9.92	959		
915	34730	10.25	996		
920	40576	10.49	1033		
925	46759	10.77	1078		
930	53009	11.08	1122		
935	59326	11.41	1167		
940	65709	11.74	1211		
945	72178	12.07	1264		
950	78751	12.39	1316		
960	92209	13.03	1420		
970	106209	13.59	1624		
980	120876	14.12	1828		
861.7	0	0	0	31.12	#36
865	665	1.56	217	0.03	

870	2814	3.29	523		
875	5276	4.72	604		
880	8314	5.81	686		
885	11985	6.54	788		
890	16104	7.13	890		
895	20600	7.64	992		
900	25396	8.13	1095		
905	30389	8.6	1146		
910	35550	9.05	1197		
915	40879	9.48	1248		
920	46445	9.85	1299		
925	52244	10.22	1366		
930	58225	10.58	1434		
935	64423	10.9	1501		
940	70920	11.14	1568		
950	84982	11.64	1719		
960	100170	12.08	1871		
970	116482	12.47	2152		
980	133920	12.83	2434		
859	0	0	0	30.75	#37
860	8	0.62	0	0.03	
865	1921	2.36	310		
870	4629	4.09	597		
875	7483	5.44	733		
880	10737	6.58	870		
885	14507	7.42	1327		
890	18728	8.08	1784		
895	23401	8.61	2241		
900	28525	9.05	2698		
905	33973	9.48	3031		
910	39619	9.89	3363		
915	45461	10.29	3696		
920	51500	10.68	4028		
925	57736	11.04	4584		
930	64169	11.39	5140		
940	77625	12.04	6251		
950	92494	12.45	8317		
960	109400	12.75	10383		
970	127719	13.13	13022		
980	146825	13.5	15660		
865.6	0	0	389	30.01	#38
870	2711	2.39	715	0.035	
875	6551	4.1	951		
880	10770	5.28	1188		
885	17477	5.61	1804		
890	26067	5.85	2419		

895	35688	6.27	3035		
900	49427	6.23	3651		
905	63833	6.69	3963		
910	78552	7.17	4274		
915	93583	7.65	4586		
920	108927	8.11	4897		
925	124583	8.56	5447		
930	140552	9	5997		
935	156833	9.42	6547		
940	173427	9.82	7097		
945	190261	10.22	8044		
950	207264	10.6	8990		
960	241777	11.36	10883		
970	276964	12.07	11269		
980	312827	12.76	11655		
857	0	0	0	29.34	#39
860	555	1.47	150	0.03	
865	2669	3.2	526		
870	5127	4.57	778		
875	7889	5.57	1029		
880	11953	5.88	1280		
885	18416	6.17	1750		
890	26290	6.32	2219		
895	39488	5.9	2688		
900	54308	5.87	3158		
905	69581	6.03	3321		
910	85176	6.26	3485		
915	101094	6.52	3648		
920	117336	6.8	3812		
925	133906	7.08	4139		
930	150805	7.35	4466		
935	168032	7.63	4794		
940	185587	7.9	5121		
945	0	0	5510		
950	0	0	5899		
960	0	0	6678		
853.4	0	0	0	28.85	#40
855	66	0.92	42	0.03	
860	1278	2.32	254		
865	3281	3.87	451		
870	5505	5.32	588		
875	8043	6.42	725		
880	11575	6.9	862		
885	15756	7.26	1044		
890	20200	7.65	1226		
895	24906	8.03	1408		

900	29875	8.4	1591		
905	35109	8.74	1711		
910	40612	9.07	1832		
915	46384	9.37	1953		
920	52425	9.65	2074		
925	58734	9.92	2293		
930	65312	10.17	2512		
935	72159	10.41	2731		
940	79275	10.63	2951		
950	94650	10.96	3467		
960	111775	11.23	3984		
851.3	0	0	14	28.23	#41
855	654	2.24	188	0.035	
860	1763	3.56	423		
865	3738	4.09	1025		
870	6091	5.23	1873		
875	8848	6.2	2720		
880	12383	7.05	3567		
885	16666	7.61	4845		
890	21594	8.03	6124		
895	27006	8.43	7402		
900	32744	8.81	8681		
905	38781	9.19	10938		
910	45094	9.55	13196		
915	51681	9.9	15453		
920	58544	10.23	17711		
925	65838	10.46	20311		
930	73719	10.66	22911		
935	82188	10.84	25511		
940	91244	11	28112		
950	110769	11.34	35184		
960	131944	11.67	42256		
848.2	0	0	0	26.84	#42
850	326	1.18	48	0.03	
855	2253	2.64	289		
860	5316	3.96	530		
865	8751	5.39	1333		
870	12379	6.33	2135		
875	16771	7.1	2938		
880	24592	7.2	3740		
885	32723	7.54	5050		
890	41139	7.96	6361		
895	49749	8.4	7671		
900	58538	8.85	8981		
905	67730	9.23	11330		
910	77546	9.57	13679		

915	87987	9.88	16028		
920	99053	10.15	18377		
925	110743	10.4	21080		
930	123058	10.63	23784		
940	149561	11.03	29191		
950	177626	11.5	36565		
960	206314	11.99	43939		
848.2	0	0	0	26.3	#43
850	326	1.18	50	0.03	
855	2175	2.9	300		
860	4567	4.21	485		
865	7364	5.45	594		
870	10428	6.34	704		
875	14192	7.33	813		
880	18614	8.02	922		
885	23631	8.54	974		
890	29153	8.97	1026		
895	35148	9.34	1078		
900	41611	9.66	1130		
905	48448	9.98	1215		
910	55508	10.3	1300		
915	62789	10.61	1385		
920	70291	10.92	1470		
925	78015	11.22	1558		
930	85961	11.5	1647		
940	102518	12.04	1823		
950	120268	12.47	2045		
960	139518	12.83	2267		
851.8	0	0	166	25.65	#44
855	914	1.54	461	0.03	
860	3853	3.37	624		
865	7039	4.9	1026		
870	10663	6.07	1427		
875	14837	6.93	1829		
880	19502	7.62	2231		
885	24458	8.25	2512		
890	29634	8.84	2793		
895	34995	9.4	3073		
900	41177	9.66	3354		
905	48378	9.9	3647		
910	56018	10.14	3940		
915	64102	10.37	4234		
920	72630	10.58	4527		
925	81599	10.79	4761		
930	91005	10.98	4996		
935	100849	11.16	5231		

940	111130	11.33	5466		
950	132880	11.68	5881		
960	156130	12.01	6296		
848.9	0	0	330	24.78	#45
850	103	0.57	382	0.045	
855	2069	2.2	584		
860	4967	3.67	729		
865	8158	4.68	1379		
870	12956	5.17	2030		
875	19725	5.53	2680		
880	32045	5.18	3331		
885	48037	5.22	4187		
890	65326	5.53	5044		
895	82700	5.95	5901		
900	100158	6.4	6757		
905	117777	6.84	7995		
910	135633	7.28	9232		
915	153727	7.7	10470		
920	172058	8.12	11707		
925	190520	8.55	13301		
930	209008	8.98	14894		
940	246058	9.81	18081		
950	283208	10.6	21713		
960	320458	11.37	25345		
818	0	0	0	23.5	#46
820	209	1.49	0	0.035	
825	880	3.24	0		
830	1686	4.48	0		
835	2614	5.45	50		
840	3725	6.04	176		
845	5018	6.8	301		
850	6452	7.54	426		
855	8009	8.48	533		
860	9666	9.43	639		
865	11450	10.22	1048		
870	13566	10.75	1458		
875	15975	11.12	1867		
880	18756	11.33	2276		
890	25094	11.65	3539		
900	32490	11.71	4802		
910	44536	10.95	6774		
920	59428	10.42	8745		
930	76255	10.12	11426		
940	94994	9.95	14108		
950	0	0	17258		
845.4	0	0	359	22.38	#47

850	2650	2.51	495	0.04	
855	6205	4.12	575		
860	11718	4.81	655		
865	19652	5.11	776		
870	28228	5.62	897		
875	36912	6.19	1018		
880	45688	6.77	1140		
885	54545	7.33	1193		
890	63512	7.87	1246		
895	72604	8.4	1299		
900	81815	8.9	1352		
905	91153	9.39	1432		
910	100673	9.84	1512		
915	110469	10.28	1592		
920	120674	10.68	1671		
925	130968	11.07	1784		
930	141303	11.47	1897		
935	151680	11.85	2009		
940	162112	12.22	2122		
950	183188	12.94	0		
843.6	0	0	400	21.56	#48
845	206	0.98	462	0.035	
850	2756	2.89	562		
855	5553	4.54	663		
860	8384	5.89	763		
865	11781	6.86	990		
870	16272	7.34	1216		
875	21425	7.76	1442		
880	26809	8.22	1668		
885	32447	8.67	2056		
890	38359	9.1	2443		
895	44547	9.5	2830		
900	51009	9.88	3217		
905	57841	10.21	3805		
910	65134	10.5	4393		
915	72891	10.76	4981		
920	81109	11	5569		
925	89691	11.23	6253		
930	98534	11.46	6937		
935	107641	11.69	7621		
940	117009	11.91	8305		
812.9	0	0	0	19.7	#49
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820	1344	3.41	0		
825	2466	4.68	0		
830	3725	5.74	119		

835	5093	6.71	268		
840	6545	7.64	417		
845	8060	8.5	503		
850	9654	9.45	588		
855	11434	10.26	674		
860	13396	10.92	759		
865	15830	11.25	963		
870	18717	11.4	1167		
875	21981	11.47	1371		
880	25596	11.51	1574		
890	33855	11.52	2307		
900	43857	11.37	3039		
910	56162	11.12	4084		
920	70893	10.93	5128		
930	0	0	6229		
940	0	0	7330		
832.8	0	0	336	18.18	#50
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840	2800	3.11	474		
845	5472	4.57	554		
850	8379	5.72	634		
855	11590	6.77	714		
860	15141	7.85	793		
865	19215	8.64	905		
870	23956	9.2	1016		
875	29400	9.6	1128		
880	35081	10.02	1239		
885	41469	10.26	1386		
890	49031	10.36	1532		
895	57769	10.37	1679		
900	67681	10.33	1826		
905	78350	10.37	1964		
910	89356	10.45	2103		
915	100700	10.56	2242		
920	112381	10.69	2380		
930	0	0	2580		
940	0	0	2780		
815.1	0	0	0	17.35	#51
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825	1343	3.55	0		
830	2483	4.51	173		
835	3898	5.4	390		
840	5521	6.31	460		
845	7294	7.24	576		
850	9149	8.23	692		
855	11341	9.06	808		

860	14072	9.54	924		
865	17572	9.68	1098		
870	21568	9.79	1272		
875	25854	9.93	1445		
880	30430	10.09	1619		
885	35297	10.24	1849		
890	40480	10.39	2080		
895	46134	10.46	2310		
900	52369	10.5	2540		
910	68202	10.18	2991		
920	87482	10.15	3443		
930	0	0	3917		
839.7	0	0	652	15.76	#52
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845	3769	2.62	842		
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855	15168	4.78	1182		
860	27212	4.73	1352		
865	40879	5.09	1521		
870	55027	5.52	1690		
875	69486	5.98	1859		
880	84181	6.43	2028		
885	99048	6.87	2251		
890	114021	7.31	2475		
895	129098	7.73	2699		
900	144271	8.15	2922		
905	159537	8.56	3168		
910	174898	8.95	3414		
915	190351	9.34	3661		
920	205899	9.71	3907		
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930	0	0	4425		
935	0	0	4684		
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850	9406	5.18	2027		
855	15372	5.49	2410		
860	22358	5.99	2794		
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870	37165	7.16	3825		
875	44896	7.71	4341		
880	52857	8.24	4857		
885	61044	8.74	5698		
890	69462	9.22	6540		

895	78126	9.67	7381		
900	87038	10.1	8223		
905	96207	10.5	9398		
910	105647	10.89	10574		
915	115368	11.26	11749		
920	125356	11.62	12925		
925	0	0	0		
930	0	0	0		
830.7	0	0	115	14.26	#54
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855	23875	5.08	2372		
860	35430	5.25	2783		
865	48055	5.55	3372		
870	61430	5.89	3962		
875	75555	6.23	4551		
880	90430	6.55	5141		
885	106149	6.84	6104		
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900	158930	7.64	8995		
905	178180	7.94	10299		
910	197930	8.23	11602		
915	218180	8.52	12906		
920	238930	8.79	14210		
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827.1	0	0	477	13.63	#55
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845	10911	5.86	1124		
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855	25849	5.87	1612		
860	35547	5.98	1856		
865	45748	6.21	2028		
870	56263	6.51	2199		
875	66988	6.83	2370		
880	77965	7.15	2542		
885	89174	7.47	2787		
890	100608	7.79	3033		
895	112269	8.1	3278		
900	124156	8.4	3524		
905	136462	8.64	3803		

910	149381	8.87	4083		
915	162912	9.1	4362		
920	177056	9.31	4642		
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822.1	0	0	406	11.42	#56
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845	14232	6.94	1346		
850	20845	6.97	1582		
855	29049	6.99	1817		
860	37501	7.22	2053		
865	46194	7.52	2271		
870	55265	7.8	2489		
875	65071	8.03	2707		
880	75640	8.23	2925		
885	86971	8.41	3237		
890	99065	8.58	3549		
895	111921	8.73	3861		
900	125539	8.87	4174		
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910	0	0	4889		
915	0	0	5246		
920	0	0	5604		
819.6	0	0	0	10.07	#57
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830	5092	4.17	1029		
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840	12655	6.15	1568		
845	19337	6.3	1772		
850	26980	6.52	1975		
855	35587	6.73	2179		
860	45155	6.93	2382		
865	55449	7.17	2700		
870	66230	7.42	3017		
875	77499	7.68	3335		
880	89255	7.93	3652		
885	101505	8.18	4067		
890	114255	8.41	4482		
895	127505	8.64	4896		
900	141255	8.86	5311		
905	0	0	5750		
910	0	0	6189		
920	0	0	7067		

814.5	0	0	335	8.4	#58
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820	2011	2.6	547		
825	4441	4.31	738		
830	6988	5.66	929		
835	10569	6.38	1120		
840	15629	6.7	1311		
845	23748	6.61	1418		
850	32504	6.94	1524		
855	41898	7.35	1630		
860	51929	7.78	1737		
865	62785	8.12	1904		
870	74654	8.45	2071		
875	87535	8.77	2238		
880	101429	9.09	2406		
885	115967	9.57	2534		
890	130779	10.04	2662		
895	145867	10.51	2790		
900	161229	10.97	2918		
910	0	0	3157		
920	0	0	3396		
811	0	0	192	7.45	#59
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825	5376	5.52	745		
830	7525	6.75	964		
835	10055	7.6	1184		
840	12975	8.23	1403		
845	16256	8.72	1534		
850	19696	9.21	1664		
855	23294	9.67	1795		
860	27853	9.76	1925		
865	33358	9.82	2096		
870	39009	9.97	2267		
875	44805	10.16	2438		
880	50748	10.38	2609		
885	56837	10.61	2777		
890	63072	10.85	2946		
895	69453	11.09	3114		
900	75980	11.33	3282		
905	0	0	3455		
915	0	0	3801		
808.2	0	0	168	6.06	#60
810	459	1.17	205	0.03	
815	2547	3.17	389		
820	4898	4.63	574		

825	7426	5.89	842		
830	10473	6.82	1111		
835	14949	7.16	1379		
840	19966	7.5	1647		
845	25712	7.73	1869		
850	32373	7.87	2091		
855	39949	7.97	2313		
860	48441	8.05	2535		
865	58148	8.03	2913		
870	69366	7.98	3290		
875	82260	7.88	3668		
880	96991	7.78	4046		
885	112791	7.83	4525		
890	128891	7.93	5004		
895	145291	8.07	5483		
900	161991	8.22	5962		
910	0	0	7116		
804.7	0	0	159	4.85	#61
805	10	0.28	165	0.03	
810	2456	2.55	262		
815	5565	4.25	415		
820	8755	5.68	569		
825	12184	6.86	768		
830	16199	7.7	966		
835	20570	8.41	1165		
840	25107	9.08	1364		
845	29792	9.7	1559		
850	34621	10.29	1755		
855	39588	10.85	1951		
860	44671	11.38	2147		
865	49919	11.86	2541		
870	55381	12.3	2935		
875	61057	12.72	3330		
880	66946	13.1	3724		
885	73036	13.46	4358		
890	79315	13.81	4992		
900	92438	14.44	6260		
910	0	0	7557		
793.5	0	0	66	3.9	#62
795	171	1.08	95	0.03	
800	1223	2.82	189		
805	2674	4.18	256		
810	4268	5.49	322		
815	5943	6.59	456		
820	7698	7.56	589		
825	9581	8.53	872		

830	11643	9.31	1156		
835	14172	9.88	1439		
840	17459	10.07	1723		
845	21266	10.17	1880		
850	25357	10.3	2036		
855	29730	10.44	2193		
860	34387	10.58	2350		
865	39564	10.59	2598		
870	45639	10.51	2847		
880	63465	9.73	3344		
890	86243	9.3	4020		
900	110562	9.19	4696		
910	0	0	5346		
794	0	0	88	2.02	#63
795	38	0.63	110	0.03	
800	1165	2.32	220		
805	2883	3.99	288		
810	4755	5.26	356		
815	6782	6.32	503		
820	8951	7.29	649		
825	11494	8.21	1006		
830	14790	8.72	1364		
835	19296	8.74	1721		
840	25465	8.45	2078		
845	37558	7.25	2314		
850	51340	6.69	2550		
855	66808	6.39	2786		
860	83965	6.22	3022		
865	102015	6.24	3342		
870	120165	6.35	3661		
880	156765	6.7	4301		
890	193615	7.14	4922		
900	230565	7.6	5543		
910	0	0	6375		
791	0	0	24	0.99	#64
795	854	2.45	122	0.03	
800	2092	3.93	243		
805	3898	4.79	299		
810	6022	5.55	355		
815	8464	6.22	500		
820	11269	6.9	646		
825	14821	7.43	947		
830	18891	7.86	1247		
835	24774	7.75	1548		
840	32848	7.46	1848		
845	42789	7.29	2278		

850	53076	7.34	2708		
855	64474	7.41	3139		
860	77112	7.46	3569		
865	91127	7.51	3935		
870	106653	7.54	4301		
880	142238	7.59	5033		
890	180870	7.84	5692		
900	219547	8.21	6351		
910	0	0	7160		
790.5	0	0	23	0.73	#65
795	1634	2.62	138	0.03	
800	3631	4.16	265		
805	5819	5.35	319		
810	8198	6.35	372		
815	10768	7.38	528		
820	13527	8.4	684		
825	17031	8.98	923		
830	23270	8.58	1162		
835	31016	8.25	1401		
840	39217	8.18	1640		
845	47684	8.25	2030		
850	56688	8.36	2420		
855	66099	8.51	2810		
860	75925	8.68	3199		
865	86188	8.84	3491		
870	97182	8.97	3783		
880	121435	9.23	4366		
890	147049	9.56	4824		
900	174675	9.87	5282		
910	0	0	5604		
789.2	0	0	3	0.17	#66
790	114	0.81	15	0.03	
795	990	2.94	147		
800	2061	4.24	280		
805	3344	5.16	331		
810	4872	5.98	383		
815	6650	6.82	545		
820	8778	7.69	707		
825	11304	8.37	902		
830	14179	8.88	1098		
835	17405	9.27	1293		
840	20980	9.57	1488		
845	25042	9.75	1591		
850	29730	9.83	1694		
855	35042	9.85	1797		
860	40980	9.85	1900		

870	61230	8.83	2276
880	82980	8.68	2652
890	107480	8.54	3027
900	135980	8.45	3403
910	0	0	3735

Canal20090713.geo

735	0	0	0	1.44	#01
740	3500	2.31	1000	0.03	
745	13843	3.65	2087		
750	24375	5.12	2125		
755	35093	6.4	2162		
760	46000	7.55	2200		
765	65000	7.98	3800		
770	84000	8.79	3800		
775	103000	9.67	3800		
780	122000	10.57	3800		
785	141000	11.47	3800		
790	160000	12.34	3800		
800	198000	14.01	3800		
810	236000	15.6	3800		
820	274000	17.12	3800		
830	312000	18.56	3800		
840	350000	19.93	3800		
850	388000	21.26	3800		
860	426000	22.53	3800		
870	464000	23.76	3800		
880	502000	24.95	3800		
760	0	0	0	1.21	#02
765	5687	2.87	1175	0.03	
770	11750	4.48	1250		
775	18187	5.77	1325		
780	25000	6.88	1400		
785	35750	7.3	2150		
790	46500	8.2	2150		
795	57250	9.14	2150		
800	68000	10.06	2150		
805	78750	10.95	2150		
810	89500	11.82	2150		
815	100250	12.65	2150		
820	111000	13.46	2150		
830	132500	15	2150		
840	154000	16.46	2150		
850	175500	17.83	2150		
860	197000	19.14	2150		

870	218500	20.4	2150		
880	240000	21.6	2150		
890	261500	22.75	2150		
900	283000	23.87	2150		
780	0	0	0	1.06	#03
785	1620	2.78	348	0.03	
790	3482	4.24	396		
795	5593	5.24	462		
800	8242	5.72	597		
805	11569	6.26	733		
810	15574	6.82	868		
815	21388	6.01	1560		
820	29415	7.11	1650		
825	38665	7.94	1850		
830	47915	8.78	1850		
835	57165	9.61	1850		
840	66415	10.41	1850		
845	75665	11.19	1850		
850	84915	11.94	1850		
855	94165	12.67	1850		
860	103415	13.38	1850		
870	121915	14.74	1850		
880	140415	16.04	1850		
890	158915	17.28	1850		
900	177415	18.47	1850		
790	0	0	0	0.94	#04
795	2578	2.86	531	0.03	
800	5315	4.45	563		
805	8209	5.73	594		
810	11260	6.82	626		
815	14538	7.85	726		
820	18680	8.61	930		
825	25498	8.57	1397		
830	32655	8.8	1465		
835	40148	9.12	1532		
840	47980	9.48	1600		
845	55980	9.92	1600		
850	63980	10.39	1600		
855	71980	10.87	1600		
860	79980	11.36	1600		
865	87980	11.84	1600		
870	95980	12.31	1600		
875	103980	12.78	1600		
880	111980	13.25	1600		
890	127980	14.15	1600		
900	143980	15.02	1600		

790	0	0	0	0.79	#05
795	2576	2.86	530	0.03	
800	5304	4.46	560		
805	8184	5.73	591		
810	11217	6.83	621		
815	14407	7.9	657		
820	17800	8.94	700		
825	21312	9.9	705		
830	24850	10.81	710		
835	28412	11.68	715		
840	32000	12.51	720		
845	36350	13.04	870		
850	40700	13.65	870		
855	45050	14.26	870		
860	49400	14.88	870		
865	53750	15.49	870		
870	58100	16.09	870		
875	62450	16.69	870		
880	66800	17.27	870		
890	75500	18.42	870		
900	84200	19.53	870		
790	0	0	0	0.64	#06
795	2551	2.88	520	0.03	
800	5206	4.49	541		
805	7964	5.8	561		
810	10826	6.93	582		
815	13849	7.98	662		
820	17580	8.75	830		
825	21730	9.43	830		
830	25880	10.14	830		
835	30030	10.84	830		
840	34180	11.54	830		
845	38330	12.22	830		
850	42480	12.89	830		
855	46630	13.53	830		
860	50780	14.17	830		
865	54930	14.78	830		
870	59080	15.39	830		
875	63230	15.97	830		
880	67380	16.55	830		
890	75680	17.67	830		
900	83980	18.74	830		
786.2	0	0	0	0.42	#07
790	2224	1.52	1228	0.03	
795	8458	3.54	1262		
800	14843	5.06	1291		

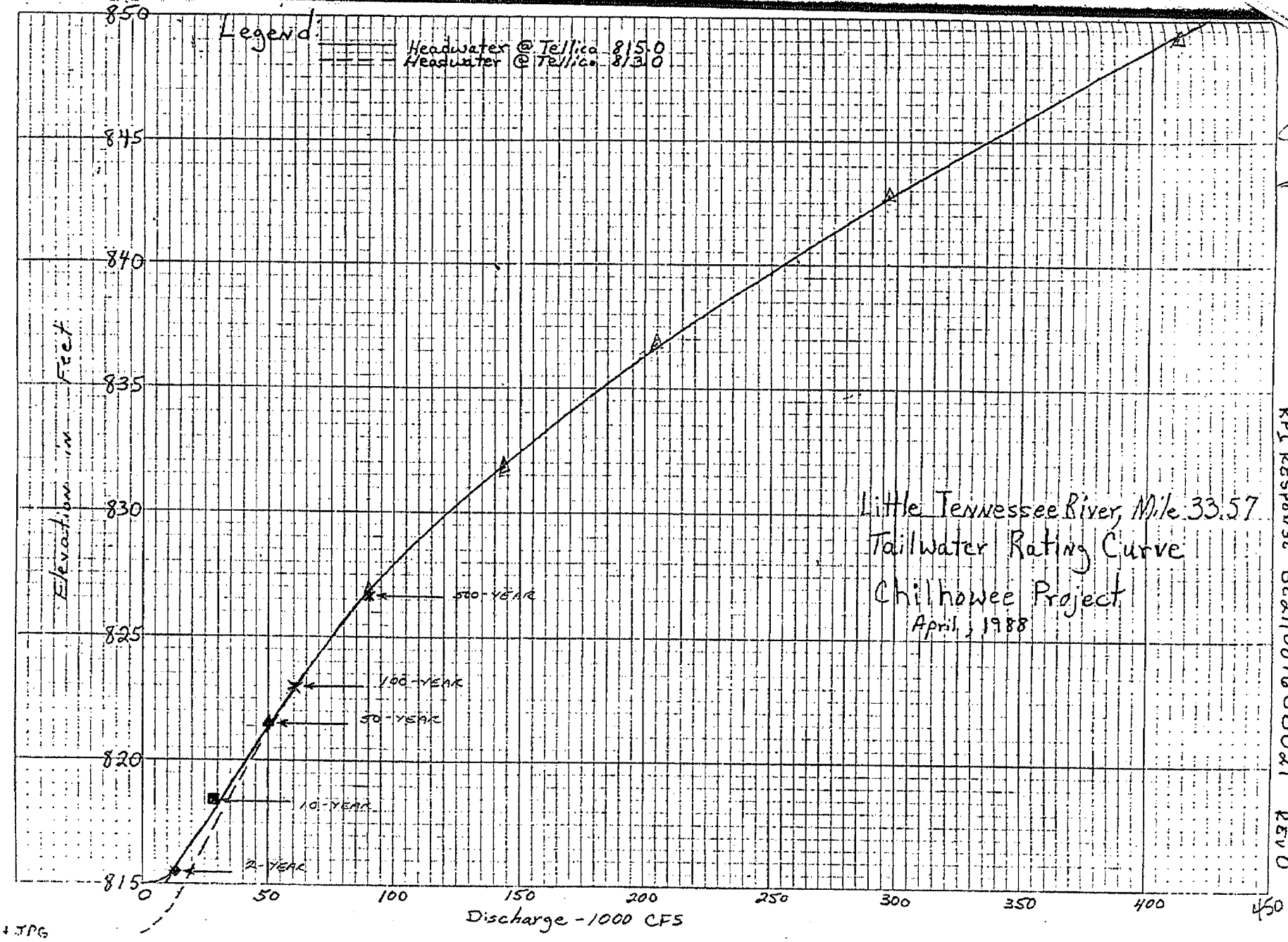
805	21373	6.39	1320		
810	28049	7.58	1349		
815	34872	8.66	1379		
820	41842	9.66	1408		
825	48959	10.6	1438		
830	56165	11.5	1441		
835	63376	12.38	1442		
840	70591	13.22	1443		
845	77810	14.04	1444		
850	85033	14.82	1445		
855	92260	15.58	1445		
860	99492	16.33	1446		
865	106727	17.04	1447		
870	113967	17.75	1448		
875	121211	18.43	1449		
880	128459	19.1	1450		
885	0	0	0		
758	0	0	0	0.24	#08
760	127	1	127	0.03	
765	2380	2.2	727		
770	6797	3.63	982		
775	12387	4.52	1353		
780	20732	5.09	1830		
785	30289	6.18	1974		
790	40603	7.06	2156		
795	52494	7.91	2400		
800	64495	9.01	2400		
805	76495	10.05	2400		
810	88495	11.04	2400		
815	100494	11.98	2400		
820	112495	12.89	2400		
825	124495	13.76	2400		
830	136495	14.6	2400		
840	160495	16.21	2400		
850	184495	17.74	2400		
860	208495	19.19	2400		
870	232495	20.59	2400		
880	256495	21.93	2400		
731.4	0	0	0	0	#09
735	2299	1.84	917	0.03	
740	8569	3.15	1530		
745	17869	4.2	2078		
750	29112	5.33	2372		
755	41840	6.1	2783		
760	56972	6.74	3411		
765	74183	7.9	3443		

770	91398	9.01	3443
775	108613	10.05	3443
780	125828	11.05	3443
790	160258	12.92	3443
800	194688	14.66	3443
810	229118	16.3	3443
820	263548	17.86	3443
830	297978	19.34	3443
840	332408	20.76	3443
850	366838	22.14	3443
860	401268	23.47	3443
870	435698	24.76	3443
880	470128	26.01	3443

CDQ000020080036 Rev 0

Attachment_02_ Tailwater_Rating_Curves.pdf
with attachments:

Chilhowee DRC.pdf – (BE21108160B021)
Douglas Dam Rating Curves, Rev 2.xls– (CDQ000020080007)
Cherokee Dam Rating Curves, Rev.1.xls– (CDQ000020080005)



RFI RESPONSE BE211081608021 REV 0

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CDQ000020080036 Rev 0

Attachment_03_ Headwater_Rating_Curves.pdf
with attachments:

Fort Loudoun DRC.xls – (CDQ000020080009)
Tellico Dam Rating Curve Rev 0 Attachment.xls– (CDQ000020080018)

Attachment 4- All Fort Loudoun Flows and Elevations

Fort Loudoun Dam Mile 602.3 Tenn. River					
HW and Q	1973 Flood - Tabulation in Book 295-20.00				
Entered by JMF 5/28/08			Entered by JMF 5/28/08		
Checked by	BCH 7/14/08		Checked by BCH 7/14/08		
Date	Time	HW elev	Date	Time	Q
3/14/1973	0	807.85	3/14/1973	0	5000
	1.5	807.82		7.5	5000
	4.5	808.05		9	20000
	6.5	808.05		10	20000
	8	808.10		11.5	12000
	8.5	807.95		17	12500
	11	807.81		18.5	19000
	11.5	807.90		22	12000
	15.5	807.65	3/15/1973	0.5	0
	18	807.65		5.5	0
	18.5	807.55		6.5	10000
	19.5	807.55		13	12500
	20	807.63		16	5000
	21	807.51		23.5	30000
	23.5	807.54	3/16/1973	2.5	14000
	24	807.60		11	54000
3/15/1973	4	807.75		16	54000
	6	807.95		20	78000
	6.5	807.86		24	90000
	7.5	808.00	3/17/1973	6	91000
	8.5	808.00		10.5	90000
	10.5	808.15		14	70000
	14	808.17		18	71000
	17.5	808.45		22	35000
	18	808.34	3/18/1973	6	34000
	18.5	808.34		12	32000
	19.5	808.45		18	31500
	24	808.48	3/20/1973	24	30000
3/16/1973	10	810.00			
	13	810.50			
	19.5	812.75			
	22	813.20			
3/17/1973	1.5	813.58			
	9	813.90			
	14.5	813.85			
	16.5	813.70			
	18	813.55			
	19	813.35			
3/18/1973	3	812.95			
	16.5	811.78			
	19.5	811.75			
3/19/1973	20.5	811.19			
3/20/1973	0.5	811.30			
	6.5	811.31			
	23	811.10			
	24	811.10			

TN Mile 645.1 (Lower Gage)			
WS Elev 1973 Flood	Book 295-20.00		
Gage Zero = 797.38			
Entered by JMF 5/28/08			
Checked by	BCH 7/14/08		
Date	Time	Stage	WS elev
3/14/1973	0	10.57	807.95
	1.5	10.80	808.18
	3	10.80	808.18
	4.5	10.70	808.08
	6.5	10.80	808.18
	11	10.79	808.17
	13.5	10.45	807.83
	15.5	10.60	807.98
	19	10.40	807.78
	21	10.40	807.78
	22	10.25	807.63
	23	10.35	807.73
3/15/1973	2	10.35	807.73
	4	10.60	807.98
	7	10.67	808.05
	9	11.08	808.46
	11.5	10.90	808.28
	15	11.20	808.58
	17	11.20	808.58
	20.5	11.58	808.96
	21	11.50	808.88
3/16/1973	2.5	12.10	809.48
	13.5	16.00	813.38
	18.5	19.00	816.38
	23	19.70	817.08
3/17/1973	2	19.60	816.98
	6	19.75	817.13
	7	19.75	817.13
	11.5	19.00	816.38
	22	17.30	814.68
3/18/1973	15.5	15.05	812.43
	16.5	15.10	812.48
	19.5	14.92	812.30
3/19/1973	17.5	14.55	811.93
	21	14.89	812.27
3/20/1973	19	14.48	811.86
	22	14.70	812.08
	24	14.70	812.08

TN River Mile 651.40 (Upper Gage)			
WS Elev 1973 Flood - Book 295-20.00			
Gage Zero = 797.38			
Entered by JMF 5/28/08			
Checked by	BCH 7/14/08		
Date	Time	Stage	WS elev
3/14/1973	0	10.62	808.00
	3	11.1	808.48
	8	11.05	808.43
	11.5	10.9	808.28
	14.5	10.6	807.98
	16.5	10.8	808.18
	21	10.75	808.13
	22.5	10.62	808.00
3/15/1973	3	10.65	808.03
	5	10.85	808.23
	7.5	10.85	808.23
	10	11.28	808.66
	13	11.28	808.66
	17	11.78	809.16
	23	12.4	809.78
3/16/1973	2.5	13.15	810.53
	7.5	15.5	812.88
	13	19	816.38
	17	22.3	819.68
	19	23.1	820.48
	20	23.25	820.63
	22.5	23.2	820.58
3/17/1973	2	22.75	820.13
	5.5	22.7	820.08
	8	22.4	819.78
	12	21.15	818.53
	17	19	816.38
	19	17.9	815.28
	22	16.8	814.18
	24	16.55	813.93
3/18/1973	14	15.25	812.63
	17	15.8	813.18
	19	15.8	813.18
	23	15.6	812.98
3/19/1973	6	15.72	813.10
	17	15.58	812.96
	21	16.45	813.83
	22	16.45	813.83
3/20/1973	4	15.8	813.18
	6	15.7	813.08
	12	15.72	813.10
	17.5	15.5	812.88
	18.5	15.5	812.88
	22	16.1	813.48
	24	16.1	813.48

Holston River Mile 5.5			
WS Elev 1973 Flood - Book 295-20.00			
Gage Zero = 815.84			
Entered by JMF 5/28/08			
Checked by	BCH 7/14/08		
Date	Time	Stage	WS elev
3/13/1973	10	2.02	817.86
3/14/1973	12	1.88	817.72
3/15/1973	7	1.85	817.69
	14	3.6	819.44
	19	3.6	819.44
	22	3.5	819.34
3/16/1973	10.5	7.5	823.34
	14.5	8	823.84
	18	10.05	825.89
	19.5	10.4	826.24
	24	9.8	825.64
3/17/1973	4	9	824.84
	13	6.35	822.19
	17	5.5	821.34
	21	4.8	820.64
3/18/1973	4	4.2	820.04
	12	3.8	819.64
	24	3.4	819.24
3/19/1973	16	3.1	818.94
	18.5	6.2	822.04
	20	6.62	822.46
3/20/1973	3	4.5	820.34
	6	3.97	819.81
	7	3.97	819.81
	10	4.3	820.14
	11.5	4.3	820.14
	17	3.59	819.43
	20	5.58	821.42
	21.5	5.75	821.59
	24	5.4	821.24

French Broad River Mile 7.4
WS Elev 1973 Flood - Book 295-20.00
Gage Zero = 800.00
Entered by JMF 5/28/08
Checked by BCH 7/14/08

Date	Time	Stage	WS elev
3/14/1973	0	18.5	818.50
	1	18.9	818.90
	5.5	18.9	818.90
	10	17.8	817.80
	12	17.6	817.60
	13	17.6	817.60
	16	18.5	818.50
	19	18.9	818.90
3/15/1973	3	18.92	818.92
	8	17.9	817.90
	9	17.9	817.90
	12	18.1	818.10
	15	19.17	819.17
	18	19.45	819.45
	23	20	820.00
3/16/1973	1	20.12	820.12
	7	21.97	821.97
	9	23	823.00
	12	25.7	825.70
	14	28.2	828.20
	18.5	30	830.00
	22.5	29.2	829.20
3/17/1973	1.5	28.45	828.45
	5.5	29.05	829.05
	8	28.4	828.40
	12	26.35	826.35
	14	25.65	825.65
	17	23	823.00
	20	20.6	820.60
	22	19.8	819.80
3/18/1973	2	19	819.00
	7	18.42	818.42
	13.5	17.95	817.95
	15	19	819.00
	16	20.6	820.60
	17	21.2	821.20
	19	21.55	821.55
	23	21.56	821.56
3/19/1973	2	22.21	822.21
	6	22.5	822.50
3/20/1973	24	22.2	822.20

Douglas Dam Mile 32.30 French Broad River
TW Elev and Q 1973 Flood - Book 295-20.00
Entered by JMF 5/28/08
Checked by BCH 7/14/08

Date	Time	TW elev
3/14/1973	0	873.28
	1	872.00
	2	871.28
	3	871.17
	5	871.14
	6.5	871.18
	7.75	871.30
	8.25	872.35
	9	872.65
	13	872.78
	22.75	872.79
	23	872.00
	23.5	871.50
	24	871.28
3/15/1973	1	871.17
	4.25	871.15
	4.5	871.48
	6.5	871.57
	7	872.45
	7.5	872.72
	10	872.80
	14.25	872.83
	16	873.65
	16.5	873.15
	17	873.51
	18.75	872.45
	19.5	872.85
	20.5	872.45
	21.25	871.95
	22	873.25
	22.5	873.40
	23.5	871.00
	24	869.98
3/16/1973	0.5	869.50
	1.5	868.90
	2.5	868.50
	5.5	868.10
	7	868.04
	7.25	868.15
	7.5	870.00
	8	873.00
	8.5	873.80
	9.25	874.15
	9.5	873.30
	11.5	872.75
	12	873.60

Entered by JMF 5/28/08
Checked by BCH 7/14/08

Date	Time	Q
3/14/1973	0	8900
	0.01	6000
	1	6000
	1.01	3700
	3	3700
	5	3850
	5.01	3300
	6	3300
	6.01	3700
	7	3700
	7.01	5500
	8	5500
	8.01	7300
	9	7300
	9.01	8500
	12	8700
	12.01	5300
	13	5300
	13.01	5650
	14	5650
	14.01	7550
	22	7400
	22.01	5800
	23	5800
	23.01	3500
	24	3500
3/15/1973	0.01	4000
	4	3900
	4.01	4750
	5	4750
	5.01	5250
	6	5250
	6.01	6800
	7	6800
	7.01	6500
	8	6500
	8.01	7250
	9	7250
	9.01	7400
	14	7500
	14.01	8750
	15	8750
	15.01	9600
	16	9600
	16.01	8750
	17	8750

Cherokee Dam, Mile 52.3 Holston River
TW Elev and Q 1973 Flood - Book 295-20.00
Entered by JMF 5/28/08
Checked by BCH 7/14/08

Date	Time	TW elev
3/14/1973	0	921.03
3/19/1973	2.5	921.09
	4	924.10
	4.25	924.25
	4.75	923.90
	5	925.00
	5.75	925.90
	6	928.20
	7.5	929.47
	9	928.80
	10.5	929.25
	11	925.00
	12	921.14
	13.5	923.70
	14	923.25
	14.5	921.50
	15	921.10
	16	921.06
	16.5	923.85
	17.5	924.10
	22.75	924.05
	23.5	921.50
	24	921.14
3/20/1973	6	921.14
	6.5	925.00
	7	929.00
	7.5	929.50
	8.5	929.68
	10	926.15
	10.5	925.85
	11	925.00
	11.5	923.68
	12	923.65
	12.5	924.70
	13	923.43
	13.5	924.75
	14.5	921.15
	15	921.07
	15.75	921.07
	16.75	925.00
	17	926.40
	18	926.75
	19.5	925.85
	20	925.00
	20.5	921.50
	21	921.14

Entered by JMF 5/28/08
Checked by BCH 7/14/08

Date	Time	Q
3/14/1973	0	0
3/19/1973	3	0
	3.01	3250
	5	3250
	5.01	8000
	6	8000
	6.01	13250
	7	13250
	7.01	14100
	8	14100
	8.01	13400
	10	13400
	10.01	9300
	11	9300
	11.01	0
	12	0
	12.01	1300
	13	1300
	13.01	2300
	14	2300
	14.01	0
	16	0
	16.01	3000
	17	3000
	17.01	3300
	22	3300
	22.01	2500
	23	2500
	23.01	0
3/20/1973	6	0
	6.01	8000
	7	8000
	7.01	15400
	8	15400
	8.01	12800
	9	12800
	9.01	7800
	10	7800
	10.01	5800
	11	5800
	11.01	3000
	12	3000
	12.01	3500
	13	3500
	13.01	2000

French Broad River Mile 7.4
WS Elev 1973 Flood - Book 295-20.00
Gage Zero = 800.00
Entered by JMF 5/28/08
Checked by BCH 7/14/08

Date	Time	Stage	WS elev

Douglas Dam Mile 32.30 French Broad River
TW Elev and Q 1973 Flood - Book 295-20.00
Entered by JMF 5/28/08
Checked by BCH 7/14/08
Entered by JMF 5/28/08
Checked by BCH 7/14/08

Date	Time	TW elev	Date	Time	Q
	12.5	873.25		17.01	7600
	14.5	872.25		18	7600
	16	873.85		18.01	6600
	17	872.85		19	6600
	18	875.00		19.01	7100
	18.5	876.19		20	7100
	18.75	875.00		20.01	5750
	20	870.05		21	5750
	20.5	871.40		21.01	8600
	21	871.80		22	8600
	21.25	871.15		22.01	4250
	22.5	873.33		23	4250
	23	871.60		23.01	1800
3/17/1973	0.5	872.05		24	1800
	1	872.75	3/16/1973	0.01	0
	1.75	872.95		7	0
	2.5	872.75		7.01	10250
	3	872.00		8	10250
	4	873.30		8.01	10750
	4.75	871.80		9	10750
	5.5	872.55		9.01	6800
	6.25	871.26		13	6300
	7.5	874.30		13.01	5600
	8.5	875.00		14	5600
	9	875.30		14.01	7200
	9.5	875.00		15	7200
	10.25	873.11		15.01	9700
	11.5	870.00		16	9700
	12.5	869.00		16.01	6800
	13.5	868.50		17	6800
	15	868.25		17.01	13500
	18	867.90		18	13500
	21	867.72		18.01	6250
	24	867.66		19	6250
3/18/1973	6	867.05		19.01	300
	8	867.05		20	300
	8.5	870.00		20.01	4400
	11	875.00		21	4400
	13.5	875.00		21.01	7900
	14	875.10		22	7900
	18	875.00		22.01	4200
	19	875.10		23	4200
	19.5	876.00		23.01	3650
3/19/1973	1	876.35		24	3650
	15	876.31	3/17/1973	0.01	5400
	24	876.38		1	5400
3/20/1973	12	876.30		1.01	5800
	24	876.42		2	5800
				2.01	4400
				3	4400
				3.01	6500
				4	6500
				4.01	4700

Cherokee Dam, Mile 52.3 Holston River
TW Elev and Q 1973 Flood - Book 295-20.00
Entered by JMF 5/28/08
Checked by BCH 7/14/08
Entered by JMF 5/28/08
Checked by BCH 7/14/08

Date	Time	TW elev	Date	Time	Q
	24	921.05		14	2000
				14.01	0
				15	0
				15.01	500
				16	500
				16.01	4200
				17	4200
				17.01	7900
				18	7900
				18.01	7000
				19	7000
				19.01	5600
				20	5600
				20.01	0
				24	0

French Broad River Mile 7.4					Douglas Dam Mile 32.30 French Broad River							Cherokee Dam, Mile 52.3 Holston River					
WS Elev 1973 Flood - Book 295-20.00					TW Elev and Q 1973 Flood - Book 295-20.00							TW Elev and Q 1973 Flood - Book 295-20.00					
Gage Zero = 800.00																	
Entered by JMF 5/28/08					Entered by JMF 5/28/08			Entered by JMF 5/28/08				Entered by JMF 5/28/08			Entered by JMF 5/28/08		
Checked by	BCH 7/14/08				Checked by	BCH 7/14/08		Checked by BCH 7/14/08				Checked by	BCH 7/14/08		Checked by BCH 7/14/08		
Date	Time	Stage	WS elev		Date	Time	TW elev	Date	Time	Q		Date	Time	TW elev	Date	Time	Q
									5	4700							
									5.01	4000							
									6	4000							
									6.01	8750							
									7	8750							
									7.01	12300							
									8	12300							
									8.01	13800							
									9	13800							
									9.01	7300							
									10	7300							
									10.01	3750							
									11	3750							
									11.01	0							
								3/18/1973	8	0							
									8.01	7800							
									9	7800							
									9.01	13100							
									10	13100							
									10.01	13600							
									13	13400							
									18	13300							
									18.01	15150							
									19	15150							
									19.01	16700							
									21	16700							
									21.01	17300							
									23	17250							
									23.01	17750							
								3/19/1973	14	17750							
									14.01	17500							
									15	17500							
									15.01	17900							
									19	17750							
								3/20/1973	12	17800							
									12.01	17650							
									13	17650							
									13.01	17750							
									16	17900							
									16.01	18100							
									20	18100							
									21	17750							
									23	17750							
									23.01	17800							
									24	17800							

Fort Loudoun Dam TRM 602.3				TN River below Knoxville (UTB) TRM 645.1			
HW and Q from TVA River Operations, River				Stage and WS Elev from TVA River Operations, River			
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database			
Entered by JMF 6/18/08				Entered by JMF 6/18/08		Gage Zero =800.00	
Checked by SCB 7/24/08				Checked by SCB 7/24/08			
Date and Time	HW elev	Discharge Q (cfs)		Date and Time	Stage	WS elev	
5/3/03 1:00	812.72	13825		5/3/03 0:00	13.31	813.31	
5/3/03 2:00	812.68	13722		5/3/03 2:00	13.07	813.07	
5/3/03 3:00	812.64	13772		5/3/03 4:00	12.85	812.85	
5/3/03 4:00	812.7	13801		5/3/03 6:00	12.81	812.81	
5/3/03 5:00	812.75	13776		5/3/03 8:00	12.93	812.93	
5/3/03 6:00	812.68	13717		5/3/03 10:00	12.89	812.89	
5/3/03 7:00	812.62	13622		5/3/03 12:00	12.76	812.76	
5/3/03 8:00	812.72	13858		5/3/03 14:00	12.68	812.68	
5/3/03 9:00	812.63	13886		5/3/03 16:00	12.66	812.66	
5/3/03 10:00	812.56	13750		5/3/03 18:00	12.65	812.65	
5/3/03 11:00	812.66	13627		5/3/03 20:00	12.67	812.67	
5/3/03 12:00	812.65	13852		5/3/03 22:00	12.65	812.65	
5/3/03 13:00	812.61	13991		5/4/03 0:00	12.7	812.7	
5/3/03 14:00	812.48	13912		5/4/03 2:00	12.71	812.71	
5/3/03 15:00	812.48	13998		5/4/03 4:00	12.63	812.63	
5/3/03 16:00	812.45	14000		5/4/03 6:00	12.72	812.72	
5/3/03 17:00	812.51	14086		5/4/03 8:00	12.74	812.74	
5/3/03 18:00	812.43	14044		5/4/03 10:00	12.65	812.65	
5/3/03 19:00	812.56	13939		5/4/03 12:00	12.6	812.6	
5/3/03 20:00	812.45	14150		5/4/03 14:00	12.54	812.54	
5/3/03 21:00	812.5	14038		5/4/03 16:00	12.48	812.48	
5/3/03 22:00	812.49	404		5/4/03 18:00	12.44	812.44	
5/3/03 23:00	812.48	0		5/4/03 20:00	12.38	812.38	
5/4/03 0:00	812.46	0		5/4/03 22:00	12.32	812.32	
5/4/03 1:00	812.48	0		5/5/03 0:00	12.37	812.37	
5/4/03 2:00	812.51	0		5/5/03 2:00	12.38	812.38	
5/4/03 3:00	812.53	0		5/5/03 4:00	12.22	812.22	
5/4/03 4:00	812.55	0		5/5/03 6:00	12.25	812.25	
5/4/03 5:00	812.53	0		5/5/03 8:00	12.17	812.17	
5/4/03 6:00	812.54	0		5/5/03 10:00	12.2	812.2	
5/4/03 7:00	812.54	1787		5/5/03 12:00	12.28	812.28	
5/4/03 8:00	812.47	13309		5/5/03 14:00	12.33	812.33	
5/4/03 9:00	812.48	13375		5/5/03 16:00	12.34	812.34	
5/4/03 10:00	812.56	13598		5/5/03 18:00	12.79	812.79	
5/4/03 11:00	812.51	13639		5/5/03 20:00	13.28	813.28	
5/4/03 12:00	812.39	13586		5/5/03 22:00	13.51	813.51	
5/4/03 13:00	812.5	13710		5/6/03 0:00	13.66	813.66	
5/4/03 14:00	812.35	13742		5/6/03 2:00	13.7	813.7	
5/4/03 15:00	812.33	13801		5/6/03 4:00	13.62	813.62	
5/4/03 16:00	812.43	13838		5/6/03 6:00	13.82	813.82	
5/4/03 17:00	812.34	13762		5/6/03 8:00	14.23	814.23	
5/4/03 18:00	812.39	13743		5/6/03 10:00	14.63	814.63	
5/4/03 19:00	812.27	13680		5/6/03 12:00	15.07	815.07	
5/4/03 20:00	812.24	13817		5/6/03 14:00	15.26	815.26	
5/4/03 21:00	812.28	13779		5/6/03 16:00	15.47	815.47	
5/4/03 22:00	812.3	13607		5/6/03 18:00	15.79	815.79	
5/4/03 23:00	812.24	13462		5/6/03 20:00	16.1	816.1	
5/5/03 0:00	812.29	13404		5/6/03 22:00	16.41	816.41	
5/5/03 1:00	812.27	13373		5/7/03 0:00	16.69	816.69	
5/5/03 2:00	812.24	13333		5/7/03 2:00	16.84	816.84	
5/5/03 3:00	812.16	13443		5/7/03 4:00	16.83	816.83	
5/5/03 4:00	812.25	13383		5/7/03 6:00	16.62	816.62	
5/5/03 5:00	812.25	13390		5/7/03 8:00	16.39	816.39	

Fort Loudoun Dam TRM 602.3				TN River below Knoxville (UTB) TRM 645.1			
HW and Q from TVA River Operations, River				Stage and WS Elev from TVA River Operations, River			
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database			
Entered by JMF 6/18/08				Entered by JMF 6/18/08		Gage Zero =800.00	
Checked by SCB 7/24/08				Checked by SCB 7/24/08			
Date and Time	HW elev	Discharge Q (cfs)		Date and Time	Stage	WS elev	
5/5/03 6:00	812.12	13468		5/7/03 10:00	16.2	816.2	
5/5/03 7:00	812.08	13418		5/7/03 12:00	16.18	816.18	
5/5/03 8:00	812.21	13508		5/7/03 14:00	16.15	816.15	
5/5/03 9:00	812.14	13574		5/7/03 16:00	16.1	816.1	
5/5/03 10:00	812.24	13421		5/7/03 18:00	16.24	816.24	
5/5/03 11:00	812.13	13442		5/7/03 20:00	16.33	816.33	
5/5/03 12:00	812.11	13386		5/7/03 22:00	16.29	816.29	
5/5/03 13:00	812.14	13420		5/8/03 0:00	16.31	816.31	
5/5/03 14:00	812.18	13556		5/8/03 2:00	16.32	816.32	
5/5/03 15:00	812.22	13119		5/8/03 4:00	16.35	816.35	
5/5/03 16:00	812.33	13219		5/8/03 6:00	16.38	816.38	
5/5/03 17:00	812.23	13258		5/8/03 8:00	16.4	816.4	
5/5/03 18:00	812.29	13322		5/8/03 10:00	16.37	816.37	
5/5/03 19:00	812.43	13363		5/8/03 12:00	16.29	816.29	
5/5/03 20:00	812.54	13319		5/8/03 14:00	16.37	816.37	
5/5/03 21:00	812.6	13157		5/8/03 16:00	16.41	816.41	
5/5/03 22:00	812.92	13069		5/8/03 18:00	16.38	816.38	
5/5/03 23:00	812.96	18937		5/8/03 20:00	16.32	816.32	
5/6/03 0:00	812.94	27329		5/8/03 22:00	16.28	816.28	
5/6/03 1:00	813.09	37522		5/9/03 0:00	16.25	816.25	
5/6/03 2:00	813.11	47930		5/9/03 2:00	16.18	816.18	
5/6/03 3:00	813.17	54418		5/9/03 4:00	16.15	816.15	
5/6/03 4:00	813.16	55063		5/9/03 6:00	16.06	816.06	
5/6/03 5:00	813.16	55081		5/9/03 8:00	16.03	816.03	
5/6/03 6:00	813.23	55099		5/9/03 10:00	15.96	815.96	
5/6/03 7:00	813.25	55069		5/9/03 12:00	15.95	815.95	
5/6/03 8:00	813.36	59410		5/9/03 14:00	15.9	815.9	
5/6/03 9:00	813.33	60864		5/9/03 16:00	15.8	815.8	
5/6/03 10:00	813.43	61262		5/9/03 18:00	15.74	815.74	
5/6/03 11:00	814.05	61676		5/9/03 20:00	15.66	815.66	
5/6/03 12:00	814.29	62073		5/9/03 22:00	15.51	815.51	
5/6/03 13:00	814.39	62227		5/10/03 0:00	15.35	815.35	
5/6/03 14:00	814.47	62326		5/10/03 2:00	15.17	815.17	
5/6/03 15:00	814.69	62433		5/10/03 4:00	15.15	815.15	
5/6/03 16:00	814.86	62559		5/10/03 6:00	15.22	815.22	
5/6/03 17:00	815.03	62833		5/10/03 8:00	15.11	815.11	
5/6/03 18:00	815.18	63067		5/10/03 10:00	14.94	814.94	
5/6/03 19:00	815.32	63093		5/10/03 12:00	14.78	814.78	
5/6/03 20:00	815.46	63417		5/10/03 14:00	14.74	814.74	
5/6/03 21:00	815.52	63520		5/10/03 16:00	14.7	814.7	
5/6/03 22:00	815.61	63996		5/10/03 18:00	14.66	814.66	
5/6/03 23:00	815.68	64050		5/10/03 20:00	14.62	814.62	
5/7/03 0:00	815.72	64126		5/10/03 22:00	14.59	814.59	
5/7/03 1:00	815.77	64149		5/11/03 0:00	14.57	814.57	
5/7/03 2:00	815.81	64175		5/11/03 2:00	14.55	814.55	
5/7/03 3:00	815.87	64201		5/11/03 4:00	14.55	814.55	
5/7/03 4:00	815.84	64228		5/11/03 6:00	14.55	814.55	
5/7/03 5:00	815.8	64159		5/11/03 8:00	14.67	814.67	
5/7/03 6:00	815.81	64161		5/11/03 10:00	14.63	814.63	
5/7/03 7:00	815.81	64125		5/11/03 12:00	14.58	814.58	
5/7/03 8:00	815.73	64083		5/11/03 14:00	14.63	814.63	
5/7/03 9:00	815.67	64109		5/11/03 16:00	14.67	814.67	
5/7/03 10:00	815.57	64077		5/11/03 18:00	14.63	814.63	

Fort Loudoun Dam TRM 602.3				TN River below Knoxville (UTB) TRM 645.1			
HW and Q from TVA River Operations, River				Stage and WS Elev from TVA River Operations, River			
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database			
Entered by JMF 6/18/08				Entered by JMF 6/18/08		Gage Zero =800.00	
Checked by SCB 7/24/08				Checked by SCB 7/24/08			
Date and Time	HW elev	Discharge Q (cfs)		Date and Time	Stage	WS elev	
5/7/03 11:00	815.49	64029		5/11/03 20:00	14.6	814.6	
5/7/03 12:00	815.42	63973		5/11/03 22:00	14.54	814.54	
5/7/03 13:00	815.36	63929		5/12/03 0:00	14.51	814.51	
5/7/03 14:00	815.35	64134		5/12/03 2:00	14.51	814.51	
5/7/03 15:00	815.38	58940		5/12/03 4:00	14.49	814.49	
5/7/03 16:00	815.35	53645		5/12/03 6:00	14.48	814.48	
5/7/03 17:00	815.36	53616		5/12/03 8:00	14.45	814.45	
5/7/03 18:00	815.33	53579		5/12/03 10:00	14.45	814.45	
5/7/03 19:00	815.38	53629		5/12/03 12:00	14.47	814.47	
5/7/03 20:00	815.41	53694		5/12/03 14:00	14.36	814.36	
5/7/03 21:00	815.47	53734		5/12/03 16:00	14.26	814.26	
5/7/03 22:00	815.53	53812		5/12/03 18:00	14.21	814.21	
5/7/03 23:00	815.58	53775		5/12/03 20:00	14.1	814.1	
5/8/03 0:00	815.61	53837		5/12/03 22:00	14	814	
5/8/03 1:00	815.67	53723		5/13/03 0:00	13.91	813.91	
5/8/03 2:00	815.69	53692		5/13/03 2:00	13.85	813.85	
5/8/03 3:00	815.73	53697		5/13/03 4:00	14.09	814.09	
5/8/03 4:00	815.76	53778		5/13/03 6:00	14.26	814.26	
5/8/03 5:00	815.8	53836		5/13/03 8:00	14.28	814.28	
5/8/03 6:00	815.82	53780		5/13/03 10:00	14.16	814.16	
5/8/03 7:00	815.84	53716		5/13/03 12:00	13.99	813.99	
5/8/03 8:00	815.83	53697		5/13/03 14:00	13.84	813.84	
5/8/03 9:00	815.76	67443		5/13/03 16:00	13.77	813.77	
5/8/03 10:00	815.76	67341		5/13/03 18:00	13.59	813.59	
5/8/03 11:00	815.73	67259		5/13/03 20:00	13.34	813.34	
5/8/03 12:00	815.68	67325		5/13/03 22:00	13.14	813.14	
5/8/03 13:00	815.66	67320		5/14/03 0:00	13.04	813.04	
5/8/03 14:00	815.62	67324		5/14/03 2:00	13.07	813.07	
5/8/03 15:00	815.59	67302		5/14/03 4:00	13.27	813.27	
5/8/03 16:00	815.58	67284		5/14/03 6:00	13.38	813.38	
5/8/03 17:00	815.57	67285		5/14/03 8:00	13.38	813.38	
5/8/03 18:00	815.55	67197		5/14/03 10:00	13.23	813.23	
5/8/03 19:00	815.52	67161		5/14/03 12:00	13.06	813.06	
5/8/03 20:00	815.5	67161		5/14/03 14:00	12.89	812.89	
5/8/03 21:00	815.47	67143		5/14/03 16:00	12.9	812.9	
5/8/03 22:00	815.46	67087		5/14/03 18:00	12.9	812.9	
5/8/03 23:00	815.42	67092		5/14/03 20:00	12.88	812.88	
5/9/03 0:00	815.39	67023		5/14/03 22:00	12.84	812.84	
5/9/03 1:00	815.37	66993		5/15/03 0:00	12.81	812.81	
5/9/03 2:00	815.34	66969		5/15/03 2:00	12.87	812.87	
5/9/03 3:00	815.32	66952		5/15/03 4:00	12.97	812.97	
5/9/03 4:00	815.29	66926		5/15/03 6:00	13.07	813.07	
5/9/03 5:00	815.26	66904		5/15/03 8:00	12.99	812.99	
5/9/03 6:00	815.23	66893		5/15/03 10:00	12.84	812.84	
5/9/03 7:00	815.19	66777		5/15/03 12:00	12.78	812.78	
5/9/03 8:00	815.17	66797		5/15/03 14:00	12.69	812.69	
5/9/03 9:00	815.13	66770		5/15/03 16:00	12.65	812.65	
5/9/03 10:00	815.1	66794		5/15/03 18:00	12.76	812.76	
5/9/03 11:00	815.07	66648		5/15/03 20:00	12.75	812.75	
5/9/03 12:00	815.03	66596		5/15/03 22:00	12.66	812.66	
5/9/03 13:00	814.99	66566		5/16/03 0:00	12.76	812.76	
5/9/03 14:00	814.95	66540		5/16/03 2:00	13.12	813.12	
5/9/03 15:00	814.91	66469		5/16/03 4:00	13.25	813.25	

Fort Loudoun Dam TRM 602.3				TN River below Knoxville (UTB) TRM 645.1			
HW and Q from TVA River Operations, River				Stage and WS Elev from TVA River Operations, River			
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database			
Entered by JMF 6/18/08				Entered by JMF 6/18/08		Gage Zero =800.00	
Checked by SCB 7/24/08				Checked by SCB 7/24/08			
Date and Time	HW elev	Discharge Q (cfs)		Date and Time	Stage	WS elev	
5/9/03 16:00	814.88	66471		5/16/03 6:00	13.3	813.3	
5/9/03 17:00	814.85	66419		5/16/03 8:00	13.24	813.24	
5/9/03 18:00	814.86	66390		5/16/03 10:00	13.22	813.22	
5/9/03 19:00	814.73	66297		5/16/03 12:00	13.17	813.17	
5/9/03 20:00	814.69	66259		5/16/03 14:00	13.09	813.09	
5/9/03 21:00	814.62	66211		5/16/03 16:00	13.07	813.07	
5/9/03 22:00	814.52	66039		5/16/03 18:00	13.04	813.04	
5/9/03 23:00	814.45	66130		5/16/03 20:00	13.04	813.04	
5/10/03 0:00	814.36	66058		5/16/03 22:00	13.05	813.05	
5/10/03 1:00	814.27	66028		5/17/03 0:00	13.24	813.24	
5/10/03 2:00	814.22	65889		5/17/03 2:00	13.54	813.54	
5/10/03 3:00	814.14	65768		5/17/03 4:00	13.57	813.57	
5/10/03 4:00	814.06	65678		5/17/03 6:00	13.55	813.55	
5/10/03 5:00	814	65558		5/17/03 8:00	13.48	813.48	
5/10/03 6:00	813.92	65507		5/17/03 10:00	13.37	813.37	
5/10/03 7:00	813.88	65457		5/17/03 12:00	13.29	813.29	
5/10/03 8:00	813.84	65442		5/17/03 14:00	13.23	813.23	
5/10/03 9:00	813.78	65874		5/17/03 16:00	13.2	813.2	
5/10/03 10:00	813.7	65827		5/17/03 18:00	13.18	813.18	
5/10/03 11:00	813.69	65800		5/17/03 20:00	13.2	813.2	
5/10/03 12:00	813.71	55832		5/17/03 22:00	13.21	813.21	
5/10/03 13:00	813.7	55123		05/17/2003 24:0	13.24	813.24	
5/10/03 14:00	813.68	55020					
5/10/03 15:00	813.7	55082					
5/10/03 16:00	813.71	55164					
5/10/03 17:00	813.72	55158					
5/10/03 18:00	813.72	55238					
5/10/03 19:00	813.72	55287					
5/10/03 20:00	813.72	55433					
5/10/03 21:00	813.72	55569					
5/10/03 22:00	813.72	55508					
5/10/03 23:00	813.71	55428					
5/11/03 0:00	813.71	55337					
5/11/03 1:00	813.7	55265					
5/11/03 2:00	813.69	55132					
5/11/03 3:00	813.69	55049					
5/11/03 4:00	813.69	55110					
5/11/03 5:00	813.68	55039					
5/11/03 6:00	813.68	54998					
5/11/03 7:00	813.75	54712					
5/11/03 8:00	813.74	54785					
5/11/03 9:00	813.71	54671					
5/11/03 10:00	813.71	54689					
5/11/03 11:00	813.71	54551					
5/11/03 12:00	813.7	54563					
5/11/03 13:00	813.69	54582					
5/11/03 14:00	813.68	54441					
5/11/03 15:00	813.68	54401					
5/11/03 16:00	813.69	54395					
5/11/03 17:00	813.68	54343					
5/11/03 18:00	813.68	54287					
5/11/03 19:00	813.67	54411					
5/11/03 20:00	813.66	54591					

Fort Loudoun Dam TRM 602.3				TN River below Knoxville (UTB) TRM 645.1			
HW and Q from TVA River Operations, River				Stage and WS Elev from TVA River Operations, River			
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database			
Entered by JMF 6/18/08				Entered by JMF 6/18/08		Gage Zero =800.00	
Checked by SCB 7/24/08				Checked by SCB 7/24/08			
Date and Time	HW elev	Discharge Q (cfs)		Date and Time	Stage	WS elev	
5/11/03 21:00	813.66	54648					
5/11/03 22:00	813.66	54438					
5/11/03 23:00	813.66	54434					
5/12/03 0:00	813.64	54494					
5/12/03 1:00	813.64	54679					
5/12/03 2:00	813.64	54615					
5/12/03 3:00	813.63	54625					
5/12/03 4:00	813.61	54678					
5/12/03 5:00	813.6	54647					
5/12/03 6:00	813.59	54522					
5/12/03 7:00	813.59	54327					
5/12/03 8:00	813.57	54109					
5/12/03 9:00	813.56	54138					
5/12/03 10:00	813.53	54041					
5/12/03 11:00	813.49	54047					
5/12/03 12:00	813.44	63383					
5/12/03 13:00	813.4	65873					
5/12/03 14:00	813.36	66410					
5/12/03 15:00	813.33	66300					
5/12/03 16:00	813.27	66293					
5/12/03 17:00	813.22	66179					
5/12/03 18:00	813.18	66075					
5/12/03 19:00	813.14	66166					
5/12/03 20:00	813.1	66234					
5/12/03 21:00	813.06	66262					
5/12/03 22:00	813.01	66142					
5/12/03 23:00	812.97	66039					
5/13/03 0:00	812.93	65937					
5/13/03 1:00	812.87	65965					
5/13/03 2:00	812.83	65936					
5/13/03 3:00	812.78	65898					
5/13/03 4:00	812.74	65865					
5/13/03 5:00	812.73	65821					
5/13/03 6:00	812.72	65840					
5/13/03 7:00	812.7	65756					
5/13/03 8:00	812.69	65730					
5/13/03 9:00	812.7	65782					
5/13/03 10:00	812.67	65737					
5/13/03 11:00	812.66	65810					
5/13/03 12:00	812.68	65990					
5/13/03 13:00	812.68	56333					
5/13/03 14:00	812.67	56339					
5/13/03 15:00	812.66	56338					
5/13/03 16:00	812.67	56232					
5/13/03 17:00	812.65	56186					
5/13/03 18:00	812.64	56088					
5/13/03 19:00	812.62	56128					
5/13/03 20:00	812.6	56060					
5/13/03 21:00	812.56	55886					
5/13/03 22:00	812.53	55703					
5/13/03 23:00	812.5	55388					
5/14/03 0:00	812.46	55572					
5/14/03 1:00	812.42	55502					

Fort Loudoun Dam TRM 602.3				TN River below Knoxville (UTB) TRM 645.1			
HW and Q from TVA River Operations, River				Stage and WS Elev from TVA River Operations, River			
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database			
Entered by JMF 6/18/08				Entered by JMF 6/18/08		Gage Zero =800.00	
Checked by SCB 7/24/08				Checked by SCB 7/24/08			
Date and Time	HW elev	Discharge Q (cfs)		Date and Time	Stage	WS elev	
5/14/03 2:00	812.38	55465					
5/14/03 3:00	812.34	55526					
5/14/03 4:00	812.31	55492					
5/14/03 5:00	812.3	55452					
5/14/03 6:00	812.29	55453					
5/14/03 7:00	812.29	55351					
5/14/03 8:00	812.28	55371					
5/14/03 9:00	812.27	55303					
5/14/03 10:00	812.26	55306					
5/14/03 11:00	812.24	55269					
5/14/03 12:00	812.22	55251					
5/14/03 13:00	812.3	46757					
5/14/03 14:00	812.29	40360					
5/14/03 15:00	812.29	40355					
5/14/03 16:00	812.28	40346					
5/14/03 17:00	812.29	40313					
5/14/03 18:00	812.3	40378					
5/14/03 19:00	812.3	40351					
5/14/03 20:00	812.3	40455					
5/14/03 21:00	812.29	40348					
5/14/03 22:00	812.29	40232					
5/14/03 23:00	812.29	40246					
5/15/03 0:00	812.25	42271					
5/15/03 1:00	812.12	55189					
5/15/03 2:00	812.09	55353					
5/15/03 3:00	812.03	55316					
5/15/03 4:00	811.97	55345					
5/15/03 5:00	811.92	55148					
5/15/03 6:00	811.88	55153					
5/15/03 7:00	811.85	55186					
5/15/03 8:00	811.81	55517					
5/15/03 9:00	811.91	50707					
5/15/03 10:00	811.91	42874					
5/15/03 11:00	811.92	39768					
5/15/03 12:00	811.95	38474					
5/15/03 13:00	811.95	38032					
5/15/03 14:00	811.98	38166					
5/15/03 15:00	812.01	38255					
5/15/03 16:00	812.01	38342					
5/15/03 17:00	812.04	38322					
5/15/03 18:00	812.04	38221					
5/15/03 19:00	812.1	38320					
5/15/03 20:00	812.08	38105					
5/15/03 21:00	812.07	38145					
5/15/03 22:00	812.12	37992					
5/15/03 23:00	812.11	37985					
5/16/03 0:00	812.12	37901					
5/16/03 1:00	812.1	37773					
5/16/03 2:00	812.1	37657					
5/16/03 3:00	812.13	37713					
5/16/03 4:00	812.14	37828					
5/16/03 5:00	812.16	38018					
5/16/03 6:00	812.18	38134					

Fort Loudoun Dam TRM 602.3				TN River below Knoxville (UTB) TRM 645.1			
HW and Q from TVA River Operations, River				Stage and WS Elev from TVA River Operations, River			
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database			
Entered by JMF 6/18/08				Entered by JMF 6/18/08		Gage Zero =800.00	
Checked by SCB 7/24/08				Checked by SCB 7/24/08			
Date and Time	HW elev	Discharge Q (cfs)		Date and Time	Stage	WS elev	
5/16/03 7:00	812.26	38179					
5/16/03 8:00	812.3	38071					
5/16/03 9:00	812.35	38080					
5/16/03 10:00	812.38	38037					
5/16/03 11:00	812.39	38435					
5/16/03 12:00	812.43	38435					
5/16/03 13:00	812.46	38513					
5/16/03 14:00	812.47	38492					
5/16/03 15:00	812.48	38425					
5/16/03 16:00	812.49	38349					
5/16/03 17:00	812.5	38296					
5/16/03 18:00	812.52	38181					
5/16/03 19:00	812.53	38339					
5/16/03 20:00	812.52	38772					
5/16/03 21:00	812.53	38873					
5/16/03 22:00	812.55	38610					
5/16/03 23:00	812.55	38740					
5/17/03 0:00	812.54	38645					
5/17/03 1:00	812.45	38620					
5/17/03 2:00	812.49	38570					
5/17/03 3:00	812.49	38567					
5/17/03 4:00	812.48	38614					
5/17/03 5:00	812.55	38492					
5/17/03 6:00	812.53	38386					
5/17/03 7:00	812.56	38382					
5/17/03 8:00	812.58	38585					
5/17/03 9:00	812.57	38579					
5/17/03 10:00	812.6	38554					
5/17/03 11:00	812.6	38489					
5/17/03 12:00	812.61	38619					
5/17/03 13:00	812.63	38650					
5/17/03 14:00	812.63	38597					
5/17/03 15:00	812.62	38522					
5/17/03 16:00	812.64	38592					
5/17/03 17:00	812.63	38553					
5/17/03 18:00	812.63	38489					
5/17/03 19:00	812.65	38684					
5/17/03 20:00	812.72	38897					
5/17/03 21:00	812.7	38901					
5/17/03 22:00	812.71	38860					
5/17/03 23:00	812.72	38844					
05/17/2003 24:00:0	812.74	38773					

Cherokee Dam Mile HRM 52.3				Douglas Dam Mile FBRM 32.3		
TW and Q from TVA River Operations, River				TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database		
Entered by JMF 6/18/08				Entered by JMF 6/18/08		
Checked by SCB 7/24/08				Checked by SCB 7/24/08		
Date and Time	TW elev	Discharge Q (cfs)		Date and Time	TW elev	Discharge Q (cfs)
5/3/03 1:00	920.93	0		5/3/03 1:00	869.02	2047
5/3/03 2:00	920.93	0		5/3/03 2:00	868.45	0
5/3/03 3:00	921.21	16		5/3/03 3:00	868.16	0
5/3/03 4:00	921.54	2077		5/3/03 4:00	868.01	30
5/3/03 5:00	920.94	0		5/3/03 5:00	868.97	2525
5/3/03 6:00	920.94	0		5/3/03 6:00	868.42	0
5/3/03 7:00	920.93	0		5/3/03 7:00	868.14	0
5/3/03 8:00	920.93	0		5/3/03 8:00	868.05	24
5/3/03 9:00	921.27	16		5/3/03 9:00	868.95	2499
5/3/03 10:00	921.54	2082		5/3/03 10:00	868.42	0
5/3/03 11:00	920.94	0		5/3/03 11:00	868.14	0
5/3/03 12:00	920.93	0		5/3/03 12:00	868	32
5/3/03 13:00	920.93	0		5/3/03 13:00	868.91	2385
5/3/03 14:00	920.93	0		5/3/03 14:00	868.4	0
5/3/03 15:00	921.29	22		5/3/03 15:00	868.24	36
5/3/03 16:00	922.35	2180		5/3/03 16:00	872.61	8798
5/3/03 17:00	920.94	0		5/3/03 17:00	872.92	9398
5/3/03 18:00	920.96	0		5/3/03 18:00	871.5	5155
5/3/03 19:00	920.93	0		5/3/03 19:00	869.33	249
5/3/03 20:00	920.93	0		5/3/03 20:00	868.62	0
5/3/03 21:00	921.24	17		5/3/03 21:00	868.32	32
5/3/03 22:00	921.58	2072		5/3/03 22:00	869.12	2493
5/3/03 23:00	920.94	0		5/3/03 23:00	868.49	0
5/4/03 0:00	920.94	0		5/4/03 0:00	868.18	0
5/4/03 1:00	920.96	0		5/4/03 1:00	868.03	31
5/4/03 2:00	920.93	0		5/4/03 2:00	868.95	2488
5/4/03 3:00	921.26	18		5/4/03 3:00	868.42	0
5/4/03 4:00	921.52	2020		5/4/03 4:00	868.13	0
5/4/03 5:00	920.94	0		5/4/03 5:00	868.06	23
5/4/03 6:00	920.94	0		5/4/03 6:00	868.94	2492
5/4/03 7:00	920.94	0		5/4/03 7:00	868.41	0
5/4/03 8:00	920.95	0		5/4/03 8:00	868.13	0
5/4/03 9:00	921.21	16		5/4/03 9:00	867.99	32
5/4/03 10:00	921.55	2093		5/4/03 10:00	868.94	2484
5/4/03 11:00	920.97	0		5/4/03 11:00	868.41	0
5/4/03 12:00	920.94	0		5/4/03 12:00	868.12	0
5/4/03 13:00	920.93	0		5/4/03 13:00	868.01	26
5/4/03 14:00	920.96	0		5/4/03 14:00	868.92	2462
5/4/03 15:00	921.27	18		5/4/03 15:00	868.4	0
5/4/03 16:00	921.57	2086		5/4/03 16:00	868.12	0
5/4/03 17:00	920.94	0		5/4/03 17:00	867.99	31
5/4/03 18:00	920.95	0		5/4/03 18:00	868.9	2366
5/4/03 19:00	920.93	0		5/4/03 19:00	868.38	0
5/4/03 20:00	920.93	0		5/4/03 20:00	868.27	37
5/4/03 21:00	921.32	23		5/4/03 21:00	872.62	8380
5/4/03 22:00	921.5	2040		5/4/03 22:00	873.03	9400
5/4/03 23:00	920.94	0		5/4/03 23:00	871.53	5180
5/5/03 0:00	920.96	0		5/5/03 0:00	869.33	251
5/5/03 1:00	920.93	0		5/5/03 1:00	868.62	0
5/5/03 2:00	920.93	0		5/5/03 2:00	868.37	21
5/5/03 3:00	921.25	16		5/5/03 3:00	869.08	2457
5/5/03 4:00	921.54	2062		5/5/03 4:00	868.48	0
5/5/03 5:00	920.94	0		5/5/03 5:00	868.18	0

Cherokee Dam Mile HRM 52.3				Douglas Dam Mile FBRM 32.3		
TW and Q from TVA River Operations, River				TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database		
Entered by JMF 6/18/08				Entered by JMF 6/18/08		
Checked by SCB 7/24/08				Checked by SCB 7/24/08		
Date and Time	TW elev	Discharge Q (cfs)		Date and Time	TW elev	Discharge Q (cfs)
5/5/03 6:00	920.94	0		5/5/03 6:00	868.01	29
5/5/03 7:00	920.96	0		5/5/03 7:00	868.97	2576
5/5/03 8:00	920.94	0		5/5/03 8:00	868.44	0
5/5/03 9:00	921.29	23		5/5/03 9:00	868.23	23
5/5/03 10:00	921.7	2259		5/5/03 10:00	870.85	3909
5/5/03 11:00	920.95	0		5/5/03 11:00	872.84	9263
5/5/03 12:00	920.94	0		5/5/03 12:00	875.92	17698
5/5/03 13:00	920.96	0		5/5/03 13:00	876.06	18647
5/5/03 14:00	920.93	0		5/5/03 14:00	876.08	18643
5/5/03 15:00	921.4	35		5/5/03 15:00	876.07	18616
5/5/03 16:00	925.67	6666		5/5/03 16:00	876.06	18556
5/5/03 17:00	925.92	7164		5/5/03 17:00	876.08	18661
5/5/03 18:00	927.26	10367		5/5/03 18:00	876.08	18600
5/5/03 19:00	927.33	10494		5/5/03 19:00	876.13	18633
5/5/03 20:00	927.32	10475		5/5/03 20:00	873.32	9953
5/5/03 21:00	927.3	10467		5/5/03 21:00	869.76	575
5/5/03 22:00	927.32	10442		5/5/03 22:00	868.85	0
5/5/03 23:00	925.79	7243		5/5/03 23:00	868.52	20
5/6/03 0:00	925.75	7128		5/6/03 0:00	869.23	2569
5/6/03 1:00	925.76	7148		5/6/03 1:00	868.57	0
5/6/03 2:00	925.77	7141		5/6/03 2:00	868.25	0
5/6/03 3:00	925.75	7122		5/6/03 3:00	868.08	27
5/6/03 4:00	925.75	7137		5/6/03 4:00	869.02	2627
5/6/03 5:00	925.91	7146		5/6/03 5:00	868.5	0
5/6/03 6:00	927.22	10389		5/6/03 6:00	868.18	0
5/6/03 7:00	921.21	363		5/6/03 7:00	868.11	22
5/6/03 8:00	920.97	0		5/6/03 8:00	869	2659
5/6/03 9:00	920.94	0		5/6/03 9:00	868.49	0
5/6/03 10:00	920.94	0		5/6/03 10:00	868.21	0
5/6/03 11:00	920.94	0		5/6/03 11:00	868.09	29
5/6/03 12:00	921.62	2045		5/6/03 12:00	869.1	2605
5/6/03 13:00	920.94	0		5/6/03 13:00	868.56	0
5/6/03 14:00	920.93	0		5/6/03 14:00	868.26	0
5/6/03 15:00	920.93	0		5/6/03 15:00	868.16	24
5/6/03 16:00	920.93	0		5/6/03 16:00	869.02	2598
5/6/03 17:00	920.93	0		5/6/03 17:00	868.51	0
5/6/03 18:00	921.6	2050		5/6/03 18:00	868.23	0
5/6/03 19:00	920.94	0		5/6/03 19:00	868.43	18
5/6/03 20:00	920.93	0		5/6/03 20:00	869.37	2419
5/6/03 21:00	920.94	0		5/6/03 21:00	869	0
5/6/03 22:00	920.94	0		5/6/03 22:00	868.87	0
5/6/03 23:00	920.96	0		5/6/03 23:00	868.7	27
5/7/03 0:00	921.7	2088		5/7/03 0:00	868.7	2598
5/7/03 1:00	920.97	0		5/7/03 1:00	868.66	0
5/7/03 2:00	920.95	0		5/7/03 2:00	868.3	0
5/7/03 3:00	920.93	0		5/7/03 3:00	868.18	22
5/7/03 4:00	920.93	0		5/7/03 4:00	870.76	4118
5/7/03 5:00	920.93	0		5/7/03 5:00	872.8	8953
5/7/03 6:00	921.95	2093		5/7/03 6:00	872.92	9462
5/7/03 7:00	920.95	0		5/7/03 7:00	875.97	16471
5/7/03 8:00	920.93	0		5/7/03 8:00	876.07	19215
5/7/03 9:00	920.93	0		5/7/03 9:00	876.17	19228
5/7/03 10:00	920.93	0		5/7/03 10:00	876.18	19215

Cherokee Dam Mile HRM 52.3				Douglas Dam Mile FBRM 32.3		
TW and Q from TVA River Operations, River				TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database		
Entered by JMF 6/18/08				Entered by JMF 6/18/08		
Checked by SCB 7/24/08				Checked by SCB 7/24/08		
Date and Time	TW elev	Discharge Q (cfs)		Date and Time	TW elev	Discharge Q (cfs)
5/7/03 11:00	920.93	0		5/7/03 11:00	876.16	19216
5/7/03 12:00	921.89	2071		5/7/03 12:00	876.17	19183
5/7/03 13:00	920.95	0		5/7/03 13:00	877.81	19183
5/7/03 14:00	920.94	0		5/7/03 14:00	878.33	29396
5/7/03 15:00	920.94	0		5/7/03 15:00	877.83	29448
5/7/03 16:00	920.94	0		5/7/03 16:00	876.44	26004
5/7/03 17:00	921.22	17		5/7/03 17:00	876.24	19094
5/7/03 18:00	922.41	2815		5/7/03 18:00	876.17	19049
5/7/03 19:00	920.97	0		5/7/03 19:00	876.13	19029
5/7/03 20:00	920.94	0		5/7/03 20:00	876.16	19028
5/7/03 21:00	920.94	0		5/7/03 21:00	876.14	19036
5/7/03 22:00	920.94	0		5/7/03 22:00	876.13	18950
5/7/03 23:00	921.26	16		5/7/03 23:00	876.1	18985
5/8/03 0:00	921.54	2057		5/8/03 0:00	876.14	19009
5/8/03 1:00	920.95	0		5/8/03 1:00	876.13	18964
5/8/03 2:00	920.94	0		5/8/03 2:00	876.17	18955
5/8/03 3:00	920.94	0		5/8/03 3:00	876.14	18915
5/8/03 4:00	920.94	0		5/8/03 4:00	876.13	18974
5/8/03 5:00	921.27	16		5/8/03 5:00	876.13	18935
5/8/03 6:00	921.54	2066		5/8/03 6:00	876.16	19022
5/8/03 7:00	920.95	0		5/8/03 7:00	876.4	18929
5/8/03 8:00	920.94	0		5/8/03 8:00	877.98	22444
5/8/03 9:00	920.94	0		5/8/03 9:00	878.21	29550
5/8/03 10:00	920.94	0		5/8/03 10:00	878.22	29466
5/8/03 11:00	921.25	17		5/8/03 11:00	878.23	29509
5/8/03 12:00	921.55	2066		5/8/03 12:00	878.2	29588
5/8/03 13:00	920.95	0		5/8/03 13:00	878.27	29500
5/8/03 14:00	920.94	0		5/8/03 14:00	878.19	29546
5/8/03 15:00	920.94	0		5/8/03 15:00	878.28	29868
5/8/03 16:00	920.94	0		5/8/03 16:00	878.5	30161
5/8/03 17:00	921.28	19		5/8/03 17:00	878.64	31006
5/8/03 18:00	921.53	2061		5/8/03 18:00	878.68	31048
5/8/03 19:00	920.95	0		5/8/03 19:00	878.69	31085
5/8/03 20:00	920.94	0		5/8/03 20:00	878.71	31087
5/8/03 21:00	920.94	0		5/8/03 21:00	878.66	31088
5/8/03 22:00	920.94	0		5/8/03 22:00	878.69	31062
5/8/03 23:00	921.2	16		5/8/03 23:00	878.65	31106
5/9/03 0:00	921.61	2084		5/9/03 0:00	878.66	31057
5/9/03 1:00	920.96	0		5/9/03 1:00	878.7	31105
5/9/03 2:00	920.95	0		5/9/03 2:00	878.71	31098
5/9/03 3:00	920.95	0		5/9/03 3:00	878.62	31096
5/9/03 4:00	920.95	0		5/9/03 4:00	878.65	31085
5/9/03 5:00	921.27	17		5/9/03 5:00	878.7	31124
5/9/03 6:00	921.55	2067		5/9/03 6:00	878.74	31147
5/9/03 7:00	920.96	0		5/9/03 7:00	878.69	31150
5/9/03 8:00	921.02	93		5/9/03 8:00	878.71	31218
5/9/03 9:00	920.95	7		5/9/03 9:00	878.65	31143
5/9/03 10:00	920.94	0		5/9/03 10:00	878.68	31157
5/9/03 11:00	921.36	19		5/9/03 11:00	878.67	31210
5/9/03 12:00	921.42	2021		5/9/03 12:00	878.69	31093
5/9/03 13:00	921.78	0		5/9/03 13:00	878.7	31147
5/9/03 14:00	922.8	308		5/9/03 14:00	878.74	31184
5/9/03 15:00	927.01	7066		5/9/03 15:00	878.7	31155

Cherokee Dam Mile HRM 52.3				Douglas Dam Mile FBRM 32.3		
TW and Q from TVA River Operations, River				TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database		
Entered by JMF 6/18/08				Entered by JMF 6/18/08		
Checked by SCB 7/24/08				Checked by SCB 7/24/08		
Date and Time	TW elev	Discharge Q (cfs)		Date and Time	TW elev	Discharge Q (cfs)
5/9/03 16:00	927.81	9018		5/9/03 16:00	878.71	31123
5/9/03 17:00	928.65	17000		5/9/03 17:00	878.72	31117
5/9/03 18:00	928.76	17000		5/9/03 18:00	878.7	31084
5/9/03 19:00	928.71	17000		5/9/03 19:00	878.65	31025
5/9/03 20:00	925.59	6122		5/9/03 20:00	878.7	31071
5/9/03 21:00	921.21	198		5/9/03 21:00	878.7	31117
5/9/03 22:00	921.08	0		5/9/03 22:00	878.63	31051
5/9/03 23:00	921.06	0		5/9/03 23:00	878.7	31187
5/10/03 0:00	921.06	0		5/10/03 0:00	878.7	31187
5/10/03 1:00	921.39	18		5/10/03 1:00	878.66	31066
5/10/03 2:00	921.64	2124		5/10/03 2:00	878.67	31026
5/10/03 3:00	921.06	0		5/10/03 3:00	878.68	30981
5/10/03 4:00	921.06	0		5/10/03 4:00	878.62	31032
5/10/03 5:00	921.05	0		5/10/03 5:00	878.7	31022
5/10/03 6:00	921.05	0		5/10/03 6:00	878.72	31101
5/10/03 7:00	921.39	18		5/10/03 7:00	878.72	31096
5/10/03 8:00	921.67	2147		5/10/03 8:00	878.71	31140
5/10/03 9:00	921.06	0		5/10/03 9:00	878.69	31192
5/10/03 10:00	921.05	0		5/10/03 10:00	878.7	31157
5/10/03 11:00	921.05	0		5/10/03 11:00	878.69	31055
5/10/03 12:00	921.05	0		5/10/03 12:00	878.7	31056
5/10/03 13:00	921.35	16		5/10/03 13:00	878.67	31078
5/10/03 14:00	921.65	2093		5/10/03 14:00	878.65	31064
5/10/03 15:00	921.06	0		5/10/03 15:00	878.69	31058
5/10/03 16:00	921.05	0		5/10/03 16:00	878.7	31183
5/10/03 17:00	921.05	0		5/10/03 17:00	878.67	31140
5/10/03 18:00	921.05	0		5/10/03 18:00	878.64	31102
5/10/03 19:00	921.4	20		5/10/03 19:00	878.69	31088
5/10/03 20:00	921.64	2119		5/10/03 20:00	878.68	31143
5/10/03 21:00	921.06	0		5/10/03 21:00	878.65	31196
5/10/03 22:00	921.05	0		5/10/03 22:00	878.64	31206
5/10/03 23:00	921.05	0		5/10/03 23:00	878.68	31147
5/11/03 0:00	921.05	0		5/11/03 0:00	878.72	31143
5/11/03 1:00	921.34	17		5/11/03 1:00	878.68	31186
5/11/03 2:00	921.61	2066		5/11/03 2:00	878.7	31160
5/11/03 3:00	921.07	0		5/11/03 3:00	878.6	31144
5/11/03 4:00	921.06	0		5/11/03 4:00	878.69	31160
5/11/03 5:00	921.06	0		5/11/03 5:00	878.65	31110
5/11/03 6:00	921.06	0		5/11/03 6:00	878.64	31033
5/11/03 7:00	921.4	18		5/11/03 7:00	878.69	31037
5/11/03 8:00	921.66	2127		5/11/03 8:00	878.7	31129
5/11/03 9:00	921.07	0		5/11/03 9:00	878.63	31069
5/11/03 10:00	921.06	0		5/11/03 10:00	878.7	31103
5/11/03 11:00	921.06	0		5/11/03 11:00	878.68	31023
5/11/03 12:00	921.06	0		5/11/03 12:00	878.64	31036
5/11/03 13:00	921.4	19		5/11/03 13:00	878.64	31028
5/11/03 14:00	921.62	2104		5/11/03 14:00	878.61	31023
5/11/03 15:00	921.07	0		5/11/03 15:00	878.66	31035
5/11/03 16:00	921.06	0		5/11/03 16:00	878.71	31018
5/11/03 17:00	921.06	0		5/11/03 17:00	878.62	30974
5/11/03 18:00	921.06	0		5/11/03 18:00	878.66	31044
5/11/03 19:00	921.38	18		5/11/03 19:00	878.68	30973
5/11/03 20:00	921.66	2085		5/11/03 20:00	878.7	31055

Cherokee Dam Mile HRM 52.3				Douglas Dam Mile FBRM 32.3		
TW and Q from TVA River Operations, River				TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database		
Entered by JMF 6/18/08				Entered by JMF 6/18/08		
Checked by SCB 7/24/08				Checked by SCB 7/24/08		
Date and Time	TW elev	Discharge Q (cfs)		Date and Time	TW elev	Discharge Q (cfs)
5/11/03 21:00	921.07	0		5/11/03 21:00	878.61	31098
5/11/03 22:00	921.06	0		5/11/03 22:00	878.69	31018
5/11/03 23:00	921.06	0		5/11/03 23:00	878.68	31150
5/12/03 0:00	921.06	0		5/12/03 0:00	878.71	31180
5/12/03 1:00	921.41	17		5/12/03 1:00	878.69	31189
5/12/03 2:00	921.66	2124		5/12/03 2:00	878.73	31210
5/12/03 3:00	921.07	0		5/12/03 3:00	878.66	31188
5/12/03 4:00	921.06	0		5/12/03 4:00	878.68	31243
5/12/03 5:00	921.06	0		5/12/03 5:00	878.72	31200
5/12/03 6:00	921.06	0		5/12/03 6:00	878.66	31236
5/12/03 7:00	921.34	17		5/12/03 7:00	878.71	31294
5/12/03 8:00	921.69	2123		5/12/03 8:00	878.67	31294
5/12/03 9:00	921.07	0		5/12/03 9:00	878.64	31292
5/12/03 10:00	921.06	0		5/12/03 10:00	878.69	31291
5/12/03 11:00	921.51	10		5/12/03 11:00	878.74	31299
5/12/03 12:00	923.81	3344		5/12/03 12:00	878.62	31319
5/12/03 13:00	924.05	3504		5/12/03 13:00	878.65	31316
5/12/03 14:00	925.85	6788		5/12/03 14:00	878.67	31324
5/12/03 15:00	928.6	17000		5/12/03 15:00	878.59	31283
5/12/03 16:00	928.72	17000		5/12/03 16:00	878.66	31230
5/12/03 17:00	928.71	17000		5/12/03 17:00	878.69	31228
5/12/03 18:00	928.66	17000		5/12/03 18:00	878.72	31216
5/12/03 19:00	928.74	17000		5/12/03 19:00	878.63	31256
5/12/03 20:00	928.76	17000		5/12/03 20:00	878.63	31296
5/12/03 21:00	928.76	17000		5/12/03 21:00	878.62	31303
5/12/03 22:00	928.74	17000		5/12/03 22:00	878.65	31245
5/12/03 23:00	925.85	7249		5/12/03 23:00	878.65	31247
5/13/03 0:00	923.9	3795		5/13/03 0:00	878.71	31223
5/13/03 1:00	921.12	221		5/13/03 1:00	878.64	31276
5/13/03 2:00	921.06	0		5/13/03 2:00	878.72	31307
5/13/03 3:00	921.06	0		5/13/03 3:00	878.65	31254
5/13/03 4:00	921.06	0		5/13/03 4:00	878.66	31347
5/13/03 5:00	921.4	18		5/13/03 5:00	878.7	31345
5/13/03 6:00	921.65	2114		5/13/03 6:00	878.68	31282
5/13/03 7:00	921.06	0		5/13/03 7:00	878.58	31243
5/13/03 8:00	922.73	190		5/13/03 8:00	878.64	31197
5/13/03 9:00	922.43	2393		5/13/03 9:00	878.62	31191
5/13/03 10:00	923.01	1623		5/13/03 10:00	878.6	31166
5/13/03 11:00	922.43	0		5/13/03 11:00	878.66	31162
5/13/03 12:00	922.6	92		5/13/03 12:00	878.54	31284
5/13/03 13:00	926.26	7500		5/13/03 13:00	877.05	28769
5/13/03 14:00	927.02	7500		5/13/03 14:00	876.82	21356
5/13/03 15:00	927.78	8900		5/13/03 15:00	876.84	21287
5/13/03 16:00	928.55	15000		5/13/03 16:00	876.8	21292
5/13/03 17:00	928.64	17000		5/13/03 17:00	876.77	21294
5/13/03 18:00	928.62	17000		5/13/03 18:00	876.74	21260
5/13/03 19:00	928.65	17000		5/13/03 19:00	876.75	21229
5/13/03 20:00	928.7	17000		5/13/03 20:00	876.8	21300
5/13/03 21:00	928.67	17000		5/13/03 21:00	876.71	21202
5/13/03 22:00	928.74	17000		5/13/03 22:00	876.7	21202
5/13/03 23:00	925.85	7100		5/13/03 23:00	876.7	21166
5/14/03 0:00	923.93	3579		5/14/03 0:00	876.77	21178
5/14/03 1:00	921.12	211		5/14/03 1:00	876.8	21214

Cherokee Dam Mile HRM 52.3				Douglas Dam Mile FBRM 32.3		
TW and Q from TVA River Operations, River				TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database		
Entered by JMF 6/18/08				Entered by JMF 6/18/08		
Checked by SCB 7/24/08				Checked by SCB 7/24/08		
Date and Time	TW elev	Discharge Q (cfs)		Date and Time	TW elev	Discharge Q (cfs)
5/14/03 2:00	921.06	0		5/14/03 2:00	876.77	21170
5/14/03 3:00	921.05	0		5/14/03 3:00	876.73	21186
5/14/03 4:00	921.05	0		5/14/03 4:00	876.82	21223
5/14/03 5:00	921.37	17		5/14/03 5:00	876.77	21251
5/14/03 6:00	921.65	2101		5/14/03 6:00	876.77	21175
5/14/03 7:00	921.06	0		5/14/03 7:00	876.74	21307
5/14/03 8:00	921.05	0		5/14/03 8:00	876.79	21270
5/14/03 9:00	921.05	0		5/14/03 9:00	876.75	21300
5/14/03 10:00	921.05	0		5/14/03 10:00	876.72	21331
5/14/03 11:00	921.52	8		5/14/03 11:00	876.77	21273
5/14/03 12:00	924.12	3453		5/14/03 12:00	876.76	21292
5/14/03 13:00	925.78	7100		5/14/03 13:00	876.8	21382
5/14/03 14:00	926.04	7100		5/14/03 14:00	876.7	21232
5/14/03 15:00	928.57	16000		5/14/03 15:00	876.77	21270
5/14/03 16:00	928.64	17000		5/14/03 16:00	876.78	21313
5/14/03 17:00	928.65	17000		5/14/03 17:00	876.73	21306
5/14/03 18:00	928.65	17000		5/14/03 18:00	876.71	21300
5/14/03 19:00	928.68	17000		5/14/03 19:00	876.74	21421
5/14/03 20:00	928.65	17000		5/14/03 20:00	876.78	21488
5/14/03 21:00	928.77	17000		5/14/03 21:00	876.8	21451
5/14/03 22:00	928.7	17000		5/14/03 22:00	876.8	21413
5/14/03 23:00	925.15	7100		5/14/03 23:00	876.77	21456
5/15/03 0:00	923.18	3417		5/15/03 0:00	876.8	21546
5/15/03 1:00	921.09	20		5/15/03 1:00	876.81	21527
5/15/03 2:00	921.05	0		5/15/03 2:00	876.76	21543
5/15/03 3:00	921.05	0		5/15/03 3:00	876.81	21534
5/15/03 4:00	921.05	0		5/15/03 4:00	876.81	21525
5/15/03 5:00	921.32	16		5/15/03 5:00	876.74	21456
5/15/03 6:00	921.67	2117		5/15/03 6:00	876.8	21499
5/15/03 7:00	921.06	0		5/15/03 7:00	876.76	21461
5/15/03 8:00	921.05	0		5/15/03 8:00	876.78	21434
5/15/03 9:00	921.05	0		5/15/03 9:00	876.83	21499
5/15/03 10:00	921.58	6		5/15/03 10:00	876.82	21428
5/15/03 11:00	925.96	7000		5/15/03 11:00	876.83	21431
5/15/03 12:00	928.64	14451		5/15/03 12:00	876.78	21539
5/15/03 13:00	928.7	13644		5/15/03 13:00	876.79	21496
5/15/03 14:00	928.69	13620		5/15/03 14:00	876.83	21524
5/15/03 15:00	928.7	13585		5/15/03 15:00	876.82	21537
5/15/03 16:00	928.69	13529		5/15/03 16:00	876.79	21497
5/15/03 17:00	928.73	13584		5/15/03 17:00	876.78	21528
5/15/03 18:00	928.72	13613		5/15/03 18:00	876.76	21598
5/15/03 19:00	928.75	13563		5/15/03 19:00	876.83	21436
5/15/03 20:00	928.7	13536		5/15/03 20:00	876.81	21593
5/15/03 21:00	927.98	11755		5/15/03 21:00	876.88	21655
5/15/03 22:00	925.85	6809		5/15/03 22:00	876.8	21598
5/15/03 23:00	921.21	324		5/15/03 23:00	876.84	21650
5/16/03 0:00	921.06	0		5/16/03 0:00	876.82	21665
5/16/03 1:00	921.05	0		5/16/03 1:00	876.82	21702
5/16/03 2:00	921.41	18		5/16/03 2:00	876.8	21666
5/16/03 3:00	921.64	2084		5/16/03 3:00	876.89	21663
5/16/03 4:00	921.05	0		5/16/03 4:00	876.86	21684
5/16/03 5:00	921.05	0		5/16/03 5:00	876.79	21737
5/16/03 6:00	921.05	0		5/16/03 6:00	876.82	21747

Cherokee Dam Mile HRM 52.3				Douglas Dam Mile FBRM 32.3		
TW and Q from TVA River Operations, River				TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database				Scheduling, Hourly Water Records database		
Entered by JMF 6/18/08				Entered by JMF 6/18/08		
Checked by SCB 7/24/08				Checked by SCB 7/24/08		
Date and Time	TW elev	Discharge Q (cfs)		Date and Time	TW elev	Discharge Q (cfs)
5/16/03 7:00	921.05	0		5/16/03 7:00	876.83	21763
5/16/03 8:00	921.48	10		5/16/03 8:00	876.77	21738
5/16/03 9:00	923.78	3394		5/16/03 9:00	876.79	21733
5/16/03 10:00	924.08	3503		5/16/03 10:00	876.79	21681
5/16/03 11:00	925.9	6501		5/16/03 11:00	876.75	21673
5/16/03 12:00	928.55	13014		5/16/03 12:00	876.84	21793
5/16/03 13:00	928.66	13466		5/16/03 13:00	876.86	21804
5/16/03 14:00	928.65	13472		5/16/03 14:00	876.82	21758
5/16/03 15:00	928.66	13442		5/16/03 15:00	876.82	21697
5/16/03 16:00	928.7	13525		5/16/03 16:00	876.82	21710
5/16/03 17:00	928.72	13502		5/16/03 17:00	876.76	21709
5/16/03 18:00	928.7	13510		5/16/03 18:00	876.85	21741
5/16/03 19:00	928.7	13460		5/16/03 19:00	876.87	21729
5/16/03 20:00	928.74	13509		5/16/03 20:00	876.82	21842
5/16/03 21:00	925.93	7152		5/16/03 21:00	876.81	21675
5/16/03 22:00	921.22	428		5/16/03 22:00	876.84	21702
5/16/03 23:00	921.05	0		5/16/03 23:00	876.79	21931
5/17/03 0:00	921.05	0		5/17/03 0:00	876.84	21783
5/17/03 1:00	921.05	0		5/17/03 1:00	876.85	21884
5/17/03 2:00	921.4	17		5/17/03 2:00	876.85	22016
5/17/03 3:00	921.7	2128		5/17/03 3:00	876.88	21943
5/17/03 4:00	921.05	0		5/17/03 4:00	876.87	21976
5/17/03 5:00	921.05	0		5/17/03 5:00	876.85	21943
5/17/03 6:00	921.04	0		5/17/03 6:00	876.82	21929
5/17/03 7:00	921.04	0		5/17/03 7:00	876.87	21971
5/17/03 8:00	921.4	18		5/17/03 8:00	876.84	21989
5/17/03 9:00	921.64	2124		5/17/03 9:00	876.86	21968
5/17/03 10:00	921.05	0		5/17/03 10:00	876.85	21910
5/17/03 11:00	921.04	0		5/17/03 11:00	876.84	21884
5/17/03 12:00	921.04	0		5/17/03 12:00	876.82	21889
5/17/03 13:00	921.04	0		5/17/03 13:00	876.85	21870
5/17/03 14:00	921.58	5		5/17/03 14:00	876.9	21898
5/17/03 15:00	925.9	6274		5/17/03 15:00	876.88	22022
5/17/03 16:00	928.51	12870		5/17/03 16:00	876.91	22056
5/17/03 17:00	928.63	13349		5/17/03 17:00	876.83	22071
5/17/03 18:00	928.7	13441		5/17/03 18:00	876.91	22089
5/17/03 19:00	928.7	13417		5/17/03 19:00	876.85	22226
5/17/03 20:00	925.9	7067		5/17/03 20:00	875.27	19062
5/17/03 21:00	921.21	339		5/17/03 21:00	875.02	16462
5/17/03 22:00	921.05	0		5/17/03 22:00	874.99	16349
5/17/03 23:00	921.05	0		5/17/03 23:00	875.09	16309
05/17/2003 24:00:0	921.05	0		05/17/2003 24:00:00	874.75	16137

Tellico Dam LTNRM 0.3		
HW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	HW elev	Discharge Q (cfs)
5/3/03 1:00	813.07	0
5/3/03 2:00	813.07	0
5/3/03 3:00	813.08	0
5/3/03 4:00	813.09	0
5/3/03 5:00	813.10	0
5/3/03 6:00	813.08	0
5/3/03 7:00	813.05	0
5/3/03 8:00	813.02	0
5/3/03 9:00	812.98	0
5/3/03 10:00	812.96	0
5/3/03 11:00	812.95	0
5/3/03 12:00	812.92	0
5/3/03 13:00	812.90	0
5/3/03 14:00	812.89	0
5/3/03 15:00	812.88	0
5/3/03 16:00	812.86	0
5/3/03 17:00	812.86	0
5/3/03 18:00	812.85	0
5/3/03 19:00	812.85	0
5/3/03 20:00	812.85	0
5/3/03 21:00	812.85	0
5/3/03 22:00	812.86	0
5/3/03 23:00	812.86	0
5/4/03 0:00	812.85	0
5/4/03 1:00	812.85	0
5/4/03 2:00	812.86	0
5/4/03 3:00	812.86	0
5/4/03 4:00	812.87	0
5/4/03 5:00	812.87	0
5/4/03 6:00	812.90	0
5/4/03 7:00	812.86	0
5/4/03 8:00	812.84	0
5/4/03 9:00	812.84	0
5/4/03 10:00	812.84	0
5/4/03 11:00	812.79	0
5/4/03 12:00	812.75	0
5/4/03 13:00	812.74	0
5/4/03 14:00	812.70	0
5/4/03 15:00	812.66	0
5/4/03 16:00	812.65	0
5/4/03 17:00	812.62	0
5/4/03 18:00	812.60	0
5/4/03 19:00	812.57	0
5/4/03 20:00	812.55	0
5/4/03 21:00	812.61	0
5/4/03 22:00	812.59	0

Chilhowee Dam LTNRM 33.6		
TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	TW elev	Discharge Q (cfs)
5/3/03 1:00	813.08	0
5/3/03 2:00	813.09	0
5/3/03 3:00	813.10	0
5/3/03 4:00	813.11	0
5/3/03 5:00	813.09	0
5/3/03 6:00	813.05	0
5/3/03 7:00	812.98	0
5/3/03 8:00	812.93	0
5/3/03 9:00	812.95	0
5/3/03 10:00	812.90	0
5/3/03 11:00	812.96	0
5/3/03 12:00	812.88	0
5/3/03 13:00	812.87	0
5/3/03 14:00	812.87	0
5/3/03 15:00	813.13	4662
5/3/03 16:00	812.90	7770
5/3/03 17:00	813.00	7548
5/3/03 18:00	812.98	7548
5/3/03 19:00	812.73	4218
5/3/03 20:00	812.74	444
5/3/03 21:00	812.67	0
5/3/03 22:00	812.61	0
5/3/03 23:00	812.66	0
5/4/03 0:00	812.86	0
5/4/03 1:00	812.78	0
5/4/03 2:00	812.81	0
5/4/03 3:00	812.82	0
5/4/03 4:00	812.81	0
5/4/03 5:00	812.86	0
5/4/03 6:00	812.90	0
5/4/03 7:00	812.84	0
5/4/03 8:00	812.86	0
5/4/03 9:00	812.81	0
5/4/03 10:00	812.77	0
5/4/03 11:00	812.77	0
5/4/03 12:00	812.77	0
5/4/03 13:00	812.73	0
5/4/03 14:00	812.70	0
5/4/03 15:00	812.66	0
5/4/03 16:00	812.62	0
5/4/03 17:00	812.59	0
5/4/03 18:00	812.85	0
5/4/03 19:00	812.93	6660
5/4/03 20:00	812.81	7326
5/4/03 21:00	812.82	7548
5/4/03 22:00	812.76	7548

Tellico Dam LTNRM 0.3		
HW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	HW elev	Discharge Q (cfs)
5/4/03 23:00	812.57	0
5/5/03 0:00	812.55	0
5/5/03 1:00	812.53	0
5/5/03 2:00	812.53	0
5/5/03 3:00	812.50	0
5/5/03 4:00	812.47	0
5/5/03 5:00	812.43	0
5/5/03 6:00	812.39	0
5/5/03 7:00	812.37	0
5/5/03 8:00	812.32	0
5/5/03 9:00	812.38	0
5/5/03 10:00	812.42	0
5/5/03 11:00	812.44	0
5/5/03 12:00	812.46	0
5/5/03 13:00	812.48	0
5/5/03 14:00	812.51	0
5/5/03 15:00	812.50	0
5/5/03 16:00	812.48	0
5/5/03 17:00	812.49	0
5/5/03 18:00	812.50	0
5/5/03 19:00	812.68	0
5/5/03 20:00	812.90	0
5/5/03 21:00	812.98	0
5/5/03 22:00	813.07	0
5/5/03 23:00	813.29	0
5/6/03 0:00	813.50	0
5/6/03 1:00	813.62	0
5/6/03 2:00	813.68	0
5/6/03 3:00	813.73	0
5/6/03 4:00	813.83	0
5/6/03 5:00	813.91	0
5/6/03 6:00	813.96	0
5/6/03 7:00	814.01	0
5/6/03 8:00	814.02	0
5/6/03 9:00	814.02	14753
5/6/03 10:00	814.02	22130
5/6/03 11:00	814.44	22190
5/6/03 12:00	814.64	22275
5/6/03 13:00	814.75	22320
5/6/03 14:00	814.90	22360
5/6/03 15:00	815.05	22400
5/6/03 16:00	815.28	22455
5/6/03 17:00	815.47	22515
5/6/03 18:00	815.56	25304
5/6/03 19:00	815.68	33595
5/6/03 20:00	815.75	33635

Chilhowee Dam LTNRM 33.6		
TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	TW elev	Discharge Q (cfs)
5/4/03 23:00	812.34	1554
5/5/03 0:00	812.42	0
5/5/03 1:00	812.30	0
5/5/03 2:00	812.27	0
5/5/03 3:00	812.29	0
5/5/03 4:00	812.37	0
5/5/03 5:00	812.28	0
5/5/03 6:00	812.34	0
5/5/03 7:00	812.26	0
5/5/03 8:00	812.61	3552
5/5/03 9:00	812.64	7104
5/5/03 10:00	812.56	7326
5/5/03 11:00	812.58	7548
5/5/03 12:00	812.60	7548
5/5/03 13:00	812.23	7326
5/5/03 14:00	812.08	1554
5/5/03 15:00	812.29	1332
5/5/03 16:00	812.37	2442
5/5/03 17:00	812.70	4884
5/5/03 18:00	812.79	6438
5/5/03 19:00	812.79	6660
5/5/03 20:00	812.93	6660
5/5/03 21:00	813.02	6660
5/5/03 22:00	813.32	6660
5/5/03 23:00	813.56	6660
5/6/03 0:00	813.74	7548
5/6/03 1:00	814.16	8241
5/6/03 2:00	814.11	9443
5/6/03 3:00	814.15	9221
5/6/03 4:00	814.37	11558
5/6/03 5:00	815.28	19482
5/6/03 6:00	815.88	21094
5/6/03 7:00	816.01	22674
5/6/03 8:00	815.46	18837
5/6/03 9:00	815.18	13191
5/6/03 10:00	815.35	13324
5/6/03 11:00	815.04	10835
5/6/03 12:00	816.53	25962
5/6/03 13:00	818.23	36498
5/6/03 14:00	818.70	36276
5/6/03 15:00	818.90	38328
5/6/03 16:00	818.81	38106
5/6/03 17:00	818.90	40732
5/6/03 18:00	818.91	40510
5/6/03 19:00	818.93	40510
5/6/03 20:00	818.51	39315

Tellico Dam LTNRM 0.3		
HW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	HW elev	Discharge Q (cfs)
5/6/03 21:00	815.80	44305
5/6/03 22:00	815.85	44335
5/6/03 23:00	815.87	44355
5/7/03 0:00	815.90	43425
5/7/03 1:00	815.92	43445
5/7/03 2:00	815.93	44400
5/7/03 3:00	815.95	44405
5/7/03 4:00	815.97	44420
5/7/03 5:00	815.95	44420
5/7/03 6:00	815.93	44405
5/7/03 7:00	815.87	44380
5/7/03 8:00	815.84	44355
5/7/03 9:00	815.80	44335
5/7/03 10:00	815.71	44290
5/7/03 11:00	815.64	44240
5/7/03 12:00	815.56	44195
5/7/03 13:00	815.54	44165
5/7/03 14:00	815.53	44155
5/7/03 15:00	815.52	44145
5/7/03 16:00	815.51	44140
5/7/03 17:00	815.51	41373
5/7/03 18:00	815.50	40450
5/7/03 19:00	815.54	35180
5/7/03 20:00	815.58	29915
5/7/03 21:00	815.64	24520
5/7/03 22:00	815.68	19125
5/7/03 23:00	815.74	19135
5/8/03 0:00	815.84	19150
5/8/03 1:00	815.87	19170
5/8/03 2:00	815.91	19185
5/8/03 3:00	815.94	19190
5/8/03 4:00	815.97	19195
5/8/03 5:00	816.00	19205
5/8/03 6:00	816.03	19215
5/8/03 7:00	816.04	19220
5/8/03 8:00	816.04	19220
5/8/03 9:00	816.00	19215
5/8/03 10:00	815.99	19210
5/8/03 11:00	815.96	19205
5/8/03 12:00	815.92	19195
5/8/03 13:00	815.98	19195
5/8/03 14:00	815.85	19185
5/8/03 15:00	815.83	19170
5/8/03 16:00	815.80	19165
5/8/03 17:00	815.78	19155
5/8/03 18:00	815.75	19150

Chilhowee Dam LTNRM 33.6		
TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	TW elev	Discharge Q (cfs)
5/6/03 21:00	817.61	36261
5/6/03 22:00	817.29	26254
5/6/03 23:00	817.15	26476
5/7/03 0:00	816.89	24194
5/7/03 1:00	816.54	20461
5/7/03 2:00	816.22	18566
5/7/03 3:00	816.18	15390
5/7/03 4:00	816.08	14446
5/7/03 5:00	816.07	14668
5/7/03 6:00	815.87	11798
5/7/03 7:00	815.89	11798
5/7/03 8:00	815.92	11576
5/7/03 9:00	816.04	12708
5/7/03 10:00	816.06	14082
5/7/03 11:00	816.45	16176
5/7/03 12:00	816.66	22362
5/7/03 13:00	816.99	21918
5/7/03 14:00	817.32	29056
5/7/03 15:00	817.35	29500
5/7/03 16:00	817.34	29056
5/7/03 17:00	817.33	29278
5/7/03 18:00	817.34	29056
5/7/03 19:00	817.33	29056
5/7/03 20:00	817.66	34480
5/7/03 21:00	817.70	34258
5/7/03 22:00	817.66	34258
5/7/03 23:00	817.77	34036
5/8/03 0:00	817.79	34036
5/8/03 1:00	817.82	34258
5/8/03 2:00	817.81	34036
5/8/03 3:00	817.85	34036
5/8/03 4:00	817.77	34258
5/8/03 5:00	817.49	33015
5/8/03 6:00	817.52	29754
5/8/03 7:00	817.51	29976
5/8/03 8:00	817.51	29754
5/8/03 9:00	817.47	29976
5/8/03 10:00	817.42	29278
5/8/03 11:00	817.33	29056
5/8/03 12:00	817.36	29056
5/8/03 13:00	817.36	29278
5/8/03 14:00	817.35	29056
5/8/03 15:00	817.33	29056
5/8/03 16:00	817.35	29278
5/8/03 17:00	817.28	29278
5/8/03 18:00	817.27	30420

Tellico Dam LTNRM 0.3		
HW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	HW elev	Discharge Q (cfs)
5/8/03 19:00	815.73	19145
5/8/03 20:00	815.71	19140
5/8/03 21:00	815.70	19135
5/8/03 22:00	815.67	19130
5/8/03 23:00	815.64	19125
5/9/03 0:00	815.62	19115
5/9/03 1:00	815.59	19110
5/9/03 2:00	815.55	19105
5/9/03 3:00	815.52	19095
5/9/03 4:00	815.50	19085
5/9/03 5:00	815.48	19080
5/9/03 6:00	815.42	19045
5/9/03 7:00	815.41	19035
5/9/03 8:00	815.38	19055
5/9/03 9:00	815.36	19050
5/9/03 10:00	815.33	19045
5/9/03 11:00	815.29	19035
5/9/03 12:00	815.25	19025
5/9/03 13:00	815.21	19015
5/9/03 14:00	815.16	19005
5/9/03 15:00	815.13	18995
5/9/03 16:00	815.11	18990
5/9/03 17:00	815.08	18985
5/9/03 18:00	815.02	18970
5/9/03 19:00	814.93	18950
5/9/03 20:00	814.88	18935
5/9/03 21:00	814.79	18915
5/9/03 22:00	814.69	18885
5/9/03 23:00	814.60	18860
5/10/03 0:00	814.54	18840
5/10/03 1:00	814.50	18825
5/10/03 2:00	814.42	18810
5/10/03 3:00	814.35	18790
5/10/03 4:00	814.22	18760
5/10/03 5:00	814.20	18740
5/10/03 6:00	814.14	18730
5/10/03 7:00	814.06	18710
5/10/03 8:00	814.00	18690
5/10/03 9:00	813.94	18670
5/10/03 10:00	813.86	18650
5/10/03 11:00	813.93	18650
5/10/03 12:00	813.90	0
5/10/03 13:00	813.88	0
5/10/03 14:00	813.88	0
5/10/03 15:00	813.92	0
5/10/03 16:00	813.93	0

Chilhowee Dam LTNRM 33.6		
TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	TW elev	Discharge Q (cfs)
5/8/03 19:00	817.30	30801
5/8/03 20:00	817.26	30579
5/8/03 21:00	817.26	30801
5/8/03 22:00	817.25	30579
5/8/03 23:00	817.22	31023
5/9/03 0:00	817.22	30801
5/9/03 1:00	817.27	30579
5/9/03 2:00	817.18	30801
5/9/03 3:00	817.23	30579
5/9/03 4:00	817.23	30801
5/9/03 5:00	817.24	30801
5/9/03 6:00	817.18	31023
5/9/03 7:00	817.16	30579
5/9/03 8:00	817.15	30801
5/9/03 9:00	817.14	30579
5/9/03 10:00	817.13	30801
5/9/03 11:00	817.14	30579
5/9/03 12:00	817.07	30801
5/9/03 13:00	817.11	30801
5/9/03 14:00	817.08	30801
5/9/03 15:00	817.03	30801
5/9/03 16:00	816.09	30357
5/9/03 17:00	815.81	19005
5/9/03 18:00	815.71	18561
5/9/03 19:00	815.29	16341
5/9/03 20:00	814.84	10878
5/9/03 21:00	814.76	11100
5/9/03 22:00	814.70	11100
5/9/03 23:00	814.66	11322
5/10/03 0:00	815.35	16341
5/10/03 1:00	815.22	16563
5/10/03 2:00	815.12	17007
5/10/03 3:00	815.05	15387
5/10/03 4:00	814.88	14668
5/10/03 5:00	814.85	15112
5/10/03 6:00	814.76	14668
5/10/03 7:00	814.75	15112
5/10/03 8:00	814.59	14446
5/10/03 9:00	814.70	15112
5/10/03 10:00	814.73	14668
5/10/03 11:00	814.65	15112
5/10/03 12:00	814.60	14890
5/10/03 13:00	814.67	14890
5/10/03 14:00	814.70	14890
5/10/03 15:00	814.67	14890
5/10/03 16:00	814.69	14890

Tellico Dam LTNRM 0.3		
HW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	HW elev	Discharge Q (cfs)
5/10/03 17:00	813.93	0
5/10/03 18:00	813.93	0
5/10/03 19:00	813.93	0
5/10/03 20:00	813.94	0
5/10/03 21:00	813.94	0
5/10/03 22:00	813.93	0
5/10/03 23:00	813.93	0
5/11/03 0:00	813.92	0
5/11/03 1:00	813.91	0
5/11/03 2:00	813.90	0
5/11/03 3:00	813.90	0
5/11/03 4:00	813.91	0
5/11/03 5:00	813.90	0
5/11/03 6:00	813.88	0
5/11/03 7:00	813.86	0
5/11/03 8:00	813.86	0
5/11/03 9:00	813.90	0
5/11/03 10:00	813.91	0
5/11/03 11:00	813.90	0
5/11/03 12:00	813.91	0
5/11/03 13:00	813.92	0
5/11/03 14:00	813.92	0
5/11/03 15:00	813.90	0
5/11/03 16:00	813.89	0
5/11/03 17:00	813.89	0
5/11/03 18:00	813.88	0
5/11/03 19:00	813.89	0
5/11/03 20:00	813.88	0
5/11/03 21:00	813.86	0
5/11/03 22:00	813.86	0
5/11/03 23:00	813.86	0
5/12/03 0:00	813.85	0
5/12/03 1:00	813.85	0
5/12/03 2:00	813.84	0
5/12/03 3:00	813.83	0
5/12/03 4:00	813.82	0
5/12/03 5:00	813.81	0
5/12/03 6:00	813.80	0
5/12/03 7:00	813.79	0
5/12/03 8:00	813.77	0
5/12/03 9:00	813.76	0
5/12/03 10:00	813.72	0
5/12/03 11:00	813.68	0
5/12/03 12:00	813.64	0
5/12/03 13:00	813.60	0
5/12/03 14:00	813.58	0

Chilhowee Dam LTNRM 33.6		
TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	TW elev	Discharge Q (cfs)
5/10/03 17:00	814.64	15112
5/10/03 18:00	814.67	14890
5/10/03 19:00	814.64	14890
5/10/03 20:00	814.66	14668
5/10/03 21:00	814.41	13243
5/10/03 22:00	814.39	13243
5/10/03 23:00	814.35	13243
5/11/03 0:00	814.33	13243
5/11/03 1:00	814.39	13243
5/11/03 2:00	814.42	13243
5/11/03 3:00	814.43	13021
5/11/03 4:00	814.42	13021
5/11/03 5:00	814.37	13243
5/11/03 6:00	814.37	13243
5/11/03 7:00	814.46	13021
5/11/03 8:00	814.43	13021
5/11/03 9:00	814.38	13465
5/11/03 10:00	814.42	13243
5/11/03 11:00	814.37	12799
5/11/03 12:00	814.37	13243
5/11/03 13:00	814.38	13243
5/11/03 14:00	814.45	13243
5/11/03 15:00	814.29	12290
5/11/03 16:00	814.30	12734
5/11/03 17:00	814.33	12734
5/11/03 18:00	814.28	12734
5/11/03 19:00	814.27	12956
5/11/03 20:00	814.29	12290
5/11/03 21:00	814.22	12734
5/11/03 22:00	814.26	12734
5/11/03 23:00	814.19	12956
5/12/03 0:00	814.30	12734
5/12/03 1:00	814.31	12734
5/12/03 2:00	814.25	12956
5/12/03 3:00	814.24	12734
5/12/03 4:00	814.29	12734
5/12/03 5:00	814.25	12956
5/12/03 6:00	814.26	12734
5/12/03 7:00	814.24	12734
5/12/03 8:00	814.15	12956
5/12/03 9:00	814.20	12734
5/12/03 10:00	814.24	12734
5/12/03 11:00	814.24	12956
5/12/03 12:00	814.23	12734
5/12/03 13:00	814.29	12734
5/12/03 14:00	814.19	12956

Tellico Dam LTNRM 0.3		
HW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	HW elev	Discharge Q (cfs)
5/12/03 15:00	813.52	0
5/12/03 16:00	813.52	0
5/12/03 17:00	813.48	0
5/12/03 18:00	813.44	0
5/12/03 19:00	813.40	0
5/12/03 20:00	813.34	0
5/12/03 21:00	813.33	0
5/12/03 22:00	813.26	0
5/12/03 23:00	813.23	0
5/13/03 0:00	813.20	0
5/13/03 1:00	813.15	0
5/13/03 2:00	813.11	0
5/13/03 3:00	813.05	0
5/13/03 4:00	813.01	0
5/13/03 5:00	812.99	0
5/13/03 6:00	812.97	0
5/13/03 7:00	812.94	0
5/13/03 8:00	812.93	0
5/13/03 9:00	812.91	0
5/13/03 10:00	812.91	0
5/13/03 11:00	812.88	0
5/13/03 12:00	812.88	0
5/13/03 13:00	812.89	0
5/13/03 14:00	812.89	0
5/13/03 15:00	812.88	0
5/13/03 16:00	812.88	0
5/13/03 17:00	812.88	0
5/13/03 18:00	812.85	0
5/13/03 19:00	812.84	0
5/13/03 20:00	812.83	0
5/13/03 21:00	812.81	0
5/13/03 22:00	812.78	0
5/13/03 23:00	812.76	0
5/14/03 0:00	812.72	0
5/14/03 1:00	812.69	0
5/14/03 2:00	812.64	0
5/14/03 3:00	812.60	0
5/14/03 4:00	812.57	0
5/14/03 5:00	812.55	0
5/14/03 6:00	812.53	0
5/14/03 7:00	812.50	0
5/14/03 8:00	812.49	0
5/14/03 9:00	812.48	0
5/14/03 10:00	812.47	0
5/14/03 11:00	812.50	0
5/14/03 12:00	812.44	0

Chilhowee Dam LTNRM 33.6		
TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	TW elev	Discharge Q (cfs)
5/12/03 15:00	814.16	12956
5/12/03 16:00	814.12	12956
5/12/03 17:00	814.10	12734
5/12/03 18:00	814.07	11544
5/12/03 19:00	814.05	12734
5/12/03 20:00	814.01	12956
5/12/03 21:00	814.01	12956
5/12/03 22:00	814.05	13178
5/12/03 23:00	813.93	12734
5/13/03 0:00	813.91	12956
5/13/03 1:00	813.90	12734
5/13/03 2:00	813.88	13178
5/13/03 3:00	813.89	12956
5/13/03 4:00	813.76	12956
5/13/03 5:00	813.77	13178
5/13/03 6:00	813.87	13269
5/13/03 7:00	813.82	13491
5/13/03 8:00	813.82	13491
5/13/03 9:00	813.85	13491
5/13/03 10:00	813.87	13491
5/13/03 11:00	813.79	13269
5/13/03 12:00	813.84	13491
5/13/03 13:00	813.87	13713
5/13/03 14:00	813.79	13269
5/13/03 15:00	813.79	13491
5/13/03 16:00	813.82	13269
5/13/03 17:00	813.81	13491
5/13/03 18:00	813.86	13491
5/13/03 19:00	813.85	13269
5/13/03 20:00	813.85	13269
5/13/03 21:00	813.79	13491
5/13/03 22:00	813.70	13491
5/13/03 23:00	813.66	13269
5/14/03 0:00	813.72	12498
5/14/03 1:00	813.65	12276
5/14/03 2:00	813.62	12276
5/14/03 3:00	813.67	12498
5/14/03 4:00	813.60	12054
5/14/03 5:00	813.62	12276
5/14/03 6:00	813.60	12276
5/14/03 7:00	813.55	12498
5/14/03 8:00	813.58	12054
5/14/03 9:00	813.60	12054
5/14/03 10:00	813.53	12276
5/14/03 11:00	813.59	12276
5/14/03 12:00	813.60	12276

Tellico Dam LTNRM 0.3		
HW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	HW elev	Discharge Q (cfs)
5/14/03 13:00	812.50	0
5/14/03 14:00	812.48	0
5/14/03 15:00	812.47	0
5/14/03 16:00	812.48	0
5/14/03 17:00	812.48	0
5/14/03 18:00	812.48	0
5/14/03 19:00	812.48	0
5/14/03 20:00	812.48	0
5/14/03 21:00	812.48	0
5/14/03 22:00	812.48	0
5/14/03 23:00	812.42	0
5/15/03 0:00	812.37	0
5/15/03 1:00	812.30	0
5/15/03 2:00	812.21	0
5/15/03 3:00	812.18	0
5/15/03 4:00	812.15	0
5/15/03 5:00	812.11	0
5/15/03 6:00	812.04	0
5/15/03 7:00	812.02	0
5/15/03 8:00	812.06	0
5/15/03 9:00	812.10	0
5/15/03 10:00	812.07	0
5/15/03 11:00	812.09	0
5/15/03 12:00	812.11	0
5/15/03 13:00	812.12	0
5/15/03 14:00	812.15	0
5/15/03 15:00	812.17	0
5/15/03 16:00	812.19	0
5/15/03 17:00	812.21	0
5/15/03 18:00	812.22	0
5/15/03 19:00	812.23	0
5/15/03 20:00	812.26	0
5/15/03 21:00	812.29	0
5/15/03 22:00	812.31	0
5/15/03 23:00	812.31	0
5/16/03 0:00	812.32	0
5/16/03 1:00	812.32	0
5/16/03 2:00	812.33	0
5/16/03 3:00	812.33	0
5/16/03 4:00	812.34	0
5/16/03 5:00	812.35	0
5/16/03 6:00	812.42	0
5/16/03 7:00	812.42	0
5/16/03 8:00	812.44	0
5/16/03 9:00	812.53	0
5/16/03 10:00	812.55	0

Chilhowee Dam LTNRM 33.6		
TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	TW elev	Discharge Q (cfs)
5/14/03 13:00	813.44	12054
5/14/03 14:00	813.47	12054
5/14/03 15:00	813.40	12276
5/14/03 16:00	813.22	12011
5/14/03 17:00	813.24	11322
5/14/03 18:00	813.28	11100
5/14/03 19:00	813.18	11100
5/14/03 20:00	813.24	11322
5/14/03 21:00	813.22	10656
5/14/03 22:00	813.22	11322
5/14/03 23:00	812.45	7104
5/15/03 0:00	812.56	3996
5/15/03 1:00	812.52	3996
5/15/03 2:00	812.37	3996
5/15/03 3:00	812.27	3996
5/15/03 4:00	812.29	3996
5/15/03 5:00	812.20	4218
5/15/03 6:00	812.10	4218
5/15/03 7:00	812.97	9990
5/15/03 8:00	812.86	11322
5/15/03 9:00	812.81	11322
5/15/03 10:00	812.84	11322
5/15/03 11:00	812.94	11322
5/15/03 12:00	812.88	11322
5/15/03 13:00	812.99	11322
5/15/03 14:00	813.04	11100
5/15/03 15:00	812.99	11100
5/15/03 16:00	813.07	11322
5/15/03 17:00	812.38	9546
5/15/03 18:00	812.47	6660
5/15/03 19:00	812.48	7104
5/15/03 20:00	812.99	9324
5/15/03 21:00	813.03	9990
5/15/03 22:00	813.03	9990
5/15/03 23:00	812.31	7104
5/16/03 0:00	812.40	3996
5/16/03 1:00	812.37	4218
5/16/03 2:00	812.31	3996
5/16/03 3:00	812.30	4218
5/16/03 4:00	812.98	5994
5/16/03 5:00	813.28	10434
5/16/03 6:00	813.24	11322
5/16/03 7:00	813.24	11100
5/16/03 8:00	813.31	11100
5/16/03 9:00	813.25	11100
5/16/03 10:00	813.26	10878

Tellico Dam LTNRM 0.3		
HW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	HW elev	Discharge Q (cfs)
5/16/03 11:00	812.55	0
5/16/03 12:00	812.63	0
5/16/03 13:00	812.64	0
5/16/03 14:00	812.65	0
5/16/03 15:00	812.67	0
5/16/03 16:00	812.68	0
5/16/03 17:00	812.69	0
5/16/03 18:00	812.71	0
5/16/03 19:00	812.72	0
5/16/03 20:00	812.72	0
5/16/03 21:00	812.72	0
5/16/03 22:00	812.74	0
5/16/03 23:00	812.74	0
5/17/03 0:00	812.68	0
5/17/03 1:00	812.60	0
5/17/03 2:00	812.54	0
5/17/03 3:00	812.62	0
5/17/03 4:00	812.66	0
5/17/03 5:00	812.69	0
5/17/03 6:00	812.68	0
5/17/03 7:00	812.73	0
5/17/03 8:00	812.75	0
5/17/03 9:00	812.75	0
5/17/03 10:00	812.76	0
5/17/03 11:00	812.79	0
5/17/03 12:00	812.82	0
5/17/03 13:00	812.81	0
5/17/03 14:00	812.80	0
5/17/03 15:00	812.81	0
5/17/03 16:00	812.74	0
5/17/03 17:00	812.78	0
5/17/03 18:00	812.81	0
5/17/03 19:00	812.85	0
5/17/03 20:00	812.88	0
5/17/03 21:00	812.89	0
5/17/03 22:00	812.90	0
5/17/03 23:00	812.91	0
05/17/2003 24:	812.92	0

Chilhowee Dam LTNRM 33.6		
TW and Q from TVA River Operations, River		
Scheduling, Hourly Water Records database		
Entered by JMF 6/19/08		
Checked by SCB 7/23/08		
Date and Time	TW elev	Discharge Q (cfs)
5/16/03 11:00	813.42	11100
5/16/03 12:00	813.17	10878
5/16/03 13:00	813.12	9990
5/16/03 14:00	813.14	9990
5/16/03 15:00	813.31	11322
5/16/03 16:00	813.28	11322
5/16/03 17:00	813.33	10878
5/16/03 18:00	813.45	11322
5/16/03 19:00	813.43	10878
5/16/03 20:00	813.47	10878
5/16/03 21:00	813.44	10878
5/16/03 22:00	812.76	10656
5/16/03 23:00	812.37	888
5/17/03 0:00	812.51	0
5/17/03 1:00	812.55	0
5/17/03 2:00	813.02	0
5/17/03 3:00	812.96	6660
5/17/03 4:00	812.93	6660
5/17/03 5:00	812.85	6216
5/17/03 6:00	812.96	7326
5/17/03 7:00	813.05	7326
5/17/03 8:00	813.03	8214
5/17/03 9:00	813.10	8214
5/17/03 10:00	813.10	8214
5/17/03 11:00	813.13	8214
5/17/03 12:00	813.14	8214
5/17/03 13:00	813.12	7992
5/17/03 14:00	813.13	8214
5/17/03 15:00	813.19	7992
5/17/03 16:00	813.05	8214
5/17/03 17:00	813.11	8214
5/17/03 18:00	813.62	10212
5/17/03 19:00	813.42	11100
5/17/03 20:00	813.42	11100
5/17/03 21:00	813.45	11100
5/17/03 22:00	813.55	10878
5/17/03 23:00	813.48	10878
05/17/2003 24:	812.60	11100

CDQ000020080036 Rev 0
Attachment_06_Total Local Hydrograph Development.pdf
with attachments:

Att 1-1_Fort Loudoun-Tellico (8, 16, 17, 18, & 24) hydrographs.xls – (CDQ000020080069)

CDQ000020080036 Rev 0

Attachment_07_Total Local Inflow for Little Pigeon River.pdf
with attachments:

LittlePigeonAtSevierville_rev0.xls– (BE21108160B021)
1973 Local Inflow for Little Pigeon River.pdf – (BE21108160B021)

HYDRAULIC DATA BRANCH
Rec'd. AUG 1 9 1974
File No.

1973

Water Resources Data for Tennessee

Part 1. Surface Water Records

Part 2. Water Quality Records

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with the Tennessee Department of Conservation, Division of Water Resources; the Tennessee Valley Authority; and with other State, municipal, and Federal agencies

03470000 Little Pigeon River at Sevierville, Tenn.

LOCATION.--Lat 35°52'42", long 83°34'40", Sevier County, on left bank, 0.2 mile (0.3 km) downstream from West Prong Little Pigeon River, 0.6 mile (1.0 km) north of intersection of U. S. Highway 441 and State Highway 66 in Sevierville, and at mile 4.4 (7.1 km).

DRAINAGE AREA.--353 sq mi (914 sq km).

PERIOD OF RECORD.--October 1920 to current year. Prior to November 1920 monthly discharge only, published in WSP 1306.

GAGE.--Water-stage recorder. Datum of gage is 879.45 ft (268.056 m) above mean sea level. Nov. 23, 1920, to June 13, 1928, non-recording gage, and June 14, 1928, to June 1, 1966, water-stage recorder, at site 0.1 mile (0.2 km) upstream at datum 1.99 ft (0.607 m) higher. June 2, 1966, to June 5, 1967, at site 1.5 miles (2.4 km) downstream at datum 7.31 ft (2.228 m) lower.

AVERAGE DISCHARGE.--53 years, 566 cfs (16.03 cu m/s), 21.77 in/yr (553 mm/yr).

EXTREMES.--Current year: Maximum discharge, 38,200 cfs (1,080 cu m/s) Mar. 16, gage height, 13.88 ft (4.231 m); minimum, 96 cfs (2.72 cu m/s) Sept. 8, 9, gage height, 1.22 ft (0.372 m).

Period of record: Maximum discharge, 41,000 cfs (1,160 cu m/s) Mar. 26, 1965, gage height, 16.09 ft (4.904 m), site and datum then in use; minimum, 2.8 cfs (0.079 cu m/s) Sept. 21, 1925; minimum gage height, 0.08 ft (0.024 m) Dec. 23, 1965, site and datum then in use; minimum daily discharge, 8.4 cfs (0.24 cu m/s) Sept. 9, 1925.

Flood of Feb. 25, 1875, reached a stage of 18 ft (5.5 m), 55,000 cfs (1,560 cu m/s); that of Apr. 1, 1896, 16.8 ft (5.12 m), 46,000 cfs (1,300 cu m/s); and that of Mar. 7, 1867, 16.5 ft (5.03 m), 43,000 cfs (1,220 cu m/s), all at site 0.1 mile (0.2 km) upstream, from reports of Tennessee Valley Authority.

REMARKS.--Records good. Some regulation at low flow caused by small mills above station prior to 1967. During the period April 1966 to July 1967, Tennessee Valley Authority constructed a flood-control project for town of Sevierville, widening and deepening Little Pigeon River through the town and 1.8 miles (2.9 km) downstream, and relocating the lower portion of West Prong Little Pigeon River. The present gage is located on the new dredged channel. Records of water temperatures for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 783: 1921-34. WSP 1336: 1921(M), 1922, 1923(M), WRD Tenn. 1972: 1969(M), 1970(M), 1971(P).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,570	426	660	586	698	340	757	1,040	618	318	1,370	130
2	779	399	578	527	2,670	334	655	846	536	290	812	116
3	536	449	519	739	1,300	502	592	914	498	258	510	109
4	479	406	479	1,060	914	519	694	790	544	237	396	108
5	4,630	365	464	801	779	578	635	650	418	248	327	134
6	1,760	340	623	759	1,090	527	556	578	442	218	283	117
7	986	385	698	678	1,060	494	1,410	536	485	200	249	106
8	708	986	527	698	1,850	536	2,010	938	407	217	275	103
9	544	698	4,680	632	2,000	473	1,290	1,090	455	254	241	272
10	449	561	7,250	578	1,250	422	1,010	759	358	330	2,280	950
11	378	487	5,670	544	938	514	792	1,460	324	399	2,690	298
12	346	426	3,340	494	790	871	689	974	322	245	825	209
13	399	392	1,940	464	688	544	615	749	479	204	566	200
14	385	586	1,430	472	718	466	545	623	427	195	450	449
15	321	544	3,850	561	868	960	500	544	364	299	450	529
16	292	456	3,010	586	708	24,300	473	487	1,900	299	352	315
17	632	426	1,660	552	604	15,100	470	472	1,980	264	304	268
18	790	392	1,210	527	569	3,610	492	434	938	283	295	349
19	5,460	441	986	879	536	2,020	569	399	622	390	261	284
20	2,310	879	890	835	510	1,570	562	419	503	323	257	219
21	1,180	586	1,210	698	479	1,960	462	372	645	263	294	185
22	835	510	1,730	1,300	449	1,770	412	340	661	226	229	167
23	678	456	1,390	1,100	426	1,360	388	412	470	386	211	168
24	595	419	1,140	846	406	1,110	370	1,250	391	468	193	149
25	527	412	1,040	698	378	995	508	902	345	574	180	136
26	472	632	926	632	372	945	1,460	1,250	310	808	168	125
27	426	510	846	708	372	855	5,760	1,460	298	914	157	116
28	812	487	759	669	358	762	4,080	4,520	592	553	149	115
29	632	544	688	1,200	------	721	1,950	1,850	542	409	140	123
30	527	586	632	938	------	693	1,310	1,020	373	328	137	183
31	472	------	604	779	------	765	------	750	------	305	145	------
TOTAL	30,910	15,186	51,429	22,540	23,780	66,616	32,016	28,828	17,247	10,705	15,196	6,732
MEAN	997	506	1,659	727	849	2,149	1,067	930	575	345	490	224
MAX	5,460	986	7,250	1,300	2,670	24,300	5,760	4,520	1,980	914	2,690	950
MIN	292	340	464	464	358	334	370	340	298	195	137	103
CFSM	2.82	1.43	4.70	2.06	2.41	6.09	3.02	2.63	1.63	.98	1.39	.63
IN.	3.26	1.60	5.42	2.38	2.51	7.02	3.37	3.04	1.82	1.13	1.60	.71

CAL YR 1972 TOTAL 119,093 MEAN 325 MAX 7,250 MIN 134 CFSM .92 IN 12.55
WTR YR 1973 TOTAL 321,185 MEAN 880 MAX 24,300 MIN 103 CFSM 2.49 IN 33.85

PEAK DISCHARGE (BASE, 7,000 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
10-19	1230	5.70	7,830	03-16	2330	13.88	38,200
12-10	2100	6.81	10,500	08-10	2300	5.51	7,370

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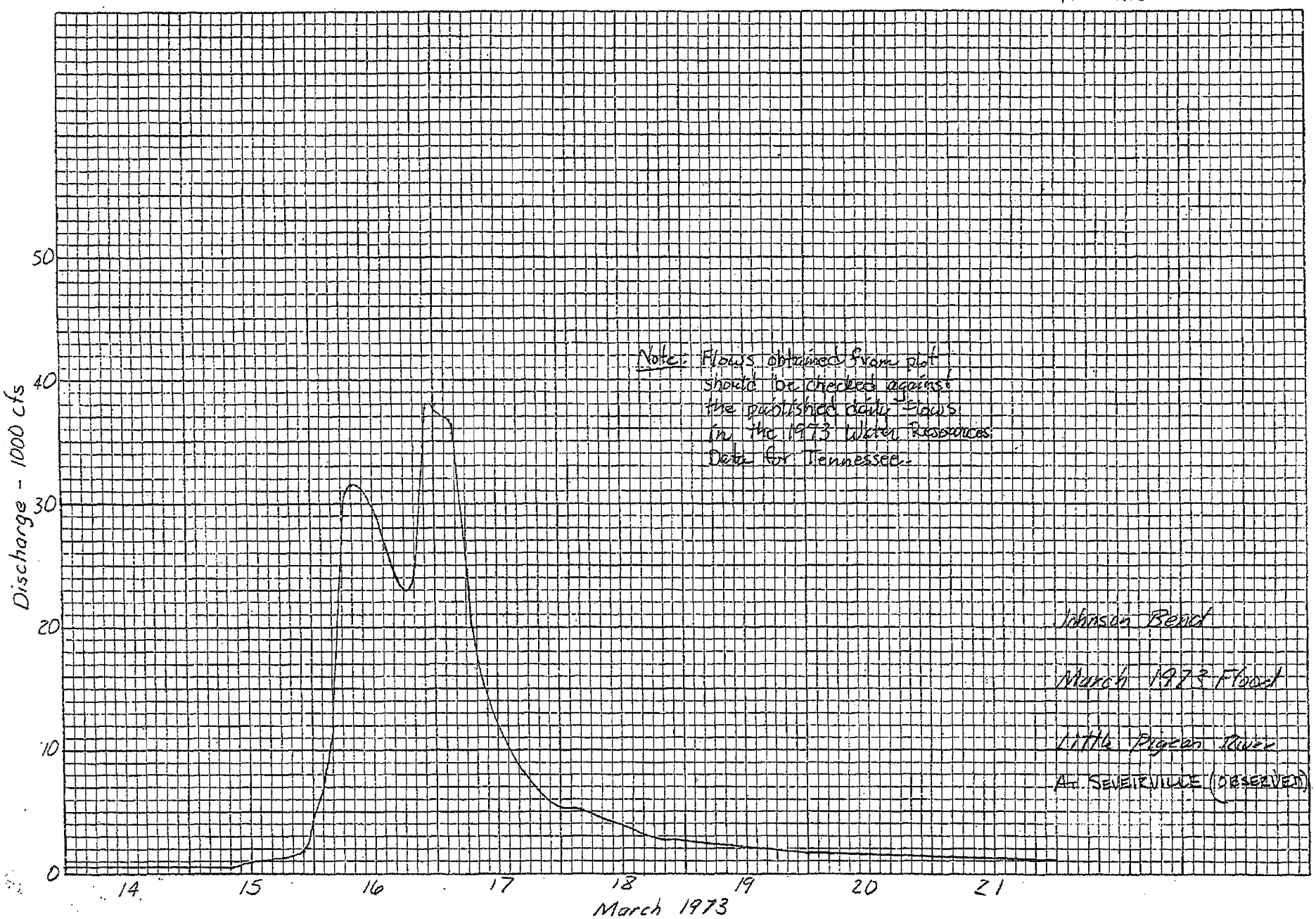
Hydraulic model



Little Pigeon River at Sevierville $A_D = 353$ sq mi

GAGE HEIGHT, IN FEET, DISCHARGE, IN CUBIC FEET PER SECOND, AND ACCUMULATED RUNOFF, IN INCHES, AT INDICATED TIME, 1973

DATE	TIME	GAGE HEIGHT	DISCHARGE	ACCUM. RUNOFF
3-13	0100	2.12	604	0.00
3-13	2400	1.99	494	0.06
3-14	0100	1.99	494	0.06
3-14	2400	1.91	434	0.11
3-15	0830	1.93	449	0.12
3-15	1200	2.38	868	0.13
3-15	2030	2.75	1,360	0.17
3-15	2200	3.00	1,760	0.18
3-15	2330	3.79	3,390	0.20
3-15	2400	4.19	4,290	0.21
3-16	0400	7.36	11,900	0.36
3-16	0800	12.62	31,500	0.77
3-16	1230	12.14	29,100	1.41
3-16	1830	10.77	23,000	2.05
3-16	2200	13.23	34,700	2.48
3-16	2330	13.88	38,200	2.73
3-16	2400	13.78	37,700	2.81
3-17	0030	13.60	36,700	2.89
3-17	0900	8.64	15,500	3.79
3-17	1700	5.77	8,000	4.17
3-17	2400	4.67	5,390	4.36
3-18	0030	4.61	5,250	4.38
3-18	1830	3.55	2,860	4.68
3-18	2400	3.40	2,540	4.74
3-19	0030	3.38	2,500	4.75
3-19	2400	2.95	1,680	4.95

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Attachment_08_ Flood Insurance Studies

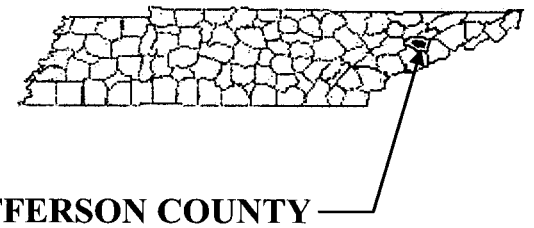
Jefferson Co.pdf
Knox Co.pdf
Loudon Co.pdf
Sevier Co.pdf

FLOOD INSURANCE STUDY

JEFFERSON COUNTY, TENNESSEE
AND INCORPORATED AREAS

Community Name	Community Number
BANEBERRY, CITY OF	470452
DANDRIDGE, TOWN OF	470299
JEFFERSON CITY, TOWN OF	475430
JEFFERSON COUNTY (UNINCORPORATED AREAS)	470097
MORRISTOWN, CITY OF[1]	470070
NEW MARKET, TOWN OF	470385
WHITE PINE, TOWN OF	470332

[1] Non-floodprone community



DECEMBER 16, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
47089CV000A

elevation-discharge relationships for the underground sink outlets were estimated from historic rainfall and flood elevation data.

Cherokee Lake elevation-frequency, which affects the lower portion of Byrd Spring Branch, was determined from a frequency analysis of lake headwater elevation records from 1972 through 1986 (References 5 and 10). Records prior to 1972 are not representative of the current Cherokee Lake seasonal operating guide and were not used in the analysis. The elevations for Douglas Lake were computed using the reservoir pool elevation that would be expected at the beginning of the flood on the French Broad River-Douglas Reservoir. For this reason, the controlling flood elevations throughout most of the reservoir are from headwater flood elevations upstream of Douglas dam (Reference 5).

This Countywide Analysis

Discharges for the 1-percent-annual-chance recurrence interval for all new approximate study streams in Jefferson County were determined using the USGS regression equations for hydrologic area 1 in Tennessee as described in USGS Water Resource Investigation Reports (WRIR) 03-4176 (Reference 21).

A summary of the drainage area-peak discharge relationships for redelineated streams is shown in Table 1, "SUMMARY OF DISCHARGES".

TABLE 1: SUMMARY OF DISCHARGES

Flooding Source and Location	Drainage Area (sq mi)	Peak Discharges (cfs)			
		10 % annual chance	2 % annual chance	1 % annual chance	0.2 % annual chance
BYRD SPRING BRANCH					
About 1,300 feet downstream of Black Oak Road (downstream crossing)	1.79	350	550	640	880
At Liberty Road	1.13	240	380	440	610
DANCE BRANCH					
At mouth	1.98	380	590	690	960
HOLSTON RIVER					
At downstream county boundary	3,580	25,970	34,605	40,170	54,405
At Cherokee Dam	3,428	23,000	31,000	36,000	54,000
LEADVALE CREEK					
At Old Leadvale Road	1.78	395	665	805	1,190
At U.S. Route 25E	1.30	310	520	640	950
At Main Street	0.39	115	205	250	385

Flood Profiles or in the Floodway Data Tables in the FIS report. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Pre-Countywide Analyses

Within Jefferson County the Town of White Pine, and Jefferson County Unincorporated Areas have previously printed FIS reports. The hydraulic analyses described in those reports not revised in this countywide FIS have been compiled and are shown below.

Cross sections were field surveyed. All bridges and culverts were surveyed to obtain elevation data and structural geometry. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1) and on the Flood Insurance Rate Map. For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM.

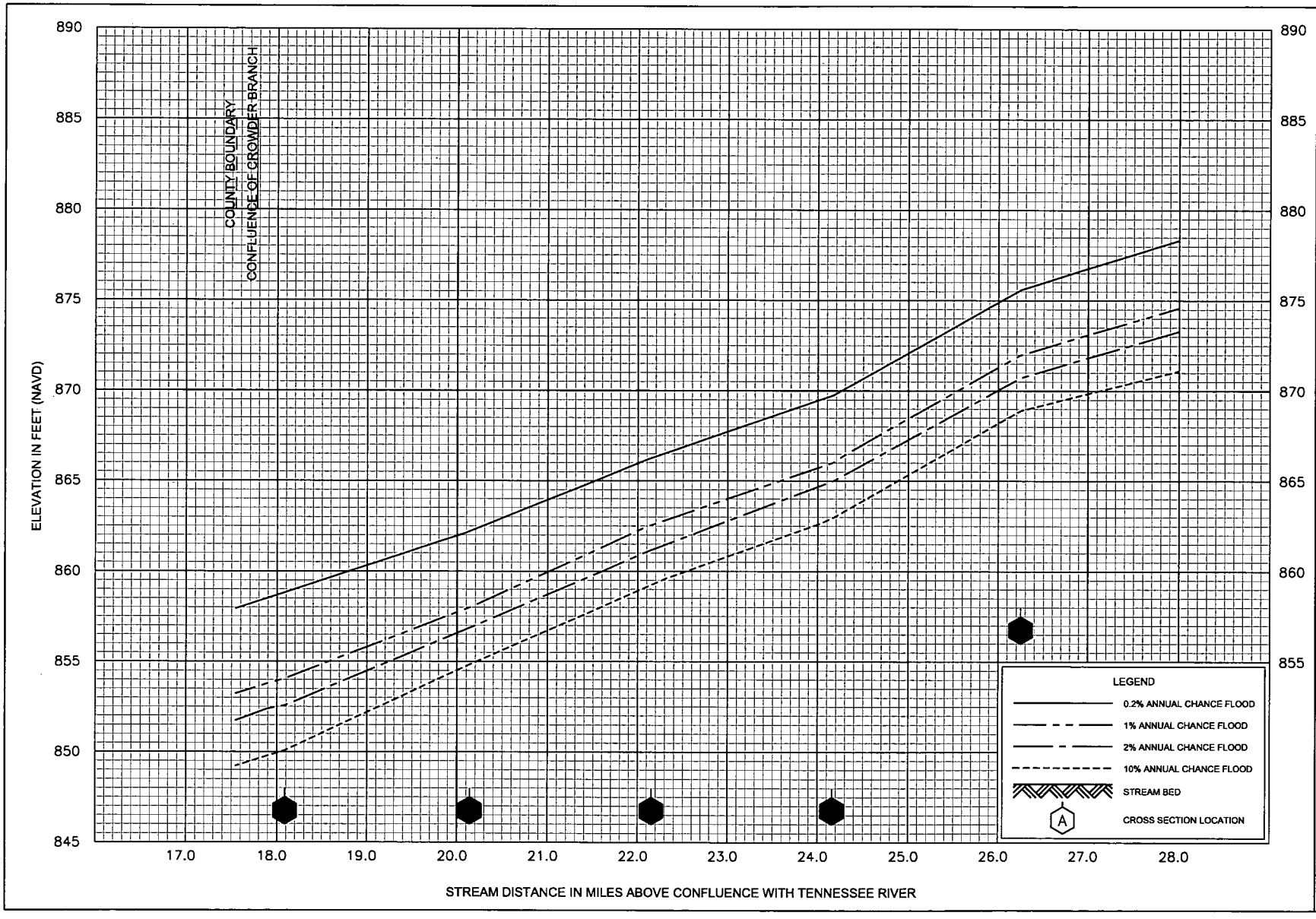
Water-surface elevations of floods of the selected recurrence intervals were computed using the U.S. Army Corps of Engineers (USACE) HEC-2 step-backwater computer program (Reference 11); except at the mouths of Piedmont Branch and Lost Creek where elevations are controlled by sinkhole outlets, and just upstream of the abandoned railroad fill on Lost Creek. Starting water-surface elevations for Piedmont Branch and Lost Creek were determined by the maximum ponding elevation. The slope-area method was used to calculate the starting water-surface elevations for Dance and Byrd Spring Branches and Leadvale Creek, and Leadvale Creek Tributary.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 0.2-percent-annual-chance and 1-percent-annual-chance flood elevations are close together, due to limitations of the profile scale, only the 1-percent-annual-chance profile has been shown.

Roughness coefficients (Manning's "n") used in the hydraulic computations were determined on the basis of field inspection of the channels and floodplain areas, and computed coefficients based on known flood profiles. The roughness coefficients for detailed studied streams are listed in Table 3, "MANNING's "n" VALUES".

TABLE 3: MANNING'S "n" VALUES

Stream	Channel "n"	Overbank "n"
Byrd Spring Branch	0.035 - 0.060	0.060 - 0.080
Dance Branch	0.045 - 0.055	0.070 - 0.120
Holston River	0.024 - 0.096	0.100 - 0.150
Leadvale Creek	0.060 - 0.070	0.080 - 0.100
Leadvale Creek Tributary	0.035	0.060
Lost Creek	0.040 - 0.060	0.060 - 0.130
Piedmont Branch	0.020 - 0.065	0.070 - 0.130



FLOOD PROFILES

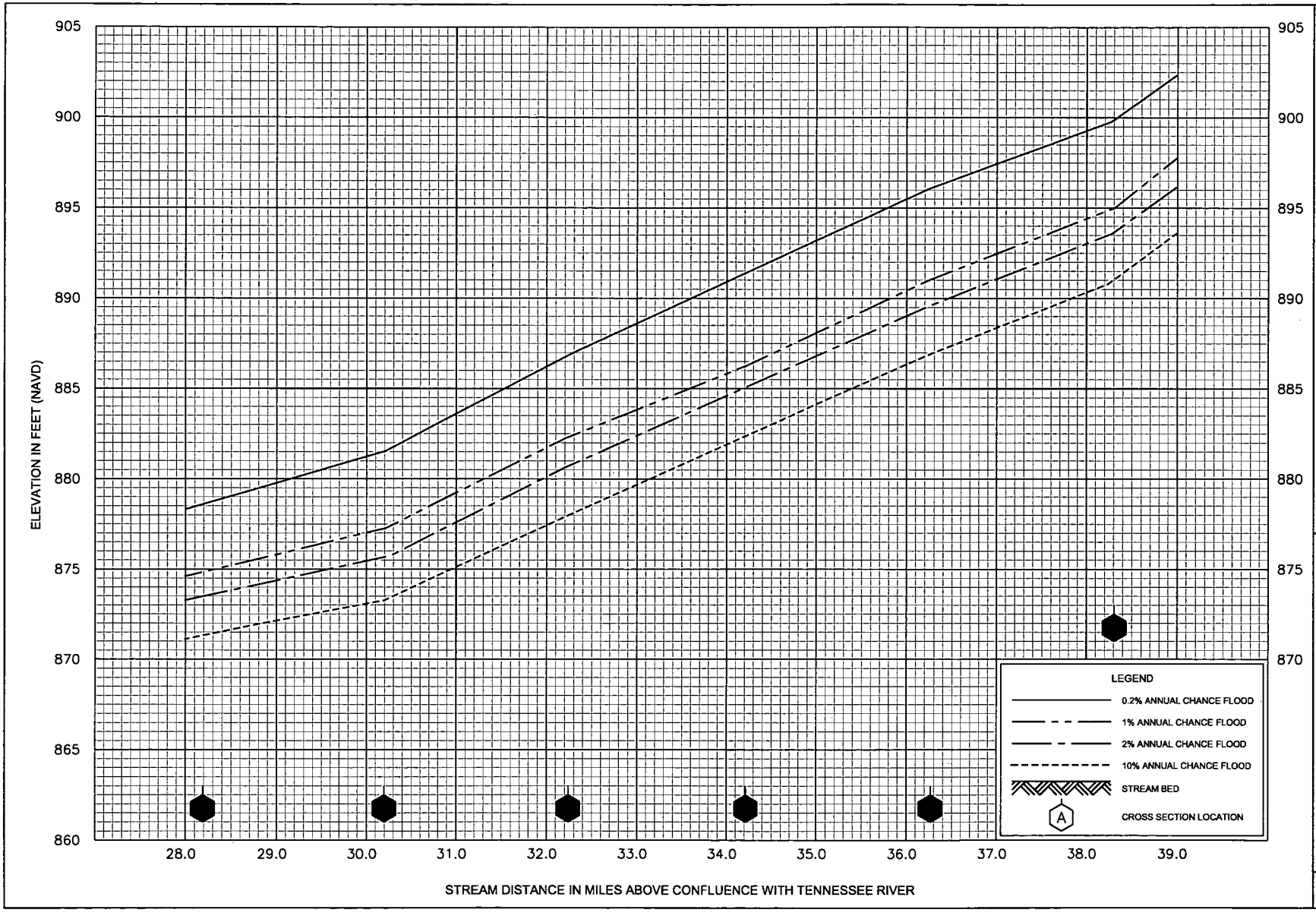
HOLSTON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

JEFFERSON COUNTY, TN

AND INCORPORATED AREAS

05P



FLOOD PROFILES

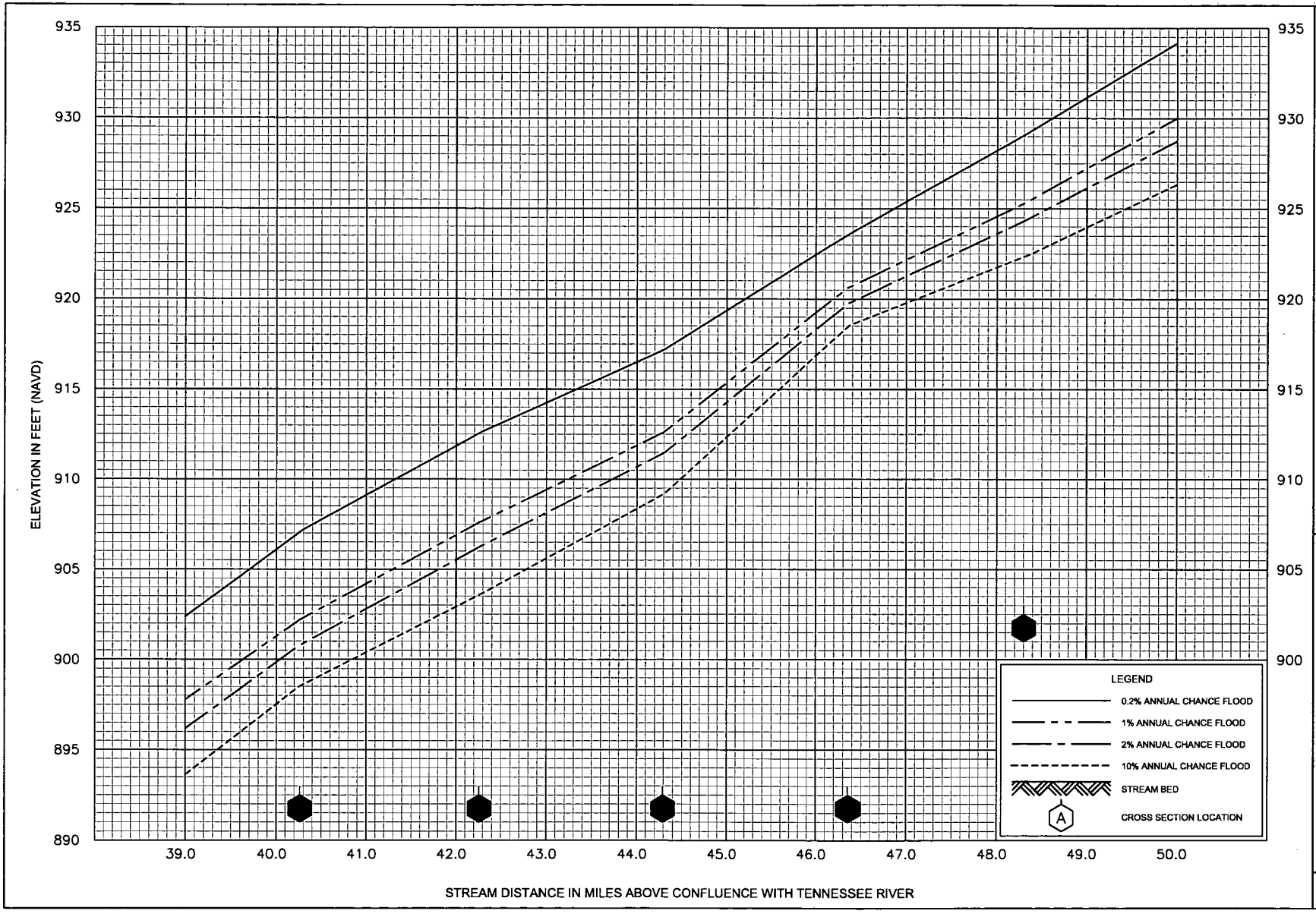
HOLSTON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

JEFFERSON COUNTY, TN

AND INCORPORATED AREAS

06P



FLOOD PROFILES

HOLSTON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

JEFFERSON COUNTY, TN

AND INCORPORATED AREAS

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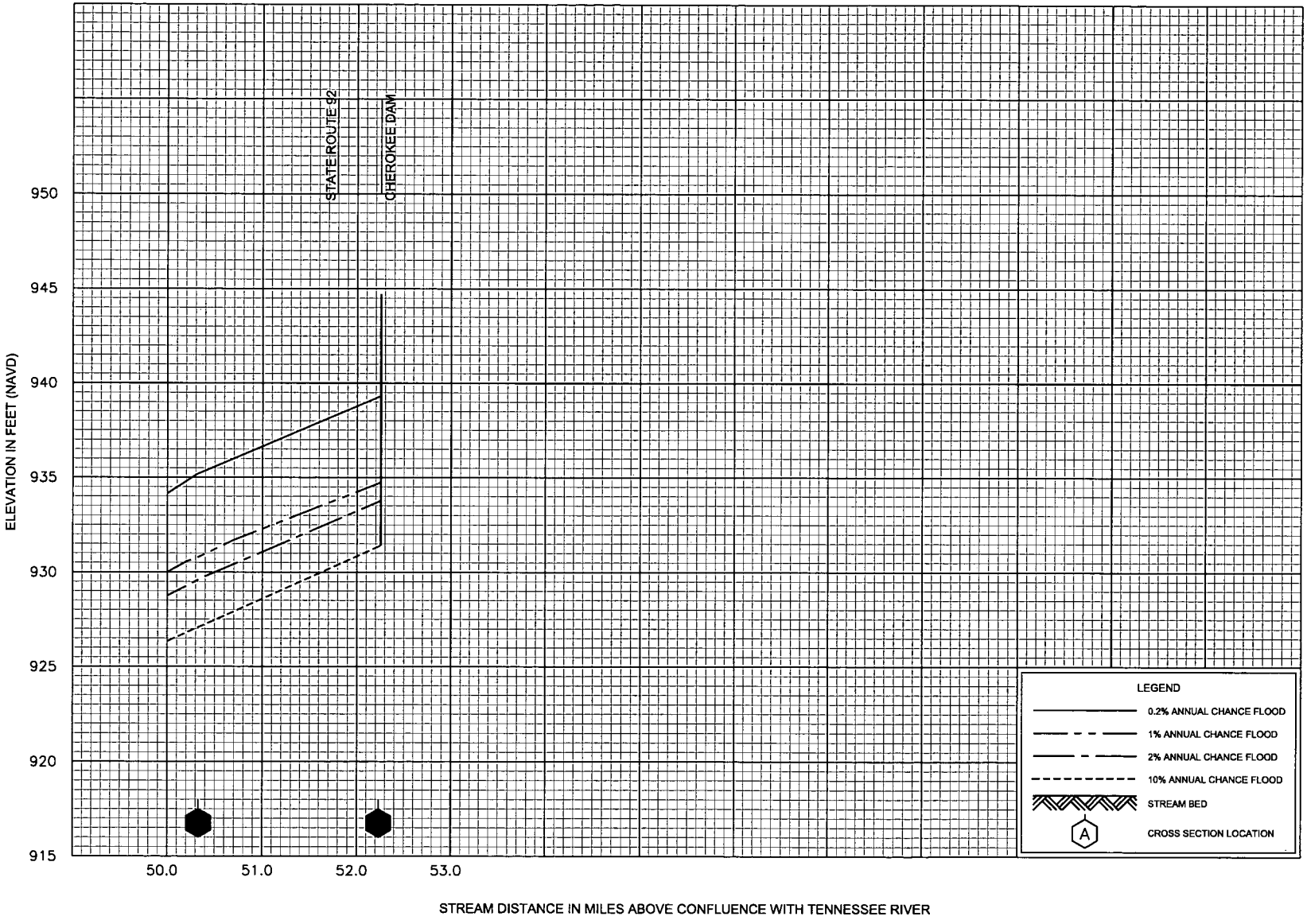

FLOOD PROFILES

HOLSTON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

JEFFERSON COUNTY, TN

AND INCORPORATED AREAS

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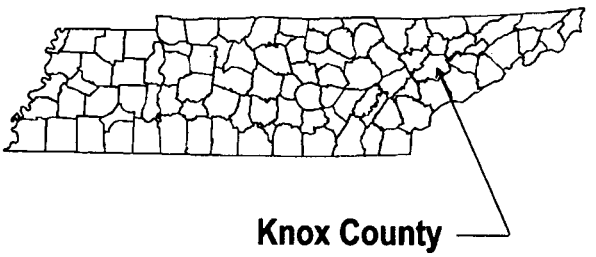
FLOOD INSURANCE STUDY

VOLUME 1 OF 4

KNOX COUNTY, TENNESSEE
AND INCORPORATED AREAS



COMMUNITY NAME	COMMUNITY NUMBER
FARRAGUT, TOWN OF	470387
KNOXVILLE, CITY OF	475434
KNOX COUNTY (UNINCORPORATED AREAS)	475433

MAY 2, 2007

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
47093CV001A

TABLE 9 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
FIRST CREEK					
At Interstate 40 Inlet	16.77	3,013	4,385	5,165	6,750
At Interstate Ramp 640 Outlet	12.68	2,459	3,587	4,225	5,517
At Old Greenway Drive	5.51	1,332	1,956	2,303	3,001
At Maple Drive	3.35	925	1,365	1,607	2,090
Above Knox Road	1.65	550	816	960	1,247
FLAT CREEK					
At mouth	66.69	5,488	8,182	9,444	12,359
At Old Rutledge Pike	61.15	6,152	7,692	8,885	11,636
Below confluence of Little Flat Creek	56.55	4,872	7,283	8,418	11,032
Above confluence of Little Flat Creek	36.18	3,515	5,292	6,139	8,077
At Union County boundary	30.13	3,080	4,651	5,402	7,120
FOURTH CREEK					
At mouth	11.16	2,526	3,639	4,286	5,557
At Westland Drive	6.59	1,715	2,482	2,922	3,783
At Walden Drive	5.69	1,531	2,219	2,612	3,380
At Papermill Drive	3.63	1,098	1,598	1,881	2,431
At Old Weisgarber Road	2.75	927	1,351	1,590	2,055
Above confluence of Tributary No. 3 to Fourth Creek near Middlebrook Pike	1.97	709	1,036	1,219	1,574
FRENCH BROAD RIVER					
At mouth	5,124	48,000	69,000	82,000	140,000
At Knox County boundary	5,049	46,000	65,000	78,000	136,000
GOOSE CREEK					
At mouth	3.52	1,100	1,500	1,650	2,050
At Candora Road	1.12	400	590	660	840
GRASSY CREEK					
At mouth	6.64	2,220	*	4,360	5,400
At Oak Ridge Highway	5.46	2,280	*	4,090	5,260
At Ball Road	5.38	2,270	*	4,120	5,270

*Data not available

TABLE 9 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
HICKORY CREEK					
At mouth	2.22	460	720	860	1,170
At Snyder School Road	1.34	320	510	610	820
At Cooper Lane	0.52	160	260	310	430
HINES BRANCH					
At mouth	2.27	1,400	*	2,630	3,360
At Mynatt Road	0.85	720	*	1,270	1,580
HINES CREEK					
At mouth	6.98	1,064	1,644	1,932	2,581
At Kimberlin Heights Road	5.54	898	1,394	1,641	2,196
At Hendron Chapel Road	3.04	580	908	1,075	1,446
At Old Sevierville Pike	2.43	495	778	922	1,243
Below Evans Road	1.25	305	484	577	782
HOLSTON RIVER					
At mouth	3,776	28,500	37,600	43,700	63,900
At mile 5.5	3,687	28,000	37,000	43,000	63,000
At Knox County line	3,566	25,700	43,200	39,700	58,800
KERNS BRANCH					
At mouth	2.93	680	*	1,440	2,120
At East Emory Road	2.61	610	*	1,330	2,010
At Majors Road	1.99	500	*	1,230	1,730
KNOB CREEK					
At mouth	7.50	1,121	1,730	2,032	2,712
At Old Maryville Pike	4.96	828	1,287	1,517	2,032
Above Brown Road	4.28	758	1,181	1,393	1,869
At driveways near Rudder Road	2.99	551	864	1,023	1,377
At Martin Mill Pike	1.55	356	564	671	908
KNOB FORK					
At mouth	5.89	1,480	*	2,430	3,050
At Callahan Road	5.02	1,580	*	2,650	3,580
At Fountain City Road	0.69	460	*	850	1,070

*Data not available

TABLE 9 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
TEN MILE CREEK					
At Ebenezer Sinkhole	14.90	3,830	*	6,670	8,730
At Kingston Pike	8.58	2,690	*	5,340	6,870
At I-40/75	8.04	2,750	*	5,280	6,790
At Bridgewater Road	6.00	2,420	*	4,700	6,110
At Walker Springs Road	4.19	1,820	*	3,550	4,640
At Middlebrook Pike	2.64	1,240	*	2,370	3,060
TENNESSEE RIVER					
At Loudoun County ' boundary	9,515	80,000	110,000	120,000	210,000
At French Broad River and Holston River confluence	8,900	68,000	100,000	110,000	180,000
THOMPSON SCHOOL TRIBUTARY					
At mouth	1.31	590	*	1,120	1,480
At Thompson School Road	0.78	380	*	740	950
THIRD CREEK					
At mouth	15.70	3,900	5,300	5,800	7,000
Downstream of West Fork	9.00	2,000	2,900	3,000	3,700
Upstream of Pleasant Ridge Road	1.86	620	900	1,000	1,300
TRIBUTARY NO. 1 TO FIRST CREEK					
At mouth	0.79	320	478	562	729
At Montrose Street	0.24	133	201	237	306
TRIBUTARY NO. 2 TO FIRST CREEK					
At mouth	0.56	227	344	404	526
Approximately 0.1 mile Below Cedar Lane	0.42	184	279	328	426
TRIBUTARY NO. 1 TO FOURTH CREEK					
At mouth	1.76	549	819	964	1,255
Above (west) Lawford Road	0.83	319	475	562	731

Channel roughness coefficients (Manning's "n") were determined by engineering judgment on the basis of field inspection of channel and floodplain areas , review of previous TVA studies, and calibration methods using known flood profiles where available. For restudied streams, all roughness coefficients from the existing flood models were updated to current conditions based on field inspection.

Roughness coefficients for all streams studied by detailed methods are shown in Table 12, "Ranges of Manning's "n" Values."

TABLE 12 - RANGES OF MANNING'S "n" VALUES

Stream	Channel "n"	Overbank "n"
Beaver Creek	0.038 – 0.060	0.050 – 0.140
Berry Branch	0.040	0.070 – 0.080
Brice Branch	0.044	0.080 – 0.09
Bullrun Creek	0.023 – 0.079	0.050 – 0.150
Burnett Creek	0.045 – 0.065	0.065 – 0.120
Clift Creek	0.043 – 0.050	0.070 – 0.100
Conner Creek	0.040 – 0.050	0.070 – 0.090
Cox Creek	0.050 – 0.060	0.075 – 0.140
Echo Valley Tributary	0.040	0.080
First Creek	0.035 – 0.060	0.045 – 0.120
Flat Creek	0.040 – 0.065	0.040 – 0.120
Fourth Creek	0.035 – 0.080	0.045 – 0.150
French Broad River	0.030 – 0.041	0.060 – 0.130
Grassy Creek	0.045	0.080 – 0.120
Hickory Creek	0.045	0.070 – 0.100
Hines Branch	0.045	0.080 – 0.120
Hines Creek	0.045	0.090
Holston River	0.024 – 0.087	0.060 – 0.150
Kerns Branch	0.050 – 0.055	0.075 – 0.120
Knob Creek	0.043 – 0.045	0.075 – 0.110
Knob Fork	0.045 – 0.080	0.080 – 0.120
Limestone Creek	0.040 – 0.050	0.075 – 0.120
Little Flat Creek	0.050 – 0.065	0.065 – 0.120
Little Turkey Creek	0.045 – 0.080	0.055 – 0.150
Little Turkey Creek Tributary	0.045 – 0.065	0.050 – 0.120
Love Creek	0.030 – 0.050	0.070 – 0.150
Love Creek Tributary	0.035 – 0.060	0.045 – 0.100
Lyon Creek	0.040 – 0.048	0.070 – 0.100
Mill Branch	0.040 – 0.055	0.075 – 0.120
Murphy Creek	0.040 – 0.047	0.070 – 0.100
North Fork Beaver Creek	0.035 – 0.050	0.070 – 0.130
North Fork Turkey Creek	0.040 – 0.070	0.050 – 0.150
Plumb Creek	0.055 – 0.060	0.070 – 0.120
Roseberry Creek	0.045 – 0.055	0.050 – 0.150

TABLE 12 - RANGES OF MANNING'S "n" VALUES - continued

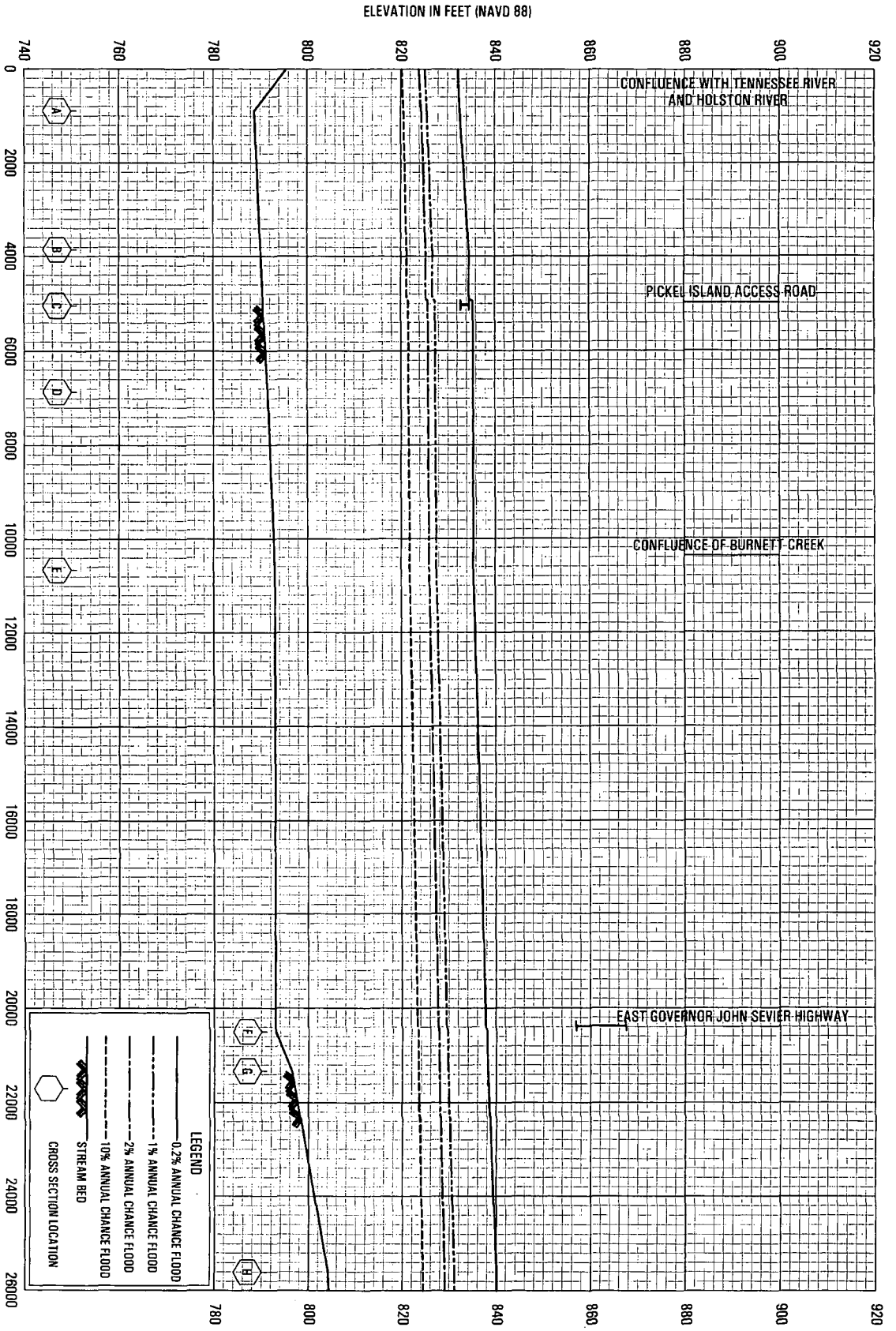
Stream	Channel "n"	Overbank "n"
Sinking Creek	0.040 – 0.043	0.080 – 0.110
Sinking Creek (Tributary to Ten Mile Creek(	0.015 – 0.050	0.070 – 0.120
Sixmile Branch	0.050 – 0.065	0.055 – 0.130
South Fork Beaver Creek	0.045 – 0.060	0.080 – 0.110
Stock Creek	0.045 – 0.065	0.055 – 0.140
Swanpond Creek	0.045 – 0.050	0.090 – 0.100
Ten Mile Creek	0.045 – 0.054	0.070 – 0.120
Tennessee River	0.021 – 0.055	0.060 – 0.150
Thompson School Tributary	0.055 – 0.060	0.080 – 0.090
Tributary to Cox Creek	0.050	0.075 – 0.095
Tributary No. 1 to First Creek	0.060 – 0.070	0.070 – 0.090
Tributary No. 2 to First Creek	0.065	0.075 – 0.120
Tributary No. 1 to Fourth Creek	0.045 – 0.060	0.050 – 0.150
Tributary No. 1 to Fourth Creek	0.045 – 0.060	0.035 – 0.120
Tributary to Grassy Creek	0.044	0.070 – 0.120
Tributary to Turkey Creek	0.030 – 0.041	0.054 – 0.080
Tuckahoe Creek	0.043 – 0.050	0.070 – 0.110
Turkey Creek	0.050	0.080 – 0.100
West Hills Tributary	0.050	0.075 – 0.100
Whites Creek	0.045 – 0.050	0.075 – 0.080
Williams Creek	0.045 – 0.065	0.050 – 0.150
Willow Fork	0.040 – 0.055	0.070 – 0.130

Channel roughness factors for East Fork Third Creek, Goose Creek, Second Creek, Third Creek, and Tributary to Goose Creek were determined on the basis of field inspection of channel floodplain areas, on previous studies by TVA, and computed coefficients based on known flood profiles.

The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

3.3 Vertical Datum

All FISs and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FISs and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD 29). With the finalization of the North



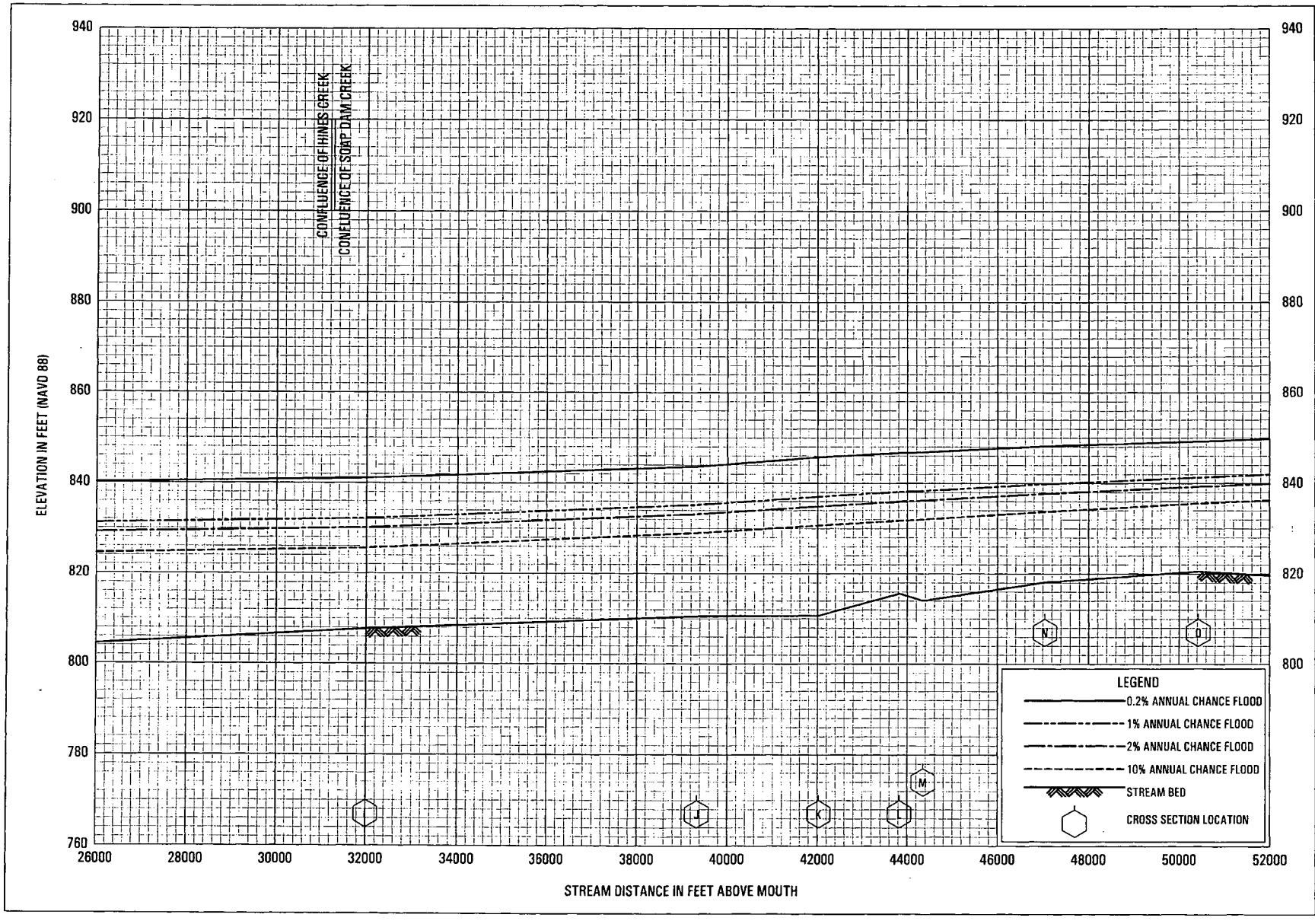
FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, TN

AND INCORPORATED AREAS

FLOOD PROFILES

FRENCH BROAD RIVER



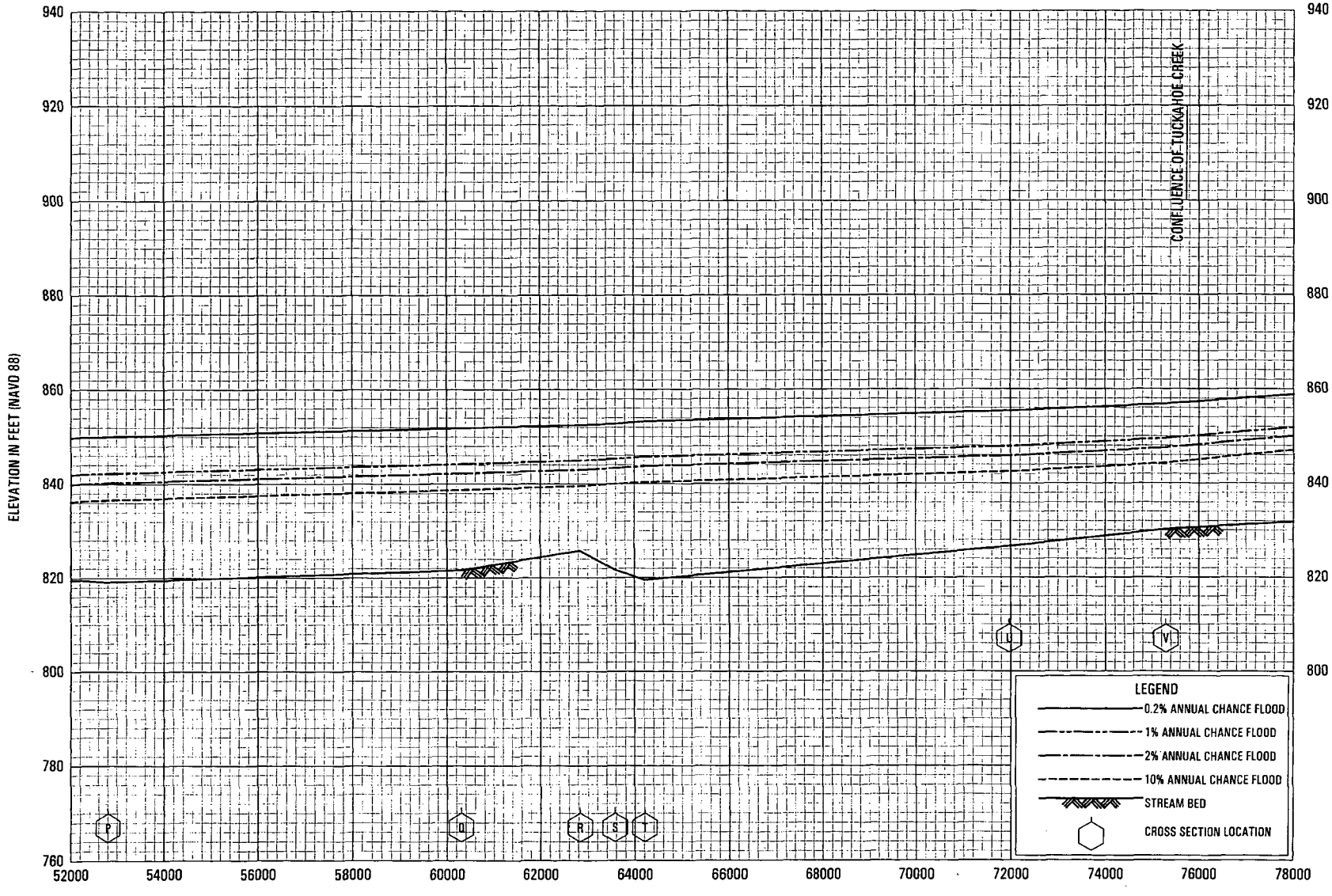
FLOOD PROFILES

FRENCH BROAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, TN

AND INCORPORATED AREAS



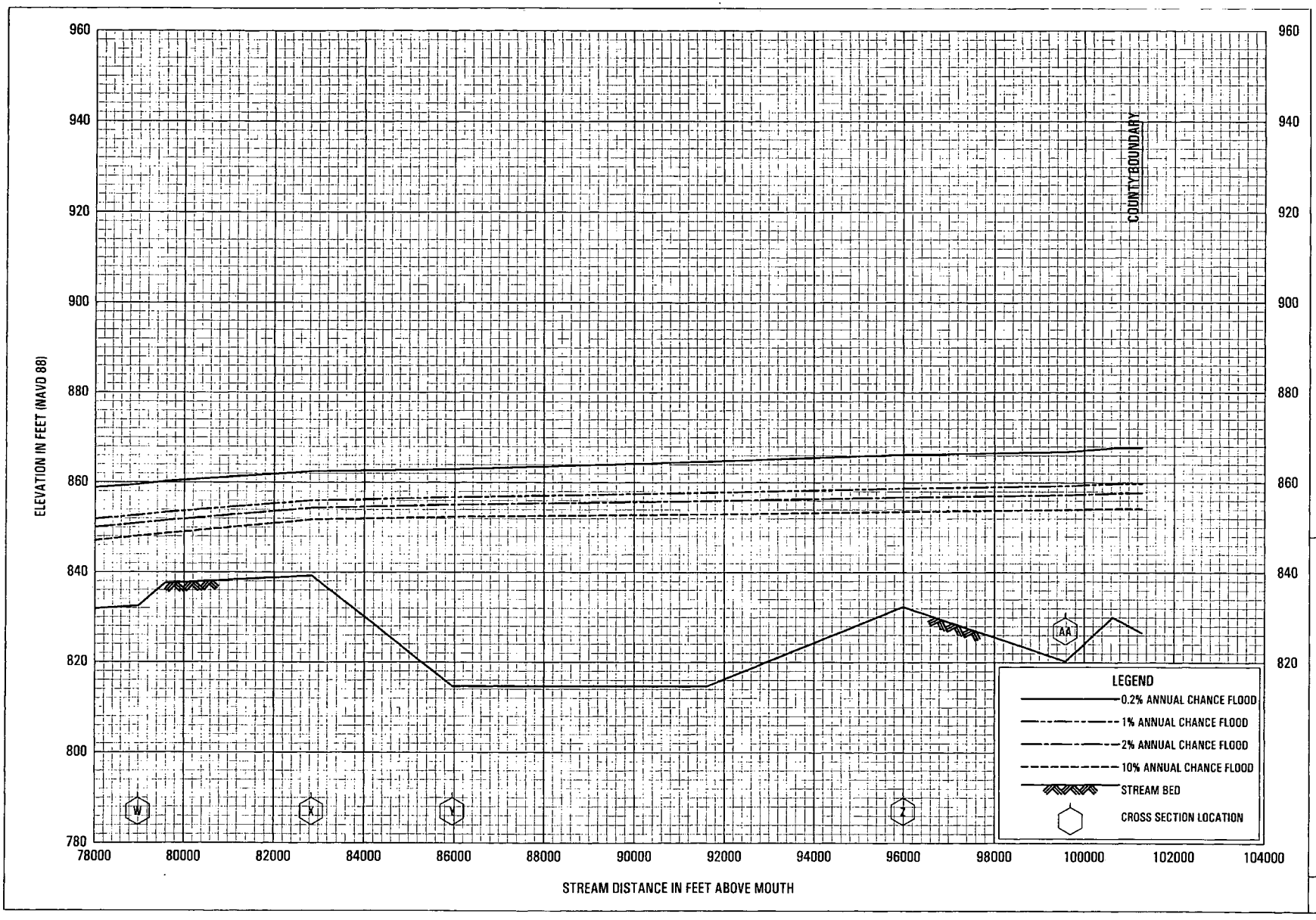
FLOOD PROFILES

FRENCH BROAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, TN

AND INCORPORATED AREAS



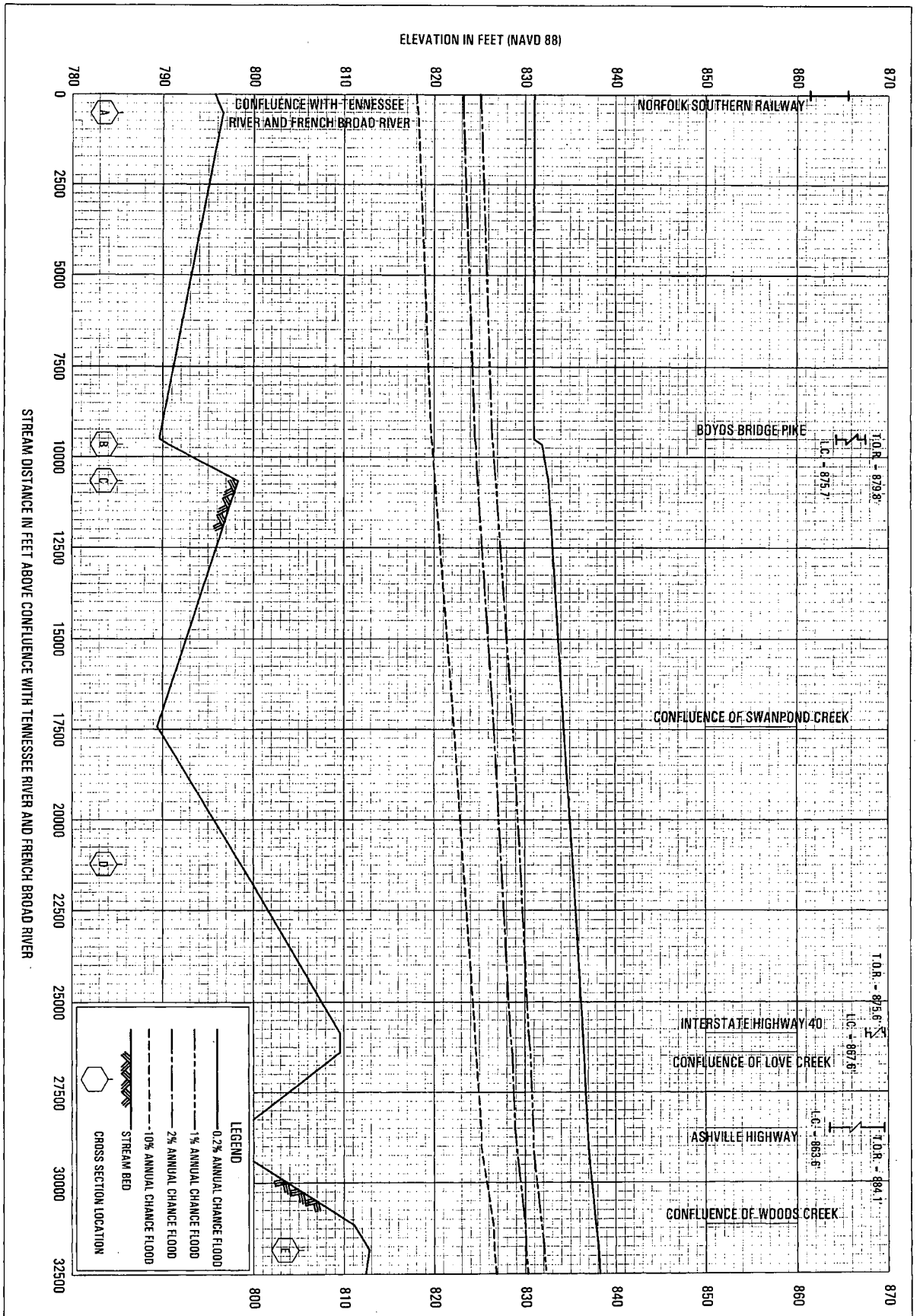
FLOOD PROFILES

FRENCH BROAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, TN

AND INCORPORATED AREAS



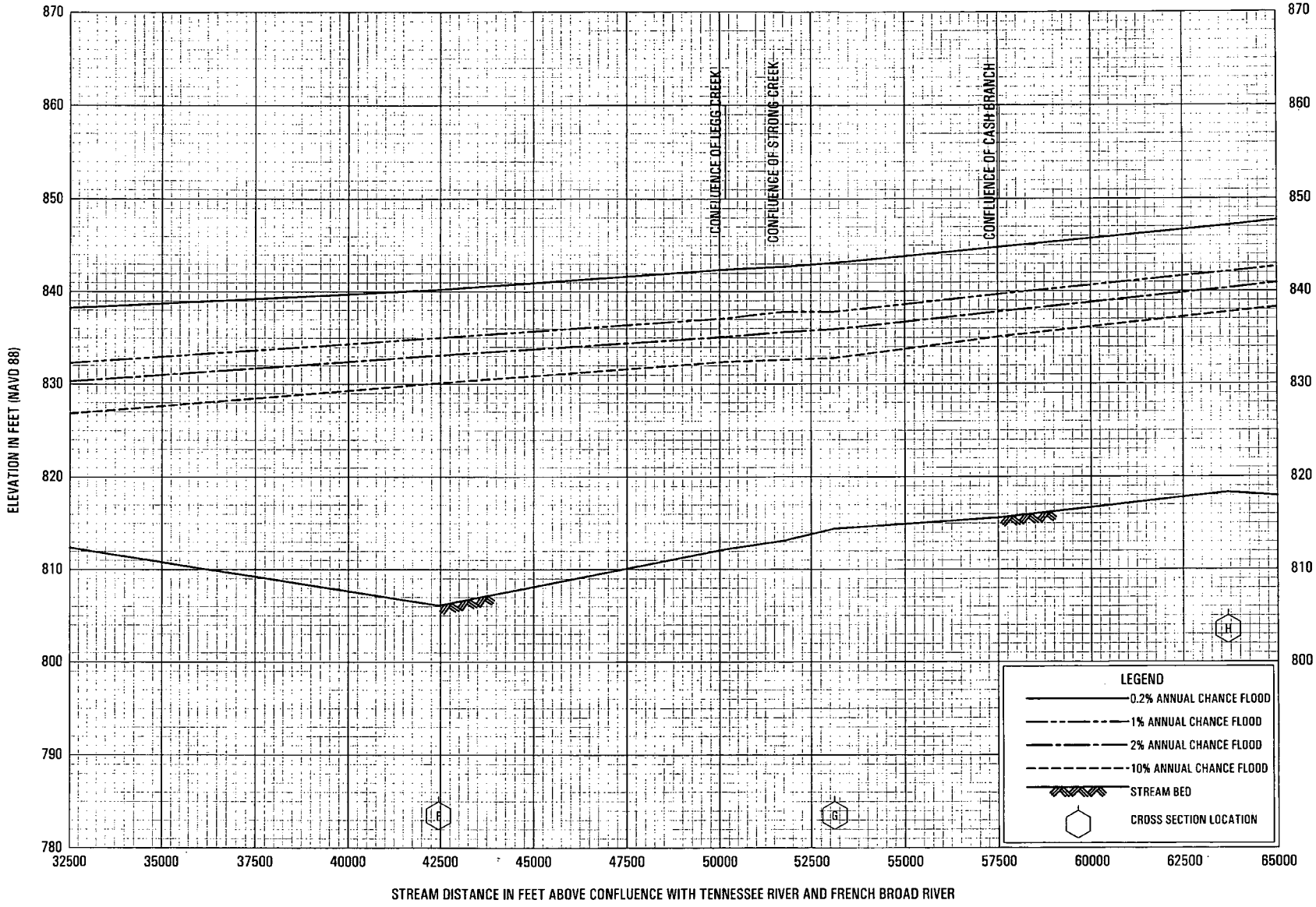
FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, TN

AND INCORPORATED AREAS

FLOOD PROFILES

HOLSTON RIVER



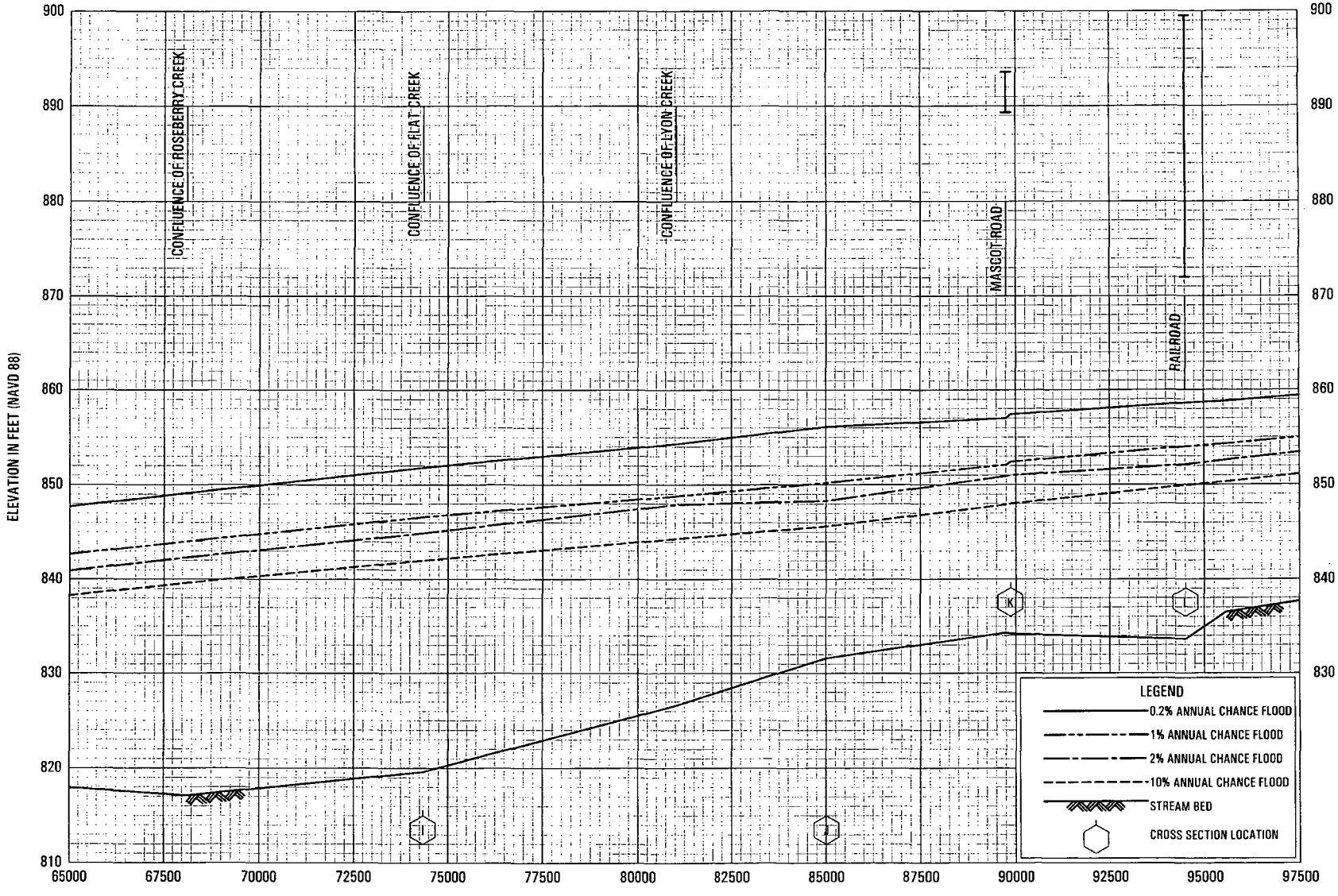
FLOOD PROFILES

HOLSTON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, TN

AND INCORPORATED AREAS



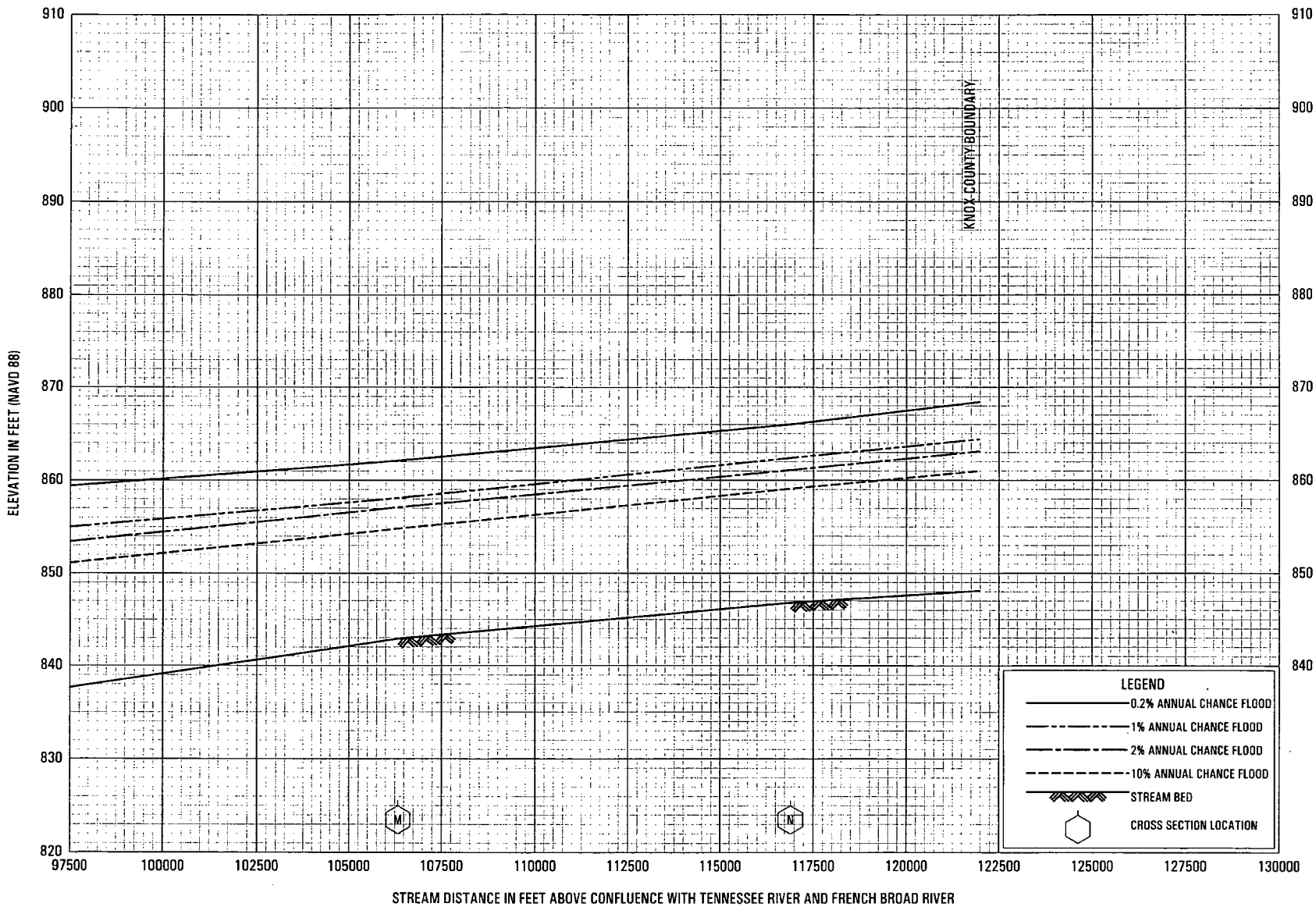
FLOOD PROFILES

HOLSTON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, TN

AND INCORPORATED AREAS



FLOOD PROFILES

HOLSTON RIVER

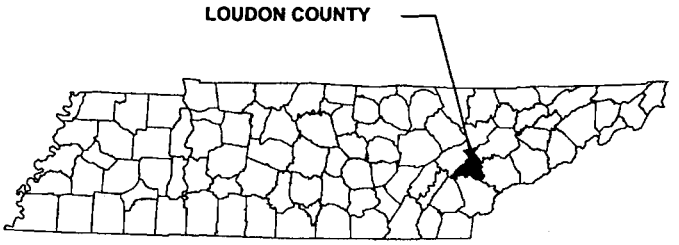
FEDERAL EMERGENCY MANAGEMENT AGENCY

KNOX COUNTY, TN

AND INCORPORATED AREAS

FLOOD INSURANCE STUDY

LOUDON COUNTY, TENNESSEE,
AND INCORPORATED AREAS



Community Name	Community Number
GREENBACK, CITY OF	470303
LENOIR CITY, CITY OF	475438
LOUDON, CITY OF	470110
PHILADELPHIA, CITY OF	470276
LOUDON COUNTY (UNINCORPORATED AREAS)	470107

May 16, 2007

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
47105CV000A

elevation data or where there is regulation from upstream dams (FEMA 1992b).
The extrapolation of the frequency curve to the 500-year flood for all streams was guided by estimates of maximum flood flows determined using maximum probable precipitation determined by the National Weather Service. Values of the 10-, 50-, 100-, and 500-year peak discharges were determined for each stream studied in detail.

This Countywide Revision

Peak discharge-frequency relationships for the Limited Detailed study streams, Bacon Creek within the corporate limits of the City of Philadelphia, Dry Valley Branch, Hines Creek and Muddy Creek Tributary 1, were calculated using regression equations for the state of Tennessee (USGS 2000). These equations are dependent upon basin drainage area. Watershed basins for these streams were delineated based on the most detailed and up-to-date topographic data available.

A summary of the drainage area-peak discharge relationships for the streams previously studied by detailed methods that have been redelineated for this study are shown in Table 3, "Summary of Discharges.

Table 3. Summary of Discharges

		Peak Discharges (cubic feet per second)			
Flooding Source and Location	Drainage Area (square miles)	10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Bacon Creek					
About 0.04 mile upstream of mouth	6.2	900	1,550	1,850	3,100
About 0.97 mile upstream of mouth	5.9	865	1,480	1,771	2,977
Baker Creek					
About 1.1 miles upstream of Sinking Creek Road	40.5	2,350	3,800	4,900	8,300
About 0.55 mile upstream of State Route 95	30.7	2,007	3,469	4,115	6,738
At upstream County Boundary	22.5	1,700	3,000	3,500	5,800
Clinch River					
At Melton Hill Dam	3,340.0	33,100	42,900	46,200	65,000
About 2.3 miles upstream of confluence with Hope Creek	3,330.0	32,796	42,670	66,067	63,585
Little Tennessee River					
At Tellico Dam	2,627.0	45,000	63,000	71,000	123,000
At upstream County Boundary	2,447.0	45,000	63,000	71,000	123,000
Muddy Creek					
At Fort Loudoun Dam Access Road	11.00	800	1,200	1,400	2,000
About 0.4 mile	7.70	672	1,042	1,208	1,714

Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to us the flood elevation data presented in this FIS report in conjunction with the data shown on the FIRM.

Pre-countywide Analyses

The unincorporated areas within Loudon County and the Cities of Greenback, Lenoir City and Loudon have a previously printed FIS report narrative. The hydraulic analyses described in those narratives are summarized below.

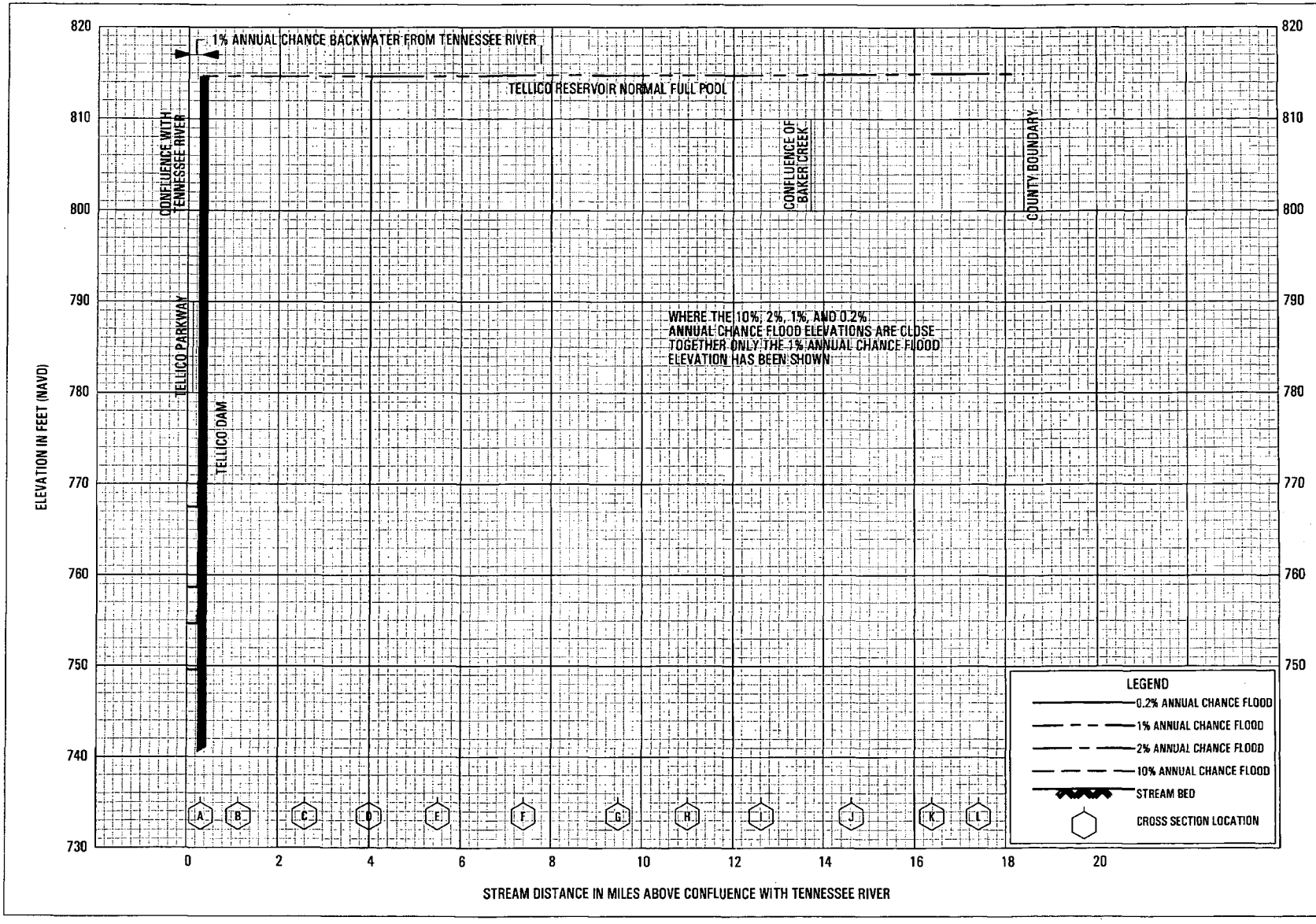
Analyses of the hydraulic characteristics of the streams studied in detail in the community are carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these streams. Cross sections for the backwater analyses of the upland streams were field surveyed and located at bridges and other strategic locations at sufficiently close intervals to accurately compute water surface elevations. All bridges and culverts were surveyed to record elevation and structural geometry. The Tennessee and Clinch River cross sections were based on silt range surveys and detailed topographic maps. Cross sections along the Little Tennessee River were determined from detailed topographic maps (FEMA 1992b).

Channel roughness factors (Manning's "n") for these computations were determined on the basis of field inspection of channel and flood plain areas, on previous studies by the TVA, and computed coefficients based on known flood profiles. Factors used are shown in Table 4.

Table 4. Manning's "n" Values

Stream	Channel "n"	Overbank "n"
Bacon Creek	0.031 – 0.060	0.060 – 0.107
Baker Creek	0.030 – 0.050	0.07 – 0.15
Clinch River	0.023 – 0.027	0.07 – 0.14
Little Tennessee River	0.013 – 0.045	0.045 – 0.10
Muddy Creek	0.028 – 0.060	0.03 – 0.15
Steekee Creek	0.025 – 0.063	0.06 – 0.015
Sweetwater Creek	0.025 – 0.066	0.05 – 0.175
Tennessee River	0.026 – 0.050	0.07 – 0.15
Town Creek	0.026 – 0.060	0.07 – 0.15

Water-surface elevations of floods for the selected recurrence intervals for Bacon Creek, Baker Creek, Clinch River, Little Tennessee River, Muddy Creek, Steekee Creek, Sweetwater Creek and Town Creek were computed through use of a step method backwater computer program developed by the TVA similar to but with some alterations to the Army Corps of Engineers HEC-2 backwater program. Starting elevations for flood-frequency profiles in Watts Bar and Fort Loudoun Reservoirs are 529.9 and 602.3 feet (NGVD), respectively, and were based on an analysis of recorded headwater data. Starting elevations for frequency profiles along the Clinch River were developed from known data for Watts Bar Reservoir and Melton Hill Dam top-of-gate elevation. Starting elevation for frequency profiles in Tellico Reservoir for the Little Tennessee River and Baker Creek was the Tellico Dam top-of-gate elevation. The 500-, 100-, and 50-year



FLOOD PROFILES

LITTLE TENNESSEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

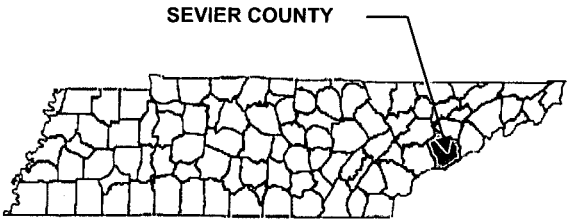
LOUDON COUNTY, TN

AND INCORPORATED AREAS

08P

FLOOD INSURANCE STUDY

SEVIER COUNTY, TENNESSEE,
AND INCORPORATED AREAS



Community Name	Community Number
GATLINBURG, CITY OF	475426
PIGEON FORGE, CITY OF	475442
PITTMAN CENTER, TOWN OF	470378
SEVIERVILLE, CITY OF	475444
SEVIER COUNTY (UNINCORPORATED AREAS)	470236

May 18, 2009

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
47155CV000A

Starting water-surface elevations for East Fork Little Pigeon River, French Broad River, Gists Creek, Middle Creek, Mill Creek, Little Pigeon River and Walden Creek from the 2004 USACE study were obtained by matching the slope of the streambed. Little Pigeon River Elevations at the mouth of West Prong Little Pigeon River from the previous FIS reports were used as starting elevations for West Prong Little Pigeon River.

Roughness factors (Manning's "n") used in the hydraulic computations were chosen on the basis of field inspections of the channels and floodplain areas, previous studies by the TVA, and computed coefficients based on known flood profiles. The following tabulation shows the channel and overbank "n" values for the streams studied by detailed methods.

Table 5 - Range of Manning's N Values

Stream	Channel	Overbank
Dudley Creek	0.045-0.055	0.050-0.100
Dry Fork	0.030-0.070	0.045-0.100
Dumplin Creek	0.050-0.060	0.070-0.100
East Fork Little Pigeon River	0.045	0.080-0.12
French Broad River	0.030-0.035	0.1
Gists Creek	0.048	0.07-0.12
Little Pigeon River	0.030-0.045	0.08-0.5
Middle Creek	0.045	0.08-0.12
Mill Creek	0.040-0.046	0.080-0.14
Walden Creek	0.035-0.047	0.09-0.15
West Fork Gists Creek	0.045-0.055	0.05-0.100
West Fork Little Pigeon River	0.04-0.060	0.05-0.100

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). In cases where the 2- and 1-percent annual chance flood elevations are close together, due to limitations of the profile scale, only the 1-percent annual chance flood profile have been shown.

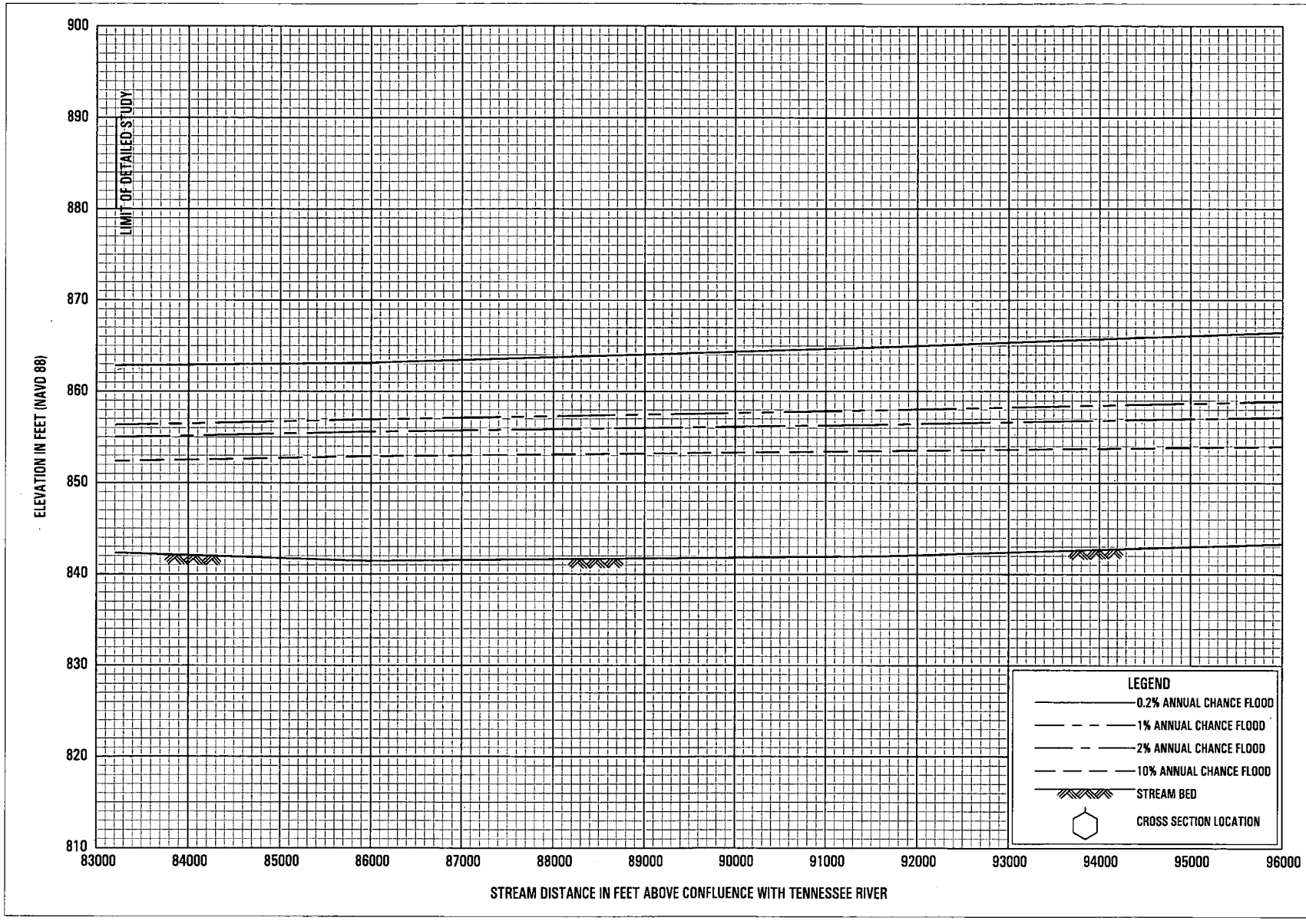
The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. The datum shift value in Sevier County to convert from NGVD29 to NAVD88 is -0.26 feet.

For more information on NAVD88, see the FEMA publication entitled *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988* (FEMA,



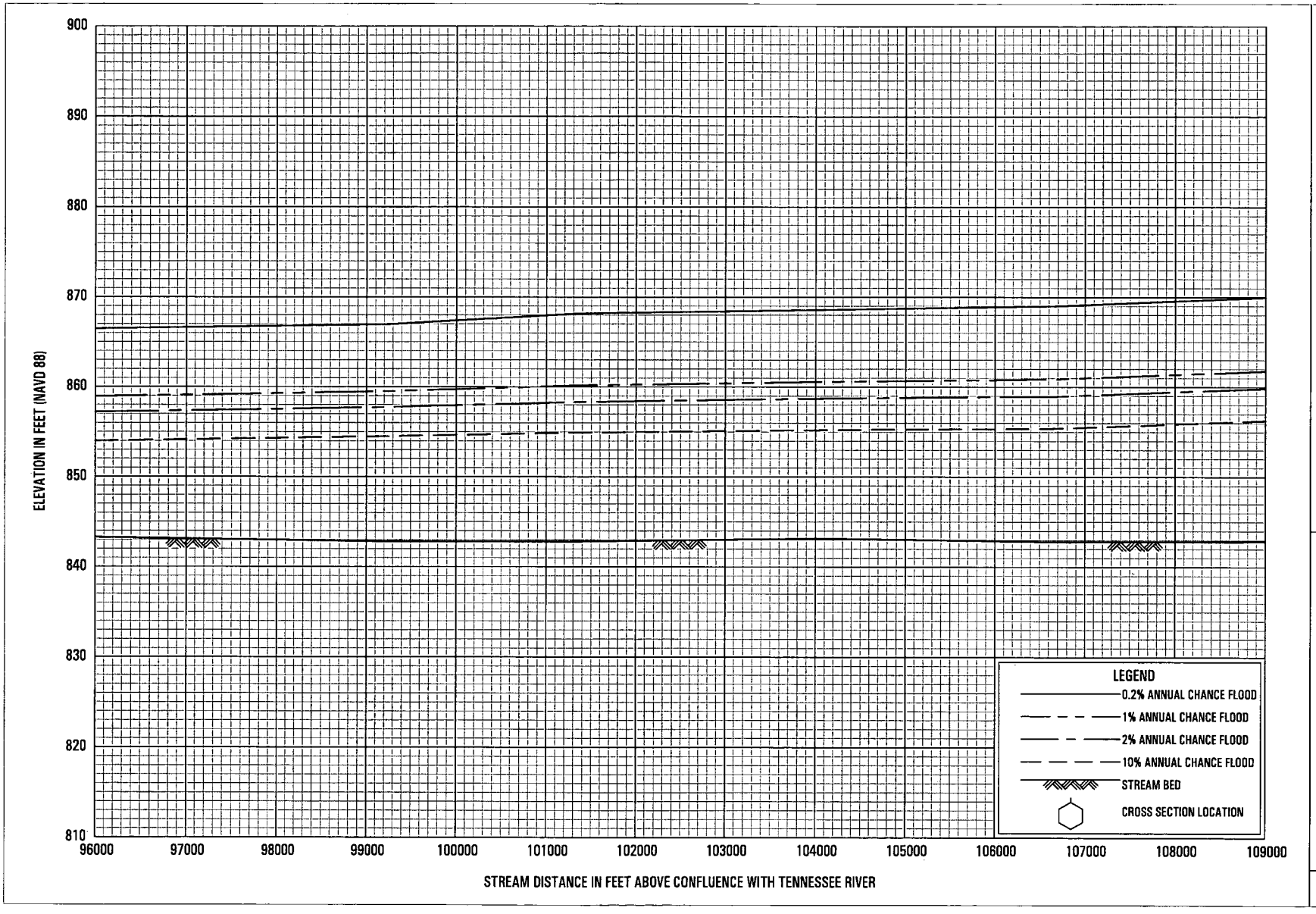
FLOOD PROFILES

FRENCH BROAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

SEVIER COUNTY, TN

AND INCORPORATED AREAS



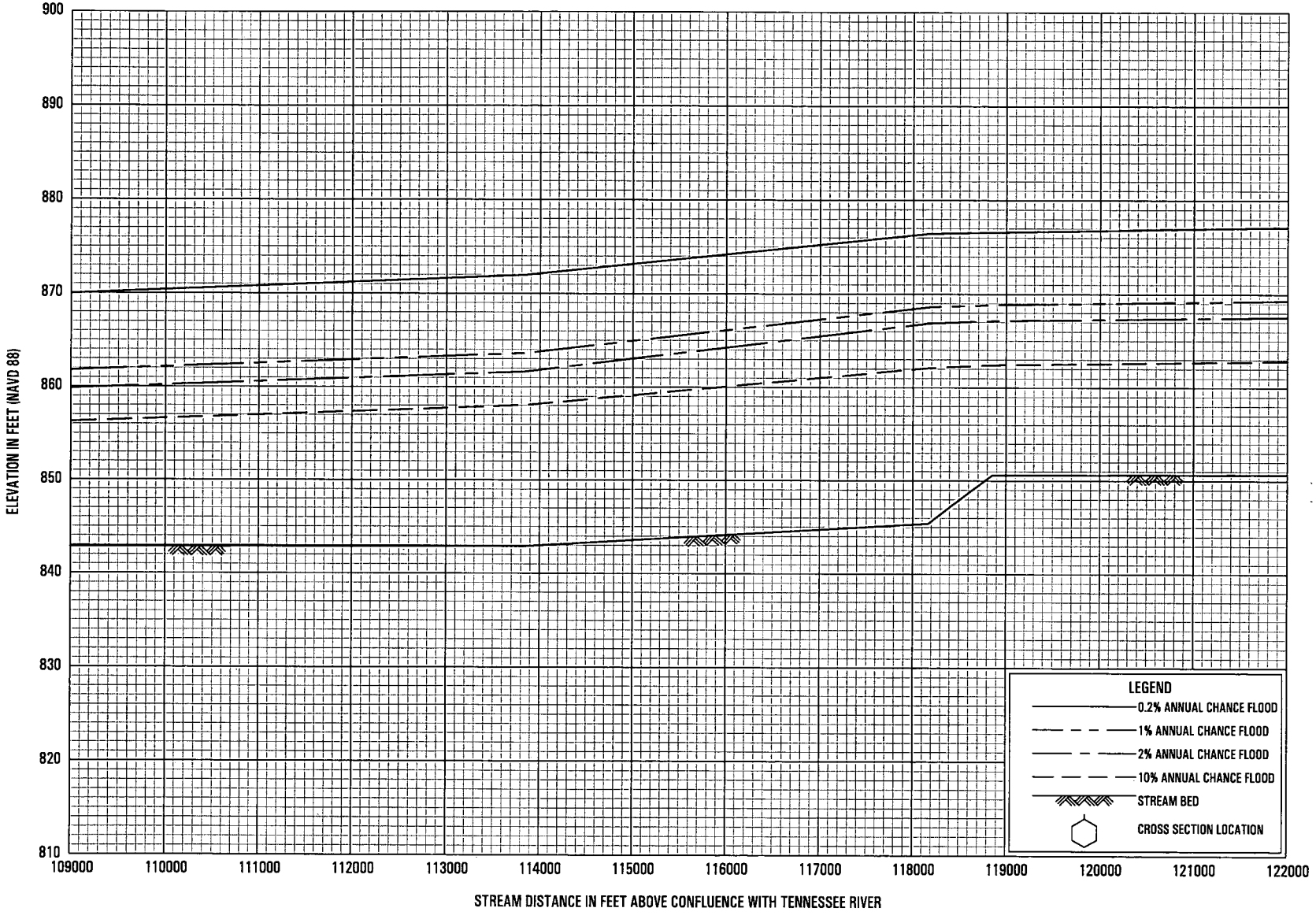
FLOOD PROFILES

FRENCH BROAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

SEVIER COUNTY, TN

AND INCORPORATED AREAS



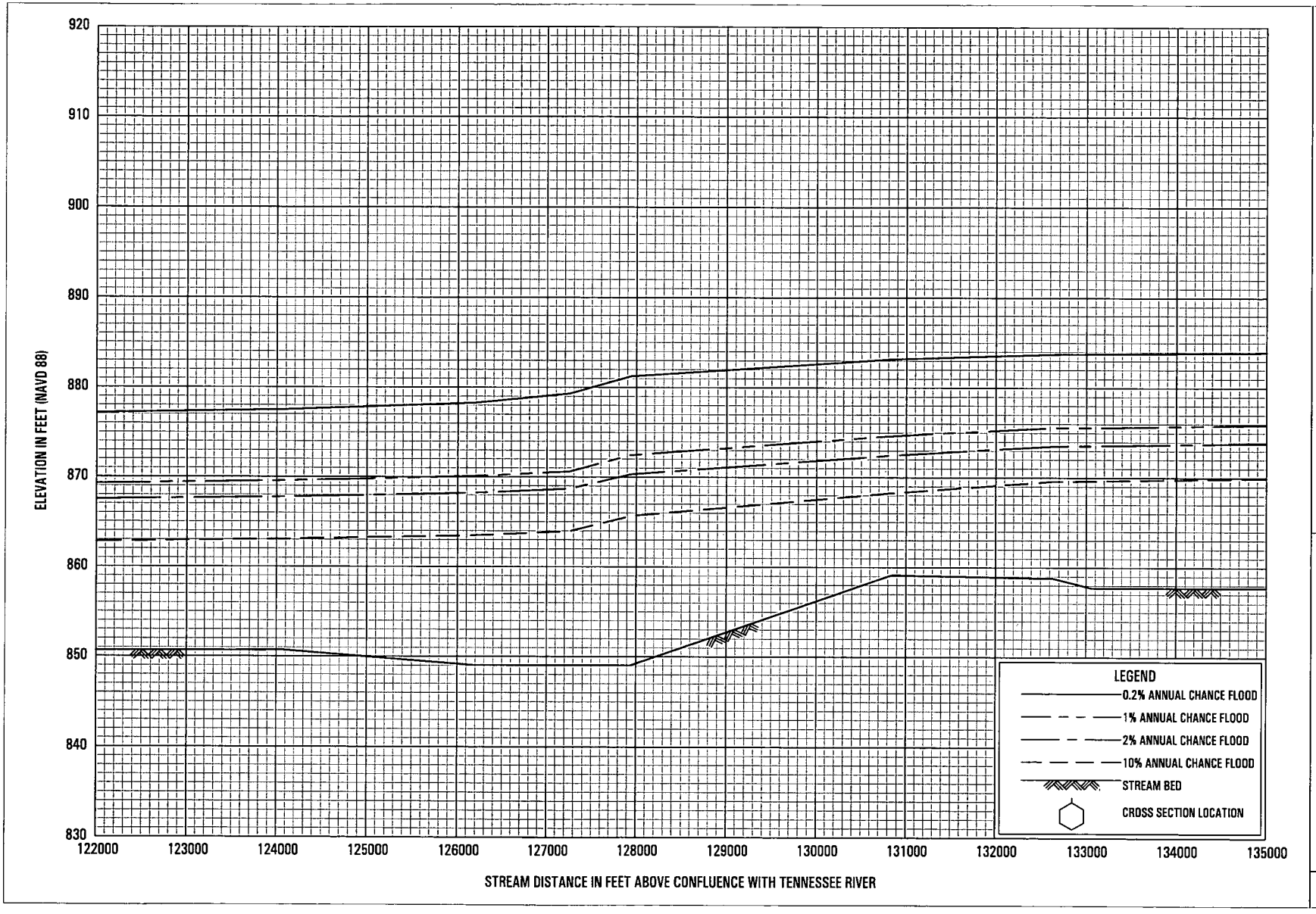
FLOOD PROFILES

FRENCH BROAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

SEVIER COUNTY, TN

AND INCORPORATED AREAS



FLOOD PROFILES

FRENCH BROAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

SEVIER COUNTY, TN

AND INCORPORATED AREAS

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Attachment_09_ HEC Files

FrBroadR.f01– (BE21147150B031)
FrBroadR.g13– (BE21147150B031)
FrBroadR.p15– (BE21147150B031)
FrBroadR.prj– (BE21147150B031)
ltnr97.dat– (BE21147150B031)
hol2000.dat– (BE21147150B031)

CDQ000020080036 Rev 0

Attachment_10_ Composite Rating Curve for Ft. Loudoun

Composite Rating Curve for Ft Loudoun.xls– (BE21108160B021)

CDQ000020080036 Rev 0

Attachment 11_ SOCH Input Preprocessor-Steady State with file:

FtLoudoun100Kto1400KBuildSOCHdata59sections.xls
49XS_1ftsections_FrenchBroad65Kto845KBuildSOCHdata1.xls
Holston35Kto490KBuildSOCHdata.xls
49XS_LittleTennBuildSOCHdata.xls

CDQ000020080036 Rev 0

Attachment_12_ SOCH Input Preprocessor-March 1973 with file:

FtLoudoun_Holston_FB_1973_BuildSOCHdata.xls

CDQ000020080036 Rev 0

Attachment_13_ SOCH Input Preprocessor-May 2003 with file:

DistLocalsRemove7_45FtLoudoun_EL_Tellico_Q_2003_BuildSOCHdata.xls

CDQ000020080036 Rev 0

Attachment_14_Macro File for SOCH Input Preprocessor with file:

SOCH_Macros.xls

CDQ000020080036 Rev 0

Attachment_15_Macro File for Extraction of SOCH Output with file:

Remove7_45Flood_ExtractSelectedSOCHOutputHydrographs.xls