CHAPTER 2

TABLE OF CONTENTS

Page No.

LIST OF TABLES

LIST OF TABLES (Cont'd)

LIST OF TABLES (Cont'd)

LIST OF TABLES (Cont'd)

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Cont'd)

LIST OF ILLUSTRATIONS (Cont'd)

LIST OF ILLUSTRATIONS (Cont'd)

LIST OF ILLUSTRATIONS (Cont'd)

2.0 SITE

2.1 Summary Description

The "Site Description" section gives the size, geographical location, and certain features of the Browns Ferry site with an analysis of the population distribution and land use in the areas adjacent to the site.

"Meteorology" presents the climate and weather of the Browns Ferry site. Included in this section are results of onsite weather measurements, which are the basis for determining diffusion and transport properties of the atmosphere.

The sections "Hydrology, Water Quality, and Marine Biology" present data on the streamflow, temperature, and aquatic life of the Tennessee River at the site. Also included are studies of subsurface waterflow and uses of water in the plant area.

Details of the geological formations underlying plant structures and the general site area are given in "Geology and Seismology." The seismic history of the area is presented with an analysis of the earthquake hazard at the plant site.

"Environmental Monitoring Program" outlines the program for monitoring the site environs for plant effluents.

The information provided in these sections was prepared by various groups within the TVA organization that have been involved for many years with the study of environmental sciences and site selection for locating and operating conventional steam plants and hydro stations.

2.2 SITE DESCRIPTION

The information contained in this section is considered historical with the exception of Section 2.2.3 and Table 2.2-10, which are periodically updated. Estimated populations for the surrounding counties within a 10-mile radius are reviewed and updated if determined necessary for state and local emergency planning purposes.

2.2.1 Location

The site is located on the north shore of Wheeler Lake at river mile 294 in Limestone County in north Alabama. The site is approximately 10 miles southwest of Athens, Alabama, and 10 miles northwest of the center of Decatur, Alabama. Figures 2.2-1 and 2.2-2 show the site location.

The plant site and adjoining areas are shown in Figure 2.2-4 which is considered historical and is not being updated. The site contains approximately 840 acres which are owned by the United States and are in the custody of TVA. The site has been developed to accommodate three units.

2.2.2 Population

2.2.2.1 Resident Population

The populations of the various towns and cities within 60 miles of the site are shown in Table 2.2-2. Only 21 towns or cities within a 60-mile radius of the site had population over 2,500 in 1990. Most of the smaller communities showed only small changes in population between 1980 and 1990. The largest center of population is about 30 miles from the site and the nearest city with a population of 25,000 or greater is Decatur. The projected growth of the larger centers of population is shown in Table 2.2-3. The greatest change in population is projected for Huntsville and Decatur.

Population distributions from the site for various directions and distances for the years 1970, 1980, 1986, 1990, 2000, 2010, and 2020 are shown in Tables 2.2-4 and 2.2-5. Within a 4-mile radius of the site, the 1990 population was 1425 persons for a density of about 45 persons per square mile, with a slight increase expected through 2020, as shown in Table 2.2-6.

The population within a 10-mile radius of the site is expected to increase from 26,740 in 1970 to 33,340 by 2020 with a corresponding increase in population density from 101 to 126 persons per square mile. There are only three towns within a radius of 20 miles (Athens and Decatur, 10 miles to the northeast and south, south-southeast, respectively and Moulton, 18 miles to the southwest), having a 1980 population greater than 1,800 persons. The population of Athens is expected to increase from 14,360 in 1970 to 18,600 in 2020. The population in Decatur is expected to increase from 38,044 to 54,000 in the same time period. Within a 60-mile radius the largest city is Huntsville, located approximately 30 miles due east from the site. The population of Huntsville is expected to increase from its 1970 level of 139,282 to 177,100 by 2020.

2.2.2.2 Transient Population

Transient population consists of visitors to recreation sites, students in schools, and employees at industrial facilities.

Recreation--Estimated and projected peak hour visitation to recreation facilities within 10 miles of the plant are contained in Table 2.2-7. The visitation is based on the maximum capacity of facilities plus some overflow. Capacities are based on an inventory done in 1989. There are no recreation facilities beyond 10 miles which are large enough to cause significant variations in the total population within any annular segment.

Schools--Eleven schools are located within 10 miles of the Browns Ferry Nuclear Plant. In 1993 these schools served 4,350 students, distributed as shown in Table 2.2-8.

Industries--Industries located in the 5 to 10 mile area are shown in Table 2.2-8. Employment in 1993 ranges from 80 to 1,700 for the day shift.

2.2.3 Land Use

Few centers of population exist within a 60-mile radius of the site. The dominant character of the land is small, scattered villages and homes in an agricultural area. Employment in the counties near the site is shown in Table 2.2-9. In 1990 agriculture employment was a higher percent of the labor force in Lawrence and Limestone counties than Morgan and Madison Counties where there was a greater concentration of manufacturing employment.

The area immediately surrounding the site is primarily agricultural with industrial areas concentrated along the Tennessee River primarily at the large centers of population. The closest industrial area is adjacent to Decatur. 3M Company, the NUCOR Steel Company, Worthington Steel Company, United Launch Alliance, and the Ascend Performance Materials, LLC, Plant are the largest industries in Morgan County and are approximately 4 to 7 air miles from the site. Browns Ferry, GM, and Steel Case are the largest industries in Limestone County. GM is located approximately 10 miles from the plant and Steel Case is located approximately 9 miles from the plant. The largest industrial complex is at the Redstone Arsenal, which is located approximately 25 miles east of the site. This is the NASA center for research and development and is the principal single economic force in the area. The remaining industrial area is located in the quad-cities area.

The nearest site boundary is approximately 4,000 feet northeast of the reactor building. The nearest house is approximately 5,400 feet north-northwest of the center of the site.

There are no railroads or principal highways penetrating the site. The closest railroad tracks are those of the Louisville and Nashville railroad approximately 8 miles east of the site running in the north-south direction, and those of the Southern railroad about 6 miles south of the site running in the east-west direction, as shown in Figure 2.2-2. The nearest principal highways are U.S. 72, about 6 miles north of the site, and State Highway 20, about 4.5 miles south of the site.

The Browns Ferry Nuclear Plant is located on a 9-foot deep navigable channel on Wheeler Reservoir. Table 2.2-10 shows the total amount of certain hazardous materials shipped past the Browns Ferry Nuclear Plant from 1983 to 1993 on a yearly basis. The product listed as gasoline on the table is actually RU250.

SECURITY RELATED INFORMATION
TEXT WITHHELD UNDER 10 CFR 2.390

The nearest missile testing facility is located on Redstone Arsenal about 25 miles east of the plant. The current range of any tested missile is approximately 8 kilometers (about 5 miles) which is well within the maximum range of any tested missile which is approximately 15 kilometers (about 9 miles). Adequate safety precautions are exercised at all times during all testing to prevent impacts outside the test range.

There are no airports within five miles of the site. The Athens-Decatur Airport is about 10 miles east of the plant. The nearest commercial airport is located in Huntsville about 25 miles from the site. The Athens-Decatur field may serve up to 10 jets, 10 turboprops, and 100 light (under 150 horsepower) aircraft operations on a busy day.

Table 2.2-1

(Deleted by Amendment 7)

Table 2.2-2

(SHEET 1)

Historical Information

1970 and 1980 POPULATION OF ALL INCORPORATED PLACES IN 1980
WITHIN 60-MILE RADIUS OF BROWNS FERRY SITE

Town	County	Direction	Miles	Population 1970	1980
			0-10		
Trinity	Morgan	S	7.0	881	1,328
Hillsboro	Lawrence	SW	6.2	222	278
			Total	1,103	1,606
			10-20		
Athens	Limestone	NE	10.0	14,360	14,558
Elkmont	Limestone	NNE	16.6	394	429
Mooresville	Limestone	ESE	13.8	72	58
Decatur	Morgan	SE	10.0	38,044	42,002
Flint City	Morgan	SE & SSE	15.3	404	673
Priceville	Morgan	SE	18.0	---	966**
Moulton	Lawrence	SW & SSW	18.9	2,470	3,197
Courtland	Lawrence	W & WSW	11.5	547	456
Town Creek	Lawrence	W	17.0	1,203	1,201
Rogersville	Lauderdale	NW	13.0	950	1,224
			Total	58,444	64,764
			20-30		
Lester	Limestone	N	20.0	70	117
Minor Hill	Giles (T)	N	24.0	315	564
Elkton	Giles (T)	NNE	27.0	341	540
Ardmore	Giles (T) and Limestone	NE	25.5	1,362	1,931
Huntsville	Madison	E	29.5	139,282	142,513
Madison	Madison	E	20.0	3,086	4,057
Triana	Madison	ESE	23.8	228	285
Hartselle	Morgan	SSE	21.0	7,355	8,858
Somerville	Morgan	SE	23.4	180	140
Falkville	Morgan	SE	26.0	946	1,310
Leighton	Colbert	W	24.0	1,231	1,218
Killen	Lauderdale	WNW	26.7	683	747
Lexington	Lauderdale	NW	23.0	278	884
Anderson	Lauderdale	NNW	28.0	---	405**
			Total	155,357	163,569

Table 2.2-2 (Continued)

(SHEET 2)

Historical Information

Town	County*	Direction	Miles	Population 1970	1980
			30-40		
Pulaski	Giles (T)	N	34.0	6,989	7,184
Lawrenceburg	Lawrence (T)	NNW	39.0	8,889	10,184
Owens Cross-roads	Madison	ESE	37.5	767	804
Eva	Morgan	SE	32.0	146	185
South Vinemont	Cullman	SSE	33.2	480	615
Cullman	Cullman	SSE	40.0	12,601	13,084
Addison	Winston	S	35.5	692	746
Muscle Shoals	Colbert	W	31.0	6,907	8,911
Sheffield	Colbert	W	33.4	3,115	11,903
Tuscumbia	Colbert	W	34.0	8,828	9,137
Littleville	Colbert	WSW	34.3	858	1,262
Russellville	Franklin	WSW	38.3	7,814	8,195
Florence	Lauderdale	W & WNW	33.0	34,031	37,029
St. Florian	Lauderdale	WNW	32.0	---	305**
Loretto	Lawrence (T)	NW	31.8	1,375	1,612
St. Joseph	Lawrence (T)	NW	32.3	637	897
Iron City	Lawrence (T)	NW	34.0	504	482
			Total	104,633	112,535
			40-50		
Lynnville	Giles (T)	N	46.4	327	383
Cornersville	Marshall (T)	NNE	46.5	655	722
Fayetteville	Lincoln (T)	NE	43.0	7,030	7,559
Petersburg	Lincoln (T) & Marshall(T)	NNE	49.2	463	681
Etheridge	Lawrence (T)	NNW	45.0	---	548**
Gurley	Madison	E	41.0	647	735
New Hope	Madison	ESE	41.8	1,300	1,546
Paint Rock	Jackson	E	44.1	226	221
Woodville	Jackson	E	47.4	322	609
Grant	Marshall	ESE	49.2	382	632
Arab	Marshall	SE	43.2	4,399	5,967
Union Grove	Marshall	ESE	44.2	118	127
Bailytown	Cullman	SE	42.0	---	396**
West Point	Cullman	SSE	43.0	---	177**
Fairview	Cullman	SE	40.2	313	450
Holly Pond	Cullman	SE	46.2	325	493

Table 2.2-2 (Cont'd)

(SHEET 3)

Historical Information

Town	County*	Direction	Miles	Population 1970	1980
Hanceville	Cullman	SSE	47.8	2,027	2,220
Good Hope	Cullman	SSE	44.4	840	1,442
Arley	Winston	S	45.0	164	276
Double Springs	Winston	SSW	42.8	957	1,057
Haleyville	Winston	SW	45.0	4,190	5,306
Phil Campbell	Franklin	SW	42.5	1,230	1,549
Bear Creek	Marion	SW	46.2	336	353
Cherokee	Colbert	W	49.2	1,484	1,589
Collinwood	Wayne (T)	NW	48.0	922	1,064
			Total	28,657	36,102
			50-60		
Lewisburg	Marshall (T)	NNE	54.0	7,207	8,706
Mount Pleasant	Maury (T)	N	57.2	3,530	3,375
Huntland	Franklin (T)	ENE	52.8	849	983
Lynchburg	Moore (T)	NE	56.9	538	668
Guntersville	Marshall	ESE	51.5	6,491	9,041
Albertville	Marshall	ESE	59.5	9,963	12,039
Garden City	Cullman	SSE	52.0	745	655
Blountsville	Blount	SE	52.1	1,254	1,509
Cleveland	Blount	SSE	58.0	413	487
Nectar	Blount	SSE	57.5	---	367**
Rosa	Blount	SE	60.0	---	204**
Hayden	Blount	SSE	59.0	195	268
Snead	Blount	SE	59.5	347	667
Hodges	Franklin	WSW	54.0	207	250
Vina	Franklin	WSW	59.0	366	346
Hackleburg	Marion	SW	51.6	726	883
Brilliant	Marion	SW	60.0	726	871
Douglas	Marshall	SE	57.5	---	116**
Nauvoo	Wa ker	SSW	54.5	265	259
Lynn	Winston	SSW	52.6	286	554
Waterloo	Lauderdale	WNW	56.3	262	260
Waynesboro	Wayne (T)	NW	56.0	1,983	2,109
			Total	36,353	44,617

*All counties are in Alabama except those Tennessee counties noted by (T).

**Place incorporated since 1970.

Source: U.S. Bureau of the Census. U.S. Census of Population: 1980. Number of Inhabitants.

Table 2.2-3
HISTORICAL INFORMATION
BROWNS FERRY NUCLEAR PLANT
CITIES AND TOWNS WITHIN 60 MILES HAVING 2,500 OR MORE RESIDENTS IN 1990

Alabama	County	1970[1]	1980[1]	1986[2]	1990[1]	2000[2]	2010[2]	2020[2]
Albertville	Marshall	9,963	12,039	13,000	14,507	15,400	16,100	16,900
Arab	Marshall	4,399	5,967	6,600	6,321	6,700	7,000	7,400
Athens	Limestone	14,360	14,558	15,400	16,901	17,500	18,000	18,600
Cullman	Cullman	12,601	13,084	13,600	13,367	13,700	14,100	14,600
Decatur	Morgan	38,044	42,002	44,700	48,761	50,100	51,900	54,000
Florence	Lauderdale	34,031	37,029	37,600	36,426	36,500	37,000	38,200
Guntersville	Marshall	6,491	7,041	7,500	7,038	7,500	7,800	8,200
Haleyville	Winston	4,190	5,306	5,300	4,452	4,500	4,600	4,700
Hartselle	Morgan	7,355	8,858	9,700	10,795	11,200	11,600	12,100
Huntsville	Madison	139,282	142,513	156,600	159,789	166,000	170,800	177,100
Madison	Madison	3,086	4,057	5,600	14,904	15,500	15,900	16,500
Moulton	Lawrence	2,470	3,197	3,300	3,248	3,200	3,200	3,200
Muscle Shoals	Colbert	6,907	8,911	8,700	9,611	9,500	9,700	9,900
Russellville	Franklin	7,814	8,195	8,200	7,812	7,700	7,700	7,900
Sheffield	Colbert	13,115	11,903	11,900	10,380	10,300	10,400	10,700
Tuscumbia	Colbert	8,828	9,137	9,000	8,413	8,400	8,500	8,700
Tennessee								
Fayetteville	Lincoln	7,030	7,559	7,600	6,921	7,200	7,400	7,700
Lawrenceburg	Lawrence	8,889	10,184	10,400	10,412	10,900	11,200	11,500
Lewisburg	Marshall	7,207	8,760	9,400	8,351	9,000	9,500	9,800
Mount Pleasant	Maury	3,530	3,375	3,400	4,278	4,500	4,700	4,900
Pulaski	Giles	6,989	7,184	7,200	7,895	7,900	8,000	8,100

1. U.S. Bureau of the Census, Census of Population: 1970, 1980, and 1990, Number of Inhabitants, Alabama and Tennessee.
2. TVA estimates.

Table 2.2-4
(Sheet 1)
Historical Information

1970 POPULATION DISTRIBUTION
WITHIN 10 MILES OF THE SITE

	Total Population	0-1	1-2	2-3	3-4	4-5	5-10
N	855	---	10	55	35	85	670
NNE	1,055	---	5	15	65	55	915
NE	4,335	---	5	25	45	80	4,180
ENE	1,485	---	15	50	40	70	1,310
E	1,025	---	---	30	10	40	945
ESE	170	---	---	5	---	---	165
SE	10,400	---	---	---	---	20	10,380
SSE	1,680	---	---	---	---	50	1,630
S	1,395	---	---	20	35	90	1,250
SSW	1,155	---	---	60	75	175	845
SW	830	---	---	20	35	90	685
WSW	480	---	---	35	15	135	295
W	685	---	---	25	5	30	625
WNW	130	---	---	---	25	55	50
NW	350	---	---	---	---	5	345
NNW	710	---	5	35	25	20	625
Total	26,740	---	40	375	410	1,000	24,915

Table 2.2-4

(Sheet 2)

Historical Information

1980 POPULATION DISTRIBUTION
WITHIN 10 MILES OF THE SITE

	Total Population	0-1	1-2	2-3	3-4	4-5	5-10
N	820	---	10	50	35	80	645
NNE	1,010	---	5	15	60	55	875
NE	5,175	---	5	30	50	80	5,010
ENE	2,060	---	20	70	55	100	1,815
E	1,435	---	---	45	15	55	1,320
ESE	235	---	---	5	---	---	230
SE	11,245	---	---	---	---	20	11,225
SSE	2,520	---	---	---	---	50	2,470
S	1,455	---	---	25	35	90	1,305
SSW	1,200	---	---	60	80	170	890
SW	860	---	---	25	40	95	700
WSW	495	---	---	35	15	140	305
W	685	---	---	25	5	30	625
WNW	130	---	---	---	25	55	50
NW	345	---	---	---	---	5	340
NNW	685	---	5	35	20	20	605
Total	30,355	---	45	420	435	1,045	28,410

TABLE 2.2-4

(Sheet 3)

Historical Information

BROWNS FERRY NUCLEAR PLANT
1986 POPULATION DISTRIBUTION
WITHIN 10 MILES OF THE SITE

	0-1	1-2	2-3	3-4	4-5	5-10	TOTAL
N	34	0	0	73	118	1135	1360
NNE	0	11	20	137	48	1341	1557
NE	0	3	20	39	109	4259	4430
ENE	0	34	76	90	39	1615	1854
E	0	0	20	6	28	1408	1462
ESE	0	0	11	0	0	106	117
SE	0	0	0	0	0	6960	6960
SSE	0	0	0	0	10	2304	2314
S	0	0	14	17	66	1405	1502
SSW	0	0	46	55	258	1307	1666
SW	0	0	0	20	152	640	812
WSW	0	0	14	26	100	354	494
W	0	115	20	11	23	116	285
WNW	0	0	6	11	37	171	225
NW	0	0	67	8	53	1059	1187
NNW	0	168	162	56	70	1179	1635
TOTAL	34	331	476	549	1111	25359	27860

TABLE 2.2-4

(Sheet 4)

Historical Information

BROWNS FERRY NUCLEAR PLANT
1990 POPULATION DISTRIBUTION
WITHIN 10 MILES OF THE SITE

	0-1	1-2	2-3	3-4	4-5	5-10	TOTAL
N	38	0	0	82	133	1338	1592
NNE	0	12	23	155	54	1516	1760
NE	0	3	23	44	123	4560	4753
ENE	0	38	86	102	44	1750	2019
E	0	0	23	7	32	1586	1647
ESE	0	0	12	0	0	123	135
SE	0	0	0	0	0	8435	8435
SSE	0	0	0	0	0	2483	2483
S	0	0	10	12	46	1525	1593
SSW	0	0	33	40	188	1345	1606
SW	0	0	0	15	111	847	973
WSW	0	0	10	19	73	244	346
W	0	84	15	8	17	79	203
WNW	0	0	4	8	27	36	75
NW	0	0	76	9	60	826	970
NNW	0	189	183	63	79	1381	1895
TOTAL	38	328	496	563	987	28073	30485

TABLE 2.2-4

(Sheet 5)

Historical Information

BROWNS FERRY NUCLEAR PLANT
2000 POPULATION DISTRIBUTION
WITHIN 10 MILES OF THE SITE

	0-1	1-2	2-3	3-4	4-5	5-10	TOTAL
N	40	0	0	85	137	1382	1644
NNE	0	13	23	160	56	1565	1817
NE	0	3	23	45	127	4708	4908
ENE	0	40	89	105	45	1807	2085
E	0	0	23	7	33	1638	1701
ESE	0	0	13	0	0	127	140
SE	0	0	0	0	0	8777	8777
SSE	0	0	0	0	0	2584	2584
S	0	0	10	12	45	1520	1587
SSW	0	0	32	39	184	1315	1570
SW	0	0	0	15	108	828	951
WSW	0	0	10	19	71	238	337
W	0	82	15	8	17	76	198
WNW	0	0	4	8	26	37	75
NW	0	0	78	9	62	853	1002
NNW	0	196	189	65	82	1426	1957
TOTAL	40	334	508	576	993	28881	31332

TABLE 2.2-4

(Sheet 6)

Historical Information

BROWNS FERRY NUCLEAR PLANT
2010 POPULATION DISTRIBUTION
WITHIN 10 MILES OF THE SITE

	0-1	1-2	2-3	3-4	4-5	5-10	TOTAL
N	41	0	0	87	141	1421	1691
NNE	0	13	24	164	58	1610	1869
NE	0	4	24	47	131	4843	5048
ENE	0	41	91	108	47	1858	2145
E	0	0	24	7	34	1684	1749
ESE	0	0	13	0	0	131	144
SE	0	0	0	0	0	9081	9081
SSE	0	0	0	0	0	2673	2673
S	0	0	10	12	45	1532	1598
SSW	0	0	32	39	183	1307	1560
SW	0	0	0	15	108	822	944
WSW	0	0	10	18	71	236	335
W	0	82	15	8	17	76	197
WNW	0	0	4	8	26	38	76
NW	0	0	80	10	63	877	1030
NNW	0	201	194	67	84	1467	2013
TOTAL	41	340	520	589	1006	29657	32153

TABLE 2.2-4

(Sheet 7)

Historical Information

BROWNS FERRY NUCLEAR PLANT
2020 POPULATION DISTRIBUTION
WITHIN 10 MILES OF THE SITE

	0-1	1-2	2-3	3-4	4-5	5-10	TOTAL
N	42	0	0	91	147	1475	1755
NNE	0	14	25	170	60	1672	1940
NE	0	4	25	49	136	5028	5241
ENE	0	42	95	112	49	1930	2227
E	0	0	25	7	35	1749	1816
ESE	0	0	14	0	0	136	149
SE	0	0	0	0	0	9452	9452
SSE	0	0	0	0	0	2782	2782
S	0	0	10	12	46	1574	1641
SSW	0	0	33	40	186	1332	1591
SW	0	0	0	15	110	838	963
WSW	0	0	10	19	72	241	342
W	0	83	15	8	17	78	201
WNW	0	0	4	8	27	39	78
NW	0	0	83	10	66	911	1070
NNW	0	209	202	70	87	1524	2091
TOTAL	42	352	539	610	1036	30760	33339

Table 2.2-5

(Sheet 1)

Historical Information

BROWNS FERRY
1970 POPULATION DISTRIBUTION
WITHIN 60 MILES OF THE SITE

	Total Pop	0-10	10-20	20-30	30-40	40-50	50-60
N	41,285	855	1,515	2,615	10,660	3,690	21,950
NNE	13,500	1,055	2,990	2,230	3,125	3,420	680
NE	47,980	4,335	14,180	6,625	5,385	12,625	4,830
ENE	39,115	1,485	4,990	9,615	13,860	5,425	3,740
E	159,800	1,025	1,910	73,405	75,125	4,610	3,725
ESE	40,045	170	1,880	2,535	7,465	9,575	18,420
SE	76,230	10,400	30,945	4,680	6,230	13,850	10,125
SSE	60,505	1,680	6,250	11,630	15,175	18,945	6,825
S	25,535	1,395	3,805	1,800	4,475	3,730	10,330
SSW	21,100	1,155	5,895	1,270	1,490	2,535	8,755
SW	23,825	830	2,970	2,280	2,725	10,675	4,345
WSW	25,685	480	3,060	3,005	11,545	3,755	3,840
W	53,150	685	2,960	6,830	35,070	4,785	2,820
WNW	57,415	130	885	9,300	39,875	5,545	1,680
NW	24,970	350	4,345	5,215	5,485	3,260	6,315
NNW	26,670	710	2,090	2,440	12,350	7,360	1,720
Total	736,810	26,740	90,670	145,475	250,040	113,785	110,100

Table 2.2-5

(Sheet 2)

Historical Information

BROWNS FERRY
1980 POPULATION DISTRIBUTION
WITHIN 60 MILES OF THE SITE

	Total Pop.	0-10	10-20	20-30	30-40	40-50	50-60
N	46,435	820	1,635	2,605	11,460	5,970	23,945
NNE	12,515	1,010	3,900	2,385	3,255	1,265	700
NE	55,670	5,175	17,740	8,065	6,440	13,330	4,920
ENE	46,970	2,060	6,065	12,225	17,105	5,670	3,845
E	168,185	1,435	2,145	77,390	77,680	4,735	4,800
ESE	48,460	235	2,240	2,665	8,265	12,095	22,960
SE	91,230	11,245	34,400	5,045	6,645	18,935	14,960
SSE	71,140	2,520	9,925	12,855	18,595	22,305	4,940
S	40,510	1,455	4,010	1,900	5,565	9,660	17,920
SSW	23,055	1,220	6,145	1,305	1,840	2,700	9,865
SW	23,075	860	3,140	2,265	3,150	8,760	4,900
WSW	28,390	495	3,115	3,080	13,650	3,770	4,280
W	59,880	685	2,940	7,750	40,615	4,985	2,905
WNW	63,690	130	905	10,500	44,435	6,025	1,695
NW	26,735	345	4,975	6,055	5,905	3,620	5,835
NNW	32,100	685	2,290	2,475	15,260	8,155	3,235
Total	838,040	30,355	105,570	158,565	279,865	131,980	131,705

TABLE 2.2-5

(Sheet 3)

Historical Information

BROWNS FERRY NUCLEAR PLANT
1986 60-MILE POPULATION DISTRIBUTION

	0-10	10-20	20-30	30-40	40-50	50-60	TOTAL
N	1360	3050	3241	11152	4028	12052	34883
NNE	1557	2680	4420	3714	4362	15419	32152
NE	4430	13573	7600	7231	14001	4606	51441
ENE	1854	10211	14149	16807	8139	5603	56763
E	1462	2360	88100	75567	7899	8881	184269
ESE	117	1972	4357	12995	11469	27572	58482
SE	6960	31383	7856	8331	21430	10150	86110
SSE	2314	18602	13747	21140	19700	10945	86448
S	1502	5186	2493	6344	4899	13509	33933
SSW	1666	6657	1134	2332	4429	9901	26119
SW	812	5028	2456	2938	17158	4881	33273
WSW	494	2761	2844	14925	2644	3306	26974
W	285	4170	10452	31575	5607	1678	53767
WNW	225	2190	7360	51760	6844	3313	71692
NW	1187	4350	6957	6368	4204	5401	28467
NNW	1635	2465	2819	15156	9731	4096	35902
TOTAL	27860	116638	179985	288335	146544	141313	900675

TABLE 2.2-5

(Sheet 4)

Historical Information

BROWNS FERRY NUCLEAR PLANT
1990 60-MILE POPULATION DISTRIBUTION

	0-10	10-20	20-30	30-40	40-50	50-60	TOTAL
N	1591	2887	3172	11844	4190	13165	36850
NNE	1760	2756	4551	3827	4236	12820	29950
NE	4753	13356	7431	7554	13972	4304	51370
ENE	2019	9232	30963	18076	7866	5086	73243
E	1647	15764	48934	90006	6583	9228	172161
ESE	135	2466	5115	26482	11164	24667	70029
SE	8435	22086	7344	8313	21440	13146	80764
SSE	2483	30555	13272	21617	20244	12218	100389
S	1592	4758	2533	6218	5550	18001	38652
SSW	1606	6369	1160	2570	4703	10937	27346
SW	971	5719	2470	3460	13138	4422	30179
WSW	346	3461	2895	13472	4772	4570	29516
W	203	3761	10877	29784	5845	2533	53003
WNW	76	1970	7936	49335	5307	3493	68117
NW	970	4145	7270	6059	4242	5044	27730
NNW	1896	2332	2958	15381	10031	4023	36620
TOTAL	30483	131617	158882	313999	143281	147657	925919

TABLE 2.2-5

(Sheet 5)

Historical Information

BROWNS FERRY NUCLEAR PLANT
2000 60-MILE POPULATION DISTRIBUTION

	0-10	10-20	20-30	30-40	40-50	50-60	TOTAL
N	1643	2981	3196	11933	4249	13976	37979
NNE	1817	2846	4621	3882	4441	13730	31338
NE	4908	13791	7681	7861	14539	4393	53173
ENE	2085	9533	32224	18816	8182	5404	76244
E	1701	16390	50939	93693	6788	9386	178897
ESE	140	2549	5323	27594	11760	26153	73520
SE	8777	22981	7642	8618	22346	13553	83916
SSE	2584	31794	13802	22132	20718	12446	103475
S	1587	4762	2610	6332	5658	18430	39380
SSW	1570	6226	1143	2596	4756	11180	27470
SW	949	5590	2414	3454	13338	4578	30324
WSW	339	3383	2849	13329	4720	4584	29202
W	198	3687	10801	29581	5813	2547	52627
WNW	76	1960	7951	49491	5368	3570	68416
NW	1002	4158	7301	6275	4530	5394	28659
NNW	1957	2357	3051	16033	10460	4209	38068
TOTAL	31331	134988	163549	321621	147664	153533	952687

TABLE 2.2-5

(Sheet 6)

Historical Information

BROWNS FERRY NUCLEAR PLANT
2010 60-MILE POPULATION DISTRIBUTION

	0-10	10-20	20-30	30-40	40-50	50-60	TOTAL
N	1690	3067	3213	11992	4292	14585	38838
NNE	1869	2927	4679	3926	4613	14480	32494
NE	5048	14186	7887	8121	15036	4473	54750
ENE	2145	9806	33156	19367	8428	5646	78548
E	1749	16865	52414	96405	6970	9577	183980
ESE	144	2622	5498	28444	12246	27407	76362
SE	9081	23776	7906	8910	23206	13954	86834
SSE	2673	32894	14275	22774	21316	12728	106660
S	1598	4808	2687	6488	5799	18872	40251
SSW	1559	6185	1142	2641	4841	11430	27799
SW	942	5554	2398	3481	13600	4726	30701
WSW	336	3361	2848	13353	4724	4630	29252
W	197	3676	10926	29930	5882	2582	53193
WNW	76	1977	8059	50177	5472	3671	69433
NW	1030	4215	7407	6465	4768	5683	29568
NNW	2013	2398	3132	16556	10805	4328	39233
TOTAL	32152	138316	167628	329031	151997	158771	977895

TABLE 2.2-5

(Sheet 7)

Historical Information

BROWNS FERRY NUCLEAR PLANT
2020 60-MILE POPULATION DISTRIBUTION

	0-10	10-20	20-30	30-40	40-50	50-60	TOTAL
N	1755	3184	3277	12228	4384	15115	39942
NNE	1941	3039	4800	4012	4766	15065	33623
NE	5241	14728	8165	8375	15482	4593	56585
ENE	2227	10181	34388	20078	8721	5855	81449
E	1816	17494	54360	99985	7220	9885	190758
ESE	149	2723	5716	29533	12789	28730	79641
SE	9452	24747	8229	9269	24197	14501	90395
SSE	2782	34237	14856	23606	22094	13174	110750
S	1640	4942	2788	6710	6000	19541	41621
SSW	1590	6306	1168	2721	4990	11826	28601
SW	961	5662	2445	3564	14036	4918	31587
WSW	343	3426	2910	13618	4813	4748	29857
W	201	3755	11242	30796	6054	2656	54703
WNW	78	2032	8306	51728	5647	3787	71578
NW	1070	4344	7635	6661	4948	5900	30559
NNW	2090	2477	3222	17035	11119	4483	40426
TOTAL	33337	143277	173506	339920	157260	164776	1012076

TABLE 2.2-6

Historical Information

BROWNS FERRY NUCLEAR PLANT
POPULATION DENSITY AT VARIOUS DISTANCES FROM THE SITE

DISTANCE FROM REACTOR BUILD NG (MILES)	LAND AREA (SQUARE MILES)	1970		1980		1986		1990		2000		2010		2020	
		POPULATION	AVERAGE DENSITY	AVERAGE POPULATION	DENSITY	AVERAGE POPULATION	DENSITY	AVERAGE POPULATION	DENSITY	AVERAGE POPULATION	DENSITY	AVERAGE POPULATION	DENSITY	AVERAGE POPULATION	DENSITY
0-1	0.2	---	---	---	---	34	170.0	38	190.0	40	200.0	41	205.0	42	211.5
1-2	3.5	40	11.4	45	12.9	331	94.6	328	93.7	334	95.4	340	97.1	352	100.5
2-3	11.3	375	33.2	420	37.2	476	42.1	496	43.9	508	45.0	520	46.0	539	47.7
3-4	16.8	410	24.4	435	25.9	549	32.7	563	33.5	576	34.3	589	35.1	610	36.3
4-5	23.2	1,000	43.1	1,045	45.0	1,111	47 9	987	42 5	993	42.8	1,006	43.4	1,036	44.6
0-5	55.0	1,825	33.2	1,945	35.4	2,501	45 5	2,412	43 9	2,451	44.6	2,496	45.4	2,579	46.9
5-10	210.5	24,915	118.4	28,410	135.0	25,359	120.5	28,073	133.4	28,881	137.2	29,657	140.9	30,760	146.1
0-10	265.5	26,740	100.7	30,355	114.3	27,860	104.9	30,483	114.8	31,332	118.0	32,153	121.1	33,339	125.6
10-20	903.0	90,670	100.4	105,570	116.9	116,638	129 2	131,617	145.8	134,988	149.5	138,316	153.2	143,277	158.7
20-30	1,560	145,475	94.5	158,565	103.0	179,985	116 9	158,882	101 8	163,549	104.8	167,628	107.5	173,506	111.2
30-40	2,180	250,040	114.7	279,865	128.4	288,335	132.3	313,999	144 0	321,621	147.5	329,031	150.9	339,920	155.9
40-50	2,790	113,785	40.8	131,980	47.3	146,544	52.5	143,281	51.4	147,664	52 9	151,997	54.5	164,776	59.1
50-60	3,400	110,100	32.4	131,705	38.7	141,313	41.6	147,657	43.4	153,533	45.2	158,771	46.7	157,260	46.3
0-60	11,078	736,810	66.5	838,040	75.6	900,675	81 3	925,919	83.6	163,549	14.8	977,895	88.3	1,012,076	91.4

TABLE 2.2-7

(Sheet 1)

Historical Information

1986 PEAK HOUR RECREATION VISITATION
WITHIN 10 MILES OF THE SITE

	Total	Mile(s) From Site					
		0-1	1-2	2-3	3-4	4-5	5-10
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	1,538	0	0	563	0	0	975
SE	285	0	0	0	0	0	285
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	568	0	0	568	0	0	0
W	441	0	0	441	0	0	0
WNW	305	0	0	0	0	0	305
NW	922	0	0	0	0	0	922
NNW	0	0	0	0	0	0	0
TOTAL	4,059	0	0	1,572	0	0	2,487

TABLE 2.2-7

(Sheet 2)

Historical Information

BROWNS FERRY NUCLEAR PLANT
1990 ESTIMATED PEAK HOUR RECREATION VISITATION
WITHIN 10 MILES OF THE SITE

		Mile(s) From Site					
	Total	0-1	1-2	2-3	3-4	4-5	5-10
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	420	0	0	420	0	0	0
SE	1,009	0	0	0	0	0	1,009
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	454	0	0	454	0	0	0
W	353	0	0	353	0	0	0
WNW	244	0	0	0	0	0	244
NW	1,232	0	0	0	0	0	1,232
NNW	0	0	0	0	0	0	0
TOTAL	3,712	0	0	1,227	0	0	2,485

TABLE 2.2-7

(Sheet 3)

Historical Information

BROWNS FERRY NUCLEAR PLANT
2000 ESTIMATED PEAK HOUR RECREATION VISITATION
WITHIN 10 MILES OF THE SITE

	Total	Mile(s) From Site					
		0-1	1-2	2-3	3-4	4-5	5-10
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	432	0	0	432	0	0	0
SE	1,038	0	0	0	0	0	1,038
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	467	0	0	467	0	0	0
W	363	0	0	363	0	0	0
WNW	251	0	0	0	0	0	251
NW	1,267	0	0	0	0	0	1,267
NNW	0	0	0	0	0	0	0
TOTAL	3,818	0	0	1,262	0	0	2,556

TABLE 2.2-7

(Sheet 4)

Historical Information

BROWNS FERRY NUCLEAR PLANT
2010 ESTIMATED PEAK HOUR RECREATION VISITATION
WITHIN 10 MILES OF THE SITE

		Mile(s) From Site					
	Total	0-1	1-2	2-3	3-4	4-5	5-10
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	443	0	0	443	0	0	0
SE	1,065	0	0	0	0	0	1,065
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	479	0	0	479	0	0	0
W	372	0	0	372	0	0	0
WNW	257	0	0	0	0	0	257
NW	1,299	0	0	0	0	0	1,299
NNW	0	0	0	0	0	0	0
TOTAL	3,915	0	0	1,294	0	0	2,621

BFN-18

TABLE 2.2-7

(Sheet 5)

Historical Information

BROWNS FERRY NUCLEAR PLANT
2020 ESTIMATED PEAK HOUR RECREATION VISITATION
WITHIN 10 MILES OF THE SITE

		Mile(s) From Site					
	Total	0-1	1-2	2-3	3-4	4-5	5-10
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	458	0	0	458	0	0	0
SE	1,102	0	0	0	0	0	1,102
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	496	0	0	496	0	0	0
W	385	0	0	385	0	0	0
WNW	266	0	0	0	0	0	266
NW	1,344	0	0	0	0	0	1,344
NNW	0	0	0	0	0	0	0
TOTAL	4,051	0	0	1,339	0	0	2,712

TABLE 2.2-8

Historical Information

Browns Ferry Nuclear Plant
Listing of 1993 School Enrollments and Industrial

Employment Within Ten Miles of the Site

School	Distance from Site (Mi)	Enrollment
Alternative School[1]	8.4	71
Clements High	7.7	963
Hubbard Elementary	6.0	237
James L. Cowart Elementary[2]	9.8	348
Leon Sheffield Elementary[3]	9.1	272
Reid Elementary	5.7	147
Tanner High[4]	8.4	775
Tennessee Valley School	6.6	122
West Decatur Elementary	9.2	261
West Lawn Elementary	9.0	203
West Morgan Elementary	8.5	950
Industry		**Employment[5]**
American Fructose	6.4	200
Amoco	6.0	450
Diakan	5.5	100
Freuhauf	7.4	150
General Motors Plant	10.0	1,717
Hispan	5.5	100
Monsanto	7.4	800
Polysar	7.7	80
Prestolite	7.4	300
Steel Case Plant	9.3	375
3M Plant	5.5	450
Whittaker	7.5	150

1 Formerly Tanner Primary facility.

2 Name change - formerly West Athens Elementary.

3 Name change - formerly Lakeview Elementary.

4 Includes grades K-12.

5 Day shift.

TABLE 2.2-9

(Sheet 1)

Historical Information

BROWNS FERRY NUCLEAR PLANT
STATISTICAL DATA FOR NEARBY COUNTIES

	1990 EMPLOYMENT BY COUNTY(1)			
	LAWRENCE	LIMESTONE	MADISON	MORGAN
TOTAL EMPLOYMENT	10,488	26,899	162,673	52,401
WAGE AND SALARY	8,138	22,920	147,430	44,778
PROPRIETORS	2,350	3,979	15,243	7,623
FARM	1,232	1,198	1,106	1,363
NONFARM	1,118	2,781	14,137	6,260
TOTAL EMPLOYMENT BY INDUSTRY:				
FARM	1,492	1,591	1,630	1,575
NONFARM	8,996	25,308	161,043	50,826
PRIVATE	7,065	17,402	123,082	43,353
AG.SERV.,FOR.,FISH., AND OTHER	161	165	708	321
MINING	(D)	(L)	131	140
CONSTRUCTION	898	1,461	7,252	4,329
MANUFACTURING	2,387	6,923	34,270	13,666
TRANSPORTATION AND PUBLIC UTILITIES	176	371	3,705	1,803
WHOLESALE TRADE	(D)	670	5,268	1,929
RETAIL TRADE	1,020	3,643	23,097	8,605
FINANCE, INSURANCE, AND REAL ESTATE	157	532	7,093	2,642
SERVICES	2,054	3,634	41,558	9,918
GOVERNMENT AND GOVERNMENT ENTERPRISES	1,931	7,906	37,961	7,473
FEDERAL, CIVILIAN	141	3,861	17,211	310
MILITARY	316	542	5,795	1,045
STATE AND LOCAL	1,474	3,503	14,955	6,118

1. BY PLACE OF WORK
D - WITHHELD TO AVOID DISCLOSURE OF INFORMATION ABOUT INDIVIDUAL FIRMS
L - LESS THAN 10

SOURCE: U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS, TABLE CA25 FOR ALABAMA

TABLE 2.2-9 (Continued)

(Sheet 2)

Historical Information

BROWNS FERRY NUCLEAR PLANT
STATISTICAL DATA FOR NEARBY COUNTIES

	MORGAN	MADISON	LIMESTONE	LAWRENCE
Agricultural Use--1987 1/				
Total farmland (acres)	159,757	235,478	223,190	188,365
Number of farms	1,243	977	1,090	1,123
Cropland harvested	44,763	112,625	101,416	77,593
Value of Products Sold - 1987 (dollars) 2/				
(All Farms)				
Crops, including nursery and greenhouse crops	6,429,600	23,088,000	23,250,000	16,453,000
Poultry and poultry products	27,676,000	5,271,000	993,000	27,328,000
Dairy products	3,865,000	2,349,000	2,639,000	936,000
Other livestock	8,878,000	11,356,000	9,333,000	15,577,000
Total	46,848,600	42,064,000	36,215,000	60,294,000
Livestock and Poultry on Farms - 1987 (number) 1/				
Cattle and calves	35,979	25,471	25,636	27,776
Milk cows	2,235	1,164	1,417	570
Sheep and lambs	(D)	207	(D)	466
Hogs and pigs	2,706	7,989	5,727	6,835
Chickens (3 months old and older)	280,865	(D)	(D)	1,156,297

1/ Source = 1987 Census of Agriculture
2/ Source = Alabama Agricultural Statistics Service 1987
(D) - Withheld to avoid disclosing data for individual farms

TABLE 2.2-10

(Sheet 1)

HAZARDOUS RIVER TRAFFIC THAT PASSES
BROWNS FERRY NUCLEAR PLANT
1983-1993 (TONS)
U.S. Army Corps of Engineers Data

CODE	COMMODITY	1983	1984	1985	1986	1987	1988	1989	Old Commodity Codes(1) 1990	New Commodity Codes(1) 1990	1991	1992	1993
2871	Nitrogenous Fert.	38,712	47,301	71,826	28,507	59,722	30,155	35,961	41,707	NA	NA	NA	NA
56211	Amon Nitrate Fert.	NA	NA	NA	NA	NA	NA	NA	NA	11,742	4,456	4,693	4,666
56216	Urea Fert.	NA	NA	NA	NA	NA	NA	NA	NA	15,165	46,696	33,706	25,871
56219	Min., Chem. Fert., Nitrogenous	NA	NA	NA	NA	NA	NA	NA	NA	14,800	16,903	6,917	13,216
2911	Gasoline	0	1,283	0	3,287(2)	0	4,900	0	0	NA	NA	NA	NA
33411	Gasoline	NA	NA	NA	NA	NA	NA	NA	NA	0	0	0	0
2914	Dis illate Fuel Oil	25,545	0	0	7,374	29,037	3,385	8,054	16,746	NA	NA	NA	NA
33419	Oth Lt. Oils From Petroleum	NA	NA	NA	NA	NA	NA	NA	NA	16,746	74,983	7,249	0
2915	Residual Fuel Oil	113,737	147,018	153,938	329,305	295,813	332,553	292,931	230,255	NA	NA	NA	NA
33440	Fuel Oils, NEC	NA	NA	NA	NA	NA	NA	NA	NA	230,255	133,642	235,508	215,461
2917	Naphtha	38,295	63,870	79,690	110,349	115,263	128,011	143,450	87,586	NA	NA	NA	NA
33429	Oth Medium Oils	NA	NA	NA	NA	NA	NA	NA	NA	87,586	8,022	8,887	5,982
2811	Crude Pds. from Coal Tar, Petro	94,594	46,241	175,255	105,100	98,894	222,789	167,272	335,539	NA	NA	NA	NA
33521	Tar	NA	NA	NA	NA	NA	NA	NA	NA	18,158	21,878	3,079	1,400
33525	Oils & O her Prod Dist of Coal	NA	NA	NA	NA	NA	NA	NA	NA	8,626	2,878	3,654	5,965
51124	Xylene, Pure	NA	NA	NA	NA	NA	NA	NA	NA	245,962	137,597	190,582	276,854
51125	Styrene	NA	NA	NA	NA	NA	NA	NA	NA	58,624	95,008	109,472	164,200
51127	Cumene	NA	NA	NA	NA	NA	NA	NA	NA	0	0	1,408	0

TABLE 2.2-10
(Sheet 2)
HAZARDOUS RIVER TRAFFIC THAT PASSES
BROWNS FERRY NUCLEAR PLANT
1983-1993 (TONS)
U.S. Army Corps of Engineers Data

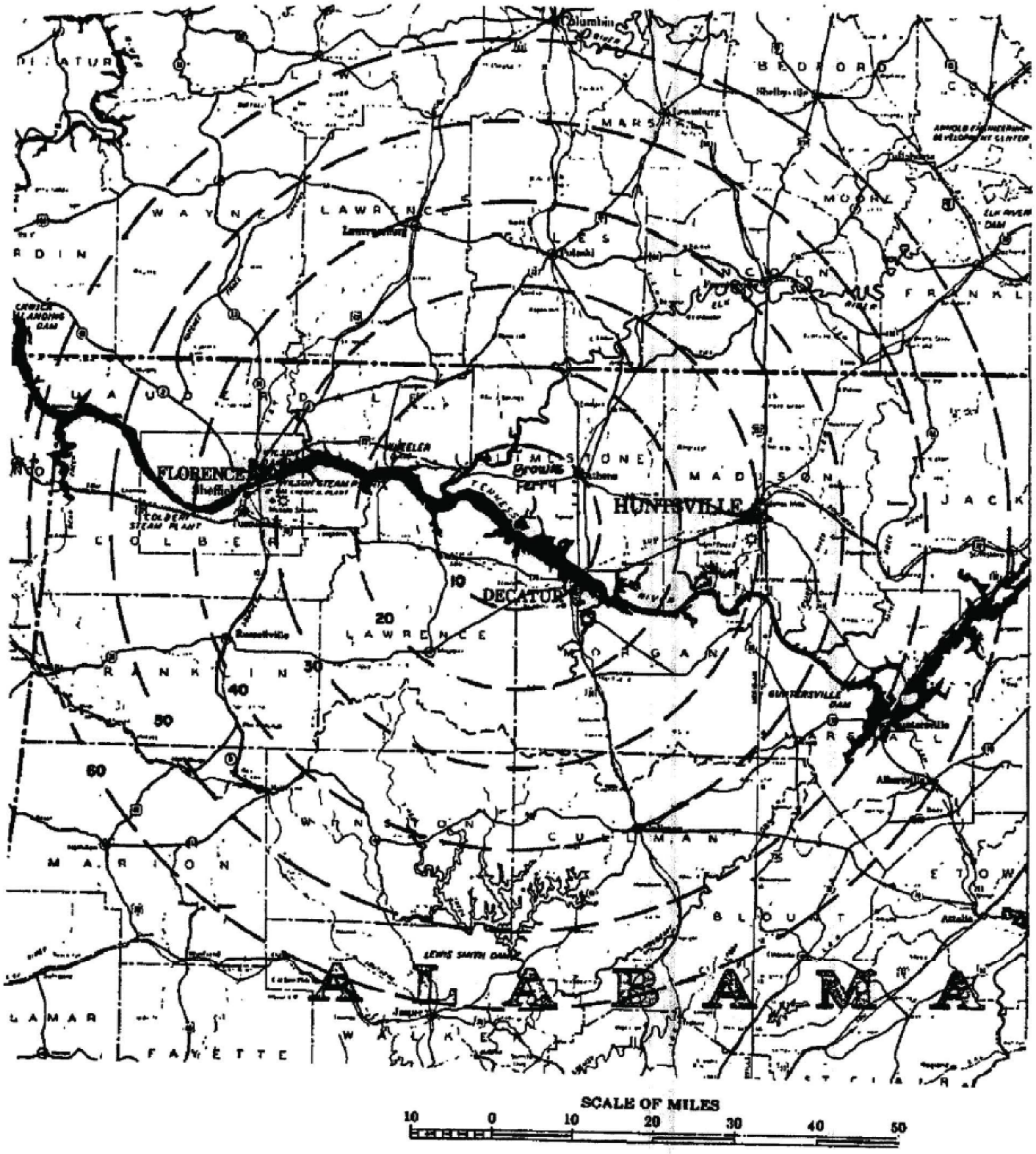
CODE	COMMODITY	1983	1984	1985	1986	1987	1988	1989	Old Commodity Codes(1) 1990	New Commodity Codes(1) 1990	1991	1992	1993
51133	Tetreclorethlene	NA	NA	NA	NA	NA	NA	NA	NA	4169	1399	0	0
2813	Alcohols	0	0	0	1,400	33,780	24,173	22,352	16,478	NA	NA	NA	NA
51215	Ethylal alchol	NA	NA	NA	NA	NA	NA	NA	NA	16,478	11,127	9,487	8,511
51216	Ethyl Alcohol Denatured	NA	NA	NA	NA	NA	NA	NA	NA	0	5,563	0	0
2817	Benzene & Toluene	0	0	16,968	0	0	2,779	0	13,812	NA	NA	NA	NA
33522	Benzole	NA	NA	NA	NA	NA	NA	NA	NA	12,412	42,220	0	6,128
51122	Benzene	NA	NA	NA	NA	NA	NA	NA	NA	1,400	0	0	6,731
2819	Basic Chemicals	237,821	341,032	331,028	342,246	384,343	458,767	398,525	283,910	NA	NA	NA	NA
51372	Esters of Acetic Acid	NA	NA	NA	NA	NA	NA	NA	NA	11,861	32,440	41,530	30,570
51483	Acrylonitrile	NA	NA	NA	NA	NA	NA	NA	NA	211,094	302,644	330,668	349,172
51484	Nitrile Function Compounds, NEC	NA	NA	NA	NA	NA	NA	NA	NA	2,649	67,159	68,236	67,333
52210	Carbon, NEC	NA	NA	NA	NA	NA	NA	NA	NA	0	0	2,869	2,947
52224	Chlorine	NA	NA	NA	NA	NA	NA	NA	NA	46,200	34,100	38,500	36,300
52349	Oth. Sulfates/ Alum	NA	NA	NA	NA	NA	NA	NA	NA	9,406	3,265	1,423	1,756
52264	Potass.Hydroxide	NA	NA	NA	NA	NA	NA	NA	NA	2,700	0	0	0
	TOTAL	548,704	646,745	828,705	927,568	1,016,852	1,207,512	1,068,545	1,026,033	1,026,033	1,041,980	1,097,868	1,223,063

(1) In 1990, more detailed and specific commodity codes became available. The double entries for that year indicate the commodities under both the old and new system.

(2) The actual product was RU250.

Table 2.2-11

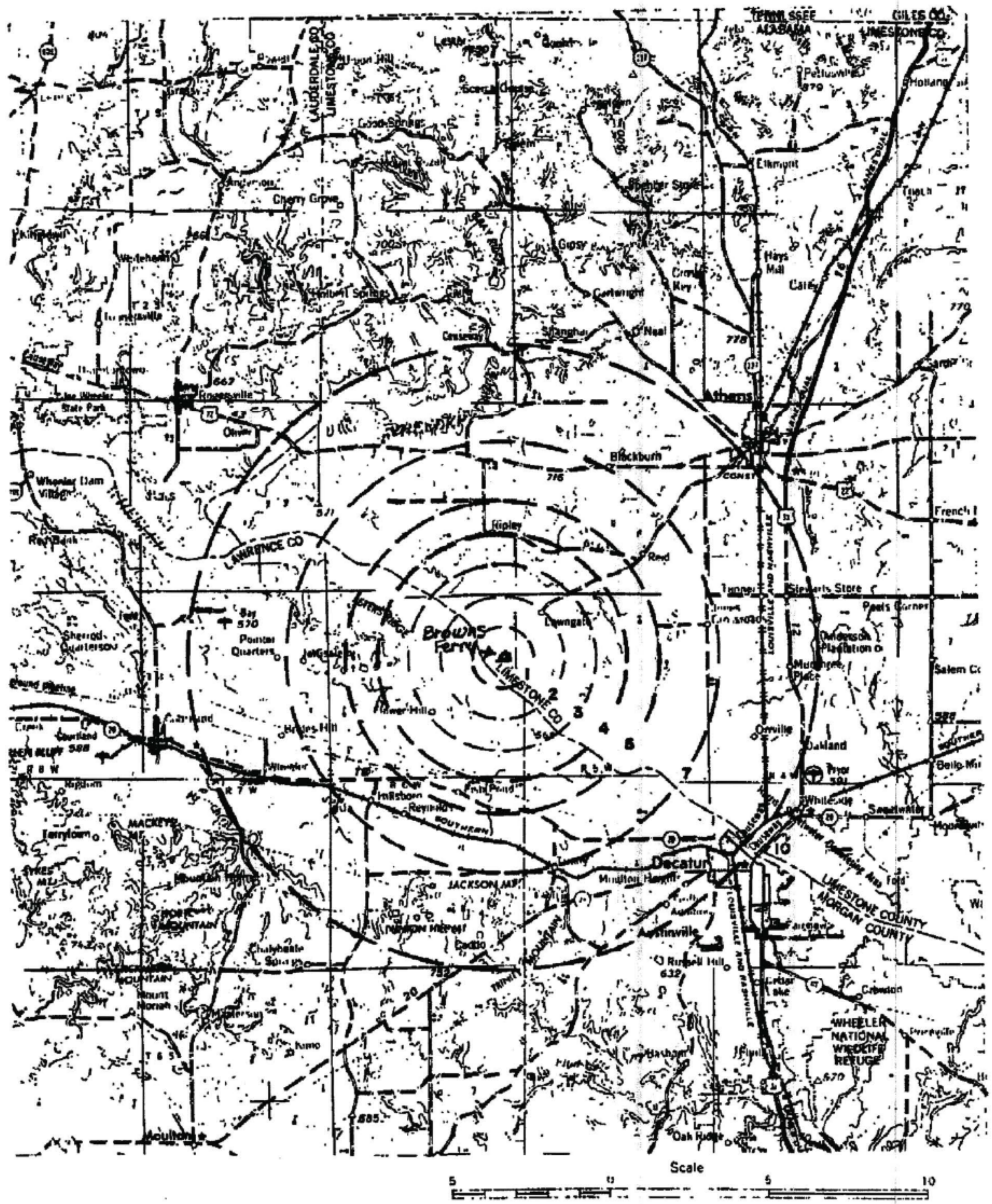
(Deleted by Amendment 12)



BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

Browns Ferry Site Location Map - 60 Mile Radius
FIGURE 2.2-1
HISTORICAL

AMENDMENT 18

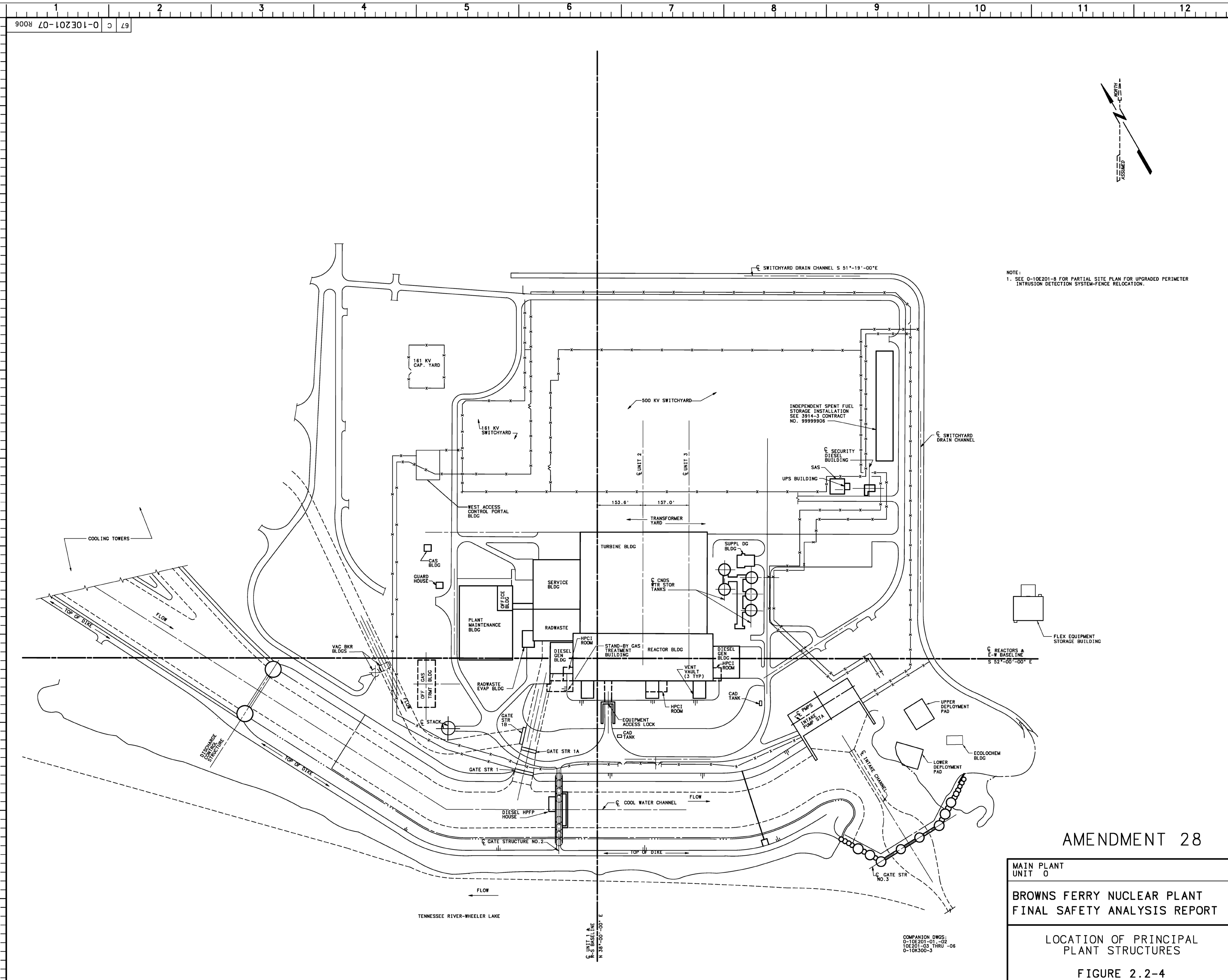


BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

Browns Ferry Site Location Map - 10 Mile Radius
FIGURE 2.2-2
HISTORICAL

AMENDMENT 18

Figure 2.2-3 has been deleted.



AMENDMENT 28

MAIN PLANT
UNIT 0

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

LOCATION OF PRINCIPAL PLANT STRUCTURES

FIGURE 2.2-4

2.3 METEOROLOGY

2.3.1 General

The Browns Ferry site is adjacent to the Tennessee River (Wheeler Lake) which flows northwest at this location. There are no local physiographical features to cause significant climatological anomalies at the site, as the immediate terrain is flat or slightly undulating, with scattered 400- to 600-foot foothills and ridges located 20 to 25 miles to the east through south and southwest. Wheeler Lake adjoins the site and averages 1 to 1-1/2 miles in width. Normally, discontinuities in ambient thermal structure from differential surface heating between land and water should not cause detectable lake breeze circulation at the site area.[1]

Limited air mass modification may occur within the lower few hundred feet, particularly with southeast winds, when the over-water trajectory may approach 10 miles.

2.3.2 Climatology

The site is in a temperate latitude about 300 miles north of the Gulf of Mexico. The area is dominated in winter and spring by alternating cool, dry continental air from the north and warm, moist maritime air from the south. During this period, migratory cyclonic disturbances with numerous thundershowers and thunderstorms pass through the area, with frequent precipitation. Storms, including tornadoes, reach strongest intensity in March and April when maximum air mass contrast generally occurs.

Persistent and unstable maritime air in the summer results in frequent thundershower and thunderstorm activity. Stagnating anticyclones sometimes dominate the area in the fall, with extended periods of low wind speeds and poor dispersion conditions.

Climatological appraisal of the Browns Ferry site is based primarily upon data collected at (1) the plant site during the three-year period, January 1, 1977 through December 31, 1979, (2) Volunteer Weather Observation Stations in Decatur, Alabama, about 13 miles southeast of the Browns Ferry site, for the 80-year period, 1879-1958, and (3) The National Weather Service Station near Huntsville, Alabama, about 20 miles east of the site, for the 13-year period, 1968-1980. Climatological features affecting the atmospheric dispersion of plant emissions are discussed later in this subsection.

2.3.3 Atmospheric Stability

Temperature data from the Browns Ferry meteorological tower were used to determine atmospheric stability. The Pasquill seven category (A-G) classification scheme, based on temperature change with height, was used. Table 2.3-1 gives the percent occurrences of the Pasquill stabilities classified by lapse rates between 33 and 150 feet (10 and 45 meters), and based on wind speeds at 33 feet (10 meters). Table 2.3-2 gives the percent occurrences of the stabilities classified by lapse rates between 150 and 300 feet (45 and 90 meters), and based on wind speeds at 300 feet (93 meters).

For the lower layer (Table 2.3-1), Classes D and E each occurred about 32 percent of the time. Unstable conditions (Classes A, B, and C) occurred least often, only about l5 percent of the time.

In the upper layer (Table 2.3-2), Classes D and E combined occurred about 88 percent of the time. Unstable classes were much less frequent, occurring less than one percent of the time.

During the three-year period of record, low-level inversion conditions (temperature increases with height) occurred during about 38 percent of the total hours. This compares well with an inversion frequency of about 37 percent obtained from a study by Hosler[2] of two years of data from selected NWS stations. Seasonally, the greatest occurrence of inversion conditions is during the fall.

2.3.4 Wind

Wind data from the Browns Ferry meteorological tower were used to represent airflow at the site. Tables 2.3-3 through 2.3-9 are joint percentage frequency distributions of wind speed by wind direction for Pasquill stability classes A-G, respectively. These are classified by lapse rates between 33 and 150 feet and based on wind data at 33 feet. Table 2.3-10 is a distribution of wind speed by wind direction based on wind data at 33 feet, disregarding stability class. Tables 2.3-11 through 2.3-22 are monthly distributions of wind data at 33 feet, based on the three-year period. A corresponding set of tables for lapse rates between 150 and 300 feet, and wind data at 300 feet, is given in Tables 2.3-23 through 2.3-42.

2.3.4.1 Wind Direction

Lower Level

From Tables 2.3-3 through 2.3-10, it can be seen that the highest frequency of winds at the 33-foot level was generally from the southeast sector. The only exception was under Class G stability conditions when the highest frequency was from the north-northeast sector.

The monthly distributions (Tables 2.3-11 through 2.3-22) show a similar high frequency of winds from the southeast sector. Exceptions are the distributions for

January, February, and September, which reveal a high frequency of winds from the north-northwest, north-northeast, and north-northeast sectors, respectively.

Annual and monthly wind direction patterns at the 33-foot level are shown in wind rose plots, Figures 2.3-1 through 2.3-20.

<u>Upper Level</u>

At the 300-foot wind sensor level, the distributions (Tables 2.3-23 through 2.3-30) reveal that the maximum frequency of winds is generally from the southeast sector. Under stabilities A, B, and C, the highest frequencies of winds were from the west or southwest sector, but these combined frequencies occurred less than one percent of the total time. For Class G stability conditions, the highest frequency was from the south-southeast sector.

The monthly distributions (Tables 2.3-31 through 2.3-42) show a high frequency of winds from the southeast and south-southeast sectors.

Exceptions are the distributions for January and February, which reveal a maximum frequency of winds from the northwest and north sectors, respectively.

Annual and monthly wind direction patterns at the 300-foot level are given in wind rose plots, Figures 2.3-21 through 2.3-40.

2.3.4.2 <u>Wind Direction Persistence</u>

Persistent wind is defined in this analysis as a continuous wind from one of the 22-1/2 degree sectors (e.g., north-northeast). The persistence is not considered to be interrupted if the wind departs from the sector for one hour and then returns, or if there are up to two hours of missing data followed by a continuation of the same directional persistence.

Tables 2.3-43 and 2.3-44 are summaries of the wind direction persistence durations at the 33 and 300-foot levels, respectively. From these tables, it can be seen that the wind directions which were the most persistent were from the southeast and south-southeast sectors.

At the lower level, about 20 percent of the persistence cases were equal to 6 hours or more, about 4 percent were equal to 12 hours or more, and about 0.2 percent were equal to 24 hours or more. The four highest persistence durations at this level were 36, 33, 32, and 32 hours with southeast, southeast, south, and north-northwest winds, respectively.

At the upper level, about 22 percent of the persistence cases were equal to 6 hours or more, about 4 percent were equal to 12 hours or more, and about 0.4 percent were equal to 24 hours or more. The four highest persistence durations at the 300-foot level were 38, 36, 33, and 32 hours with south-southeast, southeast, southeast and south winds, respectively.

2.3.4.3 Wind Speed

Lower Level

Average wind speeds at the 33-foot level under different stability conditions (Tables 2.3-3 through 2.3-9) ranged from a low of 3.2 mph under G stability to a high of 7.2 mph under B stability. The highest occurrence of wind speeds was in the 3.5-5.4 mph range under unstable and neutral conditions (Classes A, B, C, and D), and in the 1.5-3.4 mph range under stable conditions (Classes E, F, and G).

The overall mean wind speed, disregarding stability, was 5.7 mph (Table 2.3-10). The highest occurrence of wind speeds for this distribution was in the 3.5-5.4 mph range with winds primarily from the southeast sector.

From the monthly distributions (Tables 2.3-11 through 2.3-22), it is observed that the highest average wind speeds occurred in the winter and early spring (December through March) and the lowest values occurred in late spring to late fall (May through October). The highest occurrence of wind speeds was in the 7.5-12.4 mph range for January; in the 1.5-3.4 mph range for May, June, and November; and in the 3.5-5.4 mph range for the remaining months.

Annual and monthly wind speed patterns at the 33-foot level are also shown in wind rose plots, Figures 2.3-1 through 2.3-20.

Upper Level

Average wind speeds at the 300-foot level, under different stability conditions (Tables 2.3-23 through 2.3-29), ranged from a low of 9.5 mph under A stability to a high of 12.1 mph under D and F stabilities. The highest occurrence of wind speeds was in the 5.5-7.4 mph range under A stability, in the 7.5-12.4 mph range under C, D, and G stabilities, and in the 12.5-18.4 mph range under B, E, and F stabilities.
The overall mean wind speed, disregarding stability, was 12.0 mph (Table 2.3-30). The highest occurrence of wind speeds for this distribution was in the 7.5-12.4 mph range.

From the monthly distributions (Tables 2.3-31 through 2.3-42), it is observed that the highest average wind speeds occurred in the winter and early spring (December through March) and the lowest values occurred in the late spring and summer (May through August). The highest occurrence of wind speeds was in the 7.5-12.4 mph range for May through September, and in the 12.5-18.4 mph range for the remaining months.

Annual and monthly wind speed patterns at the 300-foot level are also shown in wind rose plots, Figures 2.3-21 through 2.3-40.

A detailed discussion of meteorological diffusion evaluation methods is presented in Section 14.8.5.2.

2.3.5 Temperature and Precipitation

2.3.5.1 Temperature

The climate at the Browns Ferry site is interchangeably continental and maritime in winter and spring, predominantly maritime in summer, and generally continental in fall. The mean annual temperature at Decatur[3], Alabama, during 1879-1958, was 62.0°F.

In a typical year at Decatur, there are about 70 days with maximum temperatures equal to or greater than 90°F and about 57 days with minimum temperatures equal to or less than 32°F. The most extreme daily temperatures recorded during this 80-year period occurred in June 1914 (108°F) and in February 1899 (-12°F).

Temperature statistics for Decatur (period of record 1879-1958) are given in Table 2.3-45. Table 2.3-46 gives temperature statistics for the Browns Ferry meteorological facility for January 1, 1977 - December 31, 1979. Because of the longer period of record, the Decatur data are considered more representative of normal temperatures in the area.

2.3.5.2 Precipitation

Much of the annual precipitation at the Browns Ferry site results from migratory storms in the winter and early spring (December through April).[4] Most of the remaining precipitation is in June and July when air mass thundershower activity is common. October usually has the lowest precipitation.

The maximum 1-hour rainfall which may be representative for the Browns Ferry site area was 2.12 inches, recorded in Moulton,[5] 20 miles southwest of the site, for the 11-year period, 1940-50. The maximum 1-hour rainfall for a 100-year frequency is 3.3 inches.[6] The site underground storm drainage system is designed for a maximum rainfall of 4 inches per hour.

Precipitation statistics from Huntsville for the 13-year period, 1968-1980, and normals for 1941-1970 are given in Table 2.3-47. These data are considered more representative of the normal than precipitation data from the Browns Ferry meteorological facility for January 1, 1977 - December 31, 1979, given in Table 2.3-48.

2.3.5.3 Snowfall

Snow does not often occur at the Browns Ferry site and seldom accumulates on the ground for more than a few days. Decatur[3] snowfall data in Table 2.3-49 are considered representative of the site area. The maximum 24-hour snowfall[7] reported was 17.1 inches in December 1963; next highest were 10.1 and 10.0 inches in January 1940 and February 1895, respectively.

2.3.6 Storms

2.3.6.1 Thunderstorms

During 1968-1980, there were about 57 days annually on which thunderstorms were reported in the Huntsville area.[4] Thunderstorms occurred most frequently in July, August, June, and May. November and December had the smallest number of thunderstorms, with an average of one thunderstorm day each month.

Windstorms (often associated with thunderstorms) may occur several times a year, particularly in winter, spring, and summer, with winds occasionally exceeding 40 mph. In 1964, 95 mph winds, with rain and hail, were reported at the Redstone Arsenal, 25 miles east-southeast of the site. Also in April 1958 and July 1963, winds were reported in excess of 70 mph in the Huntsville area.

2.3.6.2 Tornadoes

There were four tornadoes reported in Limestone County during the 50-year period 1916-65.[8, 9] In the adjacent counties, Morgan and Madison, 18 tornadoes were reported during the same period. The bordering Southern Tennessee counties, Giles and Lincoln, reported 13 and 5 tornadoes, respectively, during the 55-year period 1916-70.[10]

Tornado data compiled by the severe local storms (SELS) unit of the National Weather Service[11] for the period 1955-67 were used for evaluating the tornado probability for the Browns Ferry site. In the 1-degree latitude/longitude square containing the site (about 3,930 mi^2), there were 31 tornadoes reported during the 13-year period, or about 2.38 tornadoes per year. Thom's value[12] for the mean tornado path area (2.82 mi^2) was used in calculating an annual point probability for the site of 1.71×10^{-3}; this is equivalent to a mean recurrence interval of about 600 years.

The National Severe Storms Forecast Center in Kansas City, Missouri calculated the tornado return probability for the Browns Ferry site based on tornado occurrences within a 30 nautical mile (nm) radius during 1950-1986.[13] A circle of 30 nm radius has an area comparable to a one degree latitude-longitude square. Based on 48 tornado occurrences having path size estimates in the 37-year period, the return probability is 6.979×10^{-4} and the mean return interval is 1,433 years. The annual tornado occurrence in the 30 nm radius circle is 1.81 (based on 67 tornadoes reported).

2.3.7 Onsite Meteorological Measurement Program

2.3.7.1 Siting and Description of Instruments

Collection of onsite meteorological data at the Browns Ferry Nuclear Plant commenced in February 1967 from a meteorological tower located about 0.5 mile north-northeast of the reactor building and about 25 feet above plant grade. This facility was moved in early 1970 to a new location approximately 0.7 mile north-northwest of the reactor building and about 10 feet above plant grade. In March 1973, the facility was moved to its present location about 0.5 mile east-southeast of the reactor building and about 30 feet above plant grade.

The permanent meteorological facility consists of a 91-meter (300-foot) instrumented tower for wind and temperature measurements, a separate 10-meter (33-foot) tower for dewpoint measurements, a ground based instrument for rainfall measurements, and a data collection system in an instrument building (Environmental Data Station or EDS). The data collected include: wind speeds and directions at the 33-, 150-, and 300-foot levels (wind data collection at 150 feet began on April 23, 1976); temperatures at the 33-, 150-, and 300-foot levels (temperature data collection at four feet ended on May 24, 1979); and dewpoint temperatures at the 33-foot level (dewpoint data collection at 150 and 300 feet ended on March 6, 1978 and the 4-foot dewpoint data collection ended on November 15, 1978). The dewpoint sensor was moved to a separate tower on September 27, 1994. More exact heights for wind and temperature sensors are given in the EDS Manual.[14]

Rainfall is monitored from a rain gage located about 70 feet from the tower. The meteorological sensors are connected to the data collection and recording equipment in the EDS.

A system of lightning and surge protection circuitry with proper grounding is included in the facility design.

Instrument Description

A description of the meteorological sensors follows. More detailed sensor specifications are included in the EDS manual. Replacement sensors, which may be of a different manufacturer or model, will satisfy Regulatory Guide 1.23 (Revision 1) specifications.[15]

SENSOR	HEIGHT (feet)	DESCRIPTION
Wind Direction and Wind Speed	33, 150, and 300	Ultrasonic Wind Sensor
Temperature	33, 150 and 300	Platinum Wire Resistance Detector (RTD) with aspirated radiation shield
Dewpoint	33	Capacitive Humidity Sensor
Rainfall	4	Tipping bucket rain gauge

2.3.7.2 Data Acquisition System

This data acquisition system is located at the EDS and consists of meteorological sensors, a computer (with peripherals), and various interface devices. These devices send meteorological data to the plant, to the Central Emergency Control Center (CECC), and to enable callup for data validation and archiving offsite. An older data collection system, which included a NOVA minicomputer, was replaced by a new system on September 28, 1988. The previous data collection system, which included a micro-VAX minicomputer, was replaced by a new system on September 10, 2010.

System Accuracies

The meteorological data collection system is designed and replacement components are chosen to meet or exceed specifications for accuracy identified in NRC Regulatory Guide 1.23 (Revision 1).

The meteorological data collection system satisfies the Regulatory Guide 1.23 accuracy requirements. A detailed listing of error sources for each parameter is included in the EDS manual.

2.3.7.3 Data Recording and Display

The data acquisition is under control of the computer program. The output of each meteorological sensor is scanned periodically, scaled, and the data values are stored.

Meteorological sensor outputs (except rainfall) are measured every five seconds (720 per hour). Rainfall is measured continuously as it occurs. Software data processing routines within the computer accumulate output and perform data calculations to generate 15-minute and hourly averages of wind speed and temperature, 15-minute and hourly vector wind speed and direction, 15-minute and hourly total precipitation, hourly average dewpoint, and hourly horizontal wind direction sigmas. Prior to April 1987, a prevailing wind direction calculation method was used. Subsequently, vector wind speed and direction have been calculated along with arithmetic average wind speed. Prior to October 20, 2010, temperature and dewpoint were measured every minute (60 per hour).

Selected data each 15 minutes and all data each hour are stored for remote data access.

Data sent to the plant control room every 15 minutes includes 33-, 150-, and 300-foot wind direction, average wind speed, and temperature values. Hourly data sent includes all of these plus the precipitation amount.

Data sent to the CECC computer in Chattanooga every 15 minutes includes 33-, 150-, and 300-foot wind direction, wind speed, and temperature values. All data is sent to the CECC every hour. This data is available from the CECC computer to other TVA and the State emergency centers in support of the Radiological Emergency Plan, including the technical support center at Browns Ferry. Remote access of meteorological data by the Nuclear Regulatory Commission during emergency situations is available through the CECC computer.

Data are sent from the EDS to an offsite computer for validation, reporting, and archiving.

2.3.7.4 <u>Equipment Servicing, Maintenance, and Calibration</u>

The meteorological equipment at the EDS is serviced by either engineering aides, instrument technicians, or engineers. Maintenance and calibrations are performed by either instrument technicians, electrical engineering associates, or electrical engineers.

Most equipment is calibrated or replaced at least every six months of service. The methods for maintaining a calibrated status for the components of the meteorological data collection system (sensors, recorders, electronics, DVM, data logger, etc.) include field checks, field calibration, and/or replacement intervals for individual components, on the basis of operational history of the component type. Procedures and processes such as appropriate maintenance processes (procedures, work order/work request documents, etc.) are used to calibrate and maintain meteorological and station equipment.

2.3.7.5 <u>Operational Meteorological Program</u>

The operational phase of the meteorological program includes those procedures and responsibilities related to activities beginning with the initial fuel loading and continuing through the life of the plant. The meteorological data collection program is continuous without major interruptions. The meteorological program has been developed to be consistent with the guidance given in NRC Regulatory Guide 1.23 (Revision 0) and the reporting procedures in Regulatory Guide 1.21 (Revision 1).[18] The basic objective is to maintain data collection performance to assure at least 90% joint recoverability and availability of data needed for assessing the relative concentrations and doses resulting from accidental or routine releases.

The restoration of the data collection capability of the meteorological facility in the event of equipment failure or malfunction will be accomplished by replacement or repair of affected equipment. A stock of spare parts and equipment is maintained to minimize and shorten the periods of outages. Equipment malfunctions or outages are detected by personnel during routine or special checks. Equipment outages that affect the data transmitted to the plant can be detected by review of data displays in the reactor control room. Also, checks of data availability to the emergency centers are performed each work day. When an outage of one or more of the critical data items occurs, the appropriate maintenance personnel will be notified.

In the event that the onsite meteorological facility is rendered inoperable, or there is an outage of the communications of data access systems; there is no fully representative offsite source of meteorological data for identification of atmospheric dispersion conditions. Therefore, TVA has prepared procedures to provide for missing or garbled data. These procedures incorporate available onsite data (for a partial loss of data), offsite data, and conditional climatology. The CECC meteorologist will apply the appropriate procedures.

2.3.8 Conclusions

The meteorology of the Browns Ferry site provides generally favorable atmospheric conditions for transport and dispersion of plant emissions (see Section 14 and Appendix E). There are no physiographical features in the area to cause local entrapment or accumulation of emissions, particularly during extended periods of anticyclonic circulation or atmospheric stagnation. Limited air mass modification may occur within the lower few hundred feet, particularly with southeast winds when the over-water trajectory may approach 10 miles. Evaluation of the site meteorological information collected since preparation of the Design and Analysis Report confirms earlier judgment that the protective features for provision of routine atmospheric discharge of radioactive material will be adequate.

The Browns Ferry site is located in an area occasionally traversed by cyclonic storms. Wind speeds in excess of 40 mph are occasionally reported, but wind speeds in excess of 75 mph are rare. The estimated probability of a tornado occurrence at the Browns Ferry site in any one year is 6.979×10^{-4}, or about one occurrence in 1,433 years should be expected. In spite of the low probability, the plant is designed to withstand tornado forces. (See section 12 for design wind and tornado loadings.)

Because of the suitable physiographical features and adequate atmospheric diffusion conditions, it is anticipated that routine emission rates for atmospheric release of radioactive material will be favorable as compared with calculated maximum permissible emission rates (see Appendix E).

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13. Tornado data for the Browns Ferry Nuclear Plant site prepared by the National Severe Storms Forecast Center, Kansas City, Missouri, November 1987.

14. Browns Ferry Nuclear Plant Environmental Data Station Manual, U.S. Tennessee Valley Authority

15. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.23, Revision 1, “Meteorological Monitoring Programs for Nuclear Power Plants,” Washington, D.C., March 2007.

16. Deleted

17. Deleted

18. Regulatory Guide 1.21, Revision 1, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," U.S. Atomic Energy Commission, Washington, D.C., June 1974.

TABLE 2.3-1

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY STABILITY CLASS

JAN 1, 77 - DEC 31, 79

WIND SPEED (MPH)	STABILITY CLASS A	B	C	D	E	F	G
CALM	0.0	0.0	0.0	0.00	0.01	0.01	0.02
0.6- 1.4	0.0	0.0	0.0	0.05	0.68	0.50	0.57
1.5- 3.4	0.09	0.34	0.50	5.77	10.41	5.48	4.45
3.5- 5.4	2.29	2.11	1.52	8.77	9.77	4.03	2.13
5.5- 7.4	1.19	1.00	1.04	6.02	5.55	1.59	0.57
7.5-12.4	0.90	1.63	1.22	8.09	4.50	0.90	0.17
12.5-18.4	0.42	0.47	0.33	3.36	0.70	0.04	0.0
18.5-24.4	0.02	0.06	0.06	0.46	0.07	0.01	0.0
>=24.5	0.0	0.0	0.0	0.03	0.0	0.0	0.0
TOTAL	4.91	5.61	4.67	32.55	31.69	12.56	7.91

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25935
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED STABILITY OBSERVATIONS	25577
TOTAL HOURS OF OBSERVATIONS	26280
JOINT RECOVERABILITY PERCENTAGE	97.3

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 10.03 AND 45.30 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

TABLE 2.3-2

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY STABILITY CLASS

JAN 1, 77 - DEC 31, 79

WIND SPEED (MPH)	STABILITY CLASS A	B	C	D	E	F	G
CALM	0.0	0.0	0.0	0.0	0.00	0.00	0.0
0.6- 1.4	0.0	0.0	0.0	0.04	0.05	0.01	0.01
1.5- 3.4	0.0	0.0	0.04	2.22	1.25	0.29	0.08
3.5- 5.4	0.0	0.01	0.08	5.98	2.73	0.65	0.18
5.5- 7.4	0.01	0.01	0.11	6.98	3.34	0.83	0.29
7.5-12.4	0.0	0.02	0.16	17.73	9.76	2.64	0.90
12.5-18.4	0.0	0.03	0.14	15.61	9.95	3.19	0.58
18.5-24.4	0.0	0.01	0.02	6.30	3.07	0.90	0.18
>=24.5	0.0	0.0	0.05	2.48	0.82	0.0	0.0
TOTAL	0.01	0.08	0.60	57.34	30.97	8.51	2.22

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25729
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED STABILITY OBSERVATIONS	25347
TOTAL HOURS OF OBSERVATIONS	26280
JOINT RECOVERABILITY PERCENTAGE	96.4

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 45.30 AND 89.59 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

TABLE 2.3-3

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS A (DELTA T< = -1.9 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.0	0.0	0.04	0.12	0.05	0.0	0.0	0.21
NNE	0.0	0.0	0.0	0.05	0.19	0.10	0.0	0.0	0.34
NE	0.0	0.0	0.0	0.04	0.06	0.0	0.0	0.0	0.10
ENE	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01
E	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.01
ESE	0.0	0.01	0.11	0.17	0.02	0.0	0.0	0.0	0.31
SE	0.0	0.03	1.11	0.40	0.02	0.0	0.0	0.0	1.56
SSE	0.0	0.04	0.52	0.10	0.02	0.0	0.0	0.0	0.68
S	0.0	0.01	0.38	0.11	0.04	0.0	0.0	0.0	0.54
SSW	0.0	0.0	0.04	0.05	0.01	0.0	0.0	0.0	0.10
SW	0.0	0.0	0.05	0.04	0.0	0.0	0.0	0.0	0.09
WSW	0.0	0.0	0.04	0.07	0.04	0.0	0.0	0.0	0.15
W	0.0	0.0	0.01	0.05	0.05	0.01	0.0	0.0	0.12
WNW	0.0	0.0	0.02	0.03	0.09	0.06	0.0	0.0	0.20
NW	0.0	0.0	0.0	0.02	0.17	0.11	0.0	0.0	0.30
NNW	0.0	0.0	0.01	0.01	0.06	0.09	0.02	0.0	0.19
SUBTOTAL	0.0	0.09	2.29	1.19	0.90	0.42	0.02	0.0	4.91

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25935
TOTAL HOURS OF STABILITY CLASS A	1262
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS A	1259
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 10.03 AND 45.30 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 6.8 MPH

TABLE 2.3-4

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS B (-1.9< DELTA-T< = -1.7 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND	WIND SPEED (MPH)								
DIRECTION	0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.0	0.05	0.09	0.30	0.04	0.01	0.0	0.49
NNE	0.0	0.0	0.05	0.07	0.27	0.05	0.0	0.0	0.44
NE	0.0	0.0	0.04	0.02	0.09	0.01	0.0	0.0	0.16
ENE	0.0	0.01	0.01	0.01	0.01	0.0	0.0	0.0	0.04
E	0.0	0.0	0.02	0.01	0.0	0.0	0.0	0.0	0.03
ESE	0.0	0.02	0.10	0.04	0.0	0.0	0.0	0.0	0.16
SE	0.0	0.13	0.64	0.09	0.02	0.0	0.0	0.0	0.88
SSE	0.0	0.09	0.31	0.02	0.01	0.0	0.0	0.0	0.43
S	0.0	0.05	0.42	0.07	0.02	0.0	0.0	0.0	0.56
SSW	0.0	0.02	0.07	0.01	0.0	0.0	0.0	0.0	0.10
SW	0.0	0.0	0.17	0.02	0.0	0.0	0.0	0.0	0.19
WSW	0.0	0.0	0.11	0.13	0.05	0.01	0.0	0.0	0.30
W	0.0	0.02	0.04	0.17	0.17	0.03	0.0	0.0	0.43
WNW	0.0	0.0	0.07	0.11	0.23	0.08	0.04	0.0	0.53
NW	0.0	0.0	0.01	0.07	0.27	0.13	0.01	0.0	0.49
NNW	0.0	0.0	0.0	0.07	0.19	0.12	0.0	0.0	0.38
SUBTOTAL	0.0	0.34	2.11	1.00	1.63	0.47	0.06	0.0	5.61

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25935
TOTAL HOURS OF STABILITY CLASS B	1445
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS B	1440
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 10.03 AND 45.30 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 7.2 MPH

TABLE 2.3-5

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS C (-1.7< DELTA-T< =-1.5 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.01	0.08	0.11	0.21	0.02	0.0	0.0	0.43
NNE	0.0	0.01	0.07	0.09	0.17	0.02	0.0	0.0	0.36
NE	0.0	0.0	0.03	0.08	0.05	0.0	0.0	0.0	0.16
ENE	0.0	0.0	0.02	0.02	0.0	0.0	0.0	0.0	0.04
E	0.0	0.0	0.03	0.02	0.0	0.0	0.0	0.0	0.05
ESE	0.0	0.01	0.05	0.02	0.0	0.0	0.0	0.0	0.08
SE	0.0	0.17	0.29	0.09	0.01	0.0	0.0	0.0	0.56
SSE	0.0	0.12	0.17	0.04	0.01	0.0	0.0	0.0	0.34
S	0.0	0.11	0.25	0.04	0.02	0.0	0.0	0.0	0.42
SSW	0.0	0.03	0.06	0.01	0.0	0.0	0.0	0.0	0.10
SW	0.0	0.03	0.12	0.03	0.01	0.0	0.0	0.0	0.19
WSW	0.0	0.0	0.11	0.07	0.07	0.0	0.0	0.0	0.25
W	0.0	0.0	0.05	0.12	0.10	0.02	0.01	0.0	0.30
WNW	0.0	0.01	0.12	0.13	0.17	0.07	0.04	0.0	0.54
NW	0.0	0.0	0.05	0.09	0.22	0.10	0.01	0.0	0.47
NNW	0.0	0.0	0.02	0.08	0.18	0.10	0.0	0.0	0.38
SUBTOTAL	0.0	0.50	1.52	1.04	1.22	0.33	0.06	0.0	4.67

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25935
TOTAL HOURS OF STABILITY CLASS C	1202
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS C	1197
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 10.03 AND 45.30 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 7.0 MPH

TABLE 2.3-6

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS D (-1.5< DELTA-T< =-0.5 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.19	0.41	0.53	1.00	0.37	0.01	0.0	2.51
NNE	0.01	0.20	0.56	0.58	1.18	0.18	0.01	0.0	2.72
NE	0.01	0.12	0.38	0.43	0.52	0.01	0.0	0.0	1.47
ENE	0.0	0.26	0.23	0.15	0.05	0.01	0.0	0.0	0.70
E	0.0	0.20	0.31	0.17	0.05	0.0	0.0	0.0	0.73
ESE	0.0	0.24	0.51	0.30	0.08	0.0	0.0	0.0	1.13
SE	0.02	1.16	1.31	0.83	0.26	0.0	0.0	0.0	3.58
SSE	0.01	0.99	0.99	0.26	0.11	0.02	0.0	0.0	2.38
S	0.0	0.92	1.17	0.34	0.17	0.0	0.0	0.0	2.60
SSW	0.0	0.45	0.29	0.08	0.04	0.0	0.0	0.0	0.86
SW	0.0	0.24	0.29	0.09	0.02	0.01	0.0	0.0	0.65
WSW	0.0	0.32	0.70	0.29	0.33	0.11	0.0	0.0	1.75
W	0.0	0.18	0.55	0.62	0.63	0.22	0.03	0.0	2.23
WNW	0.0	0.13	0.39	0.42	1.10	0.82	0.22	0.01	3.09
NW	0.0	0.04	0.28	0.38	1.01	0.87	0.14	0.02	2.74
NNW	0.0	0.13	0.40	0.55	1.54	0.74	0.05	0.0	3.41
SUBTOTAL	0.05	5.77	8.77	6.02	8.09	3.36	0.46	0.03	32.55

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25935
TOTAL HOURS OF STABILITY CLASS D	8438
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS D	8341
TOTAL HOURS CALM	1

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 10.03 AND 45.30 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 7.1 MPH

TABLE 2.3-7

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS E (-0.5< DELTA-T< = 1.5 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.04	0.47	0.54	0.43	0.41	0.05	0.01	0.0	1.95
NNE	0.05	0.61	0.74	0.55	0.47	0.04	0.0	0.0	2.46
NE	0.05	0.57	0.63	0.42	0.27	0.02	0.0	0.0	1.96
ENE	0.05	0.71	0.45	0.17	0.08	0.02	0.0	0.0	1.48
E	0.04	0.61	0.74	0.16	0.07	0.0	0.0	0.0	1.62
ESE	0.03	0.76	1.01	0.53	0.16	0.01	0.0	0.0	2.50
SE	0.11	2.04	1.75	0.92	0.55	0.02	0.0	0.0	5.39
SSE	0.07	1.16	0.78	0.48	0.33	0.04	0.0	0.0	2.86
S	0.05	1.03	0.74	0.44	0.63	0.14	0.01	0.0	3.04
SSW	0.02	0.52	0.14	0.08	0.06	0.01	0.0	0.0	0.83
SW	0.04	0.30	0.07	0.02	0.03	0.0	0.0	0.0	0.46
WSW	0.01	0.53	0.60	0.14	0.11	0.04	0.0	0.0	1.43
W	0.02	0.37	0.77	0.42	0.27	0.04	0.0	0.0	1.89
WNW	0.03	0.15	0.13	0.11	0.22	0.09	0.02	0.0	0.75
NW	0.02	0.17	0.20	0.14	0.25	0.09	0.02	0.0	0.89
NNW	0.05	0.41	0.48	0.54	0.59	0.09	0.01	0.0	2.17
SUBTOTAL	0.68	10.41	9.77	5.55	4.50	0.70	0.07	0.0	31.68

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25935
TOTAL HOURS OF STABILITY CLASS E	8264
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS E	8098
TOTAL HOURS CALM	3

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 10.03 AND 45.30 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 5.0 MPH

TABLE 2.3-8

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS F (1.5< DELTA-T< = 4.0 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.05	0.36	0.52	0.28	0.06	0.0	0.0	0.0	1.27
NNE	0.05	0.51	0.66	0.34	0.11	0.0	0.0	0.0	1.67
NE	0.07	0.34	0.27	0.18	0.01	0.0	0.0	0.0	0.87
ENE	0.03	0.53	0.33	0.05	0.0	0.0	0.0	0.0	0.94
E	0.01	0.59	0.52	0.03	0.0	0.0	0.0	0.0	1.15
ESE	0.0	0.52	0.22	0.0	0.0	0.0	0.0	0.0	0.74
SE	0.09	0.97	0.48	0.17	0.13	0.01	0.0	0.0	1.85
SSE	0.05	0.54	0.34	0.17	0.25	0.02	0.01	0.0	1.38
S	0.03	0.29	0.18	0.20	0.27	0.01	0.0	0.0	0.98
SSW	0.03	0.13	0.03	0.0	0.01	0.0	0.0	0.0	0.20
SW	0.0	0.09	0.03	0.0	0.0	0.0	0.0	0.0	0.12
WSW	0.0	0.09	0.07	0.0	0.0	0.0	0.0	0.0	0.16
W	0.02	0.09	0.06	0.0	0.01	0.0	0.0	0.0	0.18
WNW	0.01	0.08	0.01	0.0	0.0	0.0	0.0	0.0	0.10
NW	0.01	0.08	0.04	0.01	0.0	0.0	0.0	0.0	0.14
NNW	0.05	0.27	0.27	0.16	0.05	0.0	0.0	0.0	0.80
SUBTOTAL	0.50	5.48	4.03	1.59	0.90	0.04	0.01	0.0	12.55

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25935
TOTAL HOURS OF STABILITY CLASS F	3268
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS F	3223
TOTAL HOURS CALM	2

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 10.03 AND 45.30 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL
MEAN WIND SPEED = 4.0 MPH

TABLE 2.3-9

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS G (DELTA T > 4.0 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.07	0.76	0.32	0.02	0.0	0.0	0.0	0.0	1.17
NNE	0.05	0.83	0.51	0.18	0.02	0.0	0.0	0.0	1.59
NE	0.04	0.34	0.12	0.02	0.0	0.0	0.0	0.0	0.52
ENE	0.04	0.48	0.18	0.02	0.0	0.0	0.0	0.0	0.72
E	0.02	0.52	0.34	0.0	0.0	0.0	0.0	0.0	0.88
ESE	0.01	0.18	0.01	0.0	0.0	0.0	0.0	0.0	0.20
SE	0.08	0.43	0.09	0.04	0.03	0.0	0.0	0.0	0.67
SSE	0.03	0.44	0.31	0.16	0.08	0.0	0.0	0.0	1.02
S	0.05	0.09	0.12	0.10	0.04	0.0	0.0	0.0	0.40
SSW	0.05	0.05	0.01	0.0	0.0	0.0	0.0	0.0	0.11
SW	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.01
WSW	0.02	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.04
W	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.02
WNW	0.01	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.03
NW	0.04	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.08
NNW	0.05	0.23	0.12	0.03	0.0	0.0	0.0	0.0	0.43
SUBTOTAL	0.57	4.45	2.13	0.57	0.17	0.0	0.0	0.0	7.89

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25935
TOTAL HOURS OF STABILITY CLASS G	2056
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS G	2019
TOTAL HOURS CALM	4

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 10.03 AND 45.30 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 3.2 MPH

TABLE 2.3-10

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.16	1.82	1.90	1.50	2.10	0.53	0.03	0.0	8.04
NNE	0.17	2.19	2.61	1.86	2.40	0.39	0.01	0.0	9.63
NE	0.17	1.36	1.46	1.19	1.01	0.05	0.0	0.0	5.24
ENE	0.13	1.99	1.22	0.42	0.15	0.02	0.0	0.0	3.93
E	0.07	1.93	1.94	0.38	0.12	0.0	0.0	0.0	4.44
ESE	0.05	1.74	2.01	1.07	0.27	0.01	0.0	0.0	5.15
SE	0.31	4.92	5.70	2.55	1.02	0.04	0.0	0.0	14.54
SSE	0.16	3.37	3.49	1.22	0.79	0.07	0.01	0.0	9.11
S	0.14	2.50	3.27	1.30	1.19	0.15	0.02	0.0	8.57
SSW	0.10	1.20	0.65	0.23	0.12	0.01	0.0	0.0	2.31
SW	0.04	0.69	0.73	0.22	0.07	0.01	0.0	0.0	1.76
WSW	0.03	0.97	1.60	0.69	0.60	0.15	0.0	0.0	4.04
W	0.04	0.66	1.47	1.38	1.22	0.32	0.05	0.0	5.14
WNW	0.04	0.39	0.74	0.78	1.81	1.12	0.33	0.02	5.23
NW	0.07	0.33	0.57	0.71	1.91	1.29	0.17	0.02	5.07
NNW	0.15	1.05	1.31	1.44	2.58	1.13	0.09	0.01	7.76
SUBTOTAL	1.83	27.11	30.67	16.94	17.36	5.29	0.71	0.05	99.96

TOTAL HOURS OF VALID WIND OBSERVATIONS	25810
TOTAL HOURS OF OBSERVATIONS	26280
RECOVERABILITY PERCENTAGE	98.2
TOTAL HOURS CALM	10

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 5.7 MPH

TABLE 2.3-11

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

JANUARY (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	1.34	1.79	1.74	1.84	0.25	0.10	0.0	7.06
NNE	0.05	1.99	2.09	1.39	2.24	0.15	0.0	0.0	7.91
NE	0.0	1.25	1.44	1.20	1.15	0.0	0.0	0.0	5.04
ENE	0.0	1.29	1.29	0.45	0.0	0.0	0.0	0.0	3.03
E	0.05	1.39	2.84	0.50	0.15	0.0	0.0	0.0	4.93
ESE	0.05	0.80	2.29	0.80	0.10	0.0	0.0	0.0	4.04
SE	0.25	1.99	4.08	2.19	1.89	0.0	0.0	0.0	10.40
SSE	0.0	1.94	2.24	0.95	0.90	0.05	0.0	0.0	6.08
S	0.05	0.50	0.70	0.55	0.40	0.0	0.0	0.0	2.20
SSW	0.05	0.30	0.25	0.05	0.05	0.0	0.0	0.0	0.70
SW	0.0	0.10	0.15	0.05	0.0	0.0	0.0	0.0	0.30
WSW	0.0	0.60	0.75	0.10	0.10	0.15	0.0	0.0	1.70
W	0.0	0.80	0.85	1.54	1.69	1.05	0.15	0.0	6.08
WNW	0.0	0.50	0.75	0.85	3.29	3.64	1.99	0.10	11.12
NW	0.05	0.35	1.10	0.90	4.33	5.48	0.30	0.05	12.56
NNW	0.0	0.85	1.15	1.89	8.47	3.69	0.80	0.05	16.90
SUBTOTAL	0.55	15.99	23.76	15.15	26.60	14.46	3.34	0.20	100.05

TOTAL HOURS OF VALID WIND OBSERVATIONS	2008
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	90.0
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 7.9 MPH

TABLE 2.3-12

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

FEBRUARY (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.05	1.59	1.93	2.03	3.77	1.34	0.0	0.0	10.71
NNE	0.05	1.54	2.18	2.43	4.96	1.14	0.05	0.0	12.35
NE	0.10	0.84	1.64	1.44	1.39	0.10	0.0	0.0	5.51
ENE	0.0	1.34	0.89	0.74	0.25	0.0	0.0	0.0	3.22
E	0.15	1.54	1.19	0.60	0.25	0.0	0.0	0.0	3.73
ESE	0.10	1.39	1.14	0.69	0.05	0.0	0.0	0.0	3.37
SE	0.20	3.87	3.82	1.14	0.35	0.15	0.0	0.0	9.53
SSE	0.05	3.42	4.17	1.59	0.94	0.05	0.0	0.0	10.22
S	0.10	1.64	2.38	1.14	1.29	0.0	0.0	0.0	6.55
SSW	0.15	0.35	0.50	0.20	0.30	0.0	0.0	0.0	1.50
SW	0.0	0.35	0.64	0.40	0.15	0.10	0.0	0.0	1.64
WSW	0.05	0.45	0.64	0.30	1.34	0.64	0.0	0.0	3.42
W	0.0	0.40	0.74	0.64	1.39	0.60	0.0	0.0	3.77
WNW	0.0	0.30	0.79	0.69	2.58	1.88	0.30	0.0	6.54
NW	0.0	0.20	0.60	0.55	2.83	1.93	0.64	0.0	6.75
NNW	0.0	1.04	2.18	2.43	3.57	1.93	0.05	0.0	11.20
SUBTOTAL	1.00	20.26	25.43	17.01	25.41	9.86	1.04	0.0	100.01

TOTAL HOURS OF VALID WIND OBSERVATIONS	2016
TOTAL HOURS OF OBSERVATIONS	2016
RECOVERABILITY PERCENTAGE	100.0
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL
MEAN WIND SPEED = 6.8 MPH

TABLE 2.3-13

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

MARCH (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.09	0.68	1.49	0.95	1.35	1.31	0.0	0.0	5.87
NNE	0.05	0.95	1.89	1.26	1.85	0.41	0.0	0.0	6.41
NE	0.05	0.77	1.40	1.94	0.95	0.0	0.0	0.0	5.11
ENE	0.18	0.77	0.81	0.27	0.0	0.0	0.0	0.0	2.03
E	0.0	0.90	1.53	0.27	0.0	0.0	0.0	0.0	2.70
ESE	0.09	2.07	2.03	0.99	0.54	0.0	0.0	0.0	5.72
SE	0.05	4.64	4.96	2.39	2.52	0.18	0.05	0.0	14.79
SSE	0.14	3.83	3.92	2.88	1.76	0.23	0.09	0.0	12.85
S	0.09	1.67	3.70	2.70	3.42	0.14	0.09	0.0	11.81
SSW	0.14	0.50	0.45	0.32	0.27	0.0	0.0	0.0	1.68
SW	0.05	0.41	0.59	0.18	0.18	0.0	0.0	0.0	1.41
WSW	0.0	0.54	1.13	0.63	1.31	0.27	0.0	0.0	3.88
W	0.05	0.27	0.90	1.35	1.98	0.90	0.09	0.0	5.54
WNW	0.0	0.27	0.41	0.81	2.66	1.85	0.14	0.05	6.19
NW	0.0	0.09	0.63	0.90	2.79	1.44	0.32	0.05	6.22
NNW	0.0	0.68	1.13	1.35	2.97	1.71	0.05	0.0	7.89
SUBTOTAL	0.98	19.04	26.97	19.19	24.55	8.44	0.83	0.10	100.10

TOTAL HOURS OF VALID WIND OBSERVATIONS	2219
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	99.4
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 6.7 MPH

TABLE 2.3-14

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

APRIL (77, 78, 79)

WIND	WIND SPEED (MPH)								
DIRECTION	0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.14	1.44	1.26	0.79	1.26	0.51	0.14	0.0	5.54
NNE	0.09	2.37	1.72	1.63	1.40	0.47	0.0	0.0	7.68
NE	0.23	1.44	1.49	1.82	1.44	0.05	0.0	0.0	6.47
ENE	0.14	2.00	1.16	0.51	0.19	0.05	0.0	0.0	4.05
E	0.05	1.44	1.12	0.19	0.0	0.0	0.0	0.0	2.80
ESE	0.14	1.86	1.44	1.02	0.33	0.0	0.0	0.0	4.79
SE	0.70	4.42	5.26	2.42	1.40	0.0	0.0	0.0	14.20
SSE	0.14	4.93	4.75	0.70	0.93	0.0	0.0	0.0	11.45
S	0.33	2.93	4.10	1.86	2.09	0.19	0.0	0.0	11.50
SSW	0.09	1.16	0.84	0.61	0.33	0.0	0.0	0.0	3.03
SW	0.0	0.51	0.23	0.28	0.05	0.0	0.0	0.0	1.07
WSW	0.09	0.93	1.16	0.74	1.12	0.05	0.0	0.0	4.09
W	0.0	0.56	1.63	1.30	0.88	0.19	0.14	0.0	4.70
WNW	0.05	0.28	0.42	0.79	2.28	1.58	0.56	0.0	5.96
NW	0.14	0.09	0.42	0.74	1.91	1.40	0.14	0.0	4.84
NNW	0.14	0.88	1.07	1.40	2.65	1.68	0.0	0.0	7.82
SUBTOTAL	2.47	27.24	28.07	16.80	18.26	6.17	0.98	0.0	99.99

TOTAL HOURS OF VALID WIND OBSERVATIONS	2148
TOTAL HOURS OF OBSERVATIONS	2160
RECOVERABILITY PERCENTAGE	99.4
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL
MEAN WIND SPEED = 5.8 MPH

TABLE 2.3-15

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

MAY (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.32	2.43	1.31	1.04	1.85	0.18	0.0	0.0	7.13
NNE	0.23	2.30	3.02	1.49	1.98	0.18	0.0	0.0	9.20
NE	0.23	1.76	1.49	0.81	1.04	0.0	0.0	0.0	5.33
ENE	0.32	3.16	1.44	0.09	0.14	0.0	0.0	0.0	5.15
E	0.09	2.75	1.58	0.41	0.14	0.0	0.0	0.0	4.97
ESE	0.09	1.85	2.98	1.17	0.18	0.0	0.0	0.0	6.27
SE	0.23	5.55	6.40	1.80	0.23	0.0	0.0	0.0	14.21
SSE	0.18	3.88	3.11	0.90	0.50	0.0	0.0	0.0	8.57
S	0.18	3.07	3.34	1.26	0.72	0.05	0.0	0.0	8.62
SSW	0.0	1.71	1.26	0.41	0.0	0.0	0.0	0.0	3.38
SW	0.05	1.04	1.31	0.32	0.23	0.0	0.0	0.0	2.95
WSW	0.0	1.13	2.30	1.35	0.54	0.05	0.0	0.0	5.37
W	0.0	0.59	1.49	1.58	1.67	0.32	0.14	0.0	5.79
WNW	0.18	0.50	0.41	0.90	1.53	0.27	0.36	0.0	4.15
NW	0.09	0.41	0.59	1.04	1.35	0.41	0.05	0.0	3.94
NNW	0.32	1.22	0.81	0.41	1.44	0.86	0.05	0.0	5.11
SUBTOTAL	2.51	33.35	32.84	14.98	13.54	2.32	0.60	0.0	100.14

TOTAL HOURS OF VALID WIND OBSERVATIONS	2218
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	99.4
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 5.0 MPH

TABLE 2.3-16

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

JUNE (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.28	2.75	1.58	1.35	2.56	0.47	0.0	0.05	9.04
NNE	0.37	2.28	1.68	1.07	2.23	0.65	0.0	0.0	8.28
NE	0.42	1.40	0.93	0.42	0.42	0.19	0.0	0.0	3.78
ENE	0.33	2.09	0.74	0.09	0.0	0.0	0.0	0.0	3.25
E	0.09	1.58	1.58	0.05	0.0	0.0	0.0	0.0	3.30
ESE	0.0	2.05	1.96	0.14	0.0	0.0	0.0	0.0	4.15
SE	0.28	7.64	5.31	1.30	0.14	0.0	0.0	0.0	14.67
SSE	0.19	3.40	2.37	0.37	0.0	0.0	0.0	0.0	6.33
S	0.19	3.82	3.26	0.70	0.05	0.0	0.0	0.0	8.02
SSW	0.23	2.65	0.79	0.05	0.0	0.0	0.0	0.0	3.72
SW	0.05	1.72	1.30	0.14	0.0	0.0	0.0	0.0	3.21
WSW	0.0	2.47	3.21	1.49	0.51	0.0	0.0	0.0	7.68
W	0.0	1.82	3.35	2.42	1.72	0.0	0.0	0.0	9.31
WNW	0.09	0.33	0.98	0.93	2.14	0.23	0.0	0.0	4.70
NW	0.0	0.37	0.65	1.16	1.91	0.19	0.0	0.0	4.28
NNW	0.23	1.77	1.30	2.05	0.70	0.09	0.0	0.0	6.14
SUBTOTAL	2.75	38.14	30.99	13.73	12.38	1.82	0.0	0.05	99.86

TOTAL HOURS OF VALID WIND OBSERVATIONS	2148
TOTAL HOURS OF OBSERVATIONS	2160
RECOVERABILITY PERCENTAGE	99.4
TOTAL HOURS CALM	3

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 4.6 MPH

TABLE 2.3-17

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

JULY (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.13	1.70	2.11	1.03	0.72	0.04	0.0	0.0	5.73
NNE	0.13	2.69	3.14	1.48	2.24	0.09	0.04	0.0	9.81
NE	0.09	1.30	1.26	0.99	0.85	0.0	0.0	0.0	4.49
ENE	0.04	2.11	1.57	0.22	0.04	0.0	0.0	0.0	3.98
E	0.0	1.26	2.47	0.49	0.36	0.0	0.0	0.0	4.58
ESE	0.0	1.03	2.24	1.61	0.18	0.09	0.0	0.0	5.15
SE	0.22	4.53	6.32	3.81	1.08	0.09	0.0	0.0	16.05
SSE	0.13	3.36	3.63	0.22	0.13	0.0	0.0	0.0	7.47
S	0.13	4.39	5.25	0.94	0.27	0.04	0.0	0.0	11.02
SSW	0.0	2.65	1.17	0.04	0.13	0.0	0.0	0.0	3.99
SW	0.09	1.57	1.79	0.22	0.0	0.0	0.0	0.0	3.67
WSW	0.0	2.11	4.08	1.08	0.67	0.0	0.0	0.0	7.94
W	0.0	1.48	2.74	2.20	0.90	0.0	0.0	0.0	7.32
WNW	0.04	0.31	1.39	0.76	1.26	0.27	0.0	0.0	4.03
NW	0.04	0.13	0.40	0.36	0.90	0.22	0.0	0.0	2.05
NNW	0.18	0.54	0.45	0.81	0.58	0.09	0.0	0.0	2.65
SUBTOTAL	1.22	31.16	40.01	16.26	10.31	0.93	0.04	0.0	99.93

TOTAL HOURS OF VALID WIND OBSERVATIONS	2230
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	99.9
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 4.7 MPH

TABLE 2.3-18

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

AUGUST (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.18	2.34	1.80	1.53	1.21	0.09	0.0	0.0	7.15
NNE	0.36	2.97	3.42	2.20	0.90	0.13	0.04	0.0	10.02
NE	0.27	2.07	1.35	0.63	0.31	0.0	0.0	0.0	4.63
ENE	0.04	2.43	1.26	0.40	0.04	0.0	0.0	0.0	4.17
E	0.13	2.56	1.80	0.13	0.0	0.0	0.0	0.0	4.62
ESE	0.0	2.02	2.07	0.90	0.13	0.0	0.0	0.0	5.12
SE	0.18	8.00	10.88	2.74	0.09	0.0	0.0	0.0	21.89
SSE	0.18	4.09	4.00	0.36	0.04	0.0	0.0	0.0	8.67
S	0.22	4.32	4.59	0.72	0.45	0.0	0.0	0.0	10.30
SSW	0.04	2.61	0.94	0.18	0.0	0.0	0.0	0.0	3.77
SW	0.0	0.99	0.85	0.18	0.04	0.0	0.0	0.0	2.06
WSW	0.09	1.35	2.07	0.58	0.04	0.0	0.0	0.0	4.13
W	0.04	0.76	1.71	1.71	0.58	0.0	0.0	0.0	4.80
WNW	0.0	0.40	0.72	0.99	0.45	0.04	0.0	0.0	2.60
NW	0.0	0.54	0.36	0.36	0.63	0.09	0.0	0.0	1.98
NNW	0.31	0.90	1.21	0.90	0.58	0.09	0.0	0.0	3.99
SUBTOTAL	2.04	38.35	39.03	14.51	5.49	0.44	0.04	0.0	99.90

TOTAL HOURS OF VALID WIND OBSERVATIONS	2224
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	99.6
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 4.1 MPH

TABLE 2.3-19

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

SEPT. (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.15	2.64	2.74	2.79	2.79	0.40	0.05	0.0	11.56
NNE	0.10	2.99	4.98	2.94	3.33	0.75	0.0	0.0	15.09
NE	0.10	1.49	2.49	1.89	1.49	0.20	0.0	0.0	7.66
ENE	0.20	3.04	2.59	1.29	0.45	0.20	0.05	0.0	7.82
E	0.0	2.24	3.93	1.00	0.40	0.0	0.0	0.0	7.57
ESE	0.05	2.39	3.68	1.79	0.25	0.0	0.0	0.0	8.16
SE	0.35	3.88	6.57	3.14	0.30	0.0	0.0	0.0	14.24
SSE	0.10	1.54	3.14	0.45	0.20	0.20	0.0	0.0	5.63
S	0.05	1.69	3.04	0.30	0.0	0.0	0.0	0.0	5.08
SSW	0.05	0.45	0.05	0.25	0.0	0.0	0.0	0.0	0.80
SW	0.05	0.40	0.80	0.15	0.0	0.0	0.0	0.0	1.40
WSW	0.0	0.35	0.60	0.0	0.20	0.0	0.0	0.0	1.15
W	0.0	0.25	1.19	0.90	0.30	0.05	0.0	0.0	2.69
WNW	0.0	0.30	0.65	0.55	0.35	0.20	0.0	0.0	2.05
NW	0.10	0.30	0.50	0.75	1.05	0.15	0.0	0.05	2.90
NNW	0.15	1.74	1.74	1.34	0.95	0.15	0.0	0.05	6.12
SUBTOTAL	1.45	25.69	38.69	19.53	12.06	2.30	0.10	0.10	99.92

TOTAL HOURS OF VALID WIND OBSERVATIONS	2009
TOTAL HOURS OF OBSERVATIONS	2160
RECOVERABILITY PERCENTAGE	93.0
TOTAL HOURS CALM	3

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 5.1 MPH

TABLE 2.3-20

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

OCTOBER (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.18	2.38	3.64	1.75	2.43	0.90	0.0	0.0	11.28
NNE	0.09	2.79	3.14	1.80	1.93	0.18	0.0	0.0	9.93
NE	0.27	1.44	0.99	0.54	0.67	0.0	0.0	0.0	3.91
ENE	0.13	2.61	0.76	0.18	0.09	0.0	0.0	0.0	3.77
E	0.18	3.19	2.70	0.13	0.0	0.0	0.0	0.0	6.20
ESE	0.0	2.34	2.25	1.21	0.67	0.0	0.0	0.0	6.47
SE	0.09	5.03	4.99	1.89	1.48	0.04	0.0	0.0	13.52
SSE	0.31	2.92	3.37	0.72	0.31	0.04	0.0	0.0	7.67
S	0.0	2.29	3.32	1.44	0.31	0.0	0.0	0.0	7.36
SSW	0.27	0.63	0.22	0.27	0.0	0.0	0.0	0.0	1.39
SW	0.09	0.49	0.36	0.22	0.04	0.0	0.0	0.0	1.20
WSW	0.0	0.49	1.03	0.81	0.49	0.0	0.0	0.0	2.82
W	0.13	0.31	1.08	1.03	1.26	0.04	0.0	0.0	3.85
WNW	0.04	0.58	0.76	0.76	1.71	0.45	0.0	0.0	4.30
NW	0.18	0.63	0.90	0.81	2.07	1.26	0.0	0.0	5.85
NNW	0.09	1.66	2.02	2.07	3.32	1.21	0.0	0.0	10.37
SUBTOTAL	2.05	29.78	31.53	15.63	16.78	4.12	0.0	0.0	99.89

TOTAL HOURS OF VALID WIND OBSERVATIONS	2226
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	99.7
TOTAL HOURS CALM	1

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 5.3 MPH

TABLE 2.3-21

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

NOVEMBER (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.33	1.73	2.10	2.19	2.89	0.23	0.0	0.0	9.47
NNE	0.37	2.38	2.71	3.22	3.55	0.42	0.0	0.0	12.65
NE	0.09	1.26	2.10	1.87	1.73	0.09	0.0	0.0	7.14
ENE	0.14	1.96	1.26	0.61	0.61	0.05	0.0	0.0	4.63
E	0.0	2.89	1.35	0.51	0.14	0.0	0.0	0.0	4.89
ESE	0.0	1.35	0.84	1.77	0.65	0.0	0.0	0.0	4.61
SE	0.47	5.74	3.73	2.61	1.12	0.0	0.0	0.0	13.67
SSE	0.28	3.55	3.03	2.43	1.63	0.05	0.0	0.0	10.97
S	0.19	1.31	1.77	1.31	1.63	0.37	0.05	0.0	6.63
SSW	0.09	0.37	0.42	0.0	0.05	0.0	0.0	0.0	0.93
SW	0.09	0.42	0.14	0.23	0.09	0.0	0.0	0.0	0.97
WSW	0.09	0.51	1.03	0.75	0.37	0.19	0.0	0.0	2.94
W	0.23	0.56	1.03	0.79	0.70	0.51	0.09	0.0	3.91
WNW	0.05	0.65	0.93	0.79	1.03	0.89	0.14	0.0	4.48
NW	0.09	0.42	0.23	0.47	1.35	1.45	0.14	0.0	4.15
NNW	0.33	1.17	1.68	1.31	2.71	0.61	0.0	0.0	7.81
SUBTOTAL	2.84	26.27	24.35	20.86	20.25	4.86	0.42	0.0	99.85

TOTAL HOURS OF VALID WIND OBSERVATIONS	2143
TOTAL HOURS OF OBSERVATIONS	2160
RECOVERABILITY PERCENTAGE	99.2
TOTAL HOURS CALM	3

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 5.8 MPH

TABLE 2.3-22

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

DECEMBER (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.09	0.90	1.13	1.04	2.75	0.63	0.14	0.0	6.68
NNE	0.09	1.04	1.40	1.49	2.48	0.23	0.0	0.0	6.73
NE	0.14	1.31	1.08	0.86	0.77	0.0	0.0	0.0	4.16
ENE	0.0	1.04	0.90	0.27	0.0	0.0	0.0	0.0	2.21
E	0.14	1.35	1.35	0.36	0.09	0.0	0.0	0.0	3.29
ESE	0.09	1.62	1.31	0.68	0.09	0.0	0.0	0.0	3.79
SE	0.68	3.42	5.67	5.00	1.58	0.0	0.0	0.0	16.35
SSE	0.18	3.38	4.05	3.02	2.16	0.23	0.05	0.0	13.07
S	0.14	2.07	3.38	2.52	3.47	1.04	0.09	0.0	12.71
SSW	0.09	0.86	0.81	0.41	0.36	0.09	0.0	0.0	2.62
SW	0.05	0.14	0.50	0.23	0.0	0.0	0.0	0.0	0.92
WSW	0.0	0.59	0.95	0.36	0.50	0.50	0.0	0.0	2.90
W	0.0	0.09	0.81	1.04	1.53	0.27	0.0	0.0	3.74
WNW	0.05	0.27	0.68	0.50	2.52	2.30	0.59	0.05	6.96
NW	0.09	0.41	0.54	0.50	2.03	1.85	0.50	0.05	5.97
NNW	0.05	0.23	1.08	1.44	3.51	1.67	0.14	0.0	8.12
SUBTOTAL	1.88	18.72	25.64	19.72	23.84	8.81	1.51	0.10	100.22

TOTAL HOURS OF VALID WIND OBSERVATIONS	2221
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	99.5
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

MEAN WIND SPEED = 6.8 MPH

TABLE 2.3-23

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS A (DELTA T< = -1.9 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01
WSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25729
TOTAL HOURS OF STABILITY CLASS A	6
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS A	6
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 45.30 AND 89.59 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 9.5 MPH

TABLE 2.3-24

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS B (-1.9< DELTA-T< = -1.7 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.01
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.01
SSE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.01	0.01	0.0	0.0	0.0	0.02
WSW	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.01
W	0.0	0.0	0.0	0.0	0.0	0.02	0.01	0.0	0.03
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.01	0.01	0.02	0.03	0.01	0.0	0.08

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25729
TOTAL HOURS OF STABILITY CLASS B	30
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS B	30
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 45.30 AND 89.59 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 10.4 MPH

TABLE 2.3-25

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS C (-1.7< DELTA-T < = -1.5 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.02	0.01	0.0	0.0	0.03
SE	0.0	0.01	0.03	0.02	0.01	0.0	0.0	0.0	0.07
SSE	0.0	0.01	0.01	0.01	0.0	0.0	0.0	0.0	0.03
S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSW	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.01
SW	0.0	0.01	0.02	0.04	0.04	0.02	0.0	0.0	0.13
WSW	0.0	0.01	0.01	0.03	0.04	0.02	0.0	0.0	0.11
W	0.0	0.0	0.0	0.0	0.03	0.03	0.02	0.04	0.12
WNW	0.0	0.0	0.0	0.01	0.02	0.03	0.0	0.01	0.07
NW	0.0	0.0	0.0	0.0	0.0	0.03	0.0	0.0	0.03
NNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.04	0.08	0.11	0.16	0.14	0.02	0.05	0.60

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25729
TOTAL HOURS OF STABILITY CLASS C	164
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS C	164
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 45.30 AND 89.59 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 11.0 MPH

TABLE 2.3-26

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS D (-1.5< DELTA-T< = -0.5 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
	WIND SPEED (MPH)								
N	0.01	0.11	0.30	0.48	1.54	1.51	0.38	0.05	4.38
NNE	0.0	0.09	0.22	0.43	1.65	1.42	0.15	0.04	4.00
NE	0.0	0.06	0.21	0.41	1.18	0.48	0.04	0.02	2.40
ENE	0.01	0.09	0.21	0.21	0.42	0.15	0.05	0.02	1.16
E	0.0	0.11	0.24	0.20	0.25	0.12	0.02	0.0	0.94
ESE	0.0	0.12	0.28	0.32	0.81	0.64	0.20	0.06	2.43
SE	0.01	0.22	0.71	0.75	1.42	1.39	0.81	0.32	5.63
SSE	0.0	0.20	0.69	0.56	1.39	1.34	0.58	0.28	5.04
S	0.0	0.25	0.49	0.48	1.33	1.24	0.71	0.31	4.81
SSW	0.0	0.20	0.44	0.39	0.86	0.82	0.39	0.16	3.26
SW	0.0	0.27	0.43	0.37	0.68	0.65	0.26	0.10	2.76
WSW	0.0	0.15	0.53	0.44	0.59	0.53	0.24	0.13	2.61
W	0.0	0.13	0.50	0.60	1.25	0.65	0.35	0.30	3.78
WNW	0.0	0.07	0.27	0.49	1.63	1.27	0.67	0.28	4.68
NW	0.01	0.07	0.28	0.54	1.42	1.70	0.86	0.28	5.16
NNW	0.0	0.08	0.18	0.31	1.31	1.70	0.59	0.13	4.30
SUBTOTAL	0.04	2.22	5.98	6.98	17.73	15.61	6.30	2.48	57.34

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25729
TOTAL HOURS OF STABILITY CLASS D	14807
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS D	14557
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 45.30 AND 89.59 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 12.1 MPH

TABLE 2.3-27

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS E (-0.5< DELTA-T< = 1.5 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND				WIND SPEED (MPH)					
DIRECTION	0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.05	0.07	0.13	0.45	0.77	0.15	0.0	1.62
NNE	0.0	0.04	0.07	0.12	0.67	0.88	0.17	0.0	1.95
NE	0.0	0.04	0.10	0.15	0.77	0.87	0.26	0.0	2.19
ENE	0.0	0.04	0.08	0.12	0.45	0.39	0.11	0.02	1.21
E	0.0	0.09	0.16	0.19	0.47	0.17	0.05	0.01	1.14
ESE	0.01	0.07	0.17	0.21	0.63	0.70	0.17	0.03	1.99
SE	0.0	0.09	0.43	0.39	1.35	1.50	0.71	0.37	4.84
SSE	0.0	0.17	0.42	0.51	1.14	1.01	0.57	0.25	4.07
S	0.01	0.09	0.34	0.45	0.89	0.95	0.27	0.09	3.09
SSW	0.0	0.09	0.14	0.20	0.59	0.61	0.20	0.01	1.84
SW	0.01	0.07	0.14	0.17	0.56	0.64	0.10	0.03	1.72
WSW	0.01	0.08	0.11	0.14	0.42	0.34	0.07	0.01	1.18
W	0.0	0.07	0.13	0.18	0.39	0.30	0.04	0.0	1.11
WNW	0.01	0.07	0.15	0.15	0.35	0.20	0.04	0.0	0.97
NW	0.0	0.09	0.15	0.14	0.33	0.27	0.07	0.0	1.05
NNW	0.0	0.10	0.07	0.09	0.30	0.35	0.09	0.0	1.00
SUBTOTAL	0.05	1.25	2.73	3.34	9.76	9.95	3.07	0.82	30.97

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25729
TOTAL HOURS OF STABILITY CLASS E	7965
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS E	7855
TOTAL HOURS CALM	1

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 45.30 AND 89.59 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL
MEAN WIND SPEED = 12.0 MPH

TABLE 2.3-28

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS F (1.5< DELTA-T< = 4.0 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.02	0.02	0.02	0.09	0.18	0.06	0.0	0.39
NNE	0.0	0.0	0.04	0.02	0.11	0.36	0.17	0.0	0.70
NE	0.0	0.01	0.02	0.04	0.17	0.40	0.24	0.0	0.88
ENE	0.0	0.01	0.02	0.03	0.22	0.34	0.16	0.0	0.78
E	0.0	0.01	0.06	0.05	0.24	0.11	0.0	0.0	0.47
ESE	0.0	0.04	0.06	0.10	0.29	0.27	0.05	0.0	0.81
SE	0.0	0.02	0.08	0.14	0.39	0.33	0.03	0.0	0.99
SSE	0.0	0.02	0.06	0.09	0.30	0.21	0.02	0.0	0.70
S	0.0	0.04	0.05	0.08	0.17	0.17	0.01	0.0	0.52
SSW	0.0	0.02	0.06	0.06	0.19	0.29	0.10	0.0	0.72
SW	0.0	0.02	0.03	0.05	0.18	0.24	0.06	0.0	0.58
WSW	0.0	0.01	0.03	0.06	0.09	0.14	0.0	0.0	0.33
W	0.01	0.0	0.02	0.02	0.09	0.04	0.0	0.0	0.18
WNW	0.0	0.02	0.03	0.03	0.04	0.04	0.0	0.0	0.16
NW	0.0	0.02	0.05	0.02	0.04	0.0	0.0	0.0	0.13
NNW	0.0	0.03	0.02	0.02	0.03	0.07	0.0	0.0	0.17
SUBTOTAL	0.01	0.29	0.65	0.83	2.64	3.19	0.90	0.0	8.51

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25729
TOTAL HOURS OF STABILITY CLASS F	2183
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS F	2167
TOTAL HOURS CALM	1

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 45.30 AND 89.59 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 12.1 MPH

TABLE 2.3-29

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY WIND DIRECTION FOR

STABILITY CLASS G (DELTA T> 4.0 C/100 M)

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.01	0.01	0.0	0.0	0.02	0.02	0.01	0.0	0.07
NNE	0.0	0.0	0.0	0.0	0.05	0.06	0.02	0.0	0.13
NE	0.0	0.01	0.0	0.01	0.04	0.10	0.05	0.0	0.21
ENE	0.0	0.0	0.01	0.01	0.07	0.08	0.03	0.0	0.20
E	0.0	0.01	0.01	0.02	0.05	0.03	0.01	0.0	0.13
ESE	0.0	0.01	0.02	0.02	0.06	0.04	0.01	0.0	0.16
SE	0.0	0.0	0.01	0.05	0.12	0.03	0.0	0.0	0.21
SSE	0.0	0.0	0.03	0.04	0.18	0.06	0.0	0.0	0.31
S	0.0	0.01	0.01	0.06	0.12	0.04	0.0	0.0	0.24
SSW	0.0	0.0	0.01	0.03	0.08	0.05	0.01	0.0	0.18
SW	0.0	0.0	0.02	0.03	0.08	0.05	0.04	0.0	0.22
WSW	0.0	0.0	0.01	0.01	0.02	0.02	0.0	0.0	0.06
W	0.0	0.0	0.01	0.0	0.01	0.0	0.0	0.0	0.02
WNW	0.0	0.02	0.01	0.0	0.0	0.0	0.0	0.0	0.03
NW	0.0	0.0	0.02	0.01	0.0	0.0	0.0	0.0	0.03
NNW	0.0	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0.02
SUBTOTAL	0.01	0.08	0.18	0.29	0.90	0.58	0.18	0.0	2.22

TOTAL HOURS OF VALID STABILITY OBSERVATIONS	25729
TOTAL HOURS OF STABILITY CLASS G	574
TOTAL HOURS OF VALID WIND DIRECTION-WIND SPEED-STABILITY CLASS G	568
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
STABILITY BASED ON LAPSE RATE MEASURED BETWEEN 45.30 AND 89.59 METERS
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 11.0 MPH

TABLE 2.3-30

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

JAN 1, 77 - DEC 31, 79

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.02	0.19	0.38	0.64	2.07	2.47	0.61	0.06	6.44
NNE	0.0	0.13	0.33	0.60	2.46	2.69	0.50	0.04	6.75
NE	0.0	0.12	0.35	0.64	2.16	1.85	0.58	0.02	5.72
ENE	0.02	0.14	0.32	0.36	1.15	0.95	0.34	0.04	3.32
E	0.0	0.22	0.47	0.45	0.99	0.43	0.08	0.01	2.65
ESE	0.01	0.23	0.53	0.66	1.79	1.63	0.42	0.09	5.36
SE	0.02	0.36	1.26	1.36	3.25	3.20	1.54	0.69	11.68
SSE	0.01	0.38	1.20	1.22	2.97	2.59	1.16	0.59	10.12
S	0.02	0.40	0.90	1.05	2.53	2.40	1.03	0.43	8.76
SSW	0.0	0.31	0.65	0.69	1.73	1.77	0.73	0.19	6.07
SW	0.02	0.38	0.66	0.69	1.55	1.62	0.50	0.14	5.56
WSW	0.01	0.26	0.69	0.68	1.15	1.05	0.36	0.17	4.37
W	0.02	0.20	0.66	0.81	1.76	1.04	0.42	0.35	5.26
WNW	0.01	0.17	0.46	0.69	2.03	1.54	0.76	0.30	5.96
NW	0.02	0.19	0.49	0.70	1.80	2.01	0.96	0.28	6.45
NNW	0.01	0.22	0.28	0.41	1.66	2.13	0.70	0.13	5.54
SUBTOTAL	0.19	3.90	9.63	11.65	31.05	29.37	10.69	3.53	100.01

TOTAL HOURS OF VALID WIND OBSERVATIONS	25784
TOTAL HOURS OF OBSERVATIONS	26280
RECOVERABILITY PERCENTAGE	98.1
TOTAL HOURS CALM	2

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 12.0 MPH

TABLE 2.3-31

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

JANUARY (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.34	0.58	0.87	1.69	1.74	0.10	0.0	5.32
NNE	0.0	0.15	0.63	1.21	2.90	1.21	0.0	0.0	6.10
NE	0.0	0.05	0.39	0.92	2.32	0.73	0.0	0.0	4.41
ENE	0.0	0.05	0.58	0.44	1.16	0.48	0.0	0.0	2.71
E	0.0	0.19	0.48	0.63	0.87	0.05	0.0	0.0	2.22
ESE	0.0	0.10	0.29	0.92	1.84	1.89	0.34	0.05	5.43
SE	0.0	0.10	0.34	1.16	2.51	2.80	2.61	1.06	10.58
SSE	0.0	0.15	0.29	0.77	1.60	2.27	0.92	0.29	6.29
S	0.0	0.19	0.29	0.58	1.89	1.64	0.58	0.10	5.27
SSW	0.0	0.19	0.24	0.15	0.48	0.44	0.05	0.0	1.55
SW	0.0	0.15	0.19	0.29	0.77	0.58	0.05	0.15	2.18
WSW	0.0	0.24	0.29	0.34	0.63	0.34	0.39	0.44	2.67
W	0.0	0.19	0.29	0.44	1.60	1.55	0.97	1.55	6.59
WNW	0.0	0.10	0.44	0.29	2.66	4.55	1.93	1.50	11.47
NW	0.05	0.19	0.73	0.87	2.13	5.95	3.53	0.77	14.22
NNW	0.0	0.34	0.15	0.73	3.34	5.90	1.74	0.87	13.07
SUBTOTAL	0.05	2.72	6.20	10.61	28.39	32.12	13.21	6.78	100.08

TOTAL HOURS OF VALID WIND OBSERVATIONS	2068
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	92.7
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL
MEAN WIND SPEED = 13.4 MPH

TABLE 2.3-32

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

FEBRUARY (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.15	0.51	1.02	3.63	3.78	1.07	0.0	10.16
NNE	0.0	0.20	0.20	0.66	4.19	4.55	0.26	0.05	10.11
NE	0.0	0.15	0.51	0.77	2.91	1.53	0.05	0.05	5.97
ENE	0.0	0.26	0.36	0.56	1.33	1.12	0.10	0.0	3.73
E	0.0	0.05	0.61	0.56	1.43	0.66	0.10	0.0	3.41
ESE	0.0	0.15	0.51	0.46	1.18	1.18	0.0	0.05	3.53
SE	0.0	0.36	0.66	1.07	1.38	1.99	0.56	0.15	6.17
SSE	0.0	0.05	0.61	0.41	1.84	2.15	1.12	1.12	7.30
S	0.05	0.31	0.46	0.46	1.79	1.58	1.23	0.66	6.54
SSW	0.0	0.15	0.46	0.56	1.64	1.48	0.87	0.31	5.47
SW	0.0	0.26	0.36	0.41	1.23	1.99	0.92	0.41	5.58
WSW	0.0	0.20	0.36	0.31	0.41	0.92	1.02	0.82	4.04
W	0.0	0.10	0.20	0.31	0.92	0.92	0.87	0.41	3.73
WNW	0.0	0.0	0.36	0.41	1.64	1.89	1.53	0.46	6.29
NW	0.05	0.20	0.72	0.61	2.10	3.17	1.69	0.77	9.31
NNW	0.0	0.20	0.26	0.61	3.22	2.71	1.43	0.15	8.58
SUBTOTAL	0.10	2.79	7.15	9.19	30.84	31.62	12.82	5.41	99.92

TOTAL HOURS OF VALID WIND OBSERVATIONS	1956
TOTAL HOURS OF OBSERVATIONS	2016
RECOVERABILITY PERCENTAGE	97.0
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 13.1 MPH

TABLE 2.3-33

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

MARCH (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.14	0.23	0.41	1.04	1.99	1.27	0.05	5.13
NNE	0.0	0.14	0.23	0.27	2.08	2.35	0.41	0.0	5.48
NE	0.05	0.09	0.18	0.54	1.90	1.90	0.50	0.0	5.16
ENE	0.0	0.14	0.23	0.09	1.00	0.81	0.23	0.0	2.50
E	0.0	0.05	0.18	0.23	0.68	0.23	0.0	0.0	1.37
ESE	0.0	0.14	0.27	0.36	1.40	1.36	0.59	0.32	4.44
SE	0.0	0.05	0.59	1.09	2.63	2.81	1.54	2.94	11.65
SSE	0.0	0.14	0.72	0.81	2.81	2.49	1.49	2.49	10.95
S	0.0	0.14	0.27	0.72	1.63	4.03	2.04	0.86	9.69
SSW	0.0	0.14	0.36	0.32	1.67	3.62	1.95	0.32	8.38
SW	0.0	0.05	0.59	0.45	1.18	1.36	0.41	0.32	4.36
WSW	0.0	0.27	0.45	0.50	0.91	2.08	0.77	0.27	5.25
W	0.0	0.0	0.54	0.41	1.67	1.40	0.91	0.45	5.38
WNW	0.0	0.09	0.27	0.41	1.72	2.90	1.22	0.23	6.84
NW	0.0	0.23	0.23	0.77	2.13	3.44	0.91	0.45	8.16
NNW	0.0	0.32	0.09	0.23	1.18	2.44	1.04	0.05	5.35
SUBTOTAL	0.05	2.13	5.43	7.61	25.63	35.21	15.28	8.75	100.09

TOTAL HOURS OF VALID WIND OBSERVATIONS	2209
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	99.0
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 14.6 MPH

TABLE 2.3-34

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

APRIL (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.05	0.19	0.19	0.47	1.40	1.45	0.28	0.19	4.22
NNE	0.0	0.14	0.09	0.47	1.31	1.87	0.47	0.0	4.35
NE	0.0	0.19	0.37	0.70	2.80	2.19	0.75	0.05	7.05
ENE	0.0	0.05	0.23	0.19	1.59	1.31	0.42	0.05	3.84
E	0.0	0.09	0.47	0.65	1.17	0.37	0.09	0.0	2.84
ESE	0.0	0.37	0.75	1.07	1.73	0.56	0.61	0.05	5.14
SE	0.0	0.47	1.96	1.35	2.80	2.47	2.33	0.79	12.17
SSE	0.0	0.47	1.45	0.93	2.29	2.01	1.59	0.84	9.58
S	0.05	0.61	0.98	0.89	1.49	1.96	1.63	0.33	7.94
SSW	0.0	0.19	0.65	0.65	1.68	1.87	2.33	0.23	7.60
SW	0.0	0.47	0.75	0.79	1.03	2.38	1.26	0.09	6.77
WSW	0.0	0.23	0.51	0.42	0.93	1.73	0.98	0.0	4.80
W	0.0	0.05	0.37	0.47	1.35	1.31	0.75	0.84	5.14
WNW	0.0	0.19	0.47	0.51	2.43	1.35	1.12	0.37	6.44
NW	0.0	0.14	0.28	0.51	2.10	2.10	1.54	0.19	6.86
NNW	0.0	0.19	0.23	0.33	1.12	2.57	0.84	0.0	5.28
SUBTOTAL	0.10	4.04	9.75	10.40	27.22	27.50	16.99	4.02	100.02

TOTAL HOURS OF VALID WIND OBSERVATIONS	2142
TOTAL HOURS OF OBSERVATIONS	2160
RECOVERABILITY PERCENTAGE	99.2
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 12.9 MPH

TABLE 2.3-35

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

MAY (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.18	0.36	0.68	2.17	1.13	0.23	0.0	4.75
NNE	0.0	0.14	0.36	0.32	2.48	2.80	0.50	0.0	6.60
NE	0.0	0.36	0.23	0.41	1.94	1.31	1.04	0.0	5.29
ENE	0.0	0.23	0.36	0.27	0.95	0.63	0.59	0.0	3.03
E	0.0	0.45	0.81	0.59	1.49	0.68	0.09	0.0	4.11
ESE	0.0	0.36	0.45	0.81	2.98	1.99	0.36	0.05	7.00
SE	0.0	0.36	1.58	2.03	3.48	4.47	0.50	0.05	12.47
SSE	0.0	0.45	1.58	1.45	2.30	1.81	1.08	0.14	8.81
S	0.09	0.59	1.08	1.08	3.03	2.03	1.22	0.18	9.30
SSW	0.0	0.50	0.99	0.95	1.63	1.81	0.32	0.18	6.38
SW	0.05	0.54	0.90	0.54	2.26	2.26	0.45	0.09	7.09
WSW	0.0	0.18	0.77	1.40	1.13	1.04	0.27	0.0	4.79
W	0.05	0.32	0.50	1.13	1.94	0.72	0.50	0.18	5.34
WNW	0.0	0.27	0.45	0.95	2.35	0.86	0.54	0.54	5.96
NW	0.0	0.09	0.77	0.77	1.76	1.08	0.45	0.09	5.01
NNW	0.0	0.41	0.45	0.32	1.26	0.95	0.63	0.09	4.11
SUBTOTAL	0.19	5.43	11.64	13.70	33.15	25.57	8.77	1.59	100.04

TOTAL HOURS OF VALID WIND OBSERVATIONS	2214
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	99.2
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 10.9 MPH

TABLE 2.3-36

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

JUNE (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.05	0.23	0.19	0.65	2.71	2.38	1.03	0.14	7.38
NNE	0.0	0.14	0.19	0.37	2.24	2.06	0.79	0.05	5.84
NE	0.0	0.09	0.42	0.47	1.36	1.31	0.56	0.0	4.21
ENE	0.05	0.05	0.19	0.33	0.98	0.75	0.23	0.0	2.58
E	0.05	0.37	0.47	0.47	0.51	0.09	0.0	0.0	1.96
ESE	0.0	0.37	0.56	0.70	0.93	0.65	0.0	0.0	3.21
SE	0.05	0.47	1.68	1.50	3.32	2.62	0.23	0.0	9.87
SSE	0.0	0.47	1.36	1.50	2.38	1.68	0.09	0.0	7.48
S	0.0	0.70	1.68	1.36	2.71	2.10	0.23	0.0	8.78
SSW	0.0	0.37	1.17	0.98	2.01	1.96	0.33	0.0	6.82
SW	0.0	1.07	1.36	1.40	2.85	1.64	0.28	0.0	8.60
WSW	0.0	0.61	1.17	1.07	2.34	2.20	0.14	0.0	7.53
W	0.0	0.37	1.45	1.54	3.79	1.82	0.0	0.0	8.97
WNW	0.05	0.19	0.70	1.59	3.69	0.89	0.19	0.0	7.30
NW	0.05	0.42	0.79	1.03	2.43	1.03	0.05	0.0	5.80
NNW	0.0	0.28	0.28	0.56	1.68	0.84	0.05	0.0	3.69
SUBTOTAL	0.30	6.20	13.66	15.52	35.93	24.02	4.20	0.19	100.02

TOTAL HOURS OF VALID WIND OBSERVATIONS	2140
TOTAL HOURS OF OBSERVATIONS	2160
RECOVERABILITY PERCENTAGE	99.1
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 9.8 MPH

TABLE 2.3-37

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

JULY (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.18	0.32	0.59	1.68	0.36	0.0	0.0	3.13
NNE	0.0	0.05	0.23	0.45	2.45	2.91	0.27	0.09	6.45
NE	0.0	0.09	0.05	0.59	1.45	2.36	0.14	0.0	4.68
ENE	0.0	0.09	0.36	0.41	1.18	1.09	0.41	0.0	3.54
E	0.0	0.09	0.32	0.50	1.14	0.45	0.23	0.05	2.78
ESE	0.05	0.23	0.64	0.45	1.91	2.27	0.05	0.09	5.69
SE	0.0	0.36	1.95	1.41	2.95	3.00	1.14	0.27	11.08
SSE	0.0	0.45	1.91	1.36	3.23	2.64	0.73	0.09	10.41
S	0.0	0.55	1.32	2.09	3.73	2.04	0.09	0.23	10.05
SSW	0.0	0.59	0.77	1.04	2.54	1.77	0.23	0.09	7.03
SW	0.0	0.45	0.95	0.95	2.82	2.32	0.36	0.05	7.90
WSW	0.0	0.41	1.86	1.95	2.41	0.95	0.18	0.0	7.76
W	0.0	0.18	1.73	1.86	3.95	0.82	0.05	0.0	8.59
WNW	0.0	0.18	0.45	0.91	2.50	0.55	0.09	0.0	4.68
NW	0.0	0.14	0.23	0.73	1.82	0.59	0.14	0.0	3.65
NNW	0.05	0.14	0.23	0.41	1.23	0.50	0.05	0.0	2.61
SUBTOTAL	0.10	4.18	13.32	15.70	36.99	24.62	4.16	0.96	100.03

TOTAL HOURS OF VALID WIND OBSERVATIONS	2201
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	98.6
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 10.2 MPH

TABLE 2.3-38

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

AUGUST (77, 78, 79)

WIND	WIND SPEED (MPH)								
DIRECTION	0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.09	0.77	0.59	1.67	1.44	0.14	0.0	4.70
NNE	0.0	0.14	0.63	0.59	2.26	2.07	0.23	0.05	5.97
NE	0.0	0.09	0.50	0.36	2.07	1.76	0.54	0.0	5.32
ENE	0.05	0.23	0.36	0.36	0.86	0.77	0.18	0.0	2.81
E	0.0	0.50	0.72	0.41	0.59	0.14	0.05	0.0	2.41
ESE	0.0	0.18	0.54	0.45	1.22	1.22	0.14	0.0	3.75
SE	0.09	0.41	2.17	1.89	5.19	2.80	0.50	0.0	13.05
SSE	0.05	0.81	2.80	3.38	5.37	2.93	0.27	0.0	15.61
S	0.0	0.45	1.85	2.39	4.60	2.21	0.18	0.05	11.73
SSW	0.0	0.41	1.53	1.49	2.71	1.17	0.41	0.05	7.77
SW	0.09	0.81	1.17	1.31	2.93	1.67	0.23	0.0	8.21
WSW	0.09	0.36	1.22	0.54	1.35	0.50	0.0	0.0	4.06
W	0.05	0.41	1.26	1.94	1.31	0.23	0.0	0.0	5.20
WNW	0.05	0.14	0.72	0.68	1.89	0.09	0.09	0.0	3.66
NW	0.0	0.23	0.59	1.08	1.17	0.14	0.14	0.0	3.35
NNW	0.0	0.18	0.45	0.41	0.90	0.50	0.05	0.0	2.49
SUBTOTAL	0.47	5.44	17.28	17.87	36.09	19.64	3.15	0.15	100.09

TOTAL HOURS OF VALID WIND OBSERVATIONS	2217
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	99.3
TOTAL HOURS CALM	1

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 9.1 MPH

TABLE 2.3-39

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

SEPT. (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.09	0.19	0.42	1.13	2.92	3.82	0.71	0.14	9.42
NNE	0.0	0.14	0.47	1.04	2.83	3.58	1.41	0.28	9.75
NE	0.0	0.14	0.33	1.08	2.97	4.05	1.08	0.09	9.74
ENE	0.0	0.19	0.24	0.52	1.70	1.79	1.13	0.42	5.99
E	0.0	0.19	0.28	0.42	1.60	1.46	0.38	0.09	4.42
ESE	0.0	0.19	0.52	0.71	3.11	3.25	0.61	0.0	8.39
SE	0.0	0.38	1.55	1.46	6.08	4.62	0.33	0.19	14.61
SSE	0.0	0.57	1.79	1.84	5.32	2.21	0.38	0.42	12.53
S	0.0	0.09	1.08	0.99	2.36	2.21	0.19	0.14	7.06
SSW	0.0	0.47	0.33	0.47	1.08	1.32	0.52	0.0	4.19
SW	0.0	0.09	0.52	0.28	0.24	0.57	0.19	0.0	1.89
WSW	0.0	0.19	0.38	0.33	0.66	0.14	0.05	0.0	1.75
W	0.0	0.09	0.47	0.24	0.85	0.14	0.14	0.05	1.98
WNW	0.0	0.19	0.38	0.28	0.89	0.09	0.05	0.05	1.93
NW	0.0	0.05	0.42	0.52	1.65	0.38	0.33	0.05	3.40
NNW	0.0	0.0	0.33	0.24	1.51	0.71	0.09	0.09	2.97
SUBTOTAL	0.09	3.16	9.51	11.55	35.77	30.34	7.59	2.01	100.02

TOTAL HOURS OF VALID WIND OBSERVATIONS	2123
TOTAL HOURS OF OBSERVATIONS	2160
RECOVERABILITY PERCENTAGE	98.3
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 11.5 MPH

TABLE 2.3-40

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

OCTOBER (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.22	0.36	0.36	2.29	4.85	1.21	0.0	9.29
NNE	0.0	0.13	0.36	0.67	2.07	3.86	1.08	0.0	8.17
NE	0.0	0.04	0.40	0.58	1.93	1.48	0.76	0.04	5.23
ENE	0.0	0.09	0.22	0.31	1.12	0.81	0.13	0.04	2.72
E	0.0	0.18	0.36	0.27	0.72	0.27	0.0	0.0	1.80
ESE	0.0	0.18	0.67	0.94	2.29	1.66	0.90	0.22	6.86
SE	0.04	0.72	1.03	1.57	4.63	3.86	2.02	1.30	15.17
SSE	0.0	0.31	0.49	0.63	2.88	2.25	1.12	0.13	7.81
S	0.0	0.18	0.40	0.40	2.16	2.61	1.03	0.27	7.05
SSW	0.0	0.22	0.31	0.40	1.84	2.47	0.81	0.0	6.05
SW	0.0	0.22	0.36	0.58	1.17	1.84	1.08	0.18	5.43
WSW	0.0	0.13	0.45	0.31	0.54	0.45	0.13	0.04	2.05
W	0.04	0.22	0.31	0.58	1.21	0.94	0.22	0.0	3.52
WNW	0.0	0.27	0.49	1.12	1.89	1.39	0.27	0.0	5.43
NW	0.0	0.22	0.27	0.49	1.93	2.47	0.72	0.13	6.23
NNW	0.0	0.13	0.22	0.36	1.48	3.73	0.99	0.09	7.00
SUBTOTAL	0.08	3.46	6.70	9.57	30.15	34.94	12.47	2.44	99.81

TOTAL HOURS OF VALID WIND OBSERVATIONS	2226
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	99.7
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 12.7 MPH

TABLE 2.3-41

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

NOVEMBER (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.09	0.23	0.65	0.79	2.34	3.55	0.47	0.0	8.12
NNE	0.05	0.14	0.33	0.89	3.50	3.22	0.33	0.0	8.46
NE	0.0	0.09	0.42	0.93	2.66	2.90	1.17	0.0	8.17
ENE	0.09	0.28	0.37	0.65	1.17	1.03	0.42	0.0	4.01
E	0.0	0.23	0.51	0.23	1.12	0.65	0.05	0.0	2.79
ESE	0.05	0.19	0.75	0.47	1.45	1.82	1.26	0.14	6.13
SE	0.0	0.37	0.84	0.98	2.15	3.04	2.48	0.75	10.61
SSE	0.05	0.37	0.75	0.75	2.76	3.36	2.62	0.56	11.22
S	0.0	0.47	0.84	1.03	2.71	2.29	1.36	1.03	9.73
SSW	0.0	0.14	0.51	0.75	1.12	0.84	0.0	0.37	3.73
SW	0.0	0.28	0.23	0.51	0.47	0.89	0.14	0.28	2.80
WSW	0.0	0.19	0.42	0.37	1.26	0.89	0.14	0.0	3.27
W	0.09	0.23	0.33	0.37	0.75	0.79	0.19	0.51	3.26
WNW	0.0	0.28	0.42	0.79	1.31	1.45	0.98	0.19	5.42
NW	0.05	0.28	0.61	0.51	1.40	1.64	1.07	0.23	5.79
NNW	0.09	0.33	0.42	0.47	2.10	2.38	0.56	0.05	6.40
SUBTOTAL	0.56	4.10	8.40	10.49	28.27	30.74	13.24	4.11	99.91

TOTAL HOURS OF VALID WIND OBSERVATIONS	2140
TOTAL HOURS OF OBSERVATIONS	2160
RECOVERABILITY PERCENTAGE	99.1
TOTAL HOURS CALM	1

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 12.5 MPH

TABLE 2.3-42

JOINT PERCENTAGE FREQUENCIES OF WIND SPEED BY DIRECTION

DISREGARDING STABILITY CLASS

DECEMBER (77, 78, 79)

WIND DIRECTION	WIND SPEED (MPH) 0.6-1.4	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	>=24.5	TOTAL
N	0.0	0.09	0.05	0.19	1.44	3.35	0.79	0.19	6.10
NNE	0.0	0.05	0.19	0.28	1.44	1.91	0.19	0.0	4.06
NE	0.0	0.0	0.37	0.37	1.72	0.65	0.28	0.0	3.39
ENE	0.0	0.05	0.33	0.23	0.84	0.79	0.19	0.0	2.43
E	0.0	0.19	0.47	0.51	0.65	0.14	0.0	0.0	1.96
ESE	0.0	0.33	0.37	0.56	1.35	1.68	0.19	0.09	4.57
SE	0.05	0.23	0.70	0.74	1.63	3.77	4.19	0.65	11.96
SSE	0.0	0.28	0.51	0.65	2.75	5.26	2.51	1.07	13.03
S	0.0	0.47	0.51	0.56	2.14	4.00	2.61	1.40	11.69
SSW	0.0	0.37	0.42	0.47	2.23	2.37	0.93	0.74	7.53
SW	0.05	0.19	0.47	0.65	1.49	1.91	0.61	0.09	5.46
WSW	0.0	0.05	0.28	0.51	1.12	1.35	0.28	0.51	4.10
W	0.0	0.19	0.37	0.33	1.68	1.91	0.51	0.28	5.27
WNW	0.05	0.14	0.33	0.33	1.35	2.70	1.21	0.37	6.48
NW	0.0	0.05	0.33	0.51	0.98	2.42	1.16	0.74	6.19
NNW	0.0	0.09	0.28	0.37	1.21	2.61	1.02	0.23	5.81
SUBTOTAL	0.15	2.77	5.98	7.26	24.02	36.82	16.67	6.36	100.03

TOTAL HOURS OF VALID WIND OBSERVATIONS	2148
TOTAL HOURS OF OBSERVATIONS	2232
RECOVERABILITY PERCENTAGE	96.2
TOTAL HOURS CALM	0

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF JOINT VALID OBSERVATIONS

METEOROLOGICAL FACILITY: BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

MEAN WIND SPEED = 14.2 MPH

TABLE 2.3-43

(Sheet 1)

WIND DIRECTION PERSISTENCE DATA 10 M Level

DISREGARDING STABILITY

(JAN 1, 77 - DEC 31, 79)

LOST RECORD (%) = 1.79

PERSISTENCE (HOURS)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL	ACC. TOTAL	ACC. FREQUENCY
2	177	164	105	113	93	118	181	202	149	70	35	102	129	96	91	128	1	1954	4968	100.00
3	92	91	51	35	43	48	131	93	90	25	23	53	63	45	47	61	0	991	3014	60.67
4	50	54	31	24	26	35	90	67	65	5	6	24	26	29	37	36	0	605	2023	40.72
5	31	37	20	17	15	18	79	56	26	1	1	17	22	18	27	32	0	417	1418	28.54
6	39	27	11	8	14	17	49	26	36	0	1	6	12	17	13	29	0	305	1001	20.15
7	12	21	12	2	6	10	29	20	23	0	2	9	6	9	9	15	0	185	696	14.01
8	7	11	8	2	7	5	26	10	7	1	1	3	7	8	9	13	0	125	511	10.29
9	6	5	5	3	3	4	24	4	9	0	0	5	4	9	8	10	0	99	386	7.77
10	4	5	6	0	5	3	13	4	5	0	0	1	1	4	4	6	0	61	287	5.78
11	3	9	3	0	2	1	13	3	2	0	0	0	4	2	3	6	0	51	226	4.55
12	2	7	3	0	1	0	11	4	3	0	0	0	1	2	3	7	0	44	175	3.52
13	3	11	0	2	1	3	5	2	3	0	0	0	1	1	1	1	0	34	131	2.64
14	1	0	2	0	0	1	5	2	0	0	0	1	1	0	2	2	0	17	97	1.95
15	0	5	0	0	0	0	6	0	2	0	0	1	2	3	0	1	0	20	80	1.61
16	2	1	0	0	0	0	2	2	1	0	0	0	0	1	0	3	0	12	60	1.21
17	2	3	0	0	0	0	3	0	0	0	0	0	0	1	0	1	0	10	48	0.97
18	0	2	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	6	38	0.76
19	0	0	0	0	0	0	3	0	3	0	0	0	0	1	0	0	0	7	32	0.64
20	1	1	0	0	0	0	3	0	1	0	0	0	0	0	1	0	0	7	25	0.50
21	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	18	0.36
22	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	6	17	0.34
23	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	2	11	0.22
24	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	9	0.18
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0.16
26	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	0.16
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0.14
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0.14
29	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	7	0.14
30	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.12

TABLE 2.3-43 (Continued)

(Sheet 2)

WIND DIRECTION PERSISTENCE DATA 10 M Level

DISREGARDING STABILITY

(JAN 1, 77 - DEC 31, 79)

PERSISTENCE (HOURS)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL	ACC. TOTAL	ACC. FREQUENCY
31	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0.10
32	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	2	4	0.08
>32	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	2	0.04
TOTAL	432	458	257	207	216	263	680	495	429	102	69	222	281	246	255	355	1	4968		
MAXIMUM PERSISTENCE (HOURS)	20	31	14	18	13	14	36	16	32	8	8	15	23	19	20	32	2			
50.0%	3	3	3	2	3	3	4	3	3	2	2	3	3	3	3	3	2			
80.0%	5	6	5	4	5	5	7	5	6	3	3	4	5	6	6	6	2			
90.0%	6	10	8	5	7	7	10	7	7	3	4	6	7	8	8	9	2			
99.0%	16	20	12	13	11	13	20	13	19	5	8	10	15	16	14	22	2			
99.9%	20	31	14	18	13	14	36	16	32	8	8	15	23	19	20	32	2			

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 10.00 METER LEVEL

TABLE 2.3-44

(Sheet 1)

WIND DIRECTION PERSISTENCE DATA 93 M LEVEL

DISREGARDING STABILITY

(JAN 1, 77 - DEC 31, 79)

LOST RECORD (%) = 1.89

PERSISTENCE (HOURS)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL	ACC. TOTAL	ACC. FREQUENCY
2	105	125	97	82	83	108	159	193	145	134	109	114	116	112	112	89	0	1883	5070	100.00
3	54	62	52	40	27	59	98	98	100	76	62	45	50	53	72	58	0	1006	3187	62.86
4	46	31	40	33	16	29	64	61	49	42	36	17	36	47	37	35	0	619	2181	43.02
5	27	32	35	15	13	20	50	50	38	27	20	24	25	38	22	20	0	456	1562	30.81
6	16	16	22	14	3	13	39	29	26	13	23	10	14	23	19	23	0	303	1106	21.81
7	13	9	15	6	4	6	27	31	18	12	8	6	9	11	14	10	0	199	803	15.84
8	5	12	11	3	4	3	27	13	10	8	9	2	8	7	11	9	0	142	604	11.91
9	9	12	6	0	0	11	11	12	11	9	6	3	3	9	6	9	0	117	462	9.11
10	4	3	5	2	0	2	11	4	5	2	4	4	4	4	10	5	0	69	345	6.80
11	3	4	5	1	1	7	17	6	11	1	1	1	3	3	2	4	0	70	276	5.44
12	2	6	3	0	0	2	4	6	6	2	0	1	2	1	5	2	0	42	206	4.06
13	7	1	0	0	0	5	6	4	4	1	2	0	2	0	3	2	0	37	164	3.23
14	4	5	2	0	0	2	2	2	2	0	1	1	1	1	3	0	0	26	127	2.50
15	3	1	1	0	0	0	3	3	1	2	0	1	0	1	2	2	0	20	101	1.99
16	3	1	2	0	0	1	2	3	1	1	1	0	0	1	0	1	0	17	81	1.60
17	1	2	1	0	0	1	3	1	2	0	0	0	0	0	1	1	0	13	64	1.26
18	0	1	0	0	0	0	3	1	0	0	1	0	0	0	0	0	0	6	51	1.01
19	1	2	0	0	0	0	0	1	0	0	0	0	0	2	1	0	0	7	45	0.89
20	1	1	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	5	38	0.75
21	0	1	0	0	0	0	0	1	2	0	0	0	0	1	1	0	0	6	33	0.65
22	3	1	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0	8	27	0.53
23	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	19	0.37
24	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	3	18	0.36
25	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	15	0.30
26	0	0	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0	5	13	0.26
27	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	8	0.16
28	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7	0.14
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.12

TABLE 2.3-44 (Continued)

(Sheet 2)

WIND DIRECTION PERSISTENCE DATA 93 M LEVEL

DISREGARDING STABILITY

(JAN 1, 77 - DEC 31, 79)

PERSISTENCE (HOURS)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL	ACC. TOTAL	ACC. FREQUENCY
30	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.12
31	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	5	0.10
32	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	4	0.08
>32	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	3	3	0.06
TOTAL	308	330	297	196	151	270	537	523	433	330	283	229	275	314	323	271	0	5070		
MAXIMUM PERSISTENCE (HOURS)	24	28	17	11	11	26	36	38	32	16	18	15	22	21	24	22	1			
50.0%	3	3	3	3	2	3	4	3	3	3	3	3	3	3	3	3	1			
80.0%	6	6	6	5	4	6	7	6	6	5	5	5	5	6	6	6	1			
90.0%	10	9	8	6	5	9	10	8	9	7	7	6	7	7	9	8	1			
99.0%	22	21	16	10	8	16	26	19	17	13	14	12	14	16	19	16	1			
99.9%	24	28	17	11	11	26	36	38	32	16	18	15	22	21	24	22	1			

METEOROLOGICAL FACILITY: MET FACILITY LOCATED ABOUT 0.5 MI ESE OF BROWNS FERRY NUCLEAR PLANT
WIND SPEED AND DIRECTION MEASURED AT THE 93.00 METER LEVEL

Table 2.3-45

TEMPERATURE DATA

DECATUR, ALABAMA
1879 - 1958

Month	Avg. Temp. (°F)	Avg. Max. Temp. (°F)	Avg. Min. Temp. (°F)	Extreme Max. Temp. (°F)	Extreme Min. Temp. (°F)
December	43.7	53.0	34.3	78	1
January	42.9	52.3	33.4	79	-5
February	44.6	54.8	34.4	84	-12
Winter	43.7	53.4	34.0	--	--
March	53.1	64.1	42.1	93	4
April	61.8	73.2	50.3	92	26
May	70.4	81.8	59.0	100	34
Spring	61.8	73.0	50.4	--	--
June	78.2	89.3	67.1	108	44
July	80.7	91.2	70.1	107	52
August	79.9	90.6	69.1	107	52
Summer	79.6	90.4	68.8	--	--
September	74.6	85.9	63.3	104	37
October	63.0	75.2	50.8	100	26
November	51.2	62.3	40.1	86	3
Fall	62.9	74.5	51.4	--	--
Annual	62.0	72.8	51.2	--	--

"The Climate of Decatur, Alabama" (1879-1958), Long, Arthur R., U.S. Weather Bureau State Climatologist for Alabama, Weather Bureau Office, Montgomery, Alabama, July 1959.

Table 2.3-46

TEMPERATURE DATA

BROWNS FERRY NUCLEAR PLANT
January 1, 1977 - December 31, 1979

Month	Avg. Temp. (°F)	Avg. Max. Temp. (°F)	Avg. Min. Temp. (°F)	Extreme Max. Temp. (°F)	Extreme Min. Temp. (°F)
December	42.9	50.9	35.0	73	15
January	30.5	36.5	23.7	60	-1
February	38.0	46.1	30.3	75	13
Winter	37.1	44.5	29.7	--	--
March	52.0	60.2	43.9	81	18
April	62.4	70.9	53.7	83	38
May	68.7	76.3	60.8	88	44
Spring	61.0	69.1	52.8	--	--
June	75.8	83.6	68.0	94	54
July	78.8	86.6	72.0	96	64
August	77.7	86.0	70.4	93	61
Summer	77.4	85.4	70.1	--	--
September	72.3	79.9	65.5	92	54
October	59.3	68.9	50.0	83	36
November	53.1	60.8	45.4	75	22
Fall	61.6	69.9	53.6	--	--
Annual	59.3	67.2	51.6	--	--

Temperature data measurements at about 33 feet. Meteorological facility located about 0.5 miles from Browns Ferry Nuclear Plant.

Table 2.3-47
PRECIPITATION DATA

HUNTSVILLE, ALABAMA

Month	1968-1980 Average Number of Days With 0.01 Inch or More	1941-1970 Normals (Inches)	1968-1980 Extreme Monthly Max. (Inches)	1968-1980 Extreme Monthly Min. (Inches)	1968-1980 Maximum In 24-Hours (Inches)
December	11	5.4	9.9	0.9	5.8
January	12	5.1	10.5	1.7	3.0
February	9	5.2	9.6	0.6	3.9
Winter	32	15.7			
March	13	5.8	17.0	3.0	7.7
April	9	4.8	9.1	1.8	3.6
May	11	3.9	9.1	3.1	5.7
Spring	33	14.5			
June	9	4.0	7.3	0.8	4.5
July	11	4.9	9.4	1.9	4.5
August	9	3.5	4.0	0.9	2.5
Summer	29	12.4			
September	9	3.3	9.8	1.8	4.0
October	6	2.6	12.1	0.8	6.0
November 9	3.9	11.5	1.8	3.3	
Fall	24	9.8			
Annual	119	52.2			

"Local Climatological Data," Annual Summary with Comparative Data, Huntsville, Alabama, NOAA, National Climatic Center, Asheville, NC, 1980.

Table 2.3-48
PRECIPITATION DATA

January 1, 1977 - December 31, 1979

Month	Average Number of Days With 0.01 Inch or More	Monthly Average (Inches)	Extreme Monthly Max. (Inches)	Extreme Monthly Min. (Inches)	Maximum In 24-Hours (Inches)
December 9	3.6	6.8	1.9	1.3	
January	13	3.8	5.8	2.7	1.4
February	6	2.9	4.9	0.2	2.1
Winter	28	10.3			
March	12	5.5	8.5	3.6	3.3
April	9	5.2	7.8	1.2	3.2
May	11	3.7	4.9	1.6	1.9
Spring	32	14.4			
June	10	3.3	4.0	2.3	2.1
July	11	3.2	4.5	2.3	2.3
August	10	3.9	7.9	1.5	2.0
Summer	31	10.4			
September	10	6.2	8.7	1.7	3.7
October	5	2.6	3.9	0.7	1.4
November11	6.6	8.6	3.4	3.1	
Fall	26	15.4			
Annual	117	50.5			

Meteorological facility located about 0.5 miles from Browns Ferry Nuclear Plant.

Table 2.3-49

SNOWFALL DATA

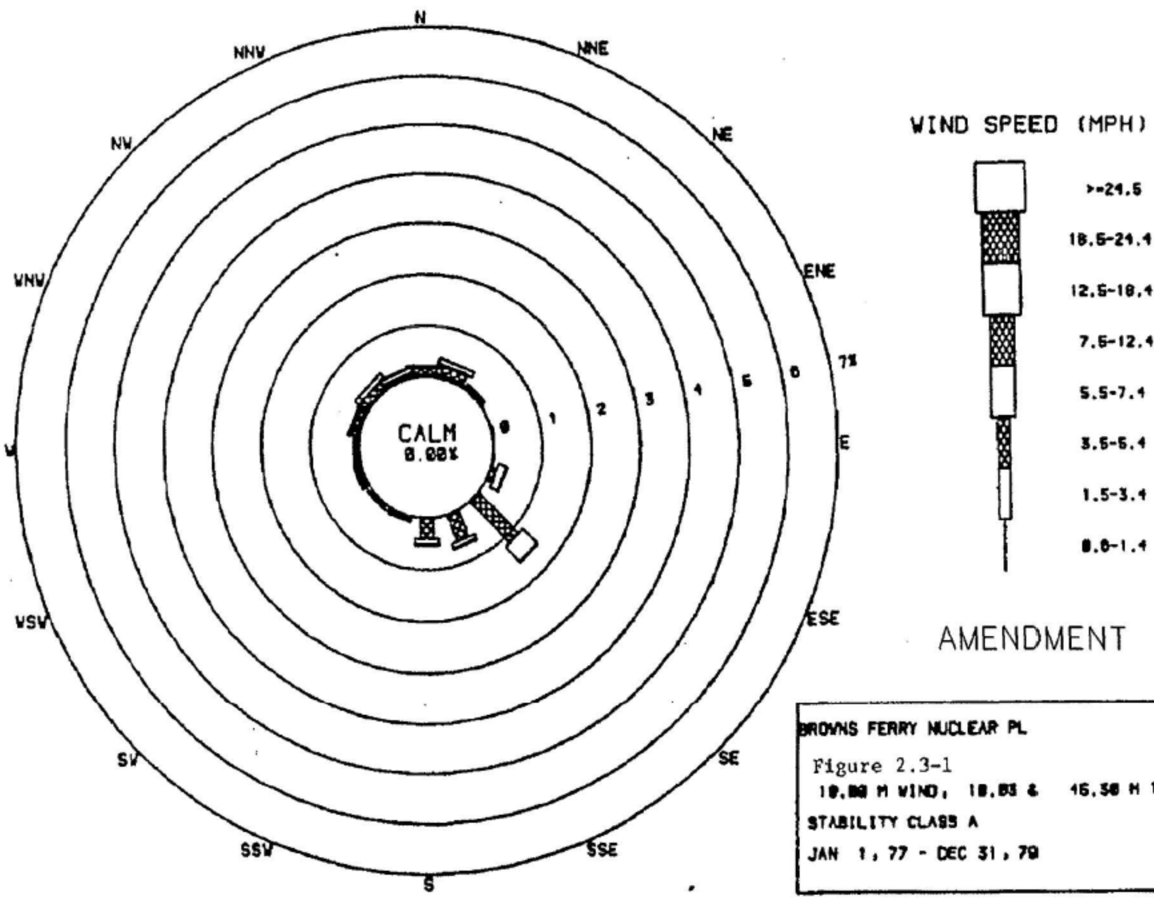
DECATUR, ALABAMA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Average snowfall (inches)	0.9	0.8	0.2	T	0	0	0	0	0	T	0.2	0.6	2.7
Average No. Days (trace or more)	1	1	1	*	0	0	0	0	0	*	*	1	6
Average No. Days (0.1 inch or more)	*	*	*	0	0	0	0	0	0	0	*	*	1

T - trace (not measurable)

* Less than one day

"The Climate of Decatur, Alabama" (1879-1958), Long, Arthur R., U.S. Weather Bureau State Climatologist for Alabama, Weather Bureau Office, Montgomery, Alabama, July 1959.



AMENDMENT 16

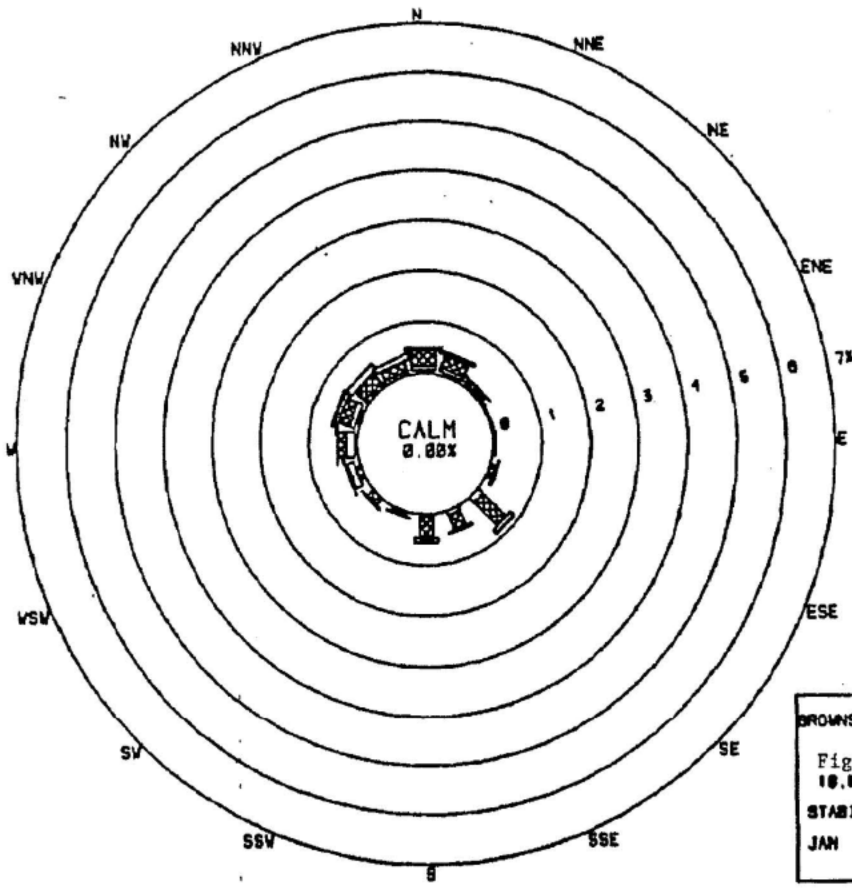
BROWNS FERRY NUCLEAR PL

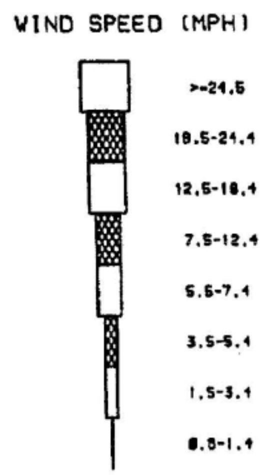
Figure 2.3-1

10.00 M WIND, 10.03 & 45.30 M TEMP

STABILITY CLASS A

JAN 1, 77 - DEC 31, 79





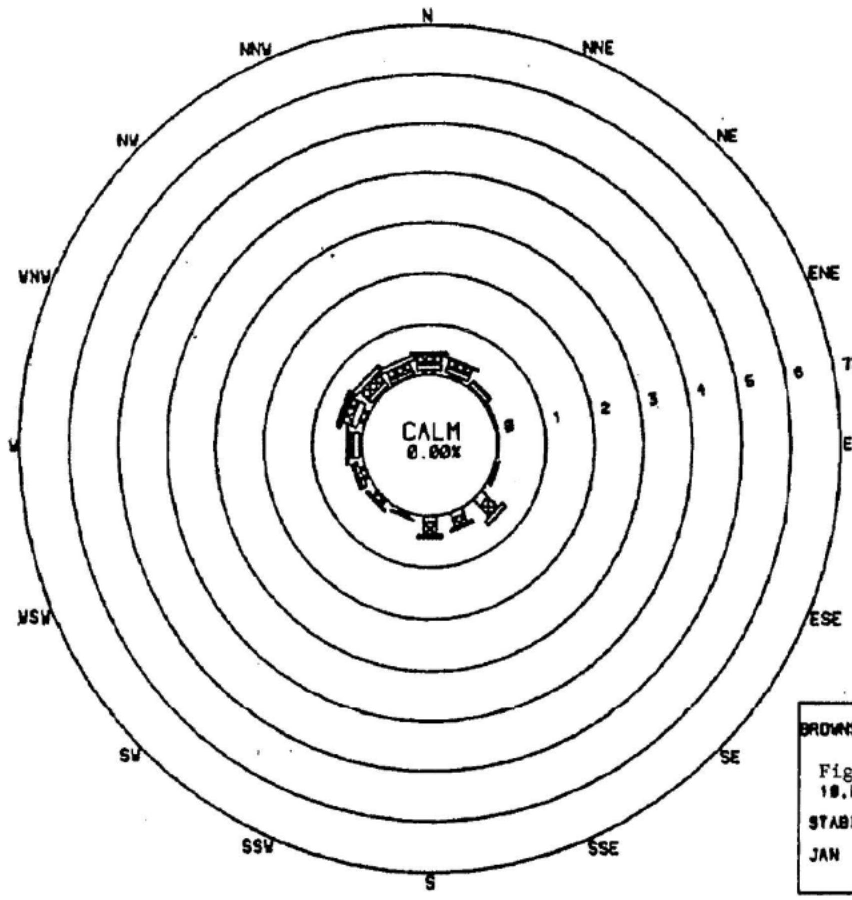
AMENDMENT 16

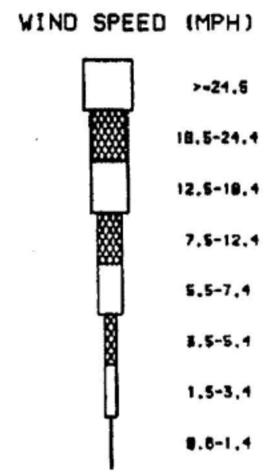
BROWNS FERRY NUCLEAR PL

Figure 2.3-2
10.00 M WIND, 10.03 & 45.30 M TEMP

STABILITY CLASS B

JAN 1, 77 - DEC 31, 79





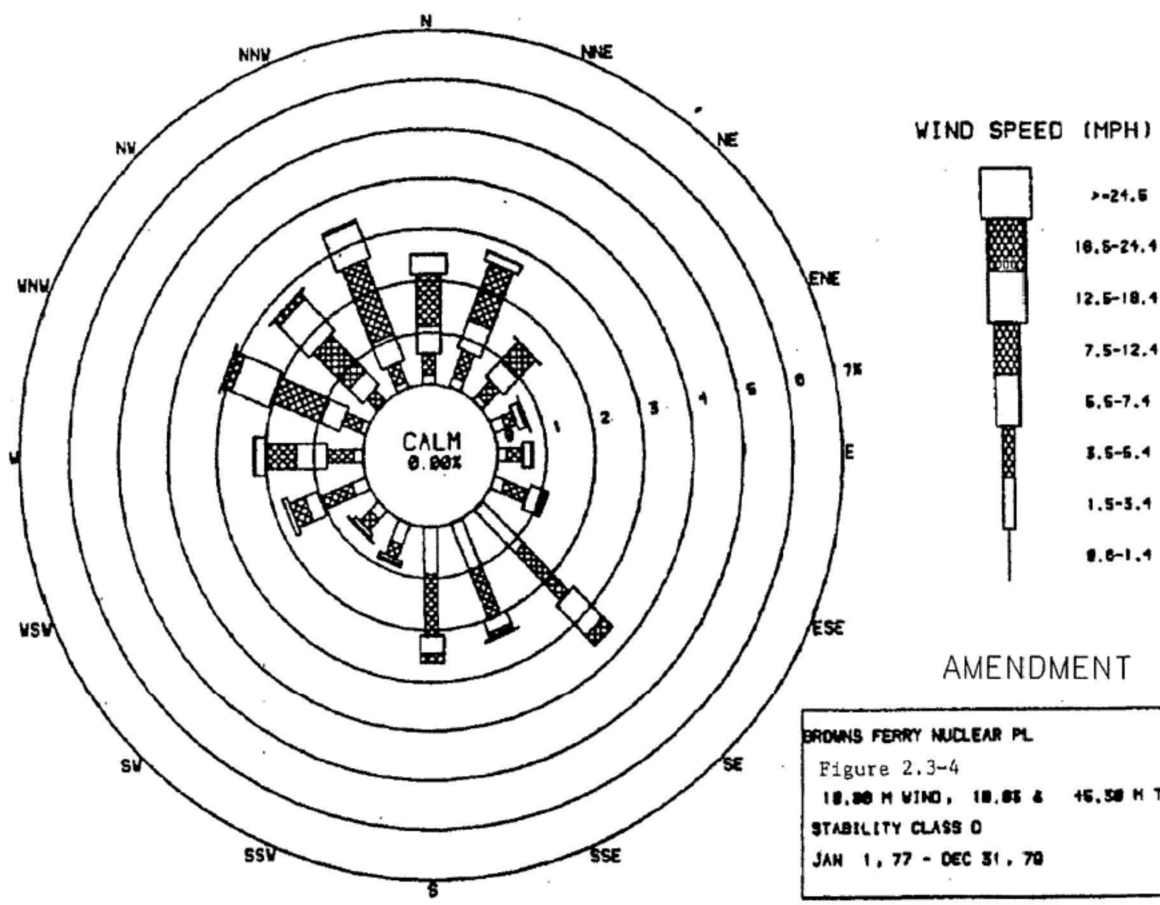
AMENDMENT 16

BROWNS FERRY NUCLEAR PL

Figure 2.3-3
10.00 M WIND, 10.05 & 46.30 M TEMP

STABILITY CLASS C

JAN 1, 77 - DEC 31, 79



AMENDMENT 16

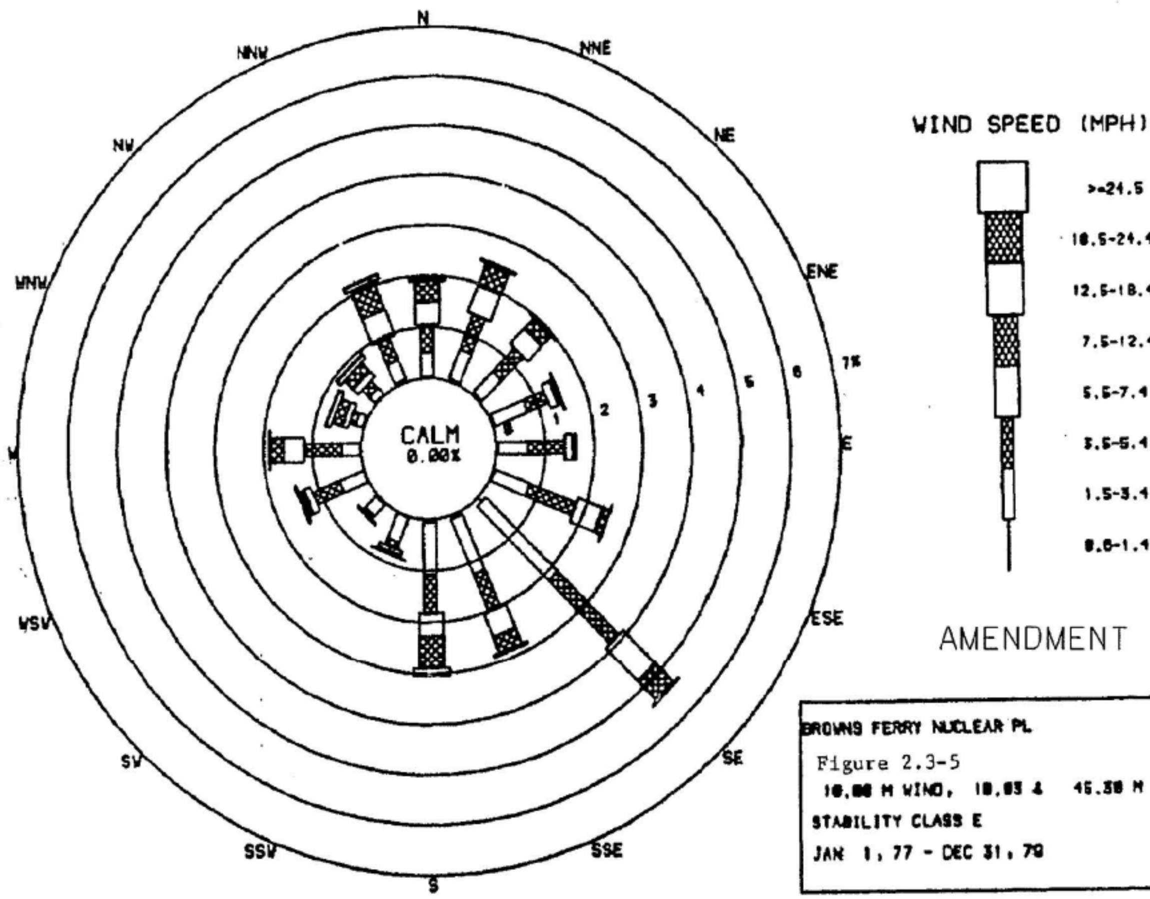
BROWNS FERRY NUCLEAR PL

Figure 2.3-4

10.00 M WIND, 10.05 & 45.50 M TEMP

STABILITY CLASS D

JAN 1, 77 - DEC 31, 79



AMENDMENT 16

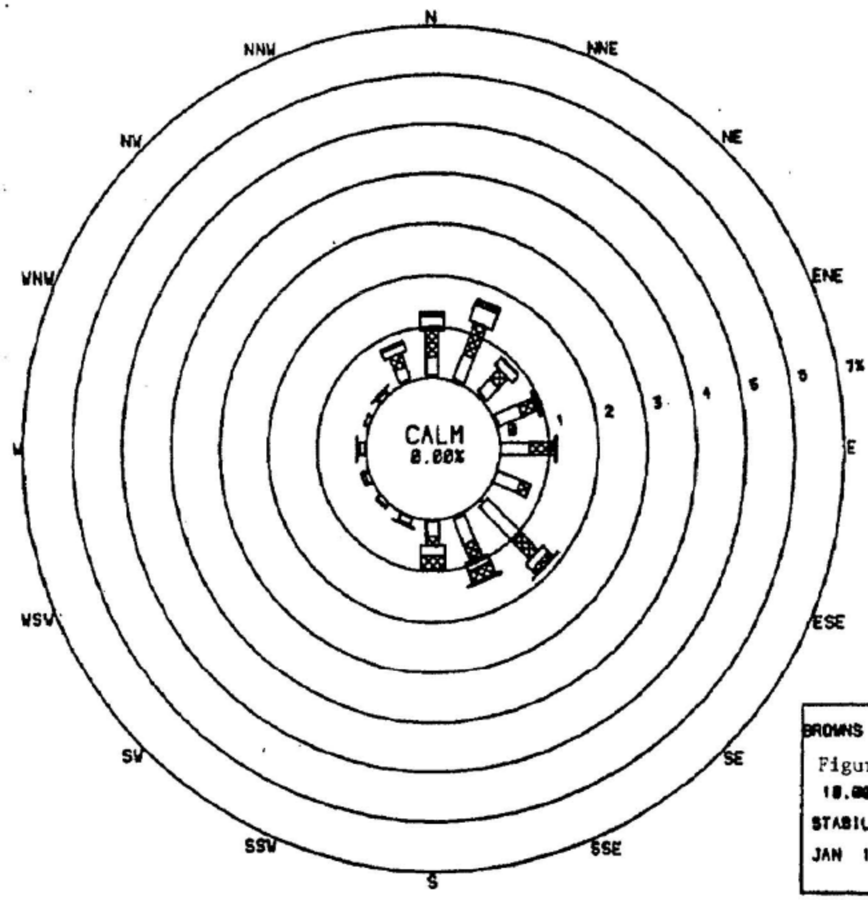
BROWNS FERRY NUCLEAR PL

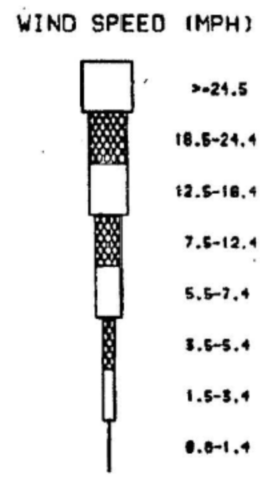
Figure 2.3-5

10.00 M WIND, 10.03 & 45.38 M TEMP

STABILITY CLASS E

JAN 1, 77 - DEC 31, 79





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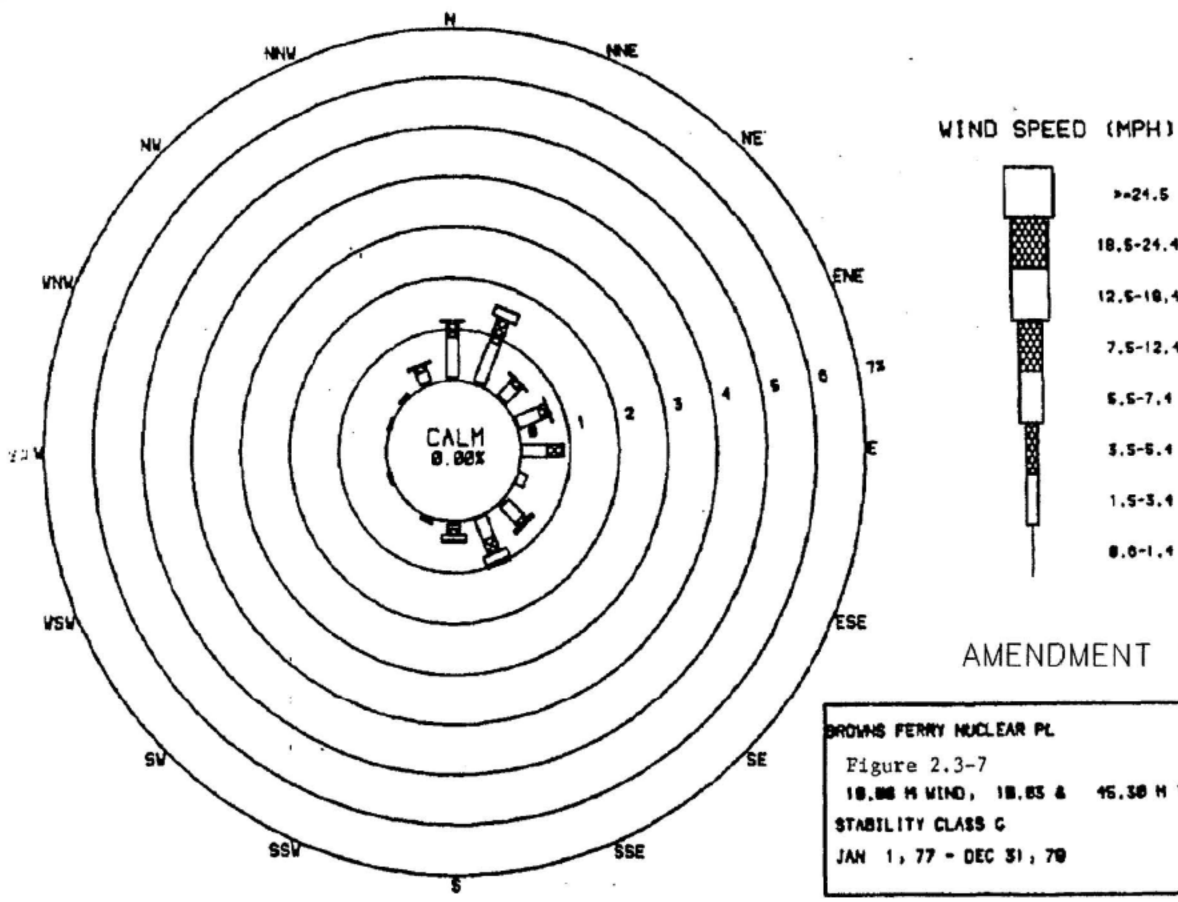
BROWNS FERRY NUCLEAR PL

Figure 2.3-6

10.00 M WIND, 10.05 & +5.38 M TEMP

STABILITY CLASS F

JAN 1, 77 - DEC 31, 78



AMENDMENT 16

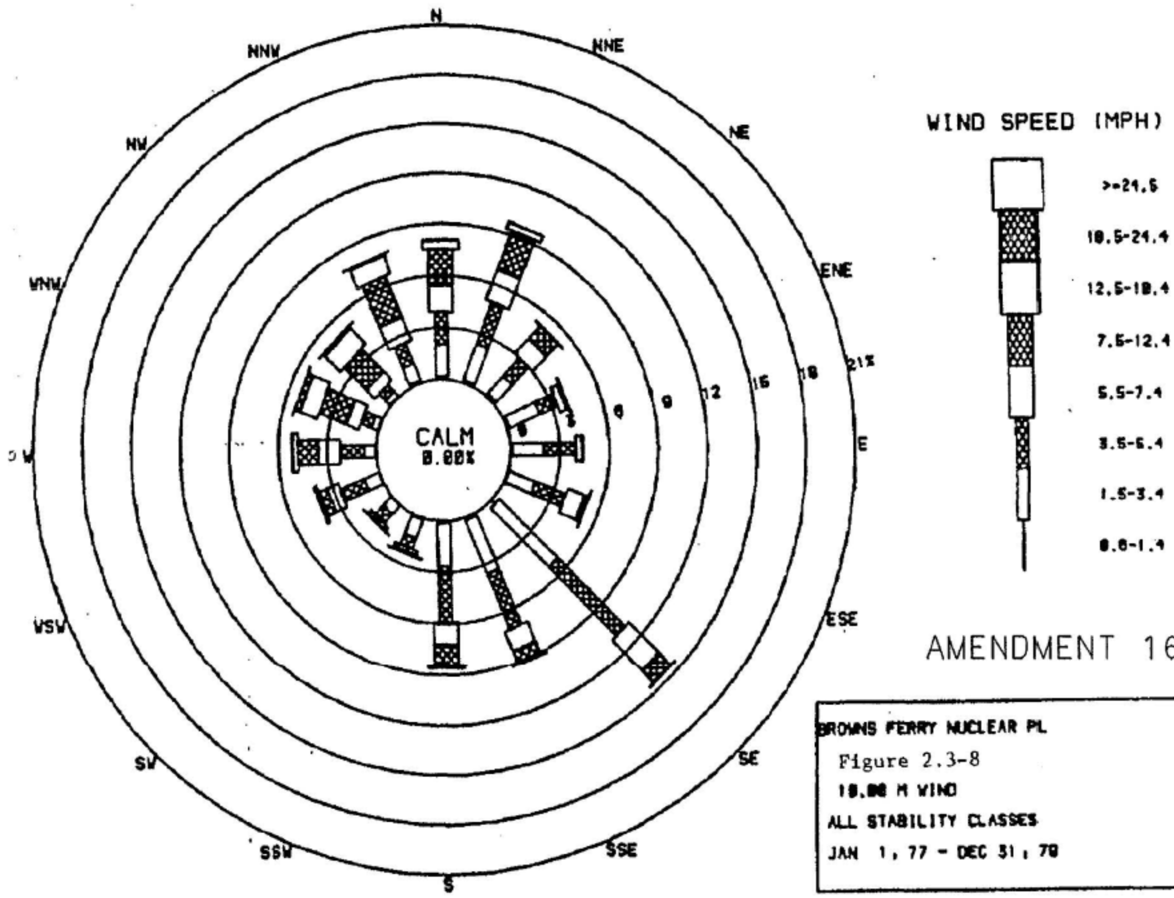
BROWNS FERRY NUCLEAR PL

Figure 2.3-7

10.00 M WIND, 10.83 & 45.30 M TEMP

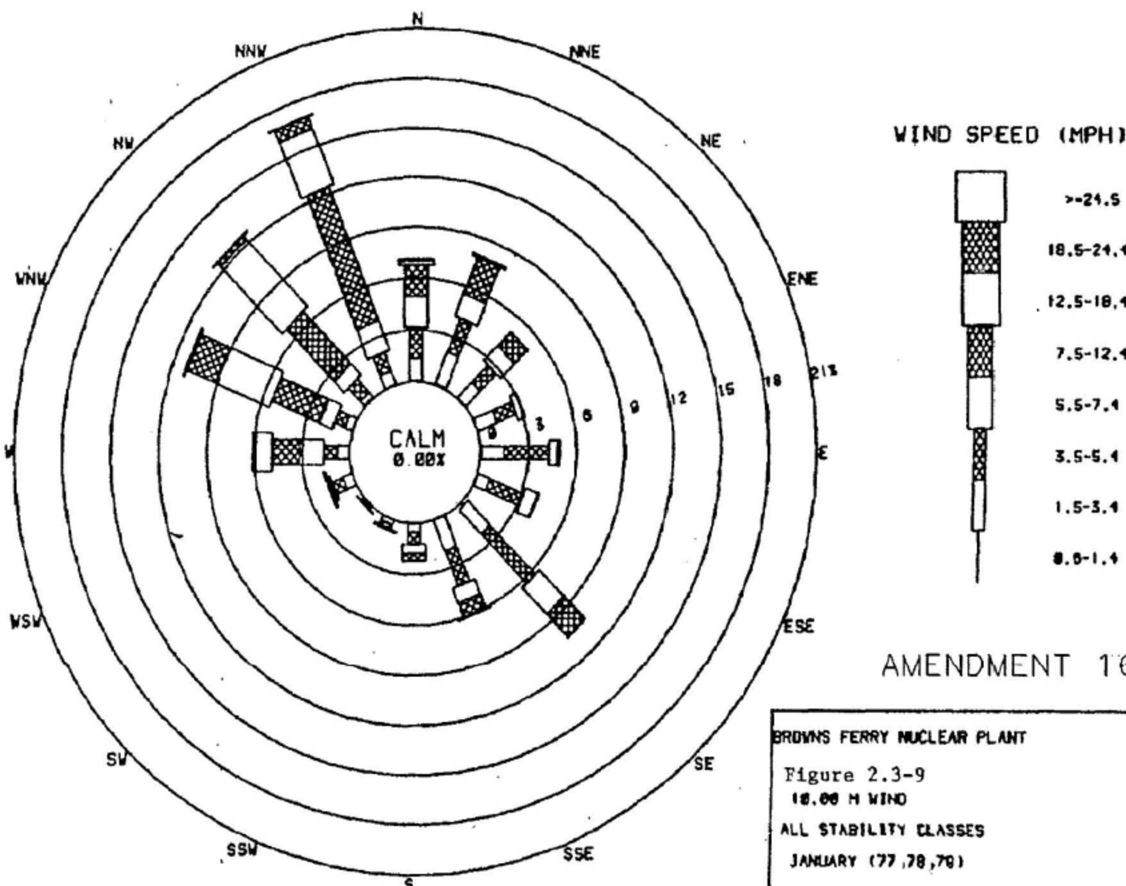
STABILITY CLASS G

JAN 1, 77 - DEC 31, 79



AMENDMENT 16

BROWNS FERRY NUCLEAR PL
Figure 2.3-8
10.00 M WIND
ALL STABILITY CLASSES
JAN 1, 77 - DEC 31, 79



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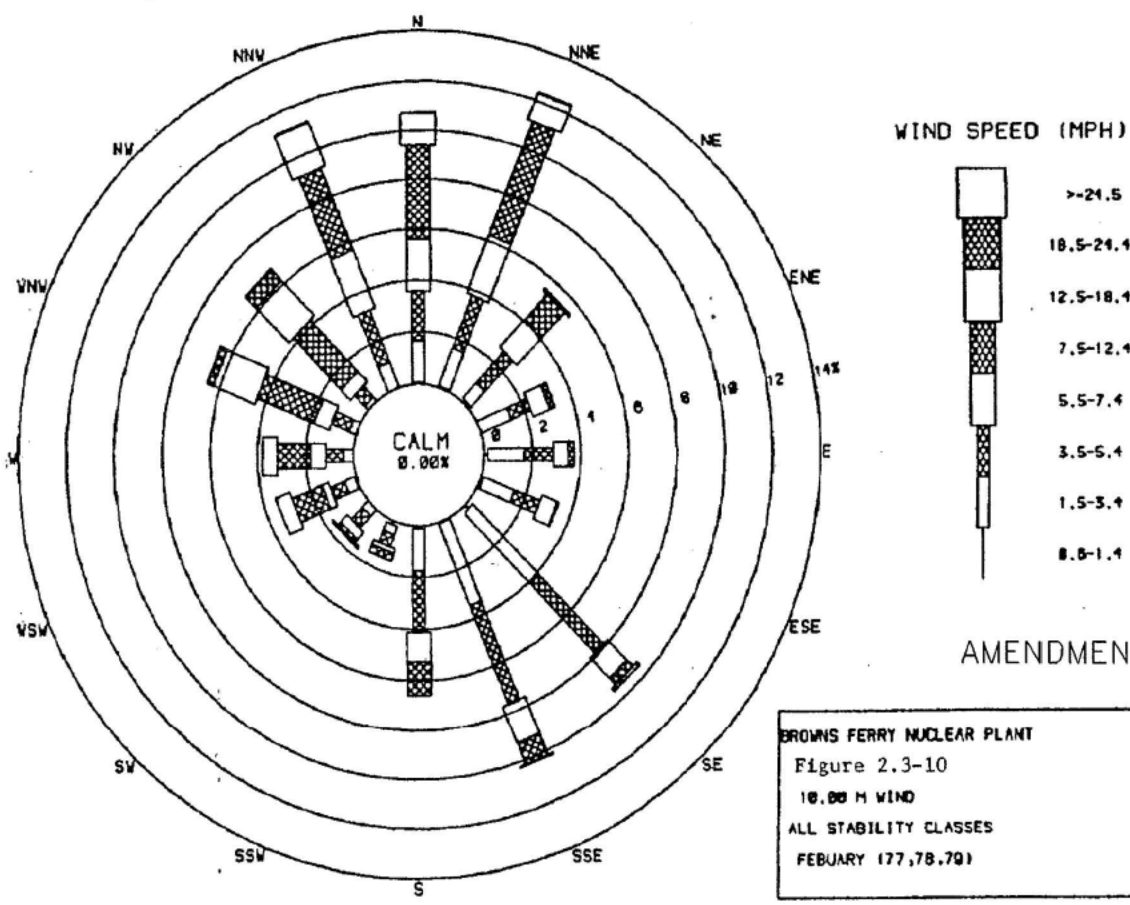
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-9
10.00 M WIND
ALL STABILITY CLASSES
JANUARY (77,78,79)



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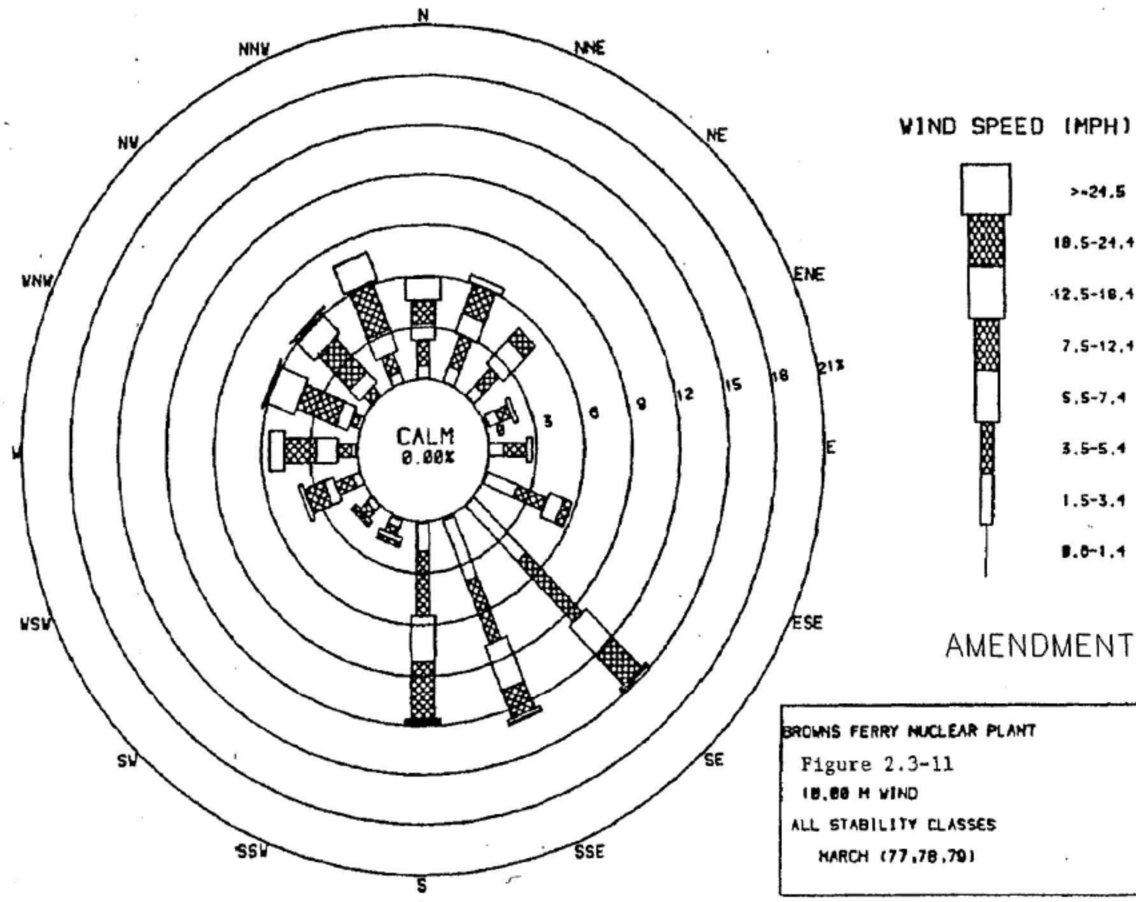
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-10

10.00 M WIND

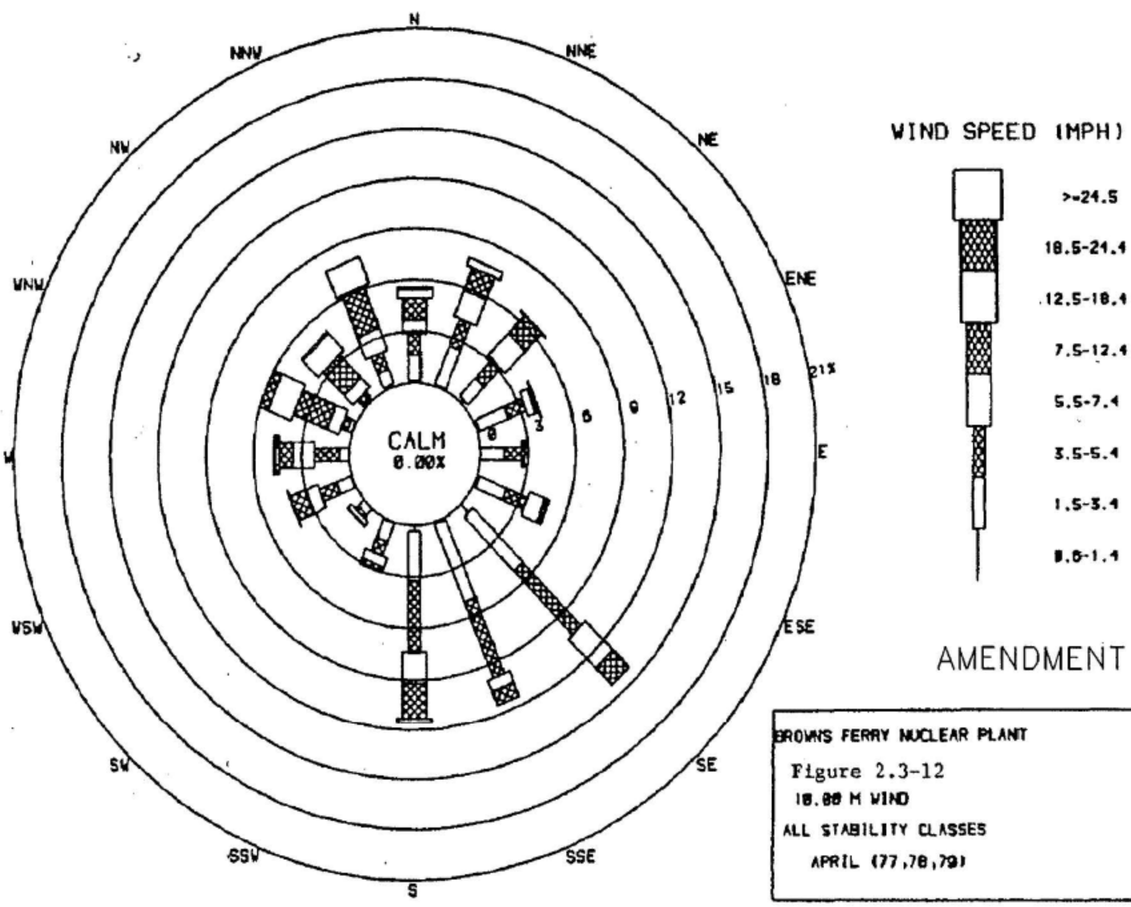
ALL STABILITY CLASSES

FEBUARY (77,78,79)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
Figure 2.3-11
10.00 M WIND
ALL STABILITY CLASSES
MARCH (77,78,79)



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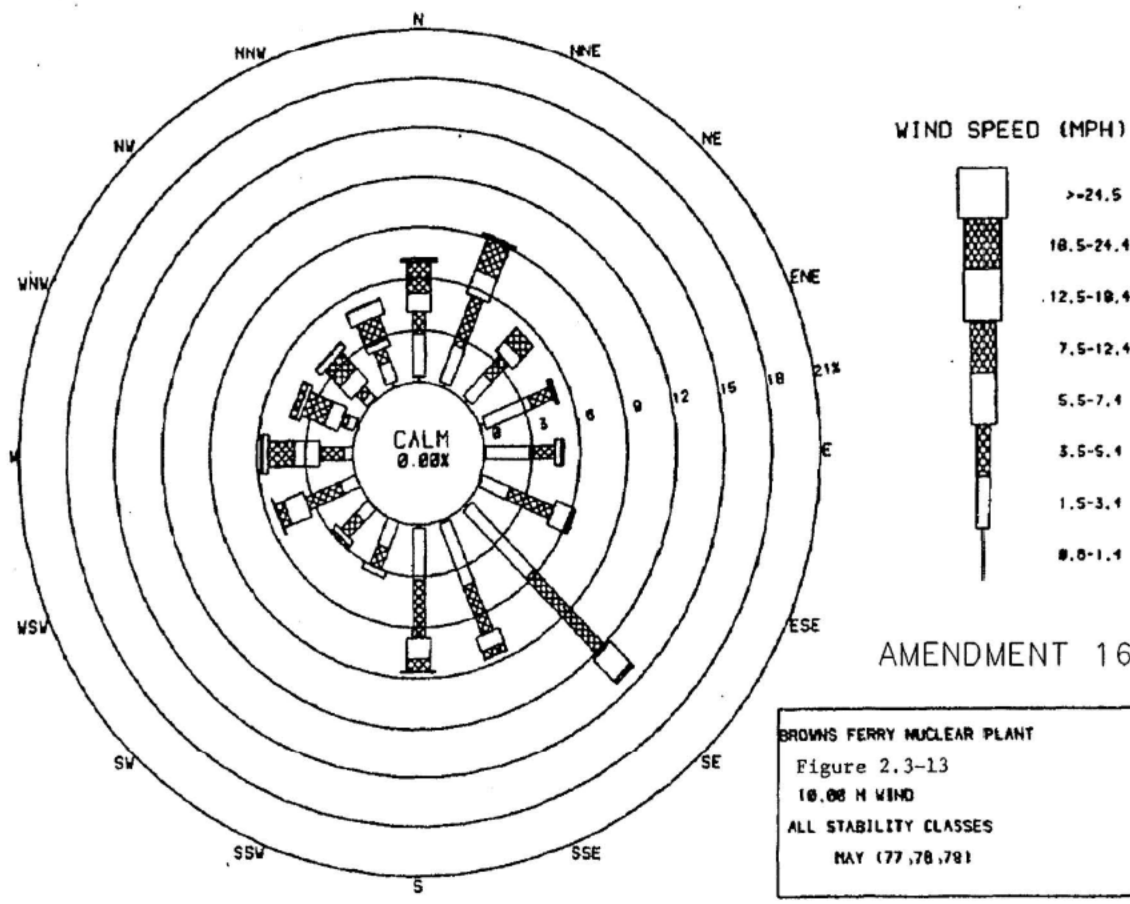
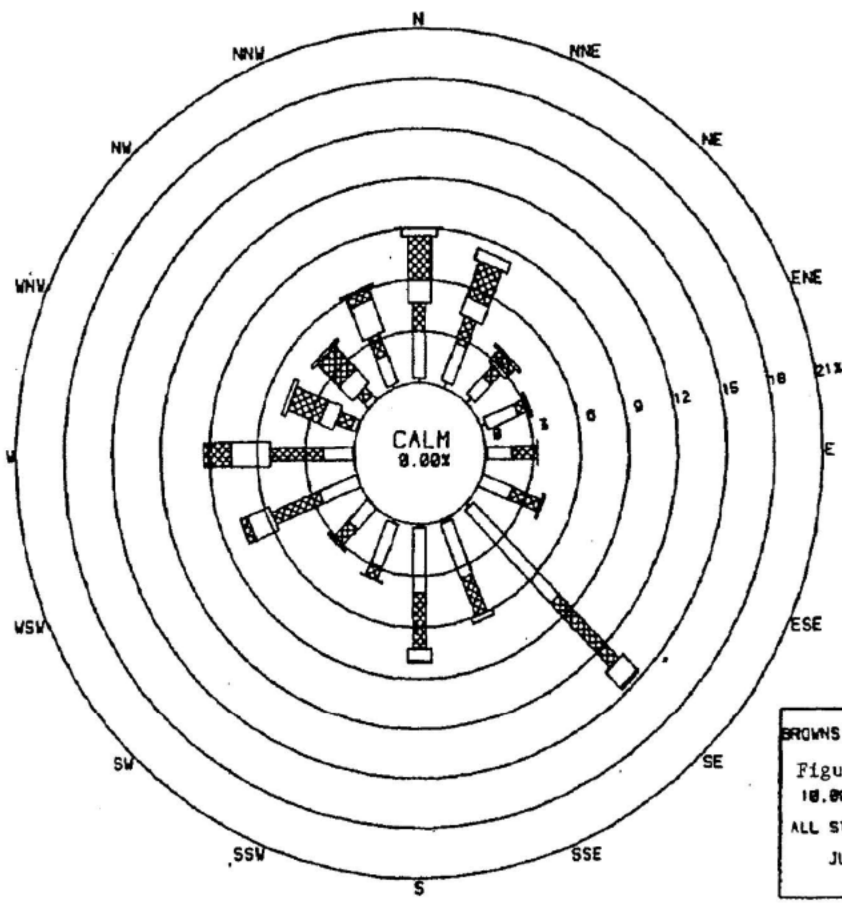
BROWNS FERRY NUCLEAR PLANT

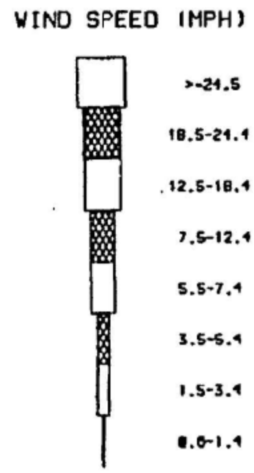
Figure 2.3-12
10.00 M WIND
ALL STABILITY CLASSES
APRIL (77,78,79)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
Figure 2.3-13
10.00 M WIND
ALL STABILITY CLASSES
MAY (77,78,79)





AMENDMENT 16

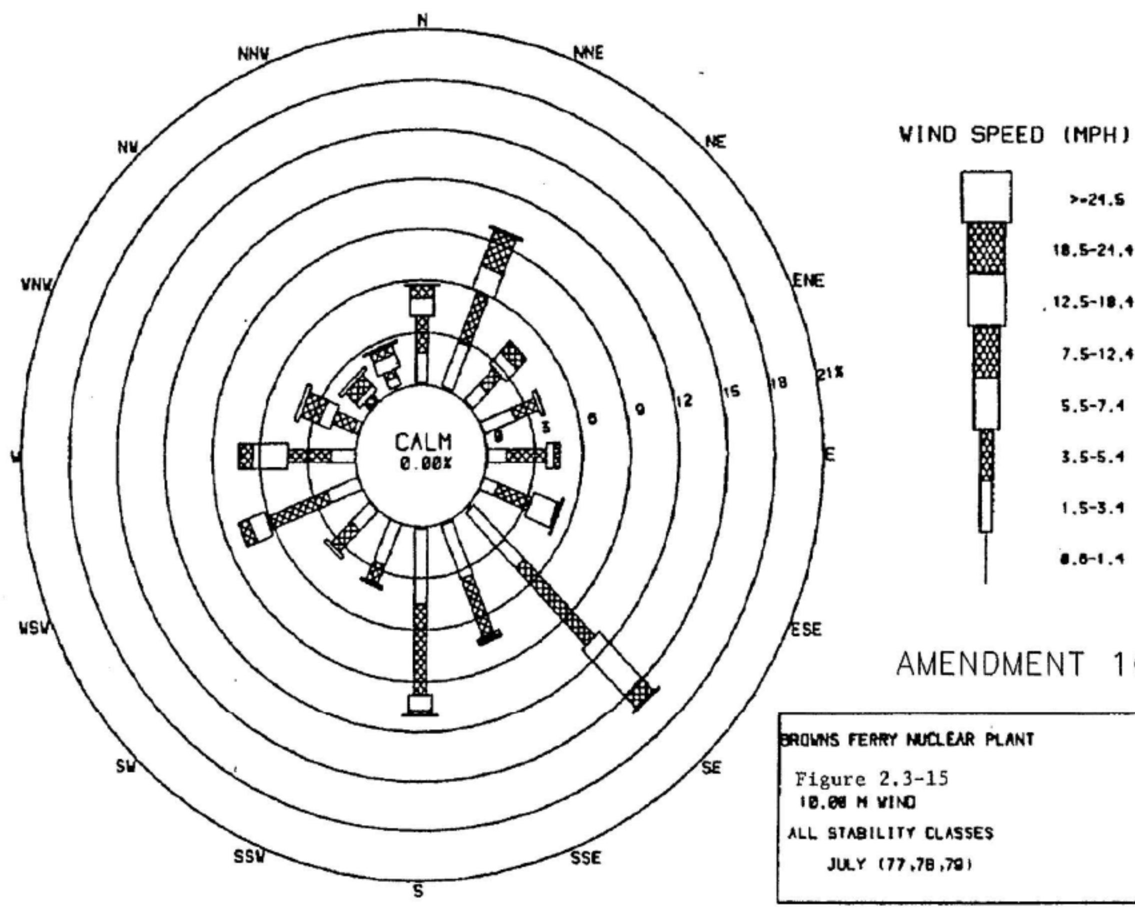
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-14

10.00 M WIND

ALL STABILITY CLASSES

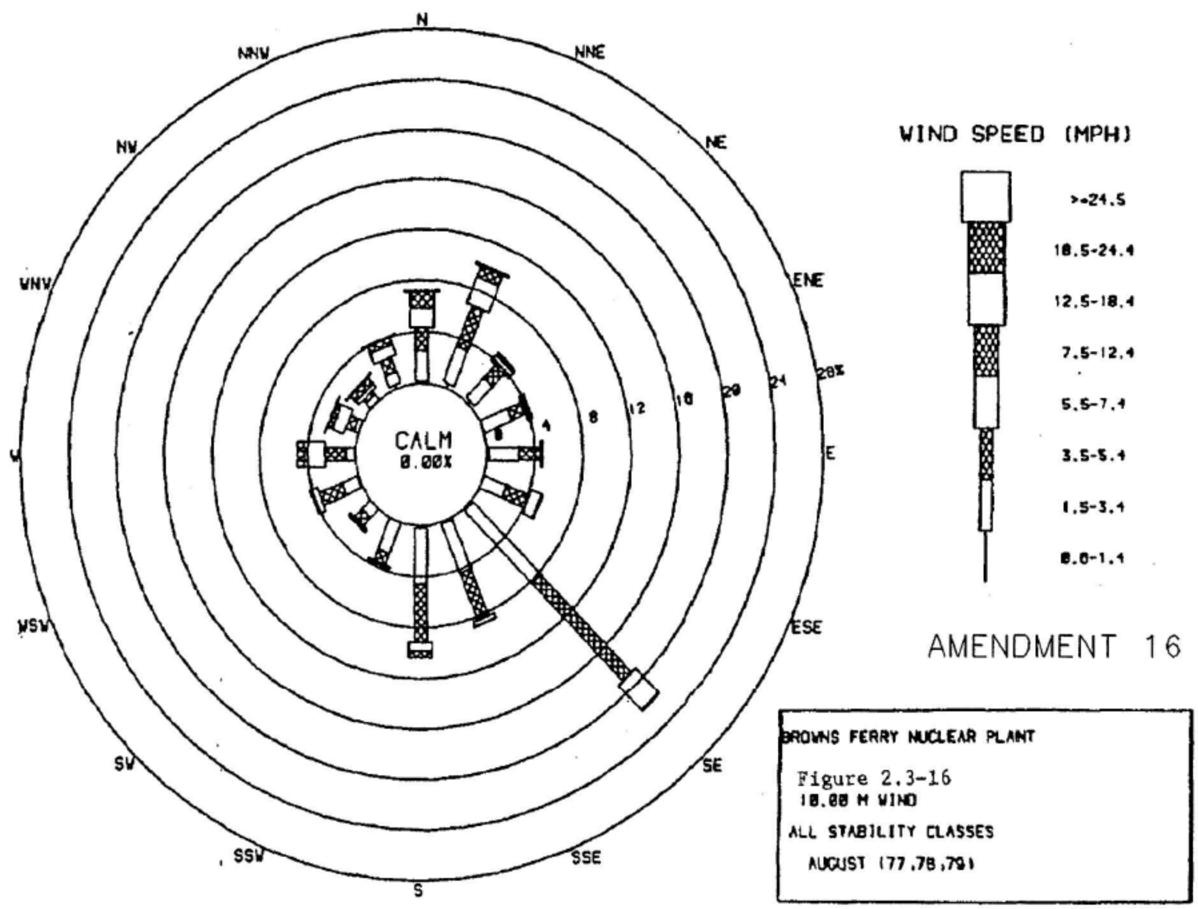
JUNE (77,78,79)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT

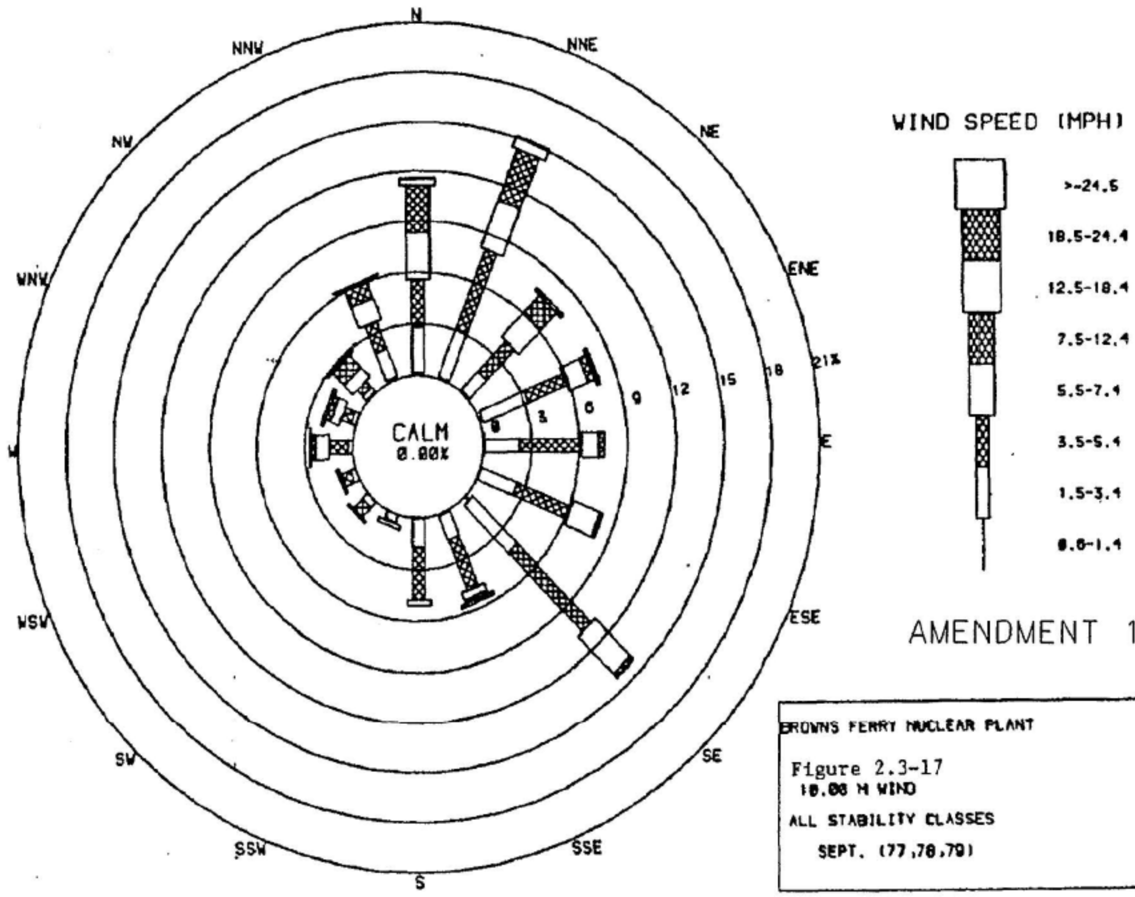
Figure 2.3-15
10.00 M WIND
ALL STABILITY CLASSES
JULY (77,78,79)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT

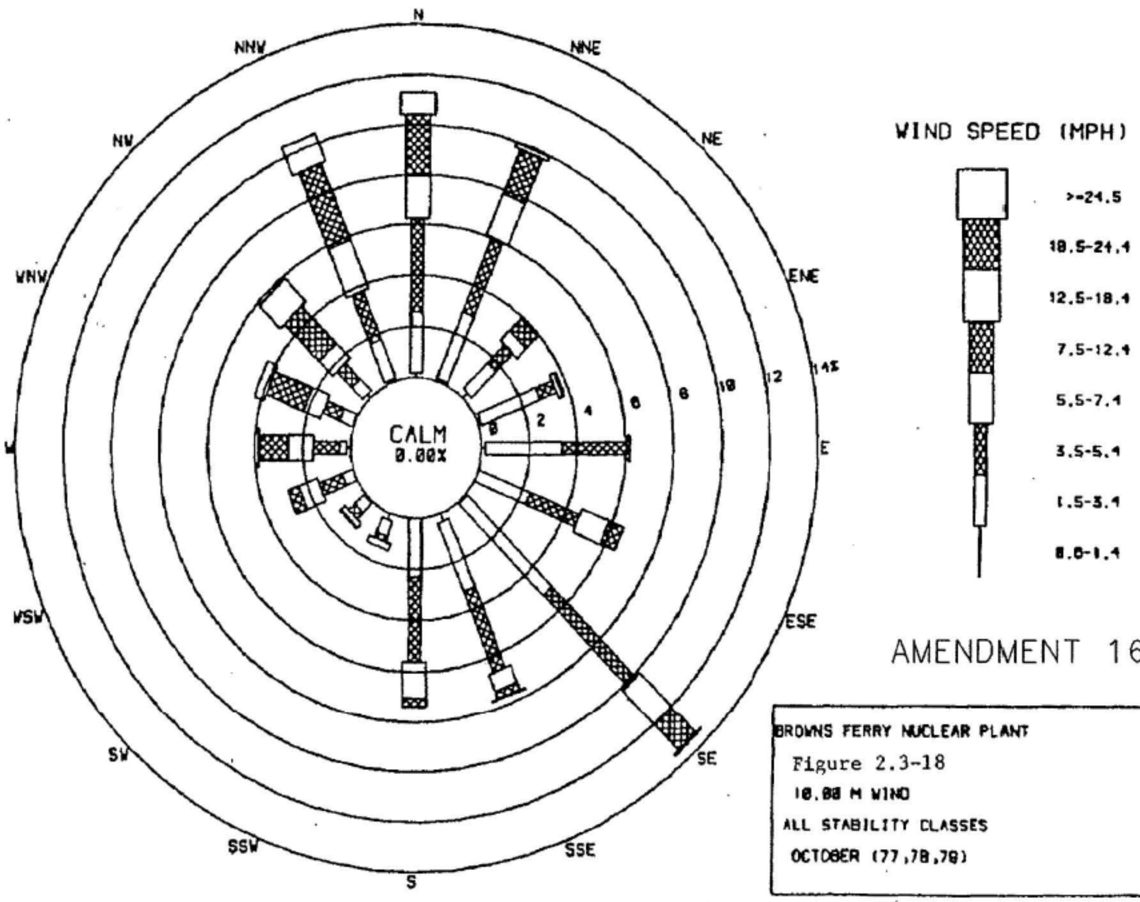
Figure 2.3-16
10.00 M WIND
ALL STABILITY CLASSES
AUGUST (77,78,79)



AMENDMENT 16

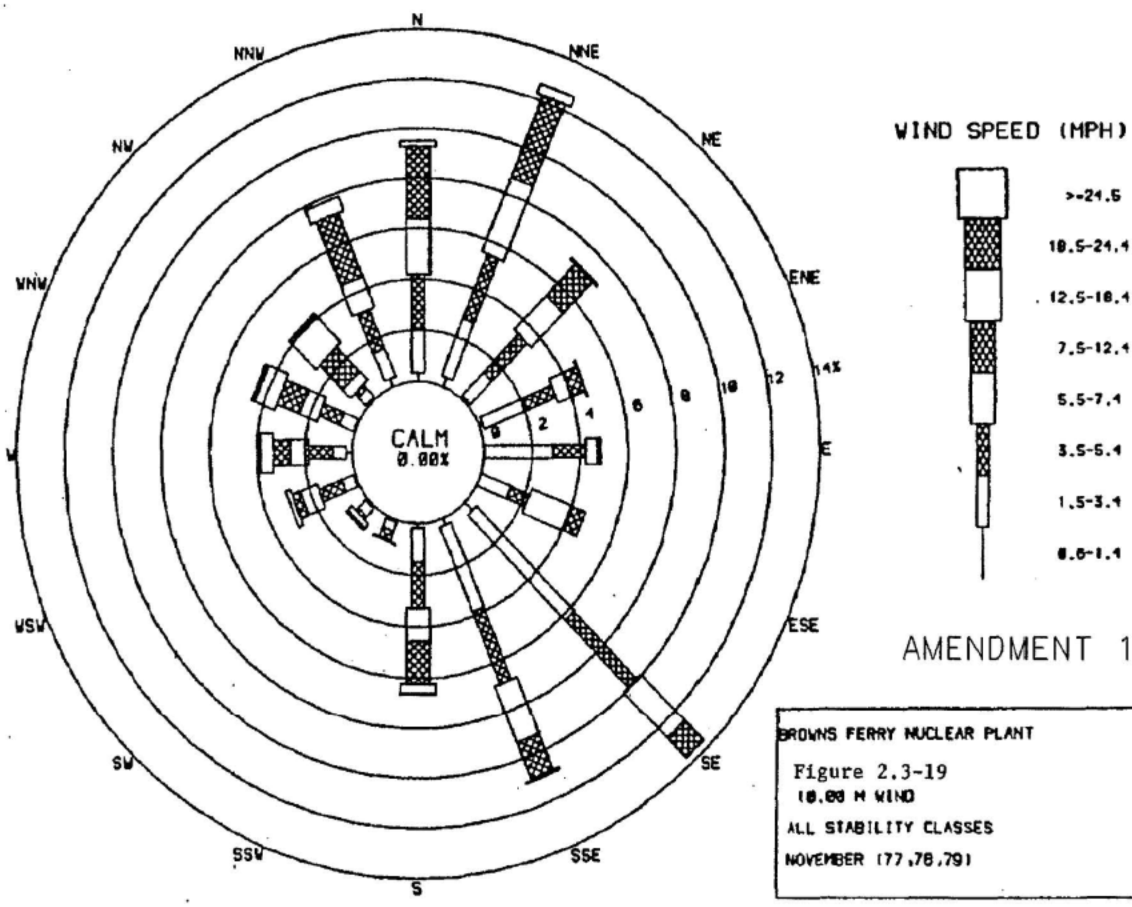
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-17
10.00 M WIND
ALL STABILITY CLASSES
SEPT. (77,78,79)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
Figure 2.3-18
10.00 M WIND
ALL STABILITY CLASSES
OCTOBER (77,78,79)



AMENDMENT 16

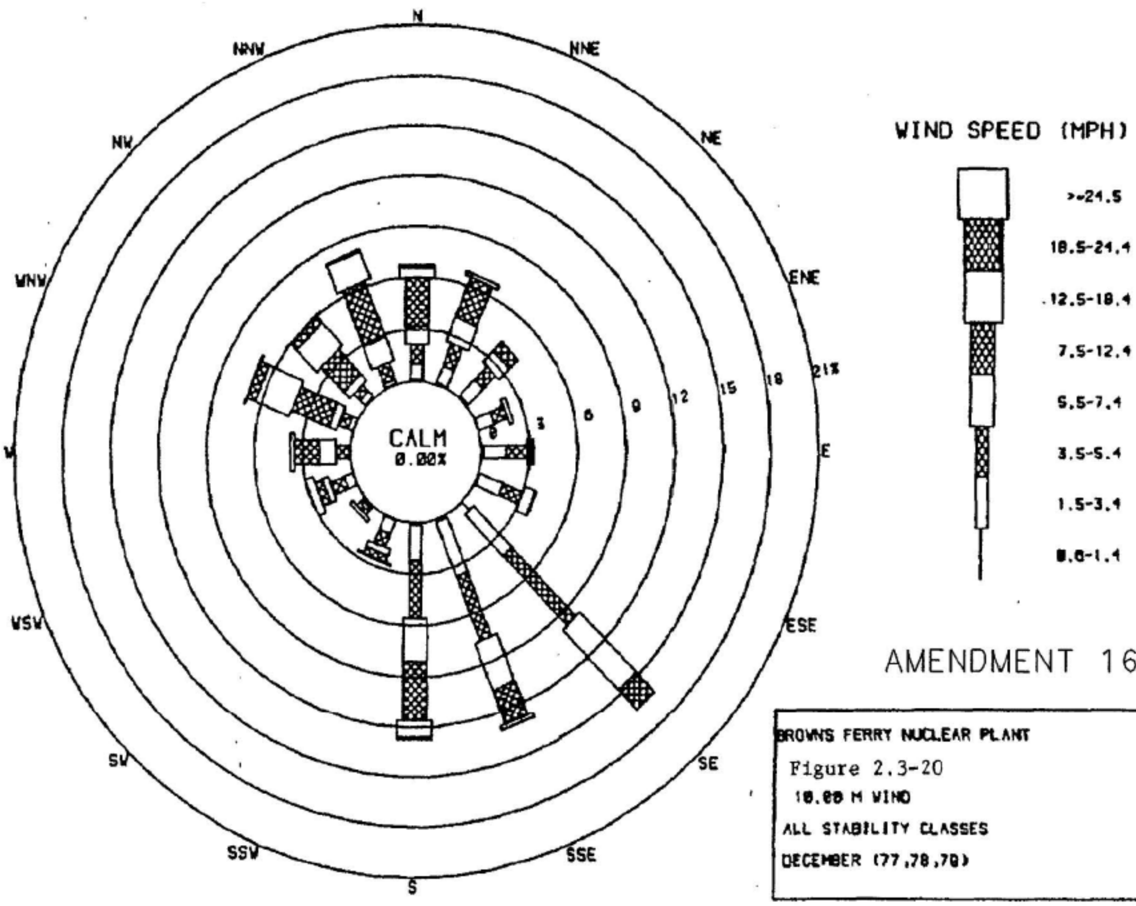
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-19

10.00 M WIND

ALL STABILITY CLASSES

NOVEMBER (77,78,79)



AMENDMENT 16

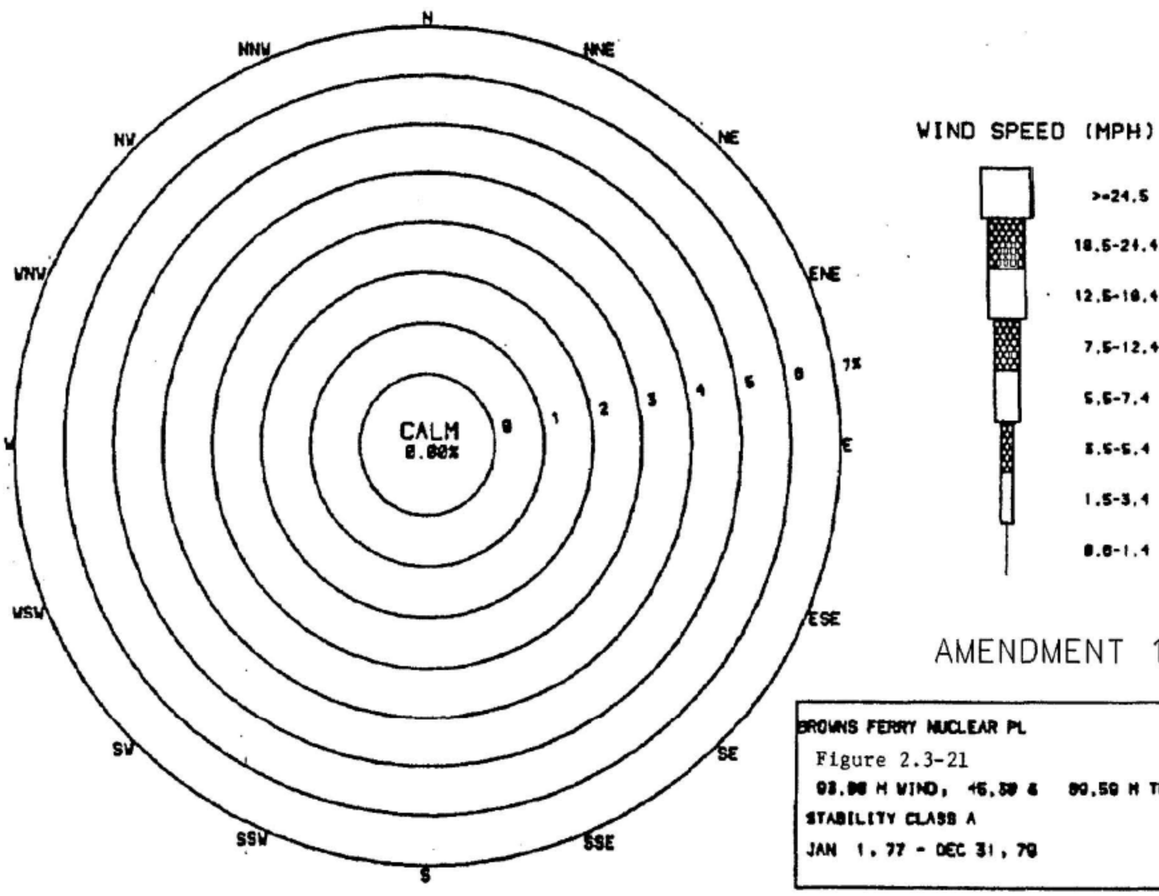
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-20

10.00 M WIND

ALL STABILITY CLASSES

DECEMBER (77,78,79)



AMENDMENT 16

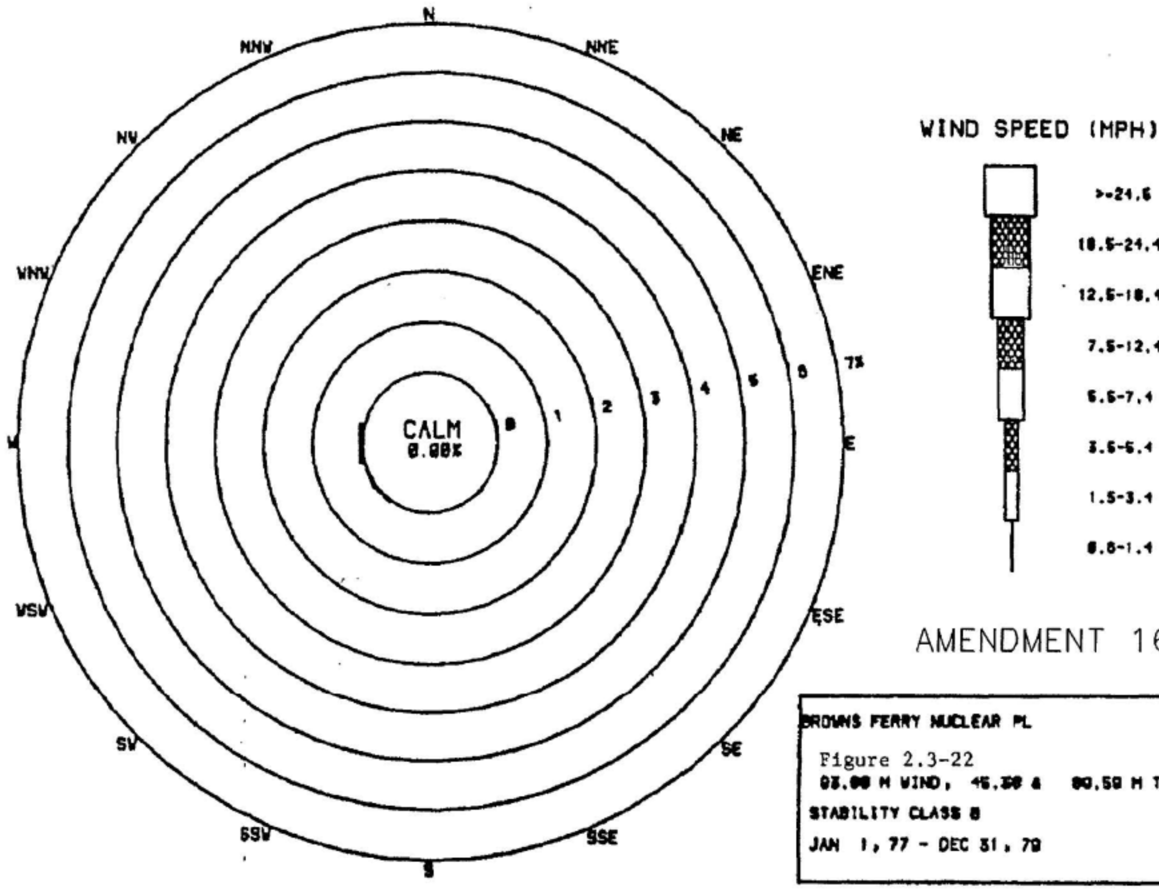
BROWNS FERRY NUCLEAR PL

Figure 2.3-21

93.00 M WIND, 45.50 & 89.50 M TEMP

STABILITY CLASS A

JAN 1, 77 - DEC 31, 79



AMENDMENT 16

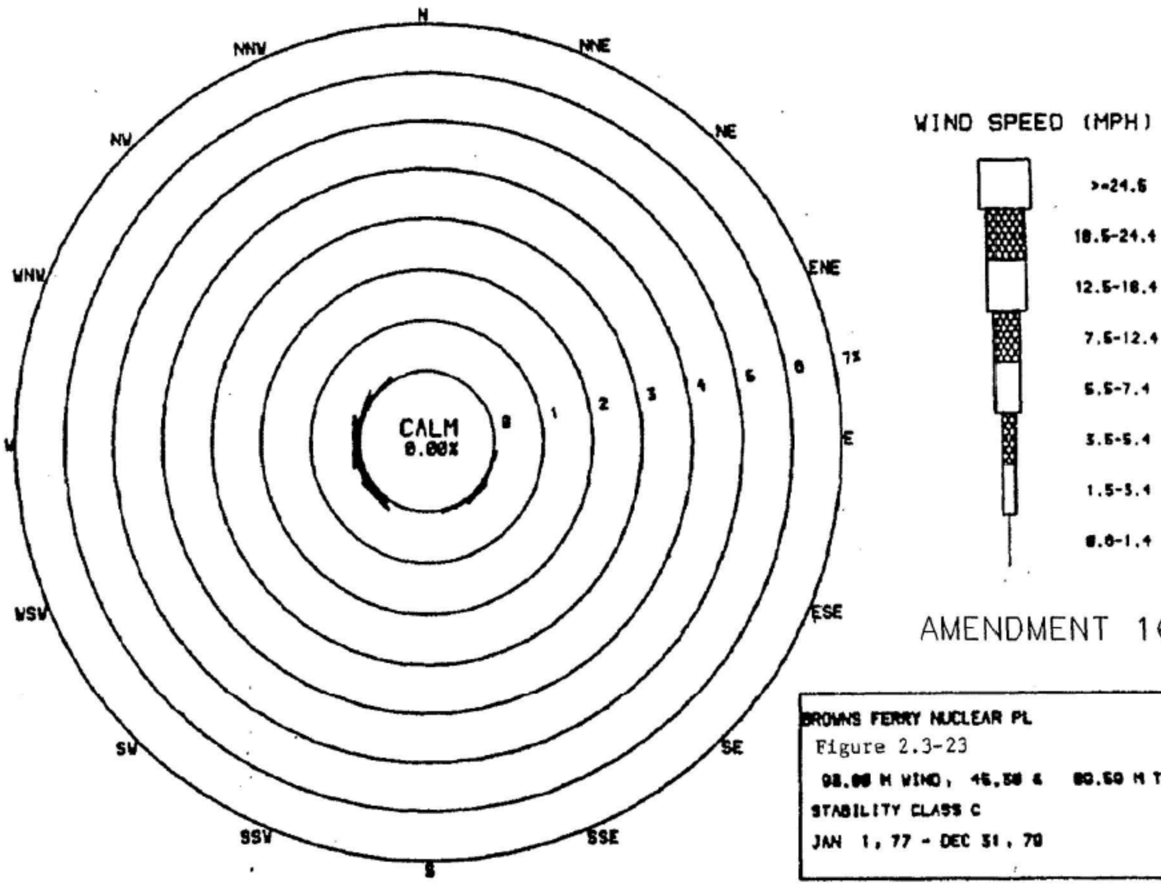
BROWNS FERRY NUCLEAR PL

Figure 2.3-22

93.00 M WIND, 45.30 & 90.50 M TEMP

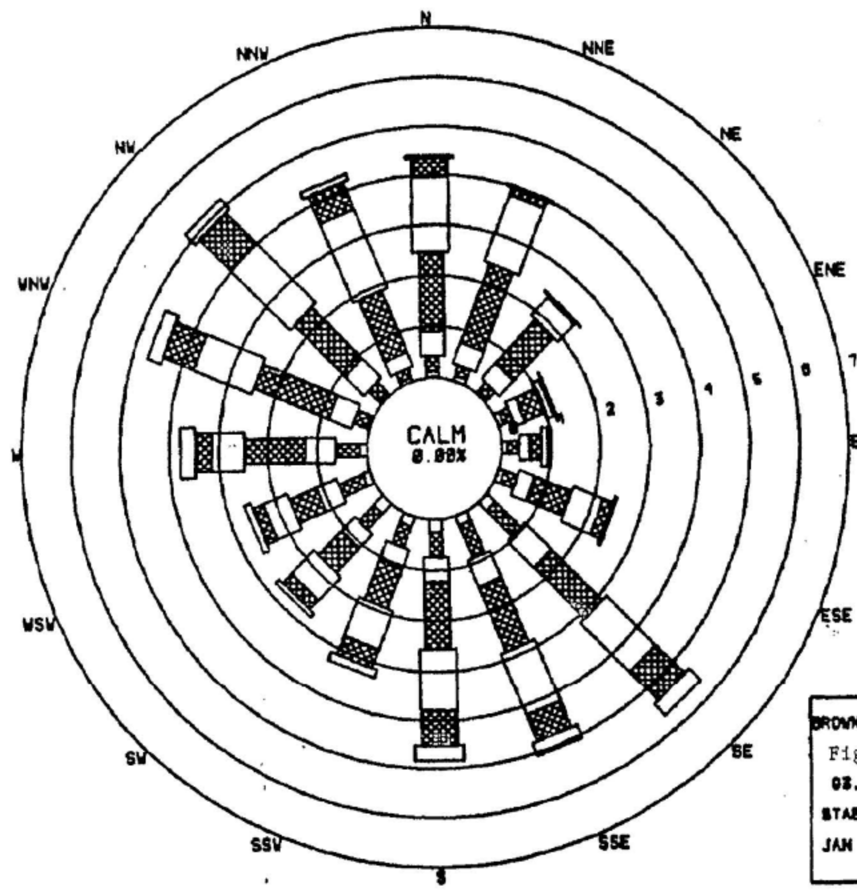
STABILITY CLASS B

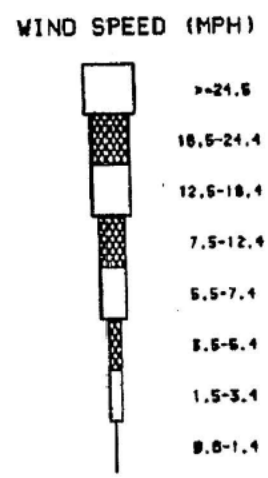
JAN 1, 77 - DEC 31, 79



AMENDMENT 16

BROWNS FERRY NUCLEAR PL
Figure 2.3-23
90.00 M WIND, 46.50 & 90.50 M TEMP
STABILITY CLASS C
JAN 1, 77 - DEC 31, 79





AMENDMENT 16

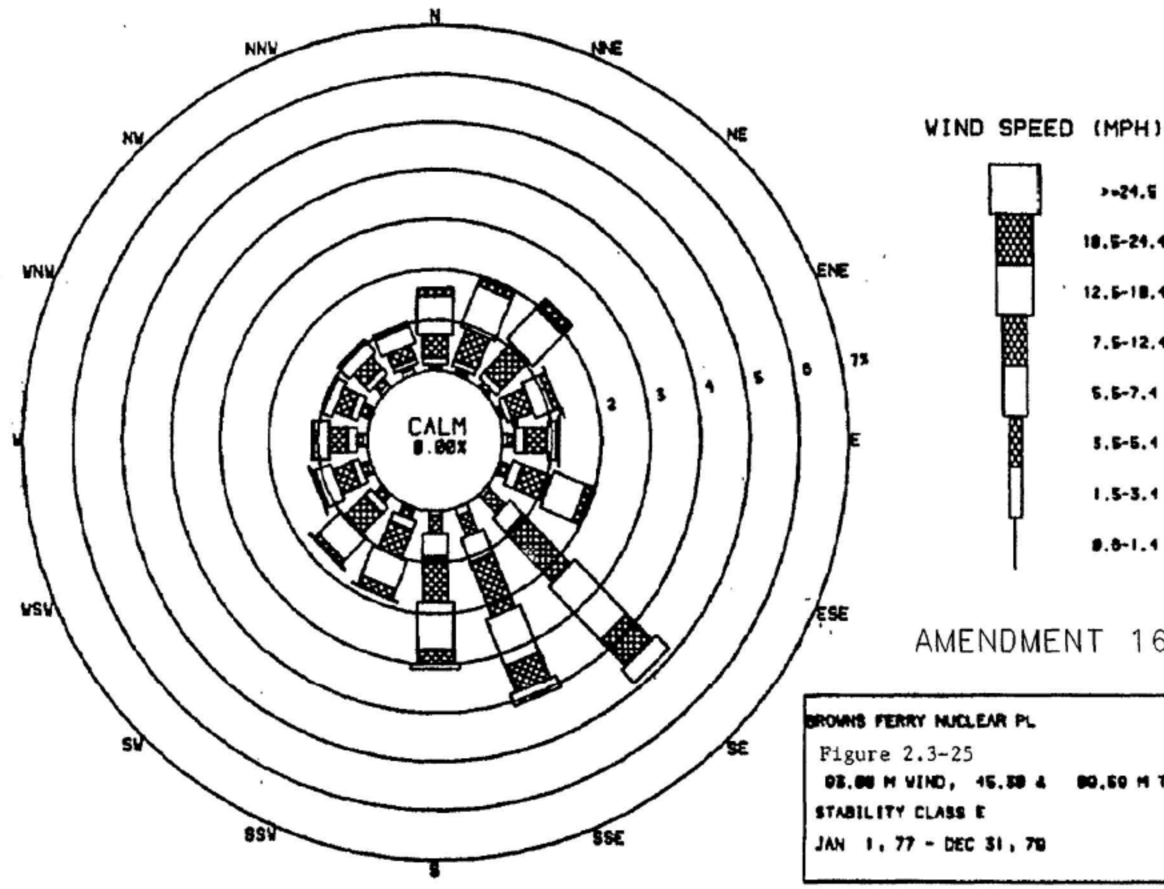
BROWNS FERRY NUCLEAR PL

Figure 2.3-24

93.00 M WIND, 45.38 & 90.60 M TEMP

STABILITY CLASS D

JAN 1, 77 - DEC 31, 79



AMENDMENT 16

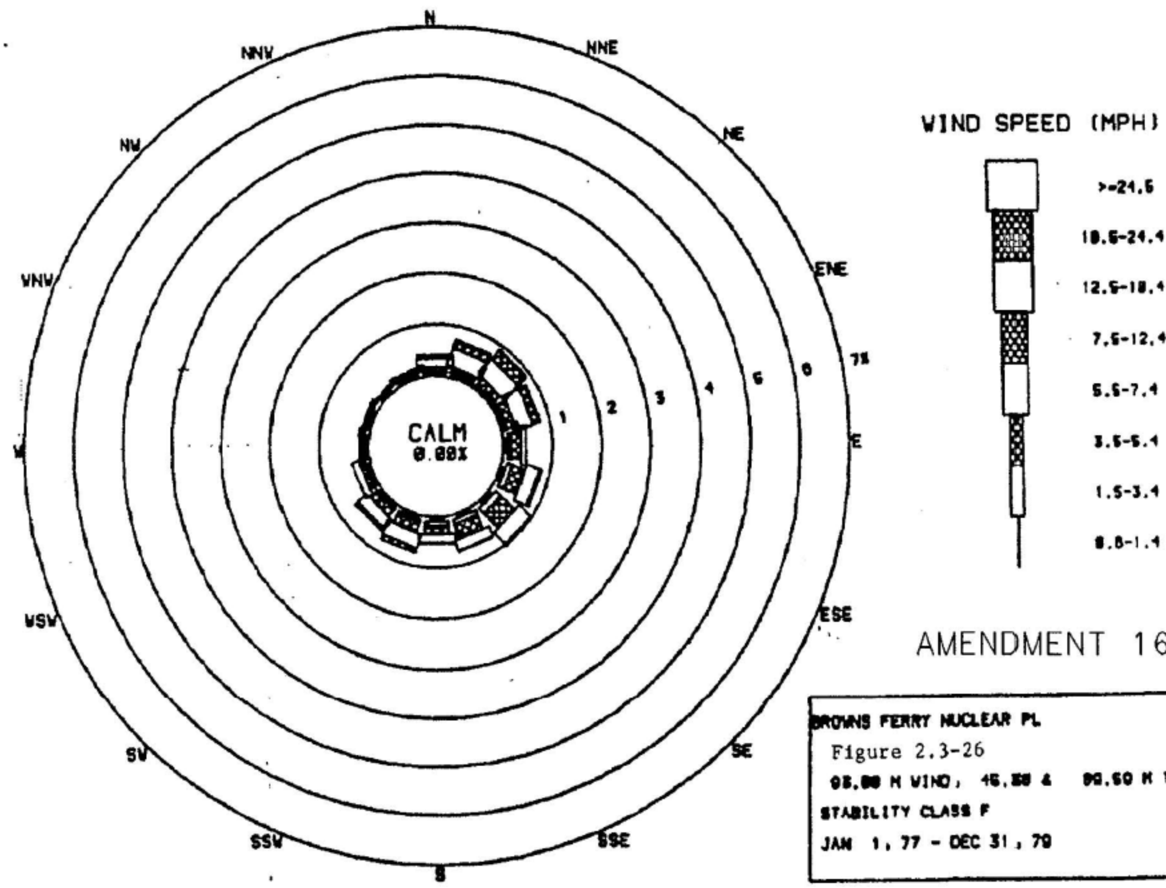
BROWNS FERRY NUCLEAR PL

Figure 2.3-25

93.00 M WIND, 45.30 & 89.50 M TEMP

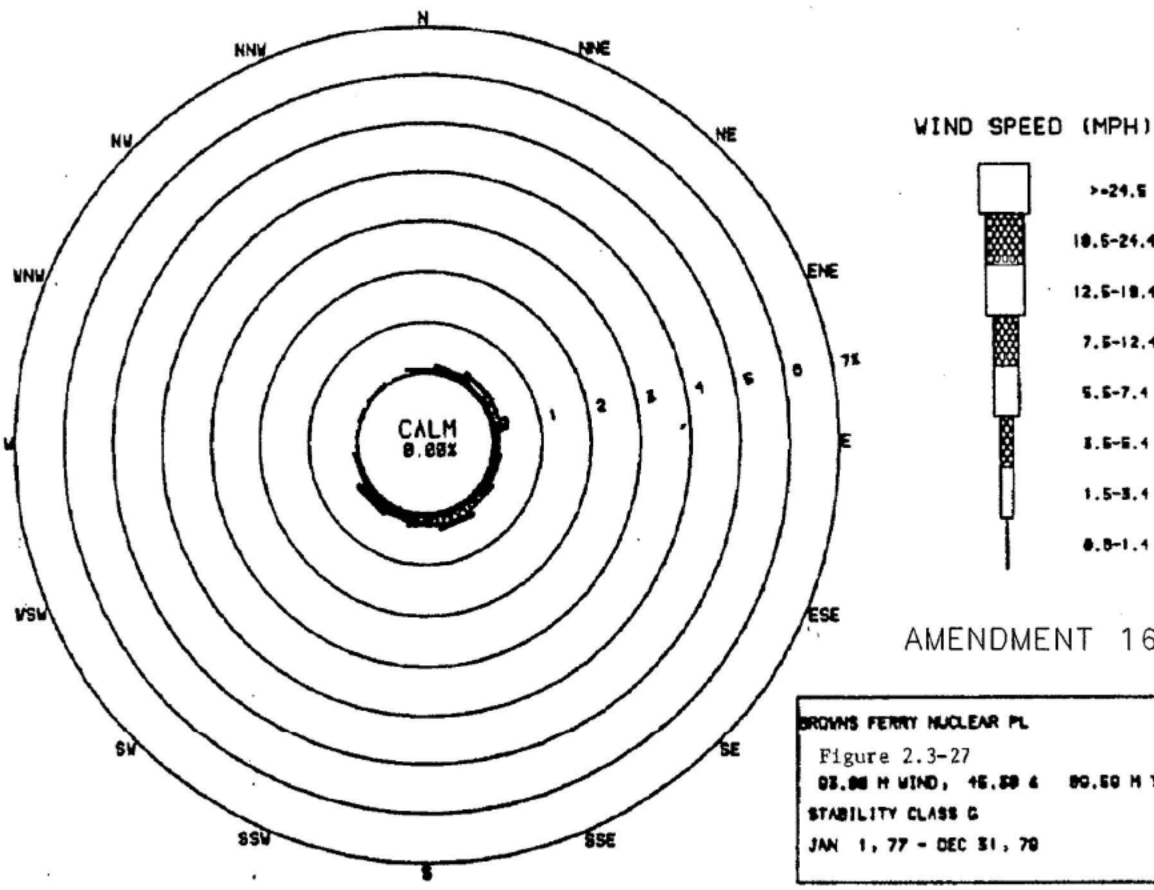
STABILITY CLASS E

JAN 1, 77 - DEC 31, 79



AMENDMENT 16

BROWNS FERRY NUCLEAR PL
Figure 2.3-26
93.00 M WIND, 46.30 & 90.60 M TEMP
STABILITY CLASS F
JAN 1, 77 - DEC 31, 79



AMENDMENT 16

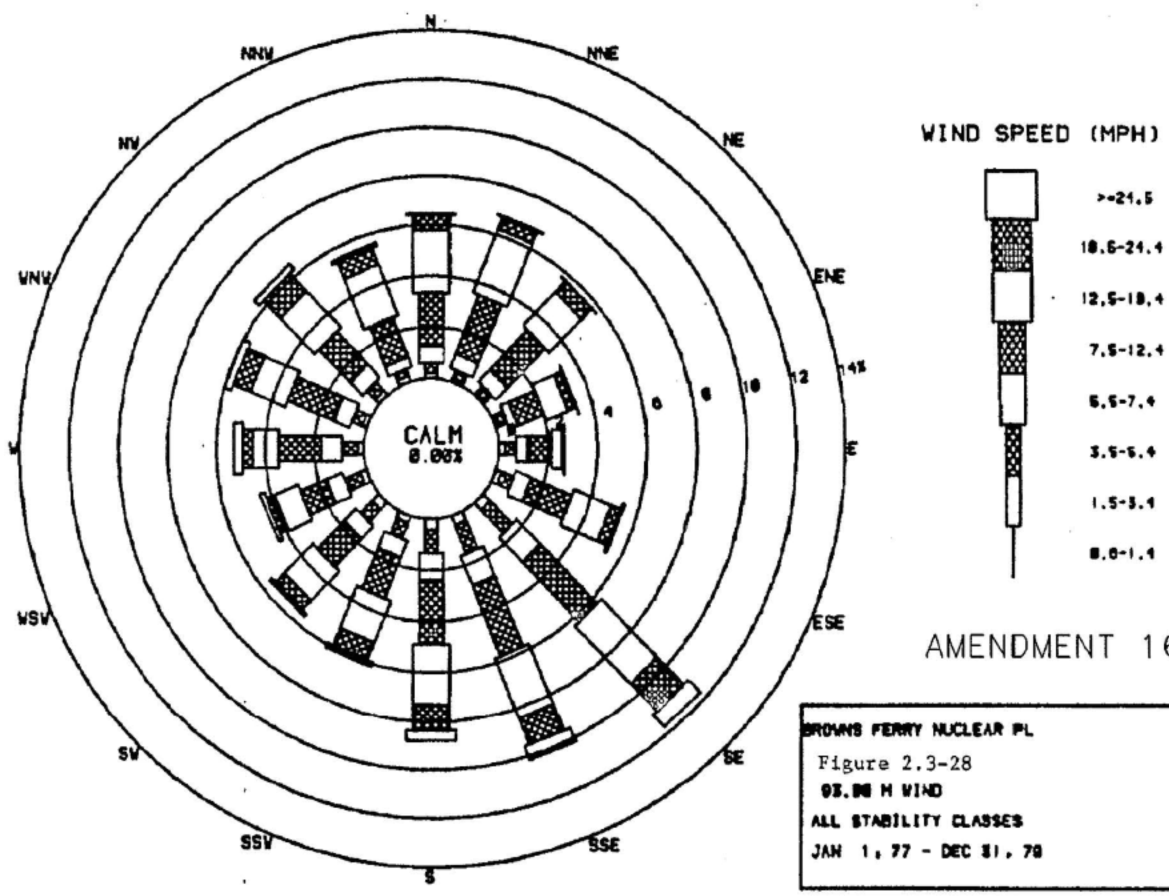
BROWNS FERRY NUCLEAR PL

Figure 2.3-27

93.90 M WIND, 45.50 & 90.50 M TEMP

STABILITY CLASS G

JAN 1, 77 - DEC 31, 79



AMENDMENT 16

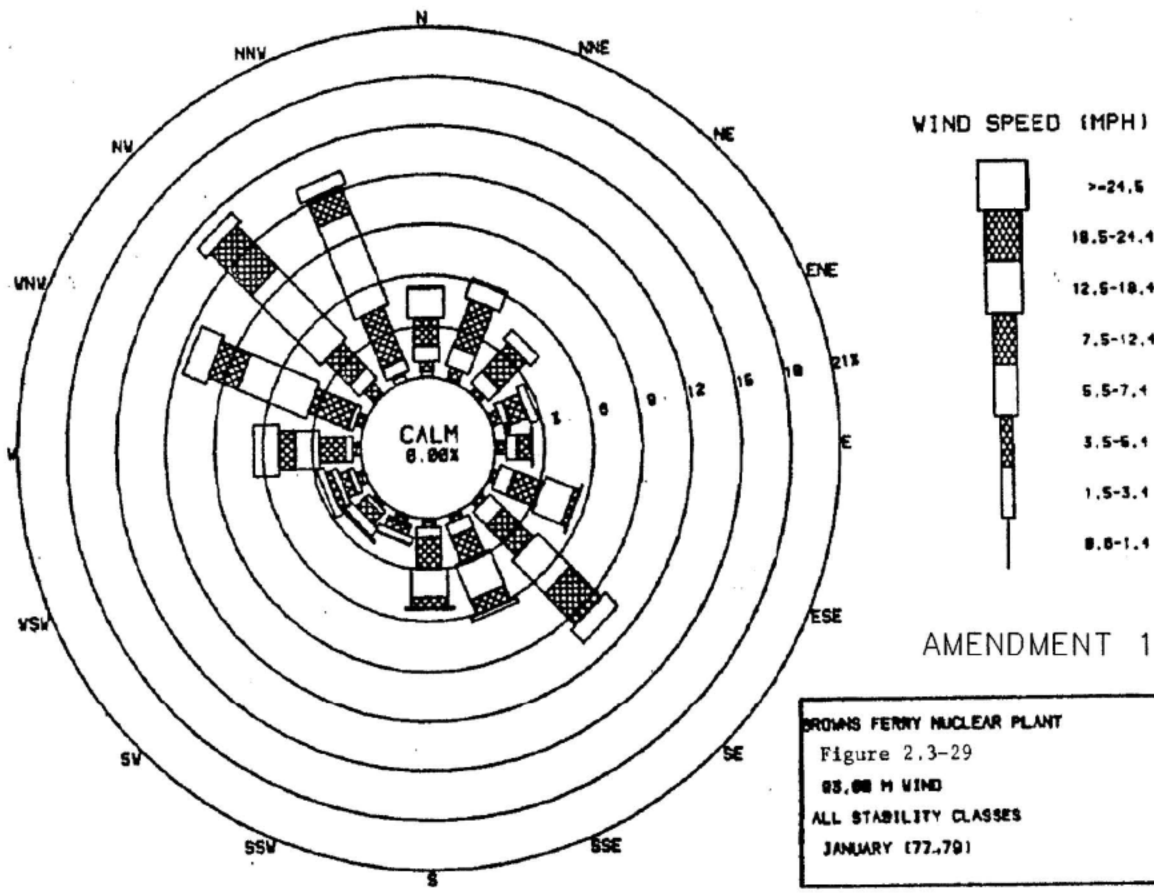
BROWNS FERRY NUCLEAR PL

Figure 2.3-28

93.00 M WIND

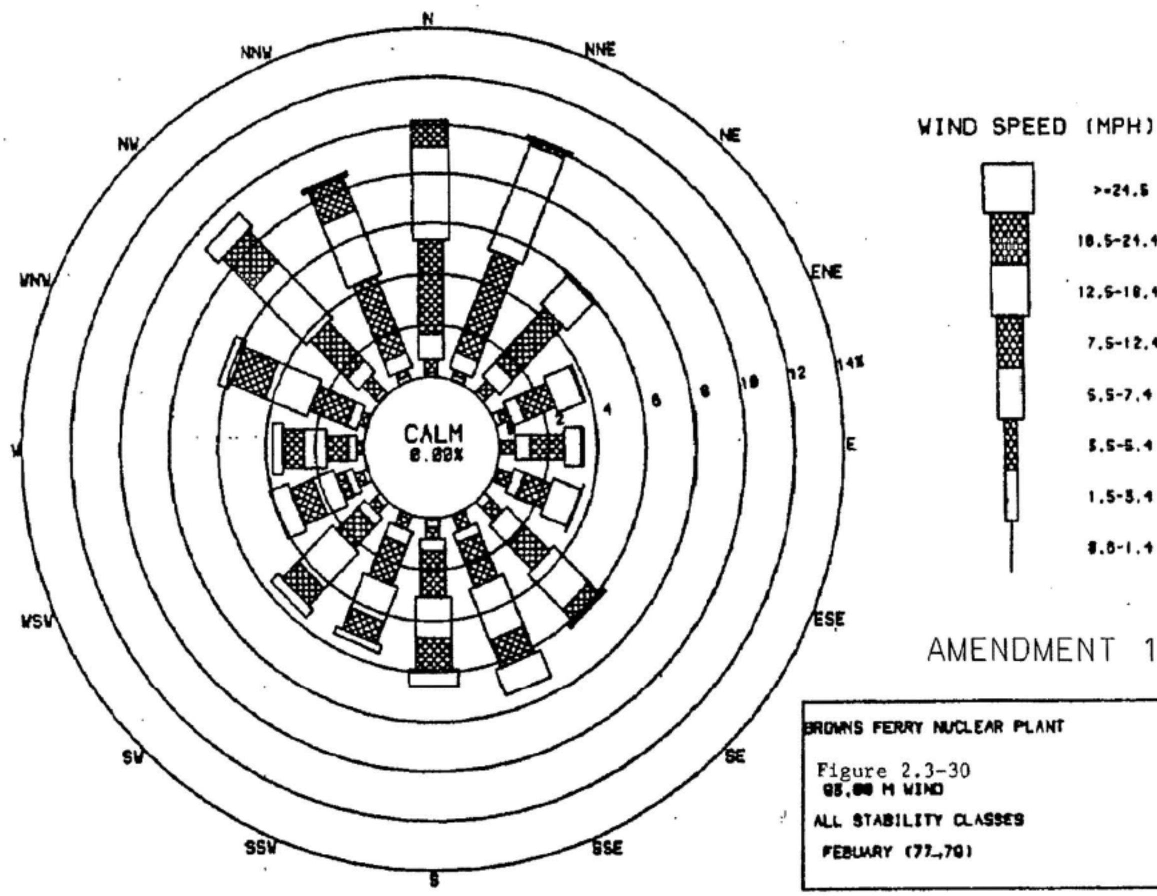
ALL STABILITY CLASSES

JAN 1, 77 - DEC 31, 78



AMENDMENT 16

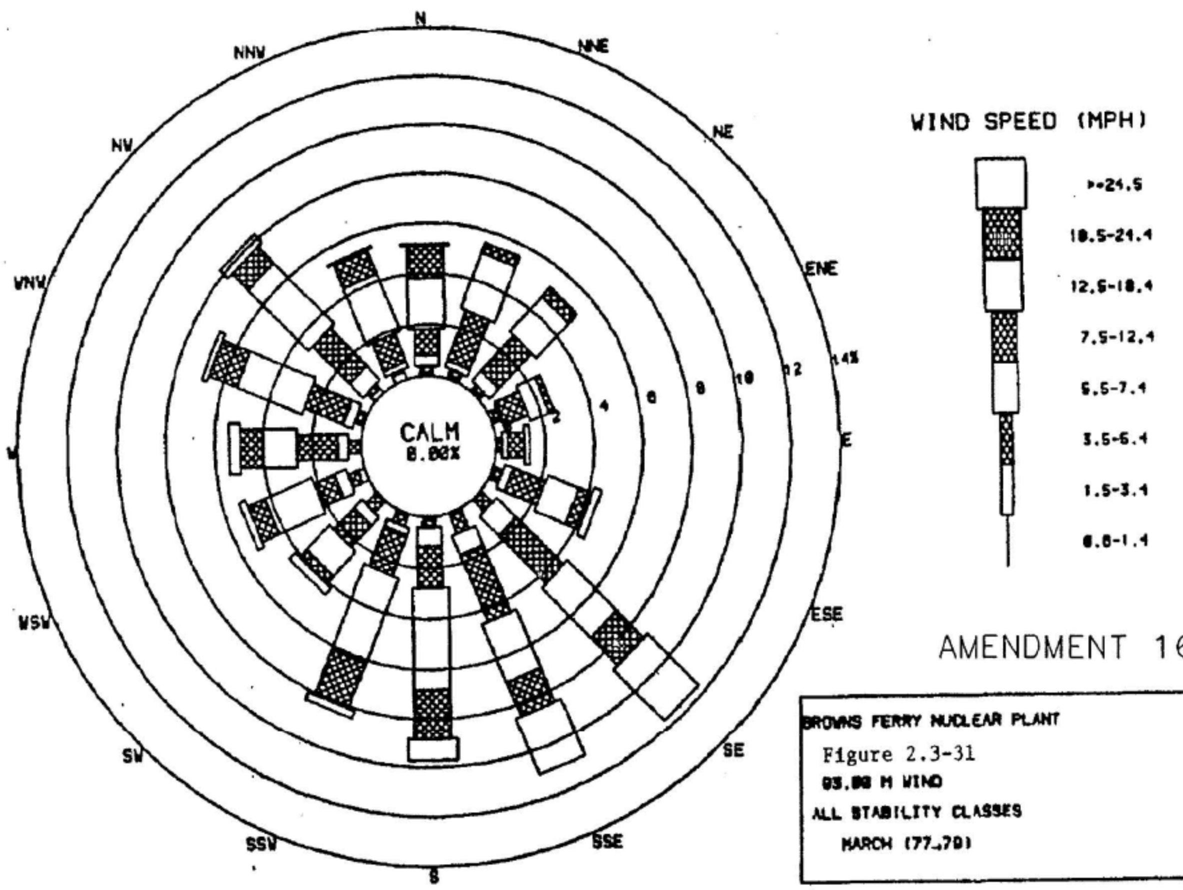
BROWNS FERRY NUCLEAR PLANT
Figure 2.3-29
93.00 M WIND
ALL STABILITY CLASSES
JANUARY (77,79)



AMENDMENT 16

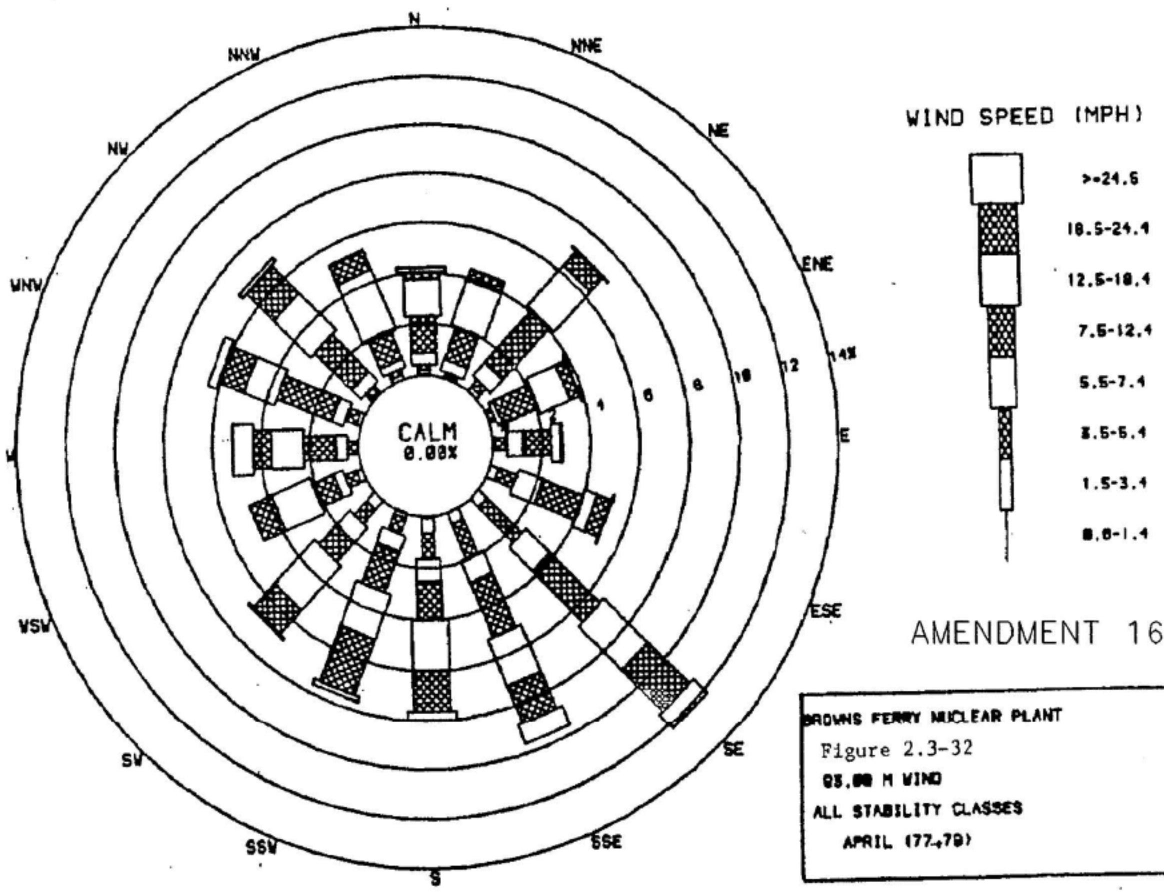
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-30
93.00 M WIND
ALL STABILITY CLASSES
FEBUARY (77,79)



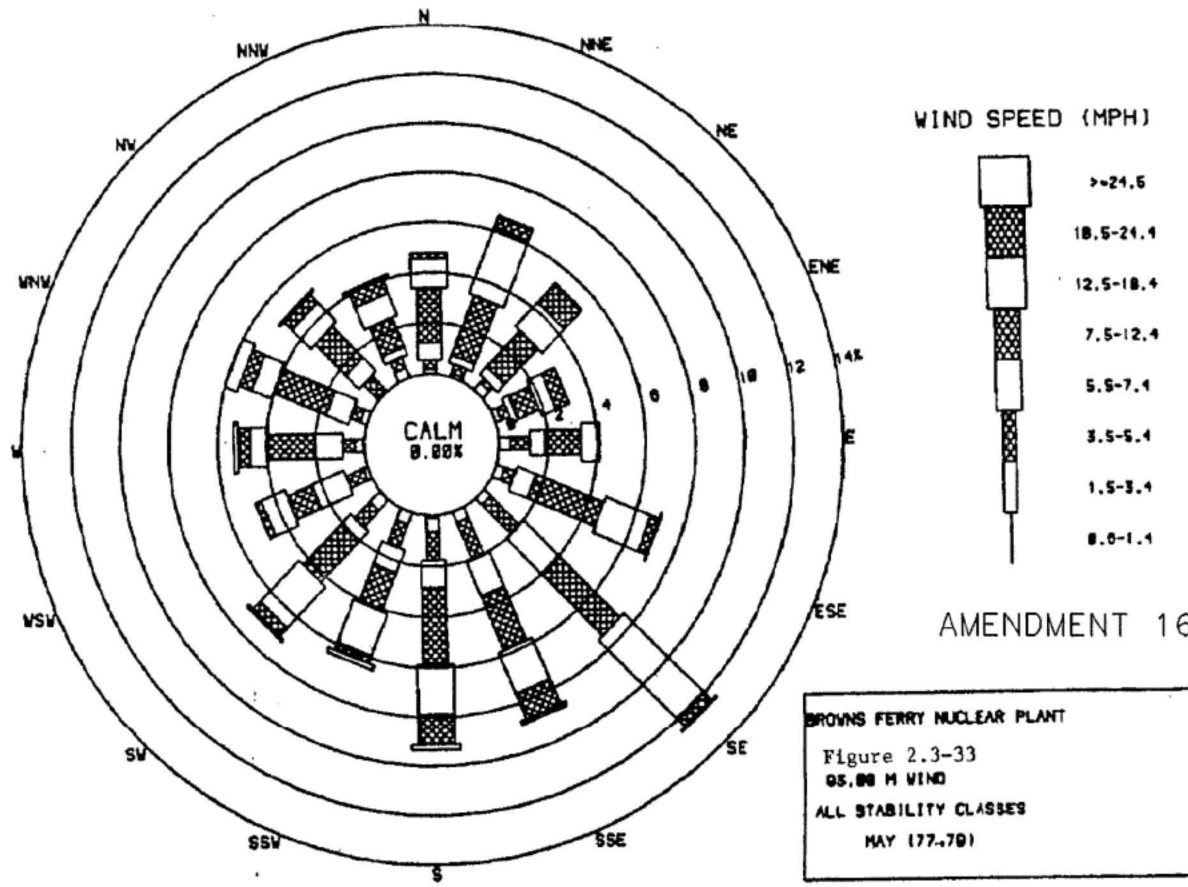
AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
Figure 2.3-31
93.00 M WIND
ALL STABILITY CLASSES
MARCH (77-79)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
Figure 2.3-32
93.00 M WIND
ALL STABILITY CLASSES
APRIL (77-79)



AMENDMENT 16

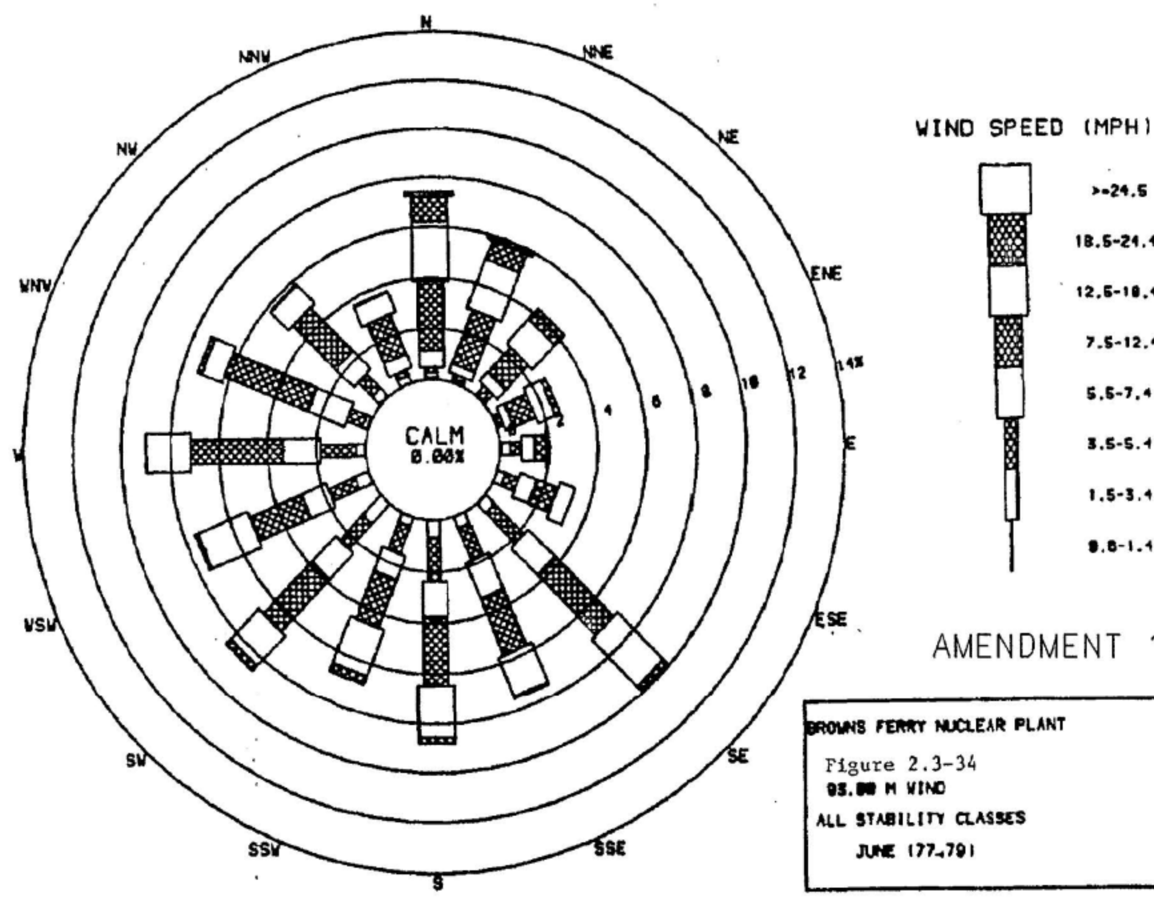
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-33

93.00 M WIND

ALL STABILITY CLASSES

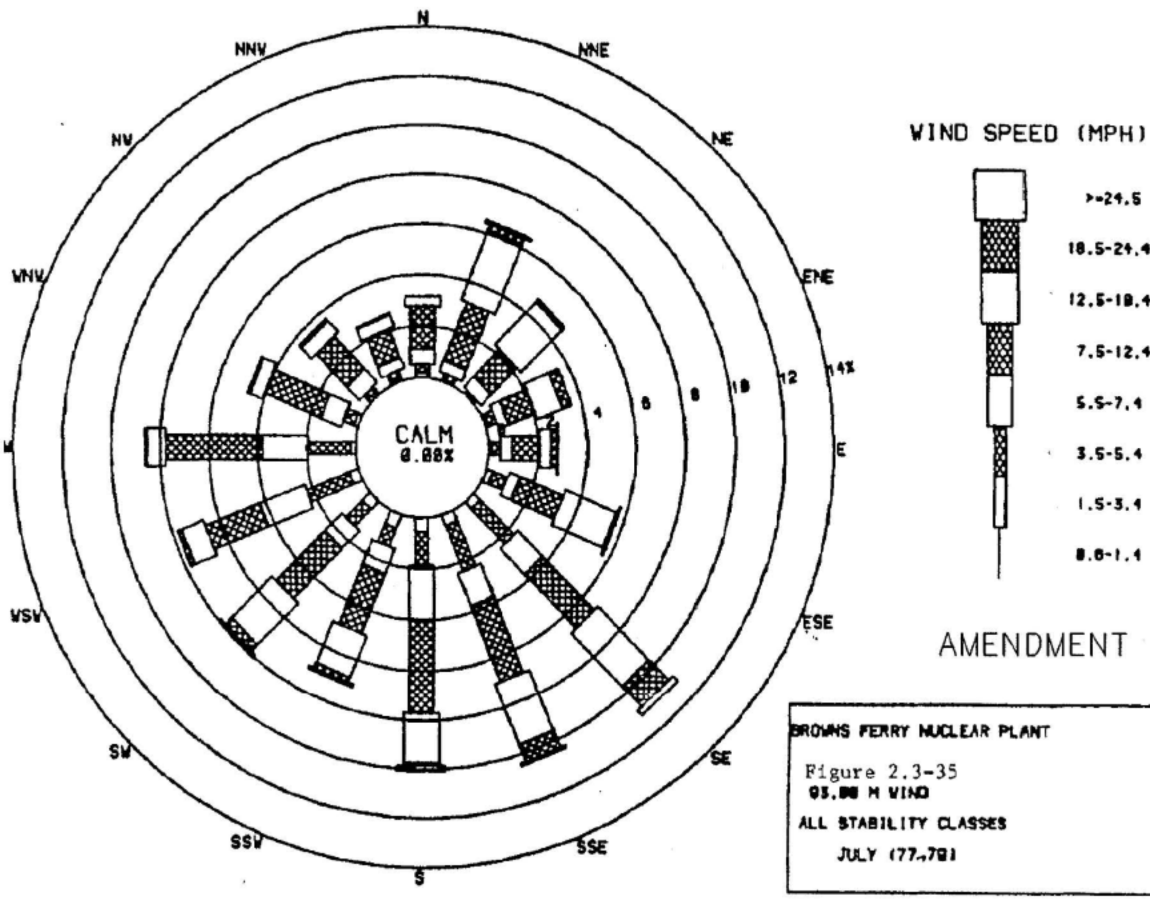
MAY (77-79)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT

Figure 2.3-34
93.00 M WIND
ALL STABILITY CLASSES
JUNE (77-79)



AMENDMENT 16

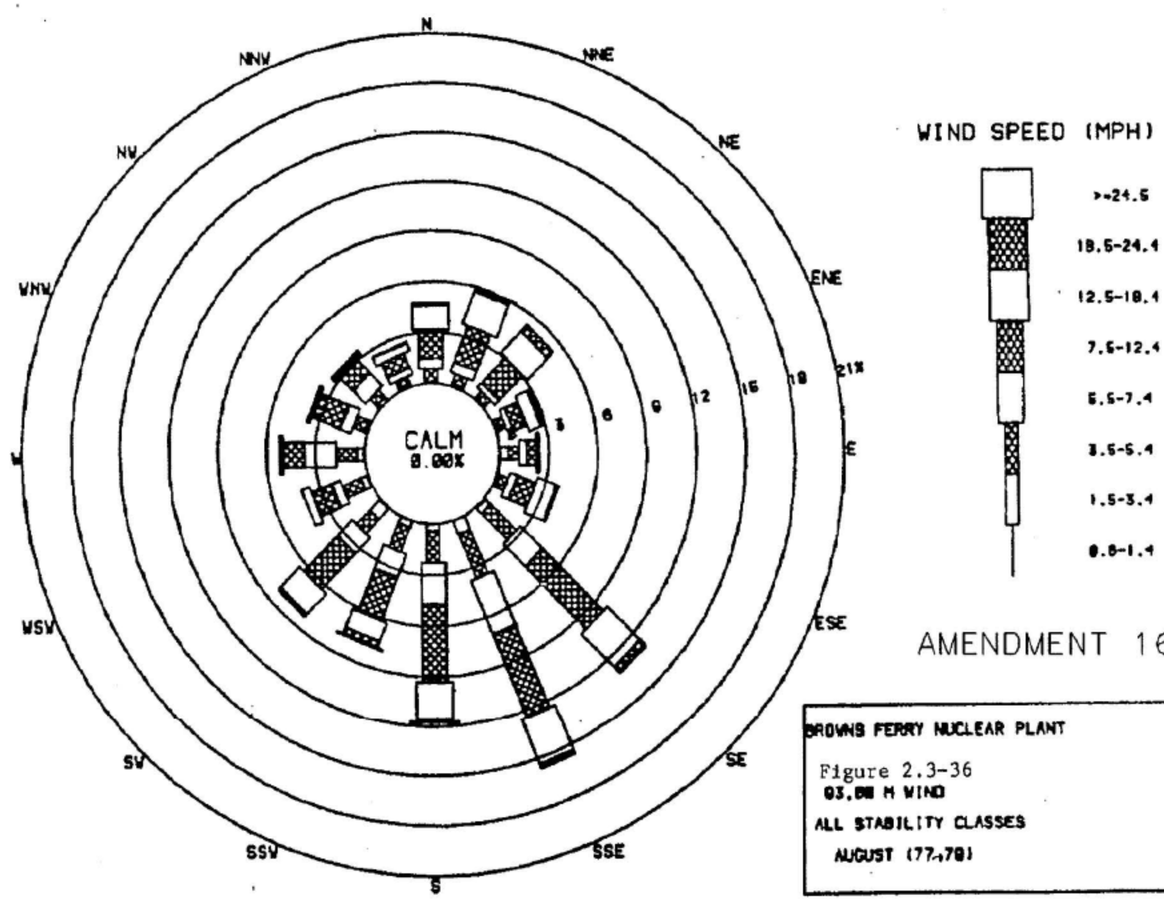
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-35

93.00 M WIND

ALL STABILITY CLASSES

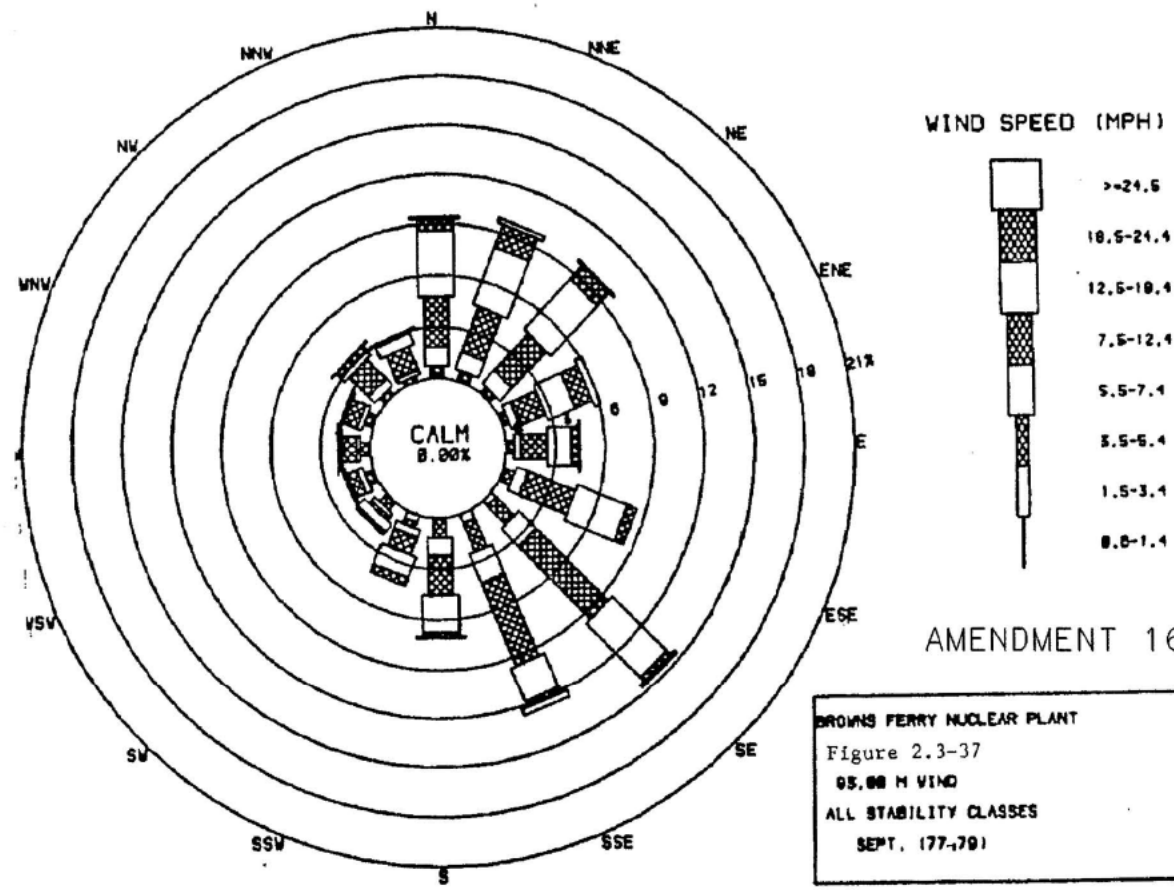
JULY (77-79)



AMENDMENT 16

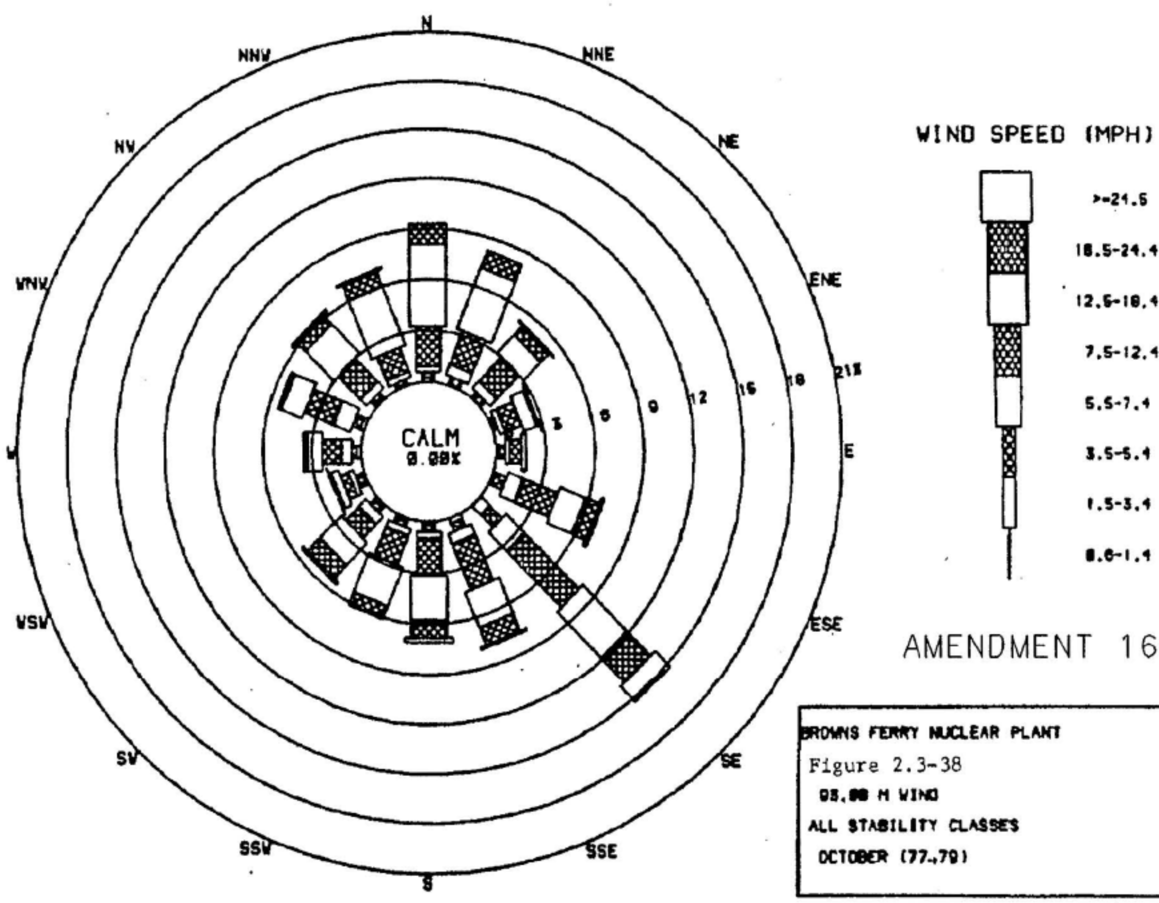
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-36
93.00 M WIND
ALL STABILITY CLASSES
AUGUST (77-79)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
Figure 2.3-37
95.00 M WIND
ALL STABILITY CLASSES
SEPT. (77-79)



AMENDMENT 16

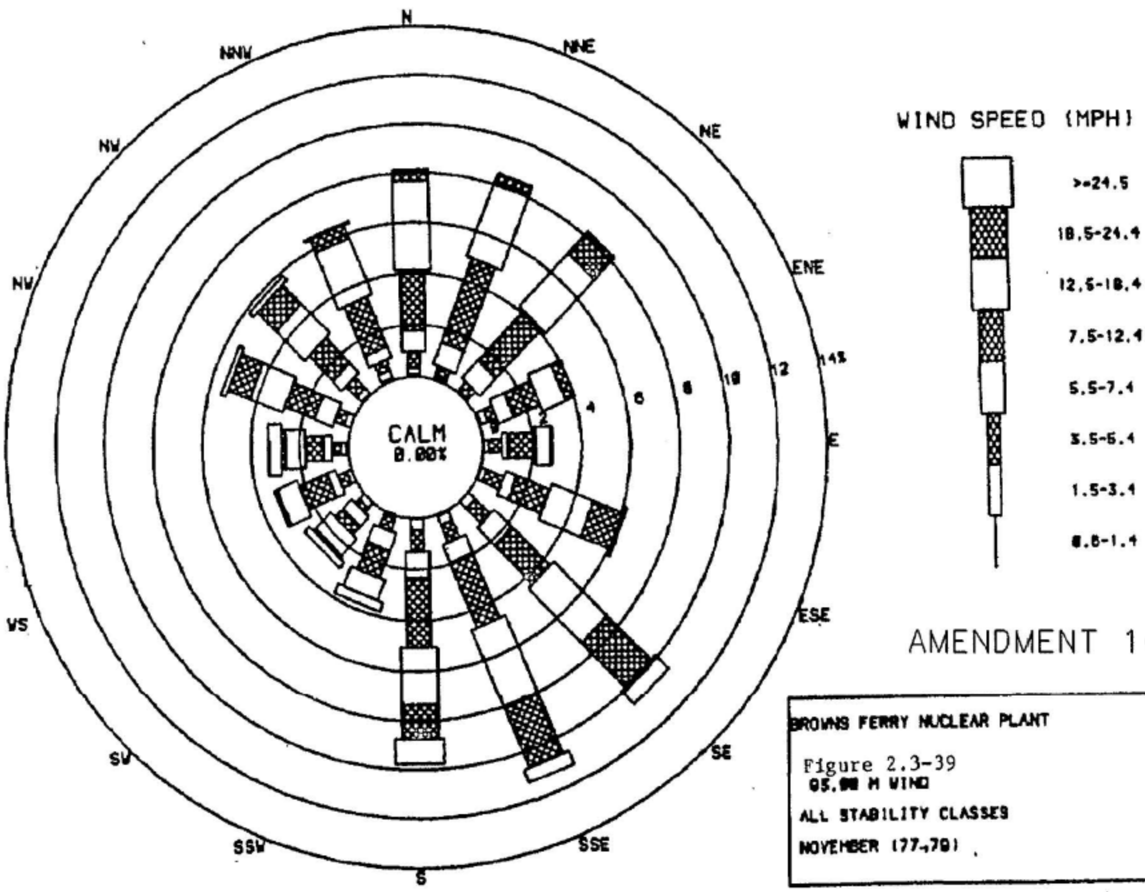
BROWNS FERRY NUCLEAR PLANT

Figure 2.3-38

93.00 M WIND

ALL STABILITY CLASSES

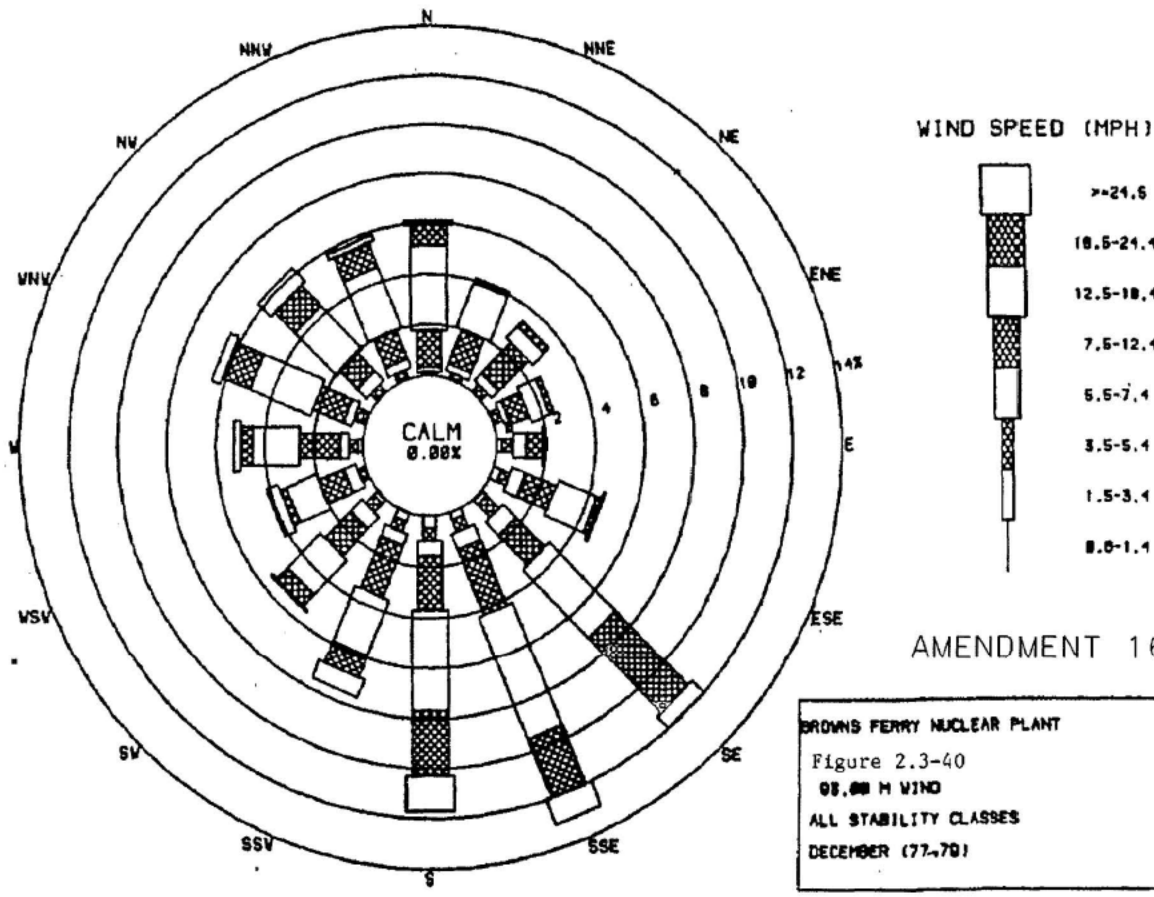
OCTOBER (77-79)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT

Figure 2.3-39
95.00 M WIND
ALL STABILITY CLASSES
NOVEMBER (77-79)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
Figure 2.3-40
93.00 M WIND
ALL STABILITY CLASSES
DECEMBER (77-79)

2.4 HYDROLOGY, WATER QUALITY, AND AQUATIC BIOLOGY

2.4.1 General

The various uses of water in the Browns Ferry area have been investigated. Ground and surface hydrology has been studied to determine the characteristics of both ground and surface water flow in the immediate plant area and the surrounding regional area. Water quality and biological monitoring programs have been developed and implemented to monitor water quality and biological life of Wheeler Reservoir during plant operation.

2.4.2 Hydrology

2.4.2.1 Ground Water

Ground water at Browns Ferry is derived from precipitation. Some of the precipitation evaporates, some runs off into streams, and some seeps into the soil. A portion of the water entering the soil is used by vegetation and some of it seeps downward to become ground water.

2.4.2.1.1 Regional Area

Studies of subsurface waterflow in the area indicate that ground water flows from the structural highs toward the structural lows. Elevations range from 556 at Wheeler Reservoir to 880 in the east Central part of Limestone County. Rock strata have a regional dip of about 20 ft/mile to the south and southwest, locally altered by minor anticlines and synclines. Both topography and drainage reflect the geologic structure of the area.

Rocks exposed in Limestone County are, from oldest to youngest, the Chickamauga limestone, Chattanooga shale, Fort Payne chert, and Tuscumbia limestone. The principal aquifer for Limestone County is the Mississippian Carbonate Regional Aquifer. At this site, the aquifer consists of the Tuscumbia Limestone and the Fort Payne Chert.

A mantle of residuum overlies the Fort Payne and Tuscumbia formations. Wells deriving their supply from the residuum are of low capacity. The residuum in the area consists of a mixture of silt, clay, chert, and discontinuous zones of chert gravel. The residuum is capable of storing large amounts of water, which are released at a slow rate to wells, springs, and solution channels in the underlying bedrock.

Ground water occurrence is restricted to fractures and solutional cavities in the bedrock. Generally large yields can be anticipated from Tuscumbia and Fort Payne formations.

2.4.2.1.2 Site Area

Ground water movement from the regional area into the Browns Ferry site area is controlled by topography and geologic structure. Recharge is also derived from local precipitation that has percolated through the residuum. Natural ground water movement in the area is from the plant site to the Tennessee River.

2.4.2.2 Surface Water

Surface water is derived from precipitation remaining after losses due to infiltration and evapotranspiration. It can be generally classified as local surface runoff or streamflow.

2.4.2.2.1 Surface Runoff

Surface runoff in the area flows down Poplar Creek, Douglas Branch, and Round Island Creek to the Tennessee River.

2.4.2.2.2 Streamflow

Regulatory Guide 1.27, “Ultimate Heat Sink for Nuclear Power Plants”, Revision 3, was used as the basis for evaluating the BFN UHS.

Per Regulatory Guide 1.27, Sections B, the BFN UHS must be capable of withstanding each of the most severe natural phenomena expected, other site-related events, appropriate combinations of natural phenomena or site-related events, and a single failure of manmade structural features without loss of capability of the UHS to accomplish its safety functions. The most severe phenomena may be considered to occur independently and not simultaneously (e.g., a tornado and an earthquake). In addition, the single failure of manmade structural features need not be considered to occur simultaneously with severe natural phenomena or site-related events unless the severe natural phenomena can cause failure of a manmade structural feature.

Per Regulatory Guide 1.27, Sections C.2.a, the BFN UHS must be capable of withstanding, without loss of the UHS safety functions, all of the following events:

(1) The most severe natural phenomena expected at the site in accordance with General Design Criteria (GDC) 2,
(2) The site-related events (e.g., transportation accident, river diversion) that historically have occurred or that may occur during the plant lifetime,
(3) Appropriate combinations of less severe natural phenomena and/or site-related events,

(4) Failure of reservoirs, dams, and other manmade water retaining structures both upstream and downstream of the site including the potential for resultant debris to block water flow; and

(5) Potential changes in ocean, river, or lake levels as a result of severe natural events, or possible changes in climatological conditions in the site region resulting from human or natural causes, that may occur during the plant lifetime.

a. Description of UHS

The Browns Ferry UHS is the Wheeler Reservoir, which was formed by the damming of the Tennessee River by the Wheeler Dam, located downstream of Browns Ferry, and the Guntersville Dam located upstream of Browns Ferry. This water area has been monitored since 1939. The Wheeler Reservoir provides water flow to the RHRSW system through the plant intake structure.

b. Inflow

Since 1939, streamflow records have been maintained at the Guntersville Dam on the Tennessee River. The average daily discharge flow for the period 1939 to 2015 has been 33,500 cfs. The maximum streamflow occurred on March 19, 1973, and was 304,400 cfs. The minimum daily average streamflow, 100 cfs, occurred several times during the period of record, due to regulation of Guntersville Dam. Generally, minimum daily flows are much higher.

Flow duration data for the period 1939 to 2015 were provided by the TVA River Management. This period of record, 76 years, represents a significant period of time
(i.e. - much greater than 30 years) and results in highly reliable data.

A review of the flow duration data observed during the time period between 1939 and 2015 shows that streamflow equal or exceed the following values for the indicated percentages of the time:

Streamflow, cfs	Percent of Time Equaled of Exceeded
230,298	0.1
129,500	2.3
56,425	15.9
33,500	50.0
17,700	84.1
7,100	97.7
1,319	99.9

It should also be noted that this data only accounts for flow through the Guntersville Dam and does not include additional flow from the various intermediate tributaries located between the Guntersville Dam and the Browns Ferry site. The intermediate tributary flows would add to the total flow available at the site.

Channel velocities at the Whitesburg gage, located upstream of Browns Ferry, were measured and average more than 2 ft/sec

Under normal winter conditions and a little more than 1 ft/sec under normal summer conditions.** These average winter and summer velocities drop to about 0.7 ft/sec and 0.3 ft/sec, respectively, at Browns Ferry where the reservoir is wider and the slope of the water surface is less.

A flood equal to the maximum of record would produce average velocities up to 4 ft/sec in the channel and up to 2 ft/sec in the overbank area. Average velocities produced by a maximum probable flood, regulated, would be about the same magnitude.

A location plan and cross-sections of the reservoir at the silt ranges (SR), and adjacent to the plant site are presented in Figures 2.4-1a through 2.4-1e. A longitudinal channel profile throughout Wheeler Reservoir is presented in Figure 2.4-2. The figure also identifies the sources of dependable watershed drainage with direct inflows into Wheeler Reservoir.

Failure of Wheeler Dam would require Browns Ferry plant to be shut down. The postulation of this event required an investigation into the effectiveness of the

** Velocity data obtained from "Tennessee River Computed Navigation Channel Velocities," TVA, July 1963.

remaining reservoir to provide adequate cooling water for the plant. If Wheeler Dam were to fail, a pool of water approximately 1000 feet wide and seven miles long (SR22 to SR31 on Figures 2.4-1b through 2.4-1e) would be available at the Browns Ferry plant site. The water would be trapped by a 529-ft elevation at the SR22 station. The cross-hatched areas on Figures 2.4-1b through 2.4-1e represent a trapped volume of about 69.6×10^6 cubic feet of water. The largest diffuser pipe reaches almost across the original river channel and extends above El. 529 for its full length. Thus, the trapped pool following a postulated failure of Wheeler Dam is essentially divided into two parts with about 33 percent downstream and 67 percent upstream of the diffusers.

The silt range profiles were taken from a survey made in August 1961; these profiles have been confirmed by 15 additional detailed silt range surveys made in August 1969 and a survey of SR24 and SR25 made in September 1989.
The results of six silt range surveys made over a 33-year interval (October 1936, May 1947, May 1953, June 1956, August 1961, and August 1969) confirm that the silting rate is insufficient to require extensive surveys at frequent intervals. This is consistent with findings from TVA's system-wide silt survey studies. Decisions about future updates for the cross sections around Browns Ferry and the frequency of the update are based upon this review. Since silting is the only mechanism for significantly reducing the volume of water available in the pool, this surveillance program will ensure against undetected decreases in pool volume. Silt transport during drawdown following a Wheeler Dam failure should not be a serious problem because of the large number of deep water pools upstream of the plant site.

Similarly, headwater elevation at the Wheeler Dam for the period 1939 to 2015 was provided by TVA River Management. Again, this period of record represents a significant timeframe and thus is considered to be very reliable. A review of the headwater elevation data observed during the time period between 1939 and 2015 shows that the headwater elevation, to the nearest tenth of a foot, equals or exceeds the following values for the indicated percentages of the time:

Headwater Elevation, ft	Percent of Time Equaled or Exceeded
556.3	0.1
556.0	3.5 (Maximum Normal Level)
555.7	15.9
553.5	50.0
551.1	84.1
550.0	99.2 (Minimum Normal Level)
549.6	99.9

Failure of Wheeler Dam would require Browns Ferry plant to be shut down. The postulation of this event required an investigation into the effectiveness of the remaining reservoir to provide adequate cooling water for the plant. If Wheeler Dam were to fail, a pool of water would be trapped by the relatively high thalweg (529-ft elevation) at Tennessee River Mile 291.8.

These minimum flows are combined with the leakage flow from Guntersville Dam to give a minimum flow of 100 cfs in the original river channel. This total flow, in traversing the pool created at the Browns Ferry site by the failure of Wheeler Dam, would have an average residence time of about 11-1/2 days.

The Browns Ferry plant intake and discharge arrangements are shown in Figures 12.2-69 through 12.2-75b, sheets 1, 2, and 3. The intake channel to the pumping station is excavated to El. 523 and extends into the reservoir until it connects with the original channel where the aforementioned pool would be trapped. The pumping station floor elevation is at 518 which gives a minimum of 11 ft of water inside the structure. (Eleven feet of water provides adequate submergence for the RHR service water pumps to deliver the shutdown cooling water requirements of 36,000 gpm (80 cfs) to the plant. This is sufficient flow to remove the decay heat from all three reactors plus the heat rejection from eight diesel generator sets operating at full load.) All of the cooling water is discharged from the plant through either the RHRSW diffuser nozzles upstream of the CCW diffusers or the storm sewer into the intake forebay.

c. Safety Evaluation

Regulatory Guide 1.27, Section C.2.a(1) - The most severe natural phenomena expected at the site in accordance with GDC-2

The intake structure has been designed for both flooding and seismic events. As a result, the most severe natural phenomena associated with the Wheeler Reservoir intake is a low level in the reservoir and a low inflow both associated with drought or hot weather conditions. Using the historical lowest flow from Guntersville Dam in combination with the historical lowest Wheeler Reservoir elevation ensures the most severe natural phenomena has been considered.

As indicated previously, the minimum inflow from Guntersville Dam was 1,319 cfs and the minimum reservoir level of the Wheeler Reservoir headwater elevation was 549.6'. Both of these conditions individually occurred less than 0.13 percent of the time during the period of record.

Since the 1,319 cfs influx alone is sufficient to provide a reliable heat sink (i.e. > 80 cfs), and the elevation of the reservoir is much greater than that required for adequate supply and submergence, the reservoir is acceptable for the most severe natural phenomena condition.

Regulatory Guide 1.27, Section C.2.a(2) – The site-related events (e.g., transportation accident, river diversion) that historically have occurred or that may occur during the plant lifetime

As specified earlier, the most severe regulation of outflow from Guntersville Dam during the period of record limited the flow to 100 cfs. The actual flow past the Browns Ferry site will be larger than this as a result of inflow from numerous incoming branches between Guntersville Dam and the site. However, the 100 cfs flow rate alone is sufficient to meet the 80 cfs accident and shutdown requirements of the plant. During this time, the water level in the Wheeler Reservoir would be expected to be at its average normal level of 553.5’, but would be no lower than its minimum normal level of 550.0’, both of which exceed the minimum required level for adequate flow and NPSH to the RHRSW pumps and provide a significant volume of water available to the plant. Additionally, a 30 day low Guntersville Dam discharge flow was determined during a period of several low flow days. The average discharge flow was still approximately 6,000 cfs, which more than supports the flow requirements of RHRSW.

Obstruction of the intake pumping station channel resulting from a river transportation accident is discussed in Section 12.2.7.6. At the normal minimum pool level of 550.0’, there is sufficient pool depth to ensure that adequate flow and NPSH to the RHRSW pumps is available to the plant.

Regulatory Guide 1.27, Section C.2.a(3) – Appropriate combinations of less severe natural phenomena and/or site-related events,

From an historical perspective, the inflow from the upstream Guntersville Dam and the Wheeler Reservoir levels combine in a myriad of ways throughout the year based on climatic conditions in the region. However, there are no reasonable combinations of reservoir level and inflow that would invalidate the ability of the reservoir to perform its safety function. The intake structure has been designed for both flooding and seismic events and is therefore capable of performing its safety function for all natural phenomena. The reasonable combination of the minimum normal Guntersville Dam flow of 1,319 cfs and the minimum normal Wheeler Reservoir level of 550.0 feet ensures the ability of the BFN UHS to perform its safety function.

Regulatory Guide 1.27, Section C.2.a(4) – Failure of reservoirs, dams, and other manmade water retaining structures both upstream and downstream of the site including the potential for resultant debris to block water flow.

A failure of the downstream Wheeler Dam was assumed as part of the design basis for the Wheeler Reservoir. This failure resulted in a consequential failure of the Wilson Dam further downstream. The analysis assumes no credit for normal effluent flow rates from the upstream Guntersville Dam. Inflow to the UHS is assumed to be limited to 100 cfs, which consists of the upstream Guntersville Dam effluent at the lowest recorded daily average flow rate in combination with the dependable watershed drainages upstream of BFN.

Therefore, the failure of the Wheeler and Wilson dams would result in the drain down of the Wheeler Reservoir to an approximate elevation of 529.0'. This elevation is more than sufficient to maintain adequate flow and NPSH to the RHRSW Pumps, which are necessary to supply shutdown cooling water to the three units. The inflow contribution to the UHS of 100 cfs is well above the minimum required flow of 80 cfs for one unit responding to an accident and two units in shutdown. Therefore, the BFN UHS fulfills its safety requirement after a single failure of a man made structure.

Regulatory Guide 1.27, Section C.2.a(5) – Potential changes in ocean, river, or lake levels as a result of severe natural events, or possible changes in climatological conditions in the site region resulting from human or natural causes, that may occur during the plant lifetime.

As specified earlier, the BFN UHS has been monitored since 1939 or more than 75 years. During this period the most severe regulation of outflow from Guntersville Dam limited the flow to 100 cfs. The actual flow past the Browns Ferry site will be larger than this because of inflow from numerous incoming branches between Guntersville Dam and the site. However, the 100 cfs flow rate alone is sufficient to meet the 80 cfs accident and shutdown requirements of the plant. During this time, the water level in the Wheeler Reservoir would be expected to be at its average normal level of 553.5', but would be no lower than its minimum normal level of 550.0', both of which exceed the minimum required level for adequate flow and NPSH to the RHRSW pumps and provide a significant volume of water available to the plant. Additionally, a 30 day low Guntersville Dam discharge flow was determined during a period of several low flow days. The average discharge flow was still approximately 6,000 cfs, which more than supports the flow requirements of RHRSW.

The Guntersville Dam flow rate and Wheeler Reservoir levels during the monitored period demonstrate that the BFN UHS can perform its safety function following potential changes in river flow or lake levels as a result of severe natural events, or possible changes in climatological conditions.

2.4.2.2.3 Floods

The Browns Ferry site is located on the right bank of Wheeler Reservoir at approximately Tennessee River mile (TRM) 294. The lowest natural ground elevation in the site vicinity is about 560 feet above mean sea level and the average ground elevation is about 580.

The probable maximum flood (PMF) at Browns Ferry is calculated to reach El. 571.7. However, the site PMF level is being maintained at elevation 572.5. This is the flood which defines the upper limit of potential flooding at the plant. A concise definition of PMF is given in Section 1.2, while the determination of PMF is described in Appendix 2.4A.

2.4.3 Water Quality

Information reflecting the water quality, water temperature, and aquatic biota conditions in the vicinity of the Browns Ferry Nuclear Plant (BFN) were incorporated into the Final Environmental Statement, Browns Ferry Nuclear Plant, Units 1, 2, and 3, Volumes 1, 2, and 3, TVA Office of Health and Safety, Chattanooga, Tennessee, September 1, 1972. Results of the preoperational water monitoring program for the period 1968 through 1973 are included in the report "Water Quality and Biological Conditions in Wheeler Reservoir Before Operation of Browns Ferry Nuclear Plant - 1968-1973." Results of the operational monitoring program for the period 1974 through 1980 were included in a series of five semiannual reports followed by five annual reports. The last report including the 1980 monitoring results was "Water Quality and Biological Conditions in Wheeler Reservoir During Operation of Browns Ferry Nuclear Plant January 1, 1980-December 31, 1980," Volumes I and II.

These monitoring and reporting requirements under the jurisdiction of NRC were determined to be duplicative of the requirements imposed by the Browns Ferry NPDES permit (AL 0022080) issued on June 30, 1977. In response to TVA's letter dated July 27, 1981, NRC notified TVA of their concurrence with this determination by letter dated December 10, 1981, and accepted TVA's recommendation to delete these monitoring requirements from the Browns Ferry Environmental Technical Specifications. All subsequent water quality, biological, and thermal monitoring and reporting have been and will continue to be in accordance with the requirements of the Browns Ferry NPDES permit (Permit No. AL 0022080) and/or TVA policy.

The most recent comprehensive evaluation of the aquatic conditions of Wheeler Reservoir is contained in the report "A Supplemental 316 (a) Demonstration For Alternative Thermal Discharge Limits For Browns Ferry Nuclear Plant, Wheeler Reservoir, Alabama," TVA, February 1983.

2.4.4 Water Use

The public and industrial water supplies which withdraw surface water from the Tennessee River in the 61-river mile reach from Decatur, Alabama to Colbert Steam Plant, not including Browns Ferry Nuclear Plant, are listed in Table 2.4-4.

2.4.4.1 Industrial

Major industrial water users are located both upstream and downstream of the Browns Ferry project. These users withdraw water from Wheeler Reservoir each day for process and cooling needs. Most of this water is subsequently returned to the reservoir.

2.4.4.2 Public

The major public uses of the reservoir are for water supplies, recreation, and waste disposal. Six public water supplies are taken directly from the Tennessee River portion of Wheeler, Wilson, and Pickwick Reservoirs within the reach from Decatur, Alabama, about 12 river miles upstream from the plant, to Colbert Steam Plant, about 49 river miles downstream from the plant. Eleven industrial supplies also withdraw water from the reservoirs in this same reach, and some use a portion of their withdrawal for potable water within the plant.

2.4.4.3 Browns Ferry Nuclear Plant

The Browns Ferry Nuclear Plant will use a large volume of water. When all three units are in operation, river water will be pumped through the plant at the rate of about 4,400 cfs. The temperature of this water will be elevated above its natural temperature. Heated condenser cooling water will be diffused into the main channel flow of the Tennessee River by a Diffuser System consisting of three perforated pipes laid side by side on the bottom of the channel near TRM 294. The Diffuser System is detailed in paragraph 12.2.7.5.

The containment, treatment, storage (including quantities), and pathways for release of liquid radiological effluents at BFN are detailed in Section 9.2 Liquid Radwaste System.

The nearest community surface water supply is at Decatur, Alabama, on Wheeler Reservoir 12 miles upstream from the Browns Ferry site. With normal operation of Guntersville and Wheeler Dams, there would be no flow upstream from Browns Ferry that would reach Decatur. Should a slug release (i.e., a finite volume of contaminant released nearly instantaneously into a receiving waterway) occur at a time when upstream flow to Decatur could conceivably occur, the river control system could be operated to prevent the upstream flow.

The first downstream water intake is the West Morgan-East Lawrence Water Authority intake located at TRM 286.5 on the left bank of Wheeler Reservoir. An analysis was made to determine the minimum dilution to be expected between the diffusers and the intake at West Morgan-East Lawrence for both accidental slug and continuous plane source releases. The following assumptions were used in the analysis.

1. Because the water intake is located on the bank opposite the plant, minimum dilution would occur when the release is fully mixed over the cross section of the reservoir. This is accomplished by configuring the release as a plane source placed vertically across the width of the channel.

2. Mixing calculations are based on steady flow conditions in the reservoir. River flow is assumed to be 33000 ft^3/sec. This is the flow which is equaled or exceeded in the reservoir approximately 50 percent of the time.

3. The concentration profile from an instantaneous (i.e. slug) release of contaminant is assumed to be Gaussian in the longitudinal direction.

4. The calculated contaminant concentration is conservative. Material discharged into the river does not degrade through radioactive decay, chemical or biological processes, nor is contaminant removed from the reservoir by adsorption to sediments or by evaporation.

All results are given in units of relative concentration, expressed as C/C_0 where C represents the concentration of contaminant at the point of interest, and C_0 is the concentration of contaminant at the point where it enters the reservoir. Dilution is the reciprocal of relative concentration.

The maximum relative concentration at the West Morgan-East Lawrence Water Authority intake due to a continuous plane source release rate Q (ft^3/sec) of contaminant is $3.0\ Q \times 10^{-5}$. The maximum relative concentration at this location due to an instantaneous plant source release of a volume V (ft^3) of contaminant is $3.2\ V \times 10^{-10}$. For the instantaneous relative concentration, the following parameter values were used:

channel width = 6000 ft,
channel depth = 35 ft,
longitudinal dispersion parameter = 200,
mixing coefficient (manning's n) = 0.03.

At the time of initial plant licensing, there were no private ground water wells located within one mile of the reactor building, and there were only eight houses located within one mile of the site perimeter which relied on groundwater as a source of water supply. Because all local groundwater in the plant site area flows directly to Wheeler Reservoir (see Section 2.4.2.1), it is improbable that any liquid released from the site could contaminate these sources of water supply through contamination of groundwater. Furthermore, with the containment provided for the liquid radwaste system (see Section 9.2), there is little likelihood of the release of liquid radwaste to the groundwater. In the event of any unusual release of radwaste liquid which could contaminate groundwater at the site, special local monitoring will be carried out in accordance with the Radiological Monitoring Plan, Browns Ferry Nuclear Plant, to ensure that the use of these wells will not result in undue hazards to any person, even though there is little likelihood of the wells becoming contaminated.

With the very unlikely event that the private wells located within one mile of the site perimeter could become contaminated, the public and industrial groundwater supplies in the site vicinity (all of which are located well beyond one mile from the site) would not be expected to be affected by plant operation. Consequently, the contamination of public and industrial groundwater supplies is not a concern at Browns Ferry requiring the monitoring and/or inventorying of such supplies.

However, a periodic inventory of the private wells located within one mile of the site reactor building will be conducted. Table 2.4-6 contains a list of the private wells as inventoried in 1989. Figure 2.4-3 shows the location of the private wells within one mile and two miles of the plant.

2.4.5 Aquatic Biota

The historic aquatic biological conditions and their associated routine monitoring and reporting are identified in Section 2.4.3 Water Quality.

2.4.6 Monitoring Programs

All Browns Ferry related radiological water quality and aquatic biological monitoring programs are being conducted and reported in accordance with the Browns Ferry Nuclear Plant Radiological Environmental Monitoring Program as described in the Browns Ferry Offsite Dose Calculation Manual.

Since 1981, all nonradiological water quality, aquatic biological, and water temperature monitoring programs have been and will continue to be conducted and reported in accordance with the Browns Ferry NPDES permit (Permit No. AL 0022080) and/or TVA policy. (See Section 2.4.3 Water Quality for a discussion of these monitoring programs prior to 1981.)

2.4.7 Conclusions

Ground water movement in the area is from the plant site to the Tennessee River. The principal aquifer in the area is overlain by a mantle of residuum that retards the movement of shallow ground water. Migration of radionuclides in the residuum would be quite slow. It is highly unlikely that the private groundwater wells located within one mile of the site perimeter could be contaminated by operation of BFN. Special local groundwater monitoring of these wells would be implemented in the event of a liquid radioactive release to the groundwater at BFN. Consequently, the potential for contamination of the public and industrial groundwater systems in the BFN area is not a concern which requires monitoring or inventorying of these systems. A periodic inventory of private wells within one mile of the site area will be implemented. Surface water runoff from the plant site is to the Tennessee River.

Surface water runoff from the plant site is to the Tennessee River. Regulated by the TVA flood control system, the probable maximum flood would result in increasing Wheeler Reservoir level to 572.5 feet above sea level at the site. Safety-related structures are protected against all flood conditions up to El. 578 as discussed in response to Question 2.6 and would not be endangered by the probable maximum flood.

All nonradiological water quality, biological, and thermal monitoring and reporting related to BFN has been and will continue to be conducted in accordance with the requirements of the NPDES permit and/or TVA policy.

Table 2.4-1

(Deleted by Amendment 6)

BFN-19

Table 2.4-2

(Deleted by Amendment 6)

BFN-19

Table 2.4-3

(Deleted by Amendment 6)

TABLE 2.4-4

PUBLIC AND INDUSTRIAL SURFACE WATER SUPPLIES WITHDRAWN FROM THE 61 MILE REACH OF THE TENNESSEE RIVER BETWEEN DECATUR ALABAMA AND TVA COLBERT STEAM PLANT

Plant Name	Average Daily Use (MGD)	Location	Approximate Distance From Site (River Miles)	Type Supply
Decatur, (Ala.)	26.92	TRM 306	12 (Upstream)	Municipal
Solutia Company (Ala.)	120.30	TRM 302	8.0 (Upstream)	Industrial
3M Company (Ala.)	12.96	TRM 299.7	5.7 (Upstream)	Industrial
Amoco Chemicals Corp. (Ala.)	6.63	TRM 299.5	5.5 (Upstream)	Industrial
Browns Ferry Nuclear Plant (Ala.) (Diffuser Location)		TRM 294R	0.0	
West Morgan-East Lawrence Water Authority (Ala.)	4	TRM 286.5L	7.5 (Downstream)	Municipal
Champion International (Ala.)	55.90	TRM 282.6L	11.4 (Downstream)	Industrial
TVA-Wheeler Dam (Ala)*	#	TRM 274.9	19.1 (Downstream)	Industrial
Reynolds Metals Company (Ala.)	3.11	TRM 261L	33.0 (Downstream)	Industrial
Florence (Ala.) **	6.70	TRM 259.8R and Cypress Cr 8.4	34.2 (Downstream)	Municipal
Muscle Shoals (Ala.)	3.61	TRM 259.6L Fleet Hollow Embayment Mi. 0.4	34.4 (Downstream)	Municipal
TVA-Environmental Research Center ERC (Ala.)	4.50	TRM 259.5L Fleet Hollow Embayment Mi. 0.5	34.5 (Downstream)	Industrial & Potable
TVA Wilson Dam (Ala.) ***	#	TRM 259.4	34.6 (Downstream)	Industrial
Occidental Chemical Co. (Ala.)	14.40	TRM 258.4L	35.6 (Downstream)	Industrial
Sheffield (Ala.)	2.10	TRM 254.3L	39.7 (Downstream)	Municipal
TVA Colbert Steam Plant (Ala.)	1250.00	TRM 245	49.0 (Downstream)	Industrial
Cherokee (Ala.)	12.80	TRM 239.3L	54.7 (Downstream)	Municipal
Laroche Industries	39.60	TRM 238.7L	55.3 (Downstream)	Industrial

* Water used for industrial purposes only. Potable water is purchased from East Lauderdale County Water District.

** Florence has two water treatment plants. The Cypress Creek Plant is not included in this number.

*** Water used for industrial purposes only. Potable water is from TVA-Property Services and Property Operation (PS&PO).

\# Water usage is not metered.

Table 2.4-5

(Deleted by Amendment 6)

Table 2.4-6

(Sheet 1)

Private Water Wells Within Two Miles of BFNP Stack, June 1995

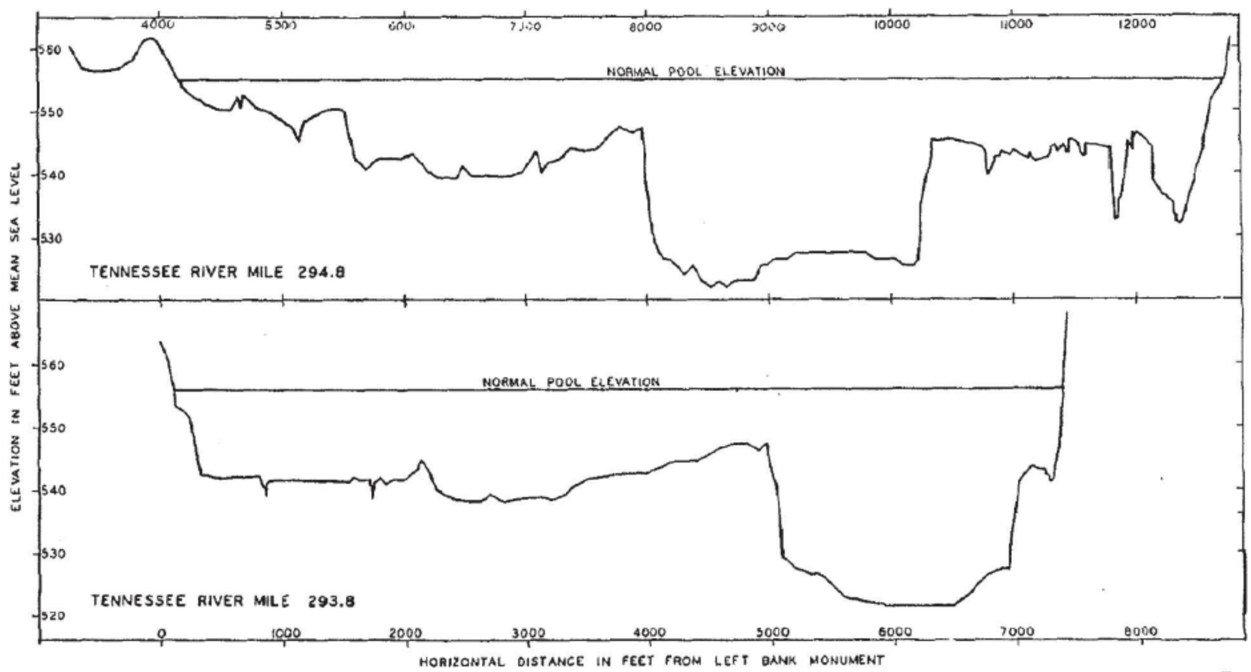
Well No.	Owner	Well Depth (ft)	Use
1A	Jesse Crouch (Renter)	38	Not Used
1B	Jesse Crouch (Renter)	25.5	Not Used
1C	Jesse Crouch (Renter)	32.5	Not Used
2	Unknown	--	Unknown
3	Ronnie Crouch	127	Not Used
4	Leonard Hudson	167	Household
5	Thurman C. Burns	185	Not Used
6	Dr. Wm. A. Sims	--	Not Used
7	James G. Ratliff	--	Unknown
8	J. M. Hall	78	Not Used
9	Leander Fau k	66	Not Used
10	Leland	--	Not Used
11	Ted Russ	61	Not Used
12	Nellie Haggermaker	--	Not Used
13	Thurman C. Burns	65	Not Used
14	T. C. Bozeman	48	Not Used
15	Vivian Mock	64	Not Used
16	Leech	--	Not Used
17	Wm. N. Clingan	--	Not Used
18	Name Not Available	2.5	Not Used
19	Lee Townsend	60	Household
20	Wayne Black	65	Not Used
21	John W. Roberts	28	Not Used
22	A. R. Barron	62	Not Used
23	W. D. Boggs	--	Unknown
24	Sam Lanza		Unknown
	Renter - James Castle	--	
25	Clifford Taylor	--	Unknown
26	Unknown	--	Unknown
27	Wm. L. Priest	55	Not Used
28	George B. Walker	35	Household
29	Ret. Col. S. H. Wade	60	Not Used
30	Charles McCormack	64	Not Used
31	Unknown	--	Unknown
32	W. M. Howard	--	Unknown
33	Glenn Ross	30	Not Used
34	Robert R. Leonard	--	Not Used

Table 2.4-6 (Cont'd)

(Sheet 2)

Private Water Wells Within Two Miles of BFNP Stack, June 1995

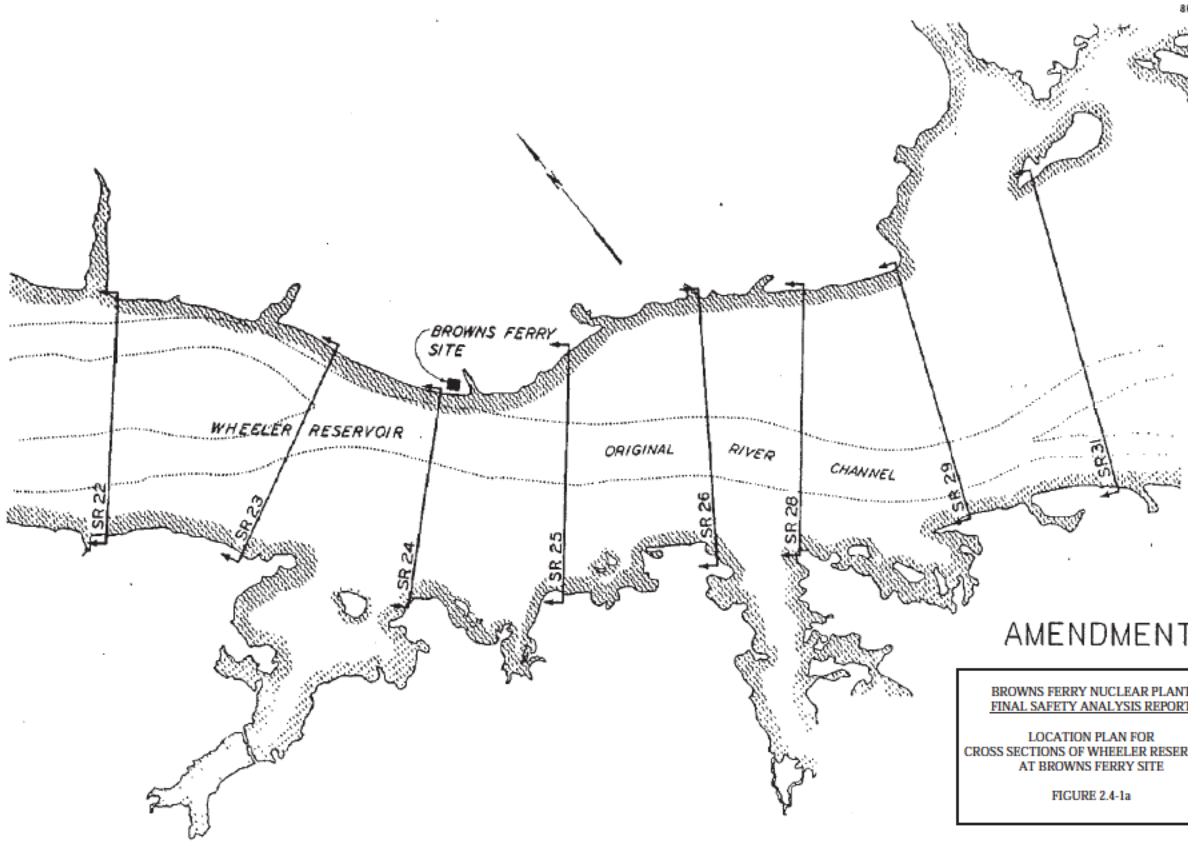
Well No.	Owner	Well Depth (ft)	Use
35	Mike Morrow	48	Not Used
36	Unknown	--	Unknown
37	Joe Cannon	48	Not Used
38	O'Neal Terry	76	Not Used
39	J. D. Walker, Jr.	75	Not Used
40	Loyd Barham	100	Not Used
41	Charles R. Aday	200	Not Used
42	Kenneth King	74	Not Used
43	Mike Basden	--	Not Used
44	Russell Mattox	50	Not Used
45	John T. Nelms	45	Not Used
46	Mrs. Lyle (Faye) Cheatham	--	Household
47	Neal Holland, Jr.	80	Not Used
48	Percy Terry	40	Not Used
49	Wayne Coggin	90	Not Used
49A	Wayne Coggin	50	Irrigation
50	Phillip Geddes	92	Not Used
51	Mrs. M. J. Watkins	100	Not Used
52	Claude Morris	60	Not Used
53	Norman Puckett	52	Not Used
54	Wayne White	62	Household
55	Troy Williams	36	Not Used
56	Dr. Chas. H. Burt	90	Not Used
57	Jim Jordan	60	Not Used
58	Dr. Wayne Brannon	45	Not Used
59	Bobby D. Hamilton	40	Not Used
60	Dr. Sidney Chennault	90	Not Used
61	Dr. Lloyd Nix	38	Not Used
62	Wayne Black	160	Household



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

Cross Sections of Wheeler Reservoir at
Browns Ferry Site
FIGURE 2.4-1



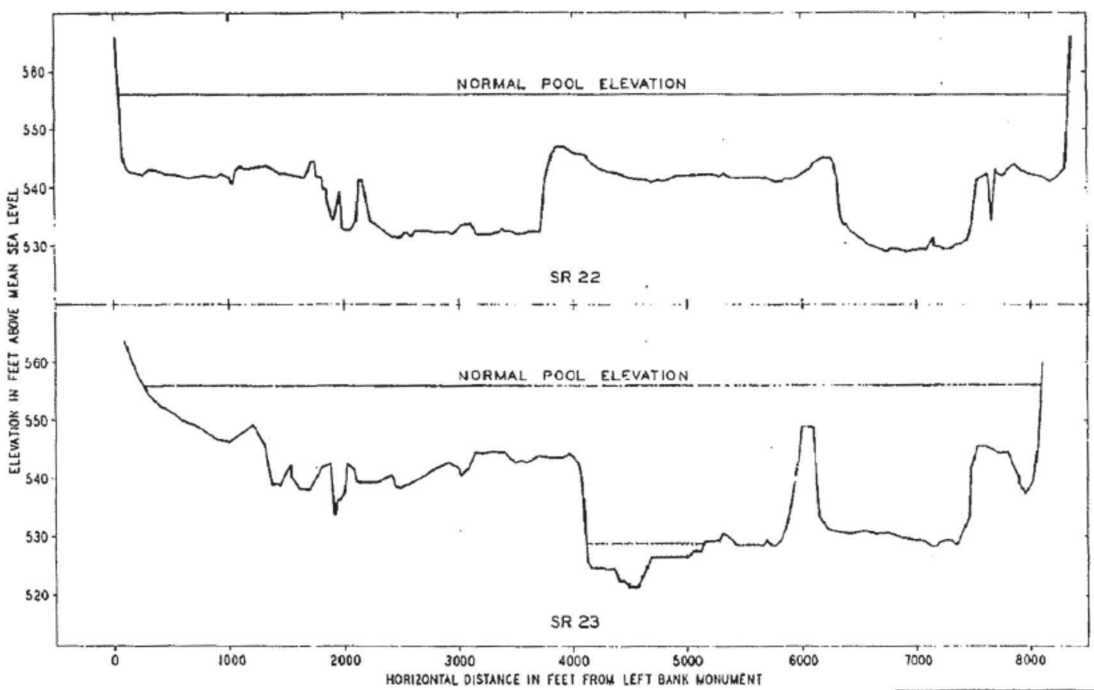
AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

LOCATION PLAN FOR
CROSS SECTIONS OF WHEELER RESERVOIR
AT BROWNS FERRY SITE

FIGURE 2.4-1a

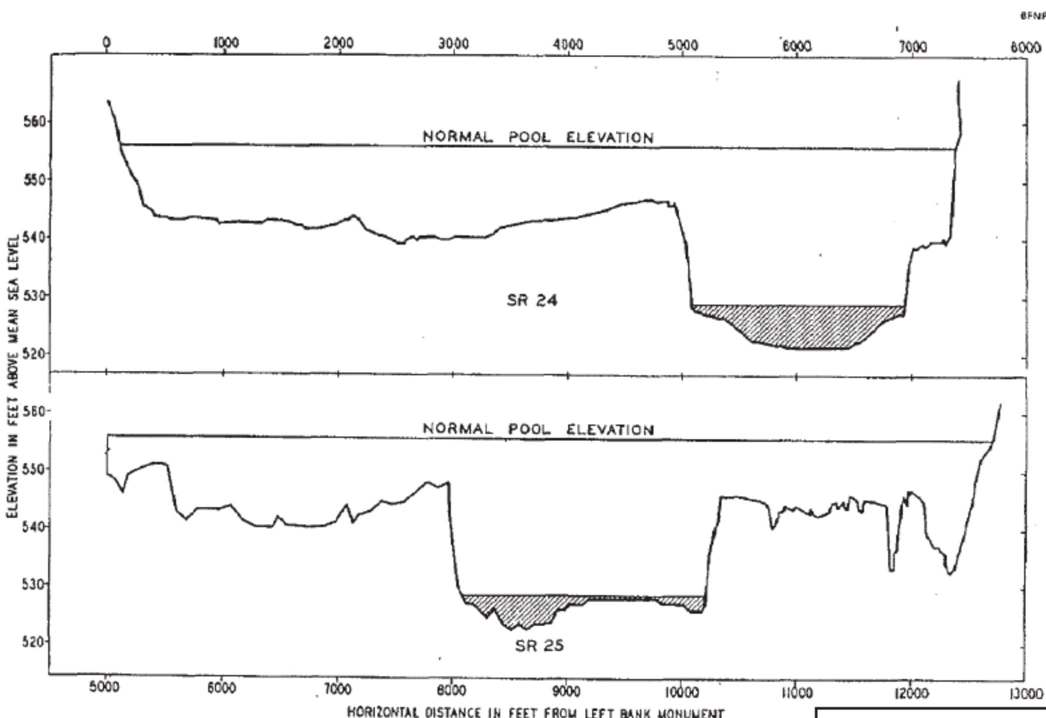
BFNP



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

CROSS SECTIONS OF WHEELER RESERVOIR
AT BROWNS FERRY SITE - Sheet 1
FIGURE 2.4.1b



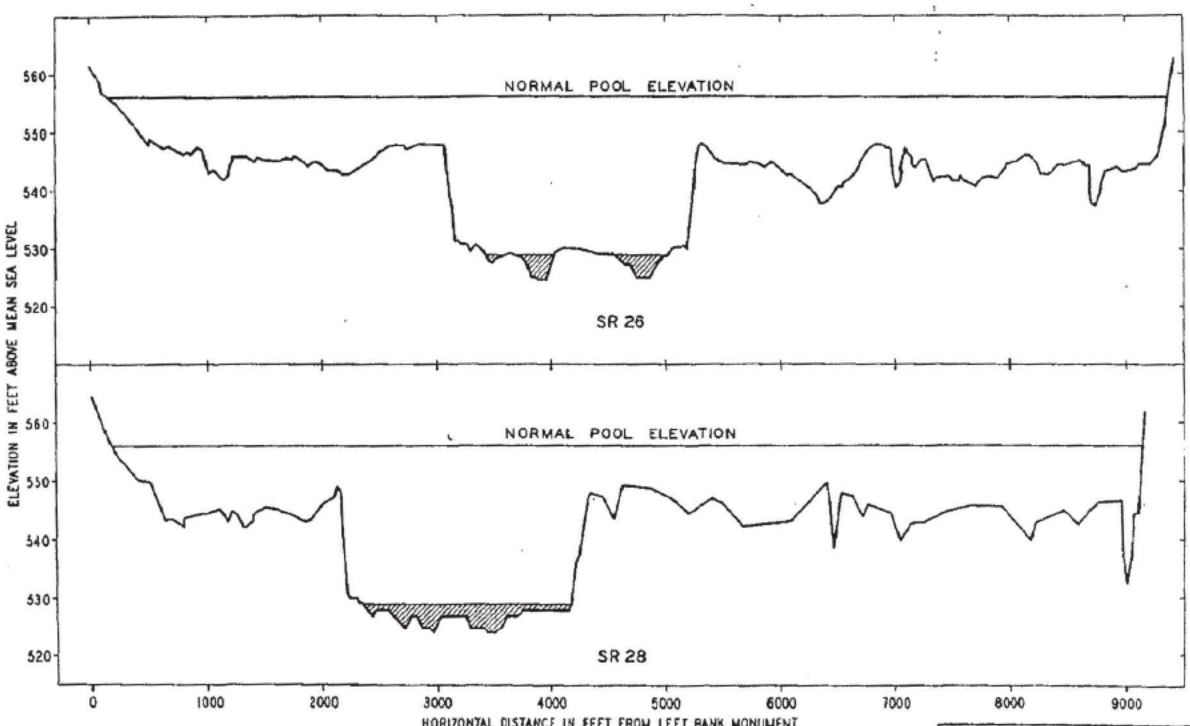
AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

CROSS SECTIONS OF WHEELER RESERVOIR
AT BROWNS FERRY SITE - Sheet 2

FIGURE 2.4-1c

BFNP

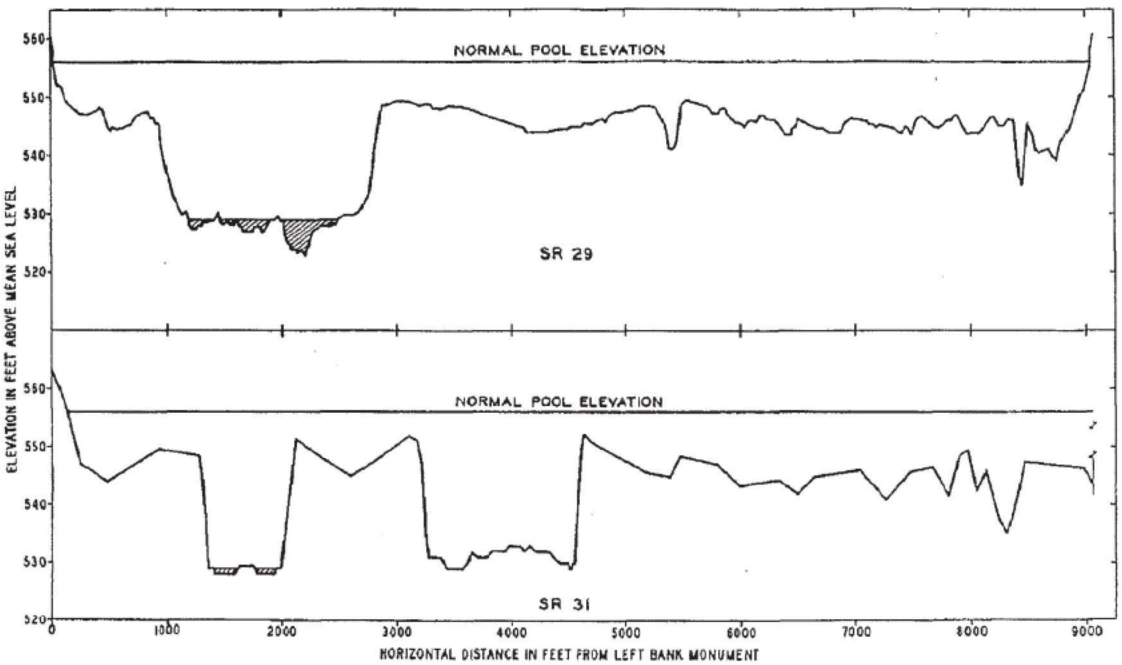


AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

CROSS SECTIONS OF WHEELER RESERVOIR
AT BROWNS FERRY SITE - Sheet 3
FIGURE 2.4 1d

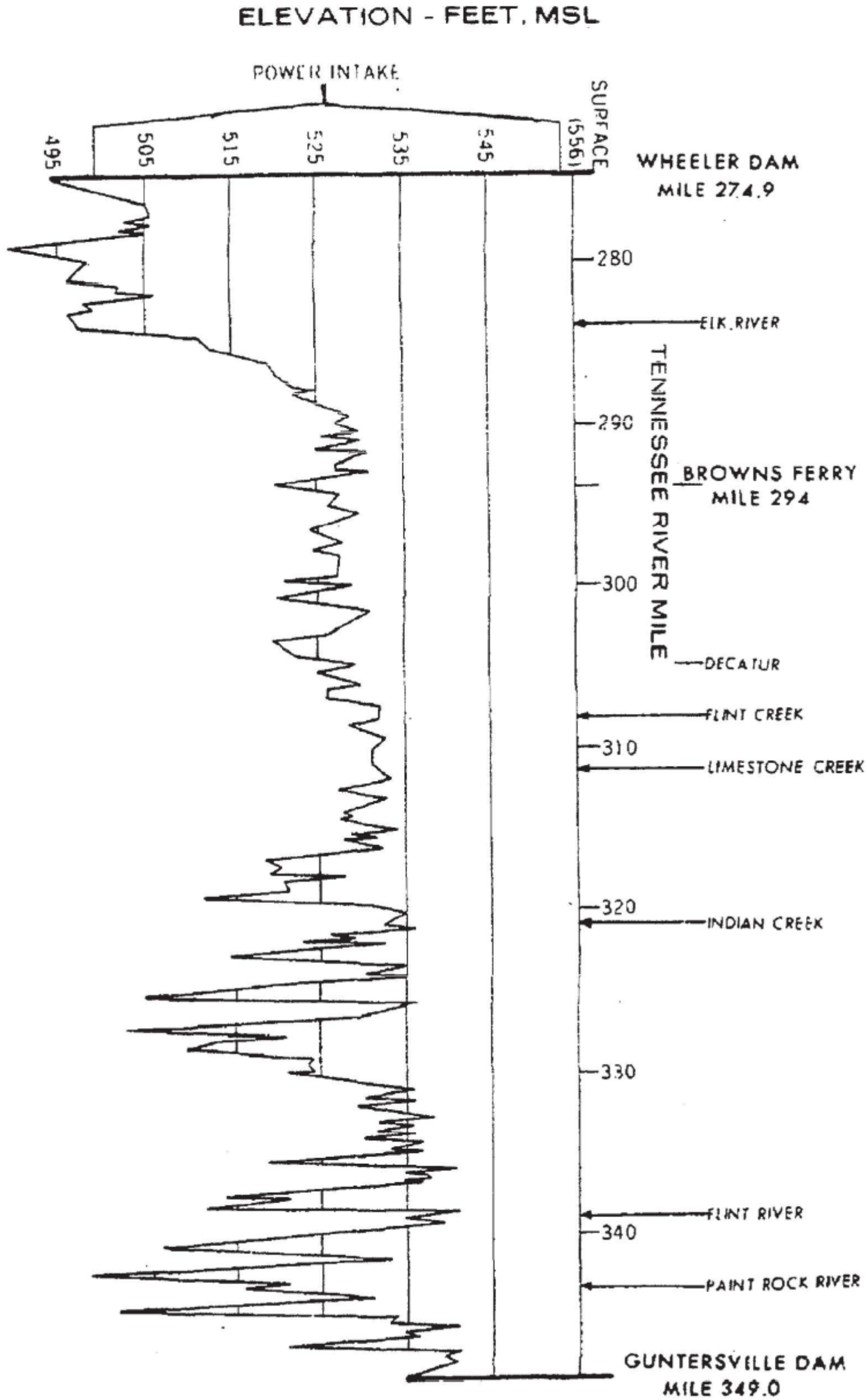
BFNP



BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

CROSS SECTIONS OF WHEELER RESERVOIR
AT BROWNS FERRY SITE–Sheet 4
FIGURE 2.4-1e

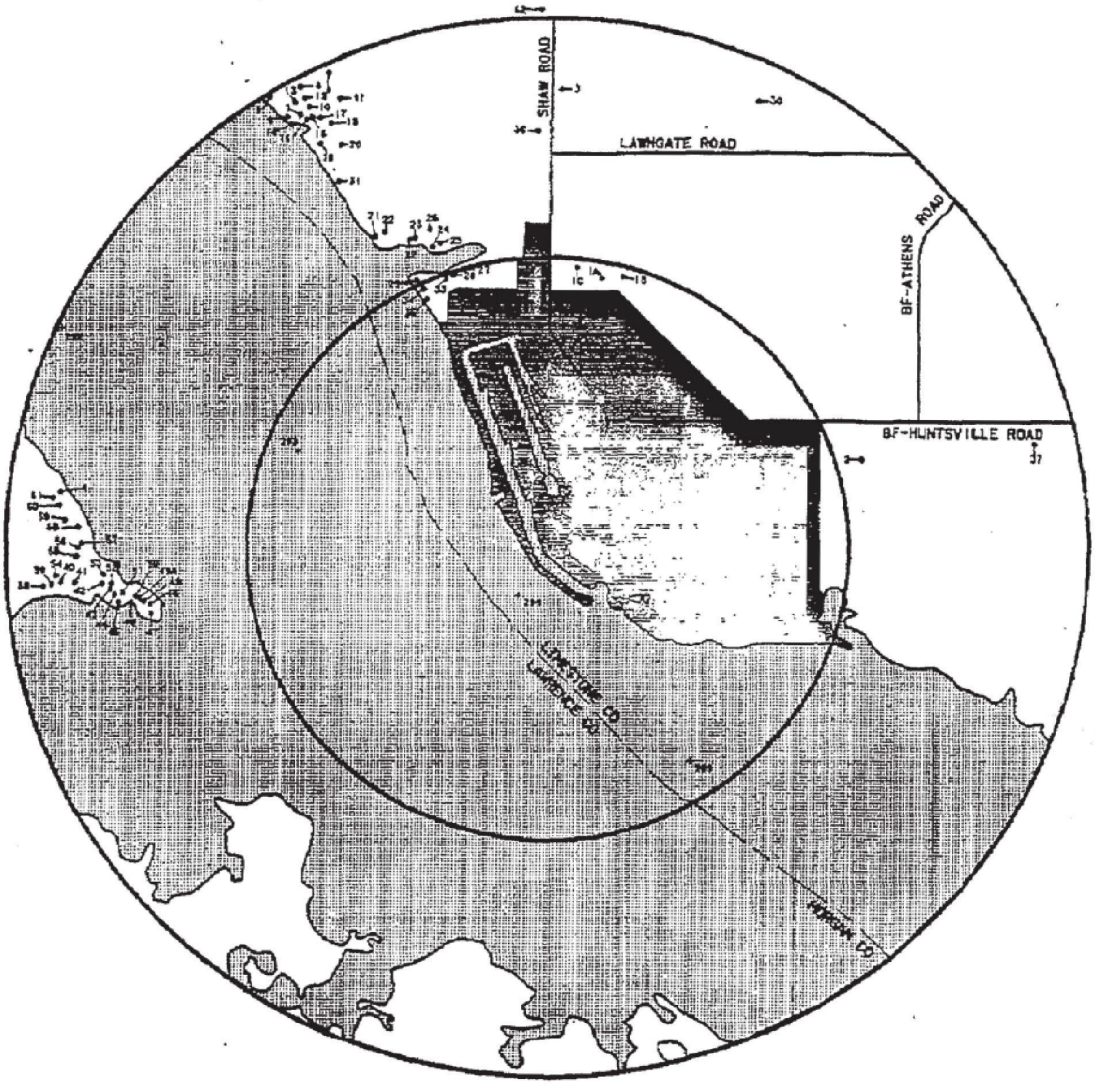
AMENDMENT 16



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

Channel Profile – Wheeler Reservoir
FIGURE 2.4-2



LEGEND:
- ROAD
- WATER
- PLANT SITE
- REACTOR BUILDING
- GROUNDWATER WELL

AMENDMENT 16

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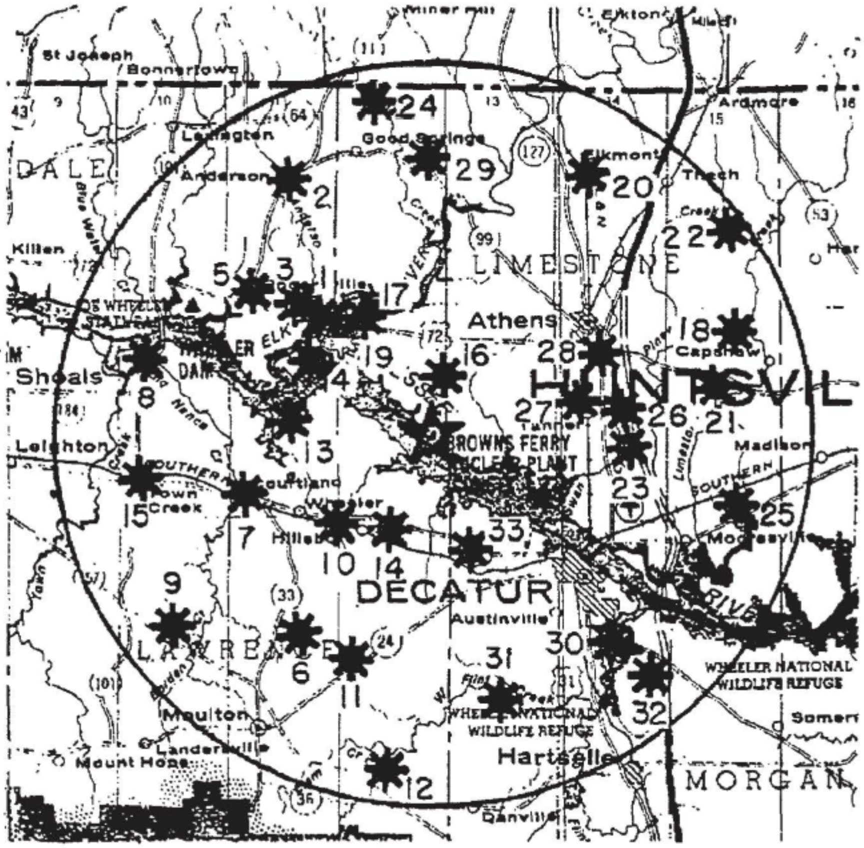
FIGURE 2.4-3 BROWNS FERRY NUCLEAR PLANT - PRIVATELY OWNED GROUNDWATER WELLS - 1 AND 2 MILE RADIUS FROM THE STACK



BROWNS FERRY NUCLEAR PLANT

★ Plant Site

✱ Ground Water Supply

NOTE: The number associated with the symbol corresponds to the numbering in Table 2.4-5

Scale of Miles

10 0 10 20

AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

Ground Water Supplies Within
20 mile Radius of Plant Site
FIGURE 2.4-4

APPENDIX 2.4A

BROWNS FERRY NUCLEAR PLANT

PROBABLE MAXIMUM FLOOD (PMF)

CONTENTS

TABLES

FIGURES

APPENDIX 2.4A
BROWNS FERRY NUCLEAR PLANT
PROBABLE MAXIMUM FLOOD (PMF)

INTRODUCTION

This appendix describes the determination of maximum flood conditions at Browns Ferry Nuclear Plant. The plant could possibly be flooded by the Tennessee River, by a small stream northwest of the plant, and by intense local storms which overtax the site drainage system. Each situation has been examined and is discussed separately in this appendix. The main body of the appendix discusses the determination of maximum flood levels resulting from conditions on the Tennessee River.

The Browns Ferry plant is on the right bank of Wheeler Reservoir at Tennessee River mile (TRM) 294, 55 miles downstream from Guntersville Dam and 19 miles upstream from Wheeler Dam. The 27,130-square-mile watershed drains the rugged southern Appalachian Mountains, the second highest annual rainfall-producing area in the conterminous United States, portions of the Cumberland Plateau and Highland Rim, and extends into parts of six states.

Definition

The term “probable maximum flood” (PMF), is used by TVA to describe the hypothetical flood which would result from an occurrence of the probable maximum precipitation (PMP) critically centered on the watershed as defined by the National Weather Service. The computational procedures used to translate this PMP rainfall into flood flows result in a flood hydrograph which defines the upper limit of potential flooding at the plant. Such a flood was earlier called the "maximum possible flood" by the Browns Ferry Nuclear Plant. The flood was determined by deterministic procedures, however most hydrologists agree that the probability of occurrence of the flood in a particular year closely approaches zero.

Data Available

The Tennessee River Basin above Wheeler Dam is a gaged watershed. TVA began its program of hydrologic data collection upon its creation in 1933. The program has continually evolved since that date. There are currently 142 rain gages and 42 recording stream gages which measure rainfall and stream-flows in the basin above Wheeler Dam. The period of above-average hydrologic gaging extends back to 1935 when TVA began its expanded program of hydrologic data collection.

The nearest location with extensive, formal flood records is 37 miles downstream at Florence, Alabama, where continuous records are available since 1871. Knowledge about significant floods extends back to 1867 based upon newspaper and historical reports.

TVA has developed procedures for predicting stream flows for use in the daily operation of the reservoir system. The forecast procedure begins with rainfall and proceeds through all the hydrologic calculations necessary to translate this rainfall into reservoir inflows. The present forecast procedure for Wheeler Reservoir has been in continuous use with modifications dictated by experience since 1952.

An important element of these flood forecasts was the analysis of flood events using rainfall developed by the Hydrometeorological Branch, Office of Hydrology, National Weather Service (NWS). The results of NWS rainfall studies are contained in Hydrometeorological Report No. 41, "Probable Maximum and TVA Precipitation Over the Tennessee River Basin Above Chattanooga," published in June 1965, and HMR 47,"Meteorlogical Criteria for Extreme Floods for Four Basins in the Tennessee and Cumberland River Watersheds," issued May 1973.

SUMMARY OF RESULTS

Maximum possible discharge from the Tennessee River at Browns Ferry Nuclear Plant is 1,200,000 cubic feet per second (cfs) with corresponding maximum elevation at the plant of 572.5. The PMF elevation includes allowances for failure of portions of an earth saddle dam at Watts Bar dam and earth embankment sections at Chickamauga, Nickajack, and Guntersville Dams located upstream of the plant.

The maximum possible discharge from the small stream northwest of the plant is 17,200 cfs. The channel system has been designed to prevent flooding of the plant in the event such a flood should occur.

At the plant the maximum concentration of drainage is northwest of the main building complex. Flow restrictions will cause water surface elevations to reach El. 566.6 between the office and service buildings.

THE WATERSHED

Physiography

The Tennessee River at Browns Ferry Nuclear Plant, mile 294, drains a 27,130-square-mile watershed area above the plant. Guntersville Dam, 55 miles upstream, has a drainage area of 24,450 square miles. Wheeler Dam, the next dam downstream, the headwater of which affects flood elevations at the plant, has a drainage area of 29,590 square miles.

The major tributaries upstream of Chattanooga, drainage area 21,400 square miles, except for the Clinch and Holston Rivers rise to the east in the rugged southern Appalachian Highlands. They flow northwestward through the Appalachian Divide, which is essentially defined by the North Carolina-Tennessee border, to join the Tennessee River which flows southwestward. The drainage pattern is shown on Figure 1. The Tennessee, Clinch, and Holston Rivers flow southwest through the valley and ridge physiographic province which, while not as rugged as the Southern Highlands, features a number of mountains including the Clinch and Powell Mountain chains. Downstream of Chattanooga the only major tributary is the Elk River which joins the Tennessee River above Wheeler Dam and downstream from the plant. About 10 percent of the watershed rises above El. 3000 feet with a maximum elevation of 6684 feet at Mount Mitchell, North Carolina. The watershed is about 60 percent forested with much of the more mountainous area being 100 percent forested.

Climate

The climate of the watershed is classified as humid temperate. Above Wheeler Dam annual rainfall averages 51 inches and varies from a low of 40 inches at sheltered locations within the mountains to high spots of 90 inches on the southern and eastern divide. Rainfall occurs relatively evenly throughout the year. The lowest monthly average is 3.0 inches in October. The highest monthly average is 5.1 inches in March.

Major flood-producing storms are of two general types: the cool season, winter type and the warm season, hurricane type. Most floods at Browns Ferry Nuclear Plant, however, have been produced by winter-type storms in the flood-season months of January through April.

Watershed snowfall is relatively light, averaging only about 14 inches annually. Individual snowfalls are normally light with an average of 13 snowfalls per year. Snowfall is not a factor in maximum flood determinations.

RESERVOIR SYSTEM

General Description

The Tennessee River, particularly above Chattanooga, Tennessee, is one of the most regulated rivers in the United States. A prime purpose of the TVA water control system is flood control with particular emphasis on protection for Chattanooga, 170 miles upstream from Browns Ferry Nuclear Plant.

There are 22 major reservoirs in the TVA system upstream from Browns Ferry Nuclear Plant, 11 of which have substantial reserved flood detention capacity on March 15. Table 1 lists pertinent data for TVA's major dams. In addition, there are six major dams owned by the Aluminum Company of America (ALCOA). The ALCOA reservoirs often contribute to flood reduction, but they do not have dependable reserved flood detention capacity. The locations of these dams are shown on Figure 1.

Flood Detention Capacity

Flood control above the plant is provided largely by tributary reservoirs. On March 15, near the end of the flood season, these provide a minimum of 4,484,000 acre-feet equivalent to approximately 5.5 inches on the 15,237 square-mile area they control. This is approximately 82 percent of the total available above the plant. The four main river reservoirs-Fort Loudoun, Watts Bar, Chickamauga, and Guntersville-provide 997,400 acre-feet equivalent to 1.6 inches on the 11,893-square-mile area above the plant and lying below the major tributary dams.

The flood detention capacity reserved in the TVA system varies seasonally, with the greatest amounts during the January through March flood season. Figures 2 and 3 show typical tributary and main river reservoir seasonal operating guides. Total assured system detention capacity above Wheeler dam varies from 3.8 inches on January 1 to 3.7 inches on March 15 and decreases to 1.1 inch during the summer and fall. Actual detention capacity may exceed these amounts, depending upon inflows and power demands.

Wheeler Dam, the headwater elevation of which affects flood elevations at the plant, has a drainage area of 29,590 square miles, 5,140 square miles more than Guntersville Dam. There is one major tributary dam, Tims Ford, in the 5,140-square-mile intervening watershed. On March 15, near the end of the flood season, this project provides a minimum of 167,000 acre-feet equivalent to approximately 5.9 inches on the 529-square-mile controlled area. Wheeler Dam contains 326,500 acre-feet of detention capacity on March 15 equivalent to 1.3 inches on the remaining 4,611 square miles.

HYDROGRAPH DETERMINATION

General Description

The hydrologic model used to determine flood hydrographs at Browns Ferry Nuclear Plant and downstream at Wheeler Dam is one in which the total basin is divided into unit areas, the outflows of which are combined to determine total basin outflows. Unit hydrographs are used to compute flows from unit areas. These flows are combined with appropriate time sequencing to compute inflows into the most upstream reservoirs which in turn are routed through the reservoirs using standard techniques. Resulting reservoir outflows are combined with the additional local inflows and continued downstream using appropriate time sequencing or routing procedures. The hydrologic model results ensure that each of the unit areas reflect watershed response to rainfall and the total system will reproduce the largest floods experienced since completion of the basic TVA reservoir system.

Unit Hydrographs

The total watershed for the Guntersville-Wheeler Reservoir inflow estimating system is divided into 62 unit areas as shown by Figure 4. A unit hydrograph has been developed for each of the unit areas from flood hydrographs either recorded at stream gaging stations or estimated from flood data using reservoir headwater elevation, inflow, and discharge data. Figure 5, which contains 14 sheets, shows the unit hydrographs developed for each unit area. Table 2 contains essential dimensional data of each unit hydrograph.

Reservoir Routing

Tributary reservoir routings were made using standard reservoir routing procedures and flat pool storage conditions. The tributary reservoirs, Tellico and Melton Hill, and the main river reservoirs were routed using unsteady flow techniques.

Unsteady flow routings were computer solved with a mathematical model based on the equations of unsteady flow. This model is described in a paper by Jack M. Garrison, Jean-Pierre Granju, and James T. Price entitled "Unsteady Flow Simulation in Rivers and Reservoirs," Journal of the Hydraulics Division, ASCE, Volume 95, No. HY5, September 1969. Boundary conditions prescribed were inflow hydrographs at the upstream boundary, local inflows, and headwater discharge relationships at the downstream boundary based upon standard operating rules or rating curves where geometry controlled, as appropriate.

Verification

The total area hydrologic model for estimating flood hydrographs was verified by using it to reproduce the March 1973 and the December 2004 floods which are two of the largest floods of record. A comparison between the observed elevations on Wheeler reservoir and the computed outflow at Wheeler Dam for the 1973 flood are shown in Figures 6 and 7, respectively, and for the 2004 flood in Figures 8 and 9, respectively.

The unsteady flow model was used to verify historic flood events in all reservoirs where unsteady flow routing was used. Since the Tellico Dam was not closed until 1979, there is no information available to verify the 1973 flood. Therefore, Federal Emergency Management Agency (FEMA) published 100- and 500-year profiles were used for the verification of this portion of the model.

Verifying the reservoir models with actual data approaching the magnitude of the PMF is not possible, because no such events have been observed. Therefore, using flows in the magnitude of the PMF (1,200,000 - 1,400,000 cfs) steady state profiles were computed using the two steady state models. An example of this comparison between the profiles for the two models is shown for Wheeler Reservoir in Figure 10. This approach was applied for each of the unsteady flow reservoir models. Similarly, the tailwater rating curve was compared at each project as shown for Guntersville Dam in Figure 11. In this figure, the initial tailwater curve is compared to results from the steady flow models.

Breached Earth Embankments

The main river dams upstream from Wheeler include earth embankments which could fail if overtopped. Maximum flood level determinations at Browns Ferry Nuclear Plant are based on the postulated failure of any earth embankment which is overtopped with time of failure based on results of the breach analysis of each embankment.

The relationship to compute the rate of erosion in an earth dam failure is that developed by the Bureau of Reclamation. The expression relates the volume of eroded fill material to the volume of water flowing through the breach. This relationship is used only to determine the time of failure of an overtopped earth embankment. At the determined time of failure, the embankment is postulated to fail instantaneously and completely.

The solution to determine if an earth embankment would fail begins by solving the erosion equation using a headwater elevation hydrograph assuming no failure. Erosion is assumed to occur across the entire earth section and to start at the downstream edge when headwater elevations reach 0.1 foot above the dam top elevation. When erosion began to lower the dam top elevation, the computations included headwater elevation adjustments for increased reservoir outflow resulting from the breach.

During the PMF analysis the earthen embankments at Cherokee, Fort Loudoun, Tellico and Watts Bar dams were shown by the hydraulic model to be susceptible to overtopping. The protection of these embankments was recognized as important to TVA dam safety as well as the protection for the nuclear plants. Therefore, these embankments were protected, temporarily, with HESCO Concertainers® and are planned to be replaced by permanent protection measures against overtopping. The additional height of these temporary flood barriers are included in the hydraulic model analysis and show that the embankments at these four dams would not be overtopped. Nickajack Dam and Guntersville Dam embankments were modified as a part of the TVA Dam Safety Program based on analysis at the time and were modified in 1992 and 1995, respectively. However, the west saddle dam at Watts Bar, and earthen embankments at Nickajack, Guntersville, and Chickamauga dams were overtopped based on results of the hydraulic model analysis and are postulated to fail.

The postulated failure of Guntersville Dam earth embankments in the Browns Ferry PMF is typical of the results obtained using this procedure. Figure 12 is a general plan of Guntersville Dam showing elevations and sections. The failure calculations were made assuming that 1026 feet of the south embankment could fail to average original ground elevation 564 and the remaining 864 feet of the south embankment fails to elevation 599 which is the elevation of the switchyard adjacent to the embankment. Five hundred feet of the north embankment could fail to average ground elevation 606, the elevation of the parking area adjacent to the north embankment.

PROBABLE MAXIMUM PRECIPITATION

Probable maximum precipitation (PMP) for the watersheds above Wheeler and Guntersville Reservoirs has been defined for TVA by the Hydrometeorological Branch of the National Weather Service. Two basic storm situations have the potential to produce a maximum flood at Browns Ferry Nuclear Plant. These are (1) storms producing maximum rainfall on the 21,400-square-mile watershed above Chattanooga with the downstream orographically fixed storm pattern, and (2) storms producing maximum rainfall on the 16,170-square-mile watershed above Wheeler Dam and below the major tributary dams. Previous analyses also considered a third storm situation, the 7,980 square mile storm. However, rainfall depth on the watershed above Wheeler reservoir eliminated the 7,980 square mile storm as a candidate storm.

Estimates of PMP for the watershed above Chattanooga are fully defined in HMR No. 41. PMP depths for the 21,400-square-mile watershed above Chattanooga are tabulated below. This storm would occur in March. Two possible isohyetal patterns producing these depths are presented in HMR No. 41. The pattern critical to this study is the "downstream pattern" shown in Figure 13.

PMP depths for the 16,170-square-mile watershed above Wheeler Dam but below the major tributaries are contained in HMR No. 47. PMP depths for the 16,170-square-mile watershed are also tabulated below. The isohyetal pattern for the storm is shown in Figure 14. The pattern and depths are for a storm centered within 35 miles of Nickajack Dam. A 72-hour storm 3 days antecedent to the main storm was assumed to occur in all PMP situations with storm depths equivalent to 40 percent of the main storm outlined in Bulletin 41.

Basin Depth, Inches

Storm,	72-Hour	Main Storm		
Sq. Mi.	Antecedent Storm	6-Hour	24-Hour	72-Hour
21,400	6.08	4.48	9.43	14.48
16,170	6.22	4.2	9.65	15.55

RAIN-RUNOFF RELATIONSHIPS

Precipitation excess resulting from the PMP storm was computed using multivariable relationships developed and used in the day-to-day operation of the TVA system. These relationships, developed from a study of flood records, relate the amount of precipitation excess expected from a given storm rainfall to the week of the year, an antecedent precipitation index (API), and geographical location. The relationships are such that the subtraction from rainfall to compute precipitation excess is greatest at the start of the storm and decreased to no subtraction where precipitation excess is equal to rainfall in the late part of extreme storms. An API determined from an 11-year period of historical rainfall records (1997-2007) was used at the start of the antecedent storm. The precipitation excess computed for the main storm is not sensitive to variations in adopted initial conditions because of the large antecedent storm.

CONDITIONS CREATING PROBABLE MAXIMUM FLOOD

Critical Storm

Enough storm arrangements including different storm centerings, seasonal variability, and consideration of potential dam failures were investigated to ensure selection of the arrangement which would produce the PMF discharge and elevation at Browns Ferry Nuclear Plant. The critical PMP storm was determined to be the 21,400-square-mile downstream centered storm, which would follow an antecedent storm commencing on March 15. The antecedent storm would produce an average precipitation of 6.08 inches on the basins above Wheeler, would be followed by a 3-day dry period, and then by the main storm which would produce an average precipitation of 14.48 inches in 3 days. Figure 13 is an isohyetal map of the maximum 3-day PMP which was used to compute the PMF.

Precipitation Excess

Median moisture conditions as determined from the 11 year period of historical records (1992-2007) were used to determine the API at the start of the storm sequence. However, the antecedent storm is so large that the precipitation excess computed for the main storm is not sensitive to variations in adopted initial moisture conditions. The precipitation excess from the critical PMP storm was 3.85 inches for the 3-day antecedent storm and 12.74 inches for the 3-day main storm. Table 3 displays the rain and precipitation excess for both the main and antecedent storm for the critical storm for each of the 62 subwatersheds of the hydrologic model.

Reservoir Operations

Reservoir routings were started with all reservoirs at their respective median mid-March elevations. The reservoir operating guides applied during the unsteady flow model simulations mimic, to the extent possible, operating policies and are within the current reservoir operating flexibility. In addition to spillway discharge, turbine and sluice discharges were used to release water from the tributary reservoirs. Turbine capacities are also used in the main river reservoirs up to the point where the head differentials are too small and/or the powerhouse would flood. All gates were assumed to be operable without failures during the flood. The flood from the antecedent storm occupied about 63 percent of the reserved detection capacity at the beginning of the main storm (day 7 of the event). Reservoir levels are at or above guide levels at the beginning of the main storm in all but Apalachia and Fort Patrick Henry reservoirs, which have no reserved flood detention capacity.

Dam Failures

Failure of upstream dams during the adopted PMF would create maximum flood elevations at Browns Ferry Nuclear Plant. For this study maximum headwater levels were determined at each major upstream dam for the PMF. Each dam, where the computed headwater level exceeded the concrete or earthen embankments, was analyzed to determine if it would fail. The current analysis revealed that the west saddle dam at Watts Bar and portions of earth embankments at Chickamauga, Nickajack, and Guntersville dams were subject to postulated failure as a result of overtopping. The concrete portions of all dams, including the main river dams, were found to be stable in these situations.

PROBABLE MAXIMUM FLOOD

The PMF peak discharge at Browns Ferry Nuclear Plant is 1,193,671 cfs. The hydrograph of the calculated discharge is shown in Figure 15. However, the design and licensing basis peak discharge is being maintained as 1,200,000 cfs. Velocities at the site would average 6 feet per second in the channel and up to 4 feet per second in the overbank at the time of peak discharge.

The PMF elevation at Browns Ferry Nuclear Plant is 571.7. The hydrograph of the calculated PMF elevation is shown in Figure 16. However, the design and licensing basis PMF elevation is being maintained as 572.5.

Wind Waves

Some wind waves are likely when the PMF is cresting at Browns Ferry Nuclear Plant. The flood would be near its crest elevation for a day beginning about 6-1/2 days after cessation of the PMP storm.

A reasonably severe windstorm producing 45 mph sustained wind speeds could occur coincidentally with the PMF. A wind from the SE will produce the largest waves at the site. A wind of this magnitude and from this direction can generate 5-foot waves (crest to trough). The analysis of wave heights used the “1% wave” of which about 5 per hour will occur. Consequent wave runup above the flood level would be about 5 feet on a vertical wall.

Maximum Elevation

A maximum flood elevation of 578 at the plantsite results from a combination of the PMF and wind wave runup on a vertical wall.

LOCAL DRAINAGE

In addition to flooding from the Tennessee River, Browns Ferry Nuclear Plant could possibly be flooded by intense local storms. Flooding sources include: (1) the small unnamed stream northwest of the plant, a portion of which has been relocated (see Figure 21), (2) the area draining to the switchyard drainage channel, (3) the main plant area, and (4) the area draining to the cooling tower system of channels. These areas, labeled Area 1 through Area 4 respectively, are shown on Figure 22. Direction of flow for runoff is indicated by arrows. Figure 22a shows the plant topography.

These areas were evaluated for a local storm producing probable maximum precipitation (PMP). PMP has been defined for TVA by the Hydrometeorological Branch of the National Weather Service and is described in Hydrometeorological Report No. 56 (HMR-56), "Probable Maximum and TVA Precipitation Estimates with Areal Distribution for Tennessee River Drainages less Than 3,000 Mi^2 in Area." HMR-56 supersedes HMR-45, which was used to define PMP in the original analysis. A 6-hour storm which would produce a total of 34.4 inches of rainfall with a maximum 1-hour amount of 16.7 inches was determined to be critical and was used to develop probable maximum flood inflows. The mass curve is shown in Figure 22b. Runoff was conservatively assumed equal to rainfall.

Ice accumulation would occur only at infrequent intervals because of the temperate climate. Maximum winter precipitation concurrent with ice accumulation would impose less severe conditions on the drainage system than would the local PMP, which is associated with severe summer thunderstorm activity.

Local Stream

An unnamed stream northwest of the plant with drainage area of 1.35 square miles formerly flowed through the plant area. Figure 21 shows this watershed. The stream has now been diverted to flow along the west boundary of the plant as shown in Figure 22. The channel is designed with capacity sufficient to carry the maximum possible (probable maximum) flood without flooding the plant.

The peak flood discharge was estimated using a 1-hour unit hydrograph developed synthetically by comparison with gaged watersheds in the region. The adopted unit hydrograph is shown on Figure 23.

The maximum possible (probable maximum) peak discharge is 17,200 cfs. This compares with 14,000 cfs determined in the original analysis. The maximum possible (probable maximum) flood hydrograph for this stream and the site PMP hyetograph are shown on Figure 24.

The alignment of the relocated channel is shown on Figure 22, typical sections are shown on Figure 25, and plan and profiles, including water surface profiles and minimum grade levels between the channel and plant, are shown on Figures 26, sheets 1 and 2. Maximum water surface elevations were completed using standard step backwater methods. As shown on Figures 26, sheets 1 and 2, the channel will pass 17,200 cfs with maximum water surface elevations below the ground, the dike, and the road which protect the plant and cooling tower areas from flooding.

SWITCHYARD DRAINAGE CHANNEL

The 100-acre area draining to the switchyard drainage channel is shown on Figure 22 (Area 2). Runoff from this area is diverted through the channel to the Tennessee River southeast of the plant. Two inflow hydrographs were developed: (1) a lateral inflow hydrograph from the 35-acre area adjacent to the channel, distributed uniformly along the length of the channel, and (2) a point inflow hydrograph from the 65-acre area draining to the upstream end of the channel. The lateral inflow hydrograph is equivalent to the PMP hyetograph using 5-minute intervals. The point inflow hydrograph was developed by considering overland flow travel time for a number of discrete points within the 65-acre area. Travel times were estimated for runoff from each respective point to the channel. Peak flood elevations in the channel were computed using unsteady flow routing methods. In the routing it was conservatively assumed that the three culverts at the oil skimmer structure at the downstream end of the channel would be clogged with debris and would provide no discharge capacity during the flood. The channel can pass the maximum possible (probable maximum) flood without flooding safety-related structures. The maximum water surface elevation at the holding pond at the downstream end of the channel would be 574.8. The maximum water surface elevation at the north corner of the switchyard would not exceed the switchyard elevation of 578'.

Main Plant Area

Plant buildings could possibly be flooded by an intense local storm which would exceed the capacity of the yard drainage system. The main plant area drains 41 acres and is shown on Figure 22 (Area 3). Plant surface drainage was investigated to determine if a plant maximum possible (probable maximum) storm would exceed plant grade El. 565 and cause flooding of safety-related plant structures. All underground drains were assumed to be clogged.

All surface drainage with the exception of that between the office building and service building (patio plaza area) is adequate. Flow from the 3.3-acre patio plaza area northwest of the service building will drain to the employee courtyard west of the service building. Flooding at this location results from runoff collecting in a low point in the area with flood elevations controlled by the narrow opening between the temporary plant engineering building and the radwaste evaporator building. The peak elevation was determined to be 566.6, which is 1.6 feet above plant grade El. 565. The elevation was computed by storage routing the inflow hydrograph equivalent to the PMP hyetograph using 5-minute intervals. The time available between the start of the most intense rainfall and the time flood levels exceed plant grade El. 565 varies from 5 to 21 minutes, depending on the assumed distribution within the critical local PMP 6-hour storm.

In the vicinity of the radioactive waste, reactor, and diesel generator buildings, water-surface elevations will not exceed El. 565. Peak water-surface elevations were determined by storage routing the inflow hydrograph using standard weir formulas and flat pool assumptions. The control section was taken to be the perimeter road south of the reactor building with elevation at 564. The total inflow hydrograph was determined by considering overland flow travel time for a number of discrete points within the 41-acre area. Travel times were determined for runoff from each respective point to the perimeter road. The total area was then divided into subareas of equal travel time, with the longest travel times for those areas farthest from the perimeter road. Each subarea contributes to total flow, with respective subarea inflow hydrographs equivalent to the PMP hyetograph using 5-minute time intervals. The total inflow hydrograph was then computed by summing the respective subarea inflow hydrographs, with each lagged by an amount equal to its travel time. Travel times ranged from 0 to 20 minutes, with 0 reflecting instantaneous watershed response.

Water-surface elevations at the radioactive waste, reactor, and diesel generator buildings at the time of maximum possible (probable maximum) flood flow could be affected if maximum water levels in the cooling water discharge channel downstream were to exceed El. 564. For a short duration during the possible maximum precipitation (PMP) concurrent with cooling towers operation water surface elevation in cooling water discharge channel reaches 564.93, overflowing the perimeter road and mixing with runoff from the main plant area. Water surface elevation at the radioactive waste, reactor, and diesel generator buildings was evaluated and determined not to exceed El. 565.

<u>Cooling Tower System</u>

The 179-acre area draining to the cooling tower system of channels is shown on Figure 22 (Area 4). Runoff from this area is diverted to the Tennessee River through the operation of several gate structures. The cooling tower system of channels has sufficient capacity to pass the combined maximum possible (probable maximum) flood runoff and condenser water without flooding the plant for any mode of plant operation.

Peak water-surface elevations were determined using storage routing methods. Local inflow hydrographs for each of the basins within the cooling tower system of channels were equivalent to the PMP hyetograph using 5-min ute intervals. These hydrographs were augmented where appropriate for condenser water and main plant area runoff.

BFN-25

Table 1

(Sheet 1 of 2)

FACTS ABOUT TVA DAMS AND RESERVOIRS

Major Dams[a]

Main River Projects	Dam Locations		Drainage Area Above Dam (Square Miles)	Cost[b] (Millions)	Construction Began	Dam Closure	First Unit in Service (Actual or Scheduled)	Last Unit in Service (Actual or Scheduled)	Winter Net Dependable Capacity[c] (Megawatts)	Number of Generating Units	Location of Dam Above Mouth of River (Miles)	Height of Dam[w] (Feet)	Length of Dam (Feet)	Type of Dam[d]	Lock Chamber Size: Width x Length x Maximum Lift (Feet)	Length of Reservoir[e] (Miles)	Miles of Shoreline[e]	Reservoir Surface Area[e] (Acres)	Area of Original River Bed (Acres)	Reservoir Elevation (Feet Above Mean Sea Level)			Reservoir Volume (Acre Feet)			Jan. 1 Controlled Storage (Acre Feet)[f]	Project	Number of Dams in Project
	River	State																		Jan. 1 Flood Guide Elevation	Top of Gates	June 1 Flood Guide Elevation	At Jan. 1 Flood Guide Elevation	At Top of Gates	At June 1 Flood Guide Elevation			
Kentucky[g]	Tennessee	KY	40,200	128.8	7/1/1938	8/30/1944	9/14/1944	1/16/1948	184	5	22.4	206	8,422	C G E	110x600x75([v])	184.3	2064.3	160,300	25,200	354.0	375.00	359.0	2,121,000	6,129,000	2,839,000	4,008,000	TN River	9
Pickwick Landing	Tennessee	TN	32,820	120.9	12/30/1934	2/8/1938	6/29/1938	12/31/1952	229	6	206.7	113	7,715	C G E	110x1000x63[i] 110x600x63 60x232x48	52.7	490.6	42,700	9,580	408.0	418.00	414.0	839,300	1,332,000	1,119,000	492,700	TN River	9
Wilson[h]	Tennessee	AL	30,750	133.5	4/14/1918	4/14/1924	9/12/1925	4/12/1962	663	21	259.4	137	4,541	C G	110x600x100([i]) 60x300x52 60x292x48	15.5	166.2	15,600	9,108	504.7	507.88	507.7	589,700	640,200	637,200	50,500	TN River	9
Wheeler	Tennessee	AL	29,590	69.0	11/21/1933	10/3/1936	11/9/1936	12/18/1963	361	11	274.9	72	6,342	C G	60x400x52 110x600x52[i]	74.1	1027.2	67,070	17,600	550.5	556.28	556.0	742,600	1,069,000	1,050,000	326,500	TN River	9
Guntersville	Tennessee	AL	24,450	74.2	12/4/1935	1/16/1939	8/1/1939	3/24/1952	124	4	349.0	94	3,979	C G E	60x360x45 110x600x45[i]	75.7	889.1	66,000	12,065	593.0	595.44	595.0	886,600	1,048,700	1,018,000	162,100	TN River	9
Nickajack	Tennessee	TN	21,870	56.1	4/1/1964	12/14/1967	2/20/1968	4/30/1968	105	4	424.7	81	3,767	C G E	110x800x41[j] 110x600x41	46.3	178.7	10,200	4,200	632.5-634.5	635.00	632.5-634.5	N/A	251,600	N/A	N/A	TN River	9
Chickamauga	Tennessee	TN	20,790	74.4	1/13/1936	1/15/1940	3/4/1940	3/7/1952	119	4	471.0	129	5,800	C G E	60x360x53[v]	58.9	783.7	36,050	9,500	675.0	685.44	682.5	392,000	737,300	622,500	345,300	TN River	9
Watts Bar	Tennessee	TN	17,310	66.4	7/1/1939	1/1/1942	2/11/1942	4/24/1944	182	5	529.9	112[x]	2,960	C G E	60x360x70	95.5[r]	721.7	37,500	10,343	735.0	745.00	741.0	796,000	1,175,000	1,010,000	379,000	TN River	9
Fort Loudoun	Tennessee	TN	9,550	45.3	7/8/1940	8/2/1943	11/9/1943	1/27/1949	162	4	602.3	122[x]	4,190	C G E	60x360x80	60.8[s]	378.2	14,000	4,420	807.0	815.00	813.0	282,000	393,000	363,000	111,000	TN River	9
Pumped Storage Project																												
Raccoon Mountain	Tennessee	TN	1	237.8	7/1/1970	7/11/1978	12/31/1978	8/31/1979	1653	4[k]		230	8,500	E R	N/A			528		1530.0-1672.0			N/A		N/A	N/A	Raccoon Mtn.	1
Tributary Power Projects																												
Tims Ford	Elk	TN	529	43.8	3/28/1966	12/1/1970	3/1/1972	3/1/1972	36	1	133.3	175	1,580	E R	N/A	34.2	308.7	10,500	565	873.0	895.00	888.0	388,400	608,000	530,000	219,600	Elk River	1
Apalachia	Hiwassee	NC	1,018	29.4	7/17/1941	2/14/1943	9/22/1943	11/17/1943	82	2	66.0	150	1,308	C G	N/A	9.8	31.5	1,100	80	1272.0-1280.0	1280.00	1272.0-1280.0	N/A	57,800	N/A	N/A	Hiwassee	4
Hiwassee	Hiwassee	NC	968	42.5	7/15/1936	2/8/1940	5/21/1940	5/24/1956	141	2[l]	75.8	307	1,376	C G	N/A	22.2	164.8	5,870	1,000	1485.0	1526.50	1521.0	228,400	434,000	399,000	205,600	Hiwassee	4
Chatuge	Hiwassee	NC	189	9.5	7/17/1941	2/12/1942	12/9/1954	12/9/1954	13	1	121.0	150	2,850	E	N/A	13.0	128.0	6,700	107	1918.0	1928.00	1926.0	177,900	240,500	226,600	62,600	Hiwassee	4
Ocoee 1[h][m]	Ocoee	TN	595	11.8	8/00/1910	12/15/1911	1/28/1912	0/0/1914	24	5	11.9	135	840	C G	N/A	7.5	47.0	1,620	170	820.0	830.76	829.0	64,300	83,300	79,900	19,000	Ocoee	3
Ocoee 2[h]	Ocoee	TN	512	28.8	5/00/1912	10/00/1913	10/0/1913	10/00/1913	23	2	24.2	30	450	O	N/A	N/A	N/A	N/A	N/A	N/A	1115.20	N/A	N/A	N/A	N/A	N/A	Ocoee	3
Ocoee 3	Ocoee	TN	492	4.9	7/17/1941	8/15/1942	4/30/1943	4/30/1943	29	1	29.2	110	612.1	C G	N/A	7.0	24.0	600	260	1428.0-1435.0	1435.00	1428.0-1435.0	N/A	4,200	N/A	N/A	Ocoee	3
Blue Ridge[h][m]	Toccoa	GA	232	20.4	11/00/1925[n]	12/6/1930	7/0/1931	7/0/1931	13	1	53.0	175	1,000	E	N/A	11.0	68.1	3,220	182	1668.0	1691.00	1687.0	127,400	195,900	182,800	68,500	Toccoa/Ocoee	1
Nottely	Nottely	GA	214	17.2	7/17/1941	1/24/1942	1/10/1956	1/10/1956	18	1	21.0	197	2,300	R E	N/A	20.2	102.1	3,970	170	1762.0	1780.00	1777.0	112,700	174,300	162,000	61,600	Hiwassee	4
Melton Hill	Clinch	TN	3,343	21.5	9/6/1960	5/1/1963	7/3/1964	11/11/1964	79	2	23.1	103	1,020	C G	75x400x60	44	193.4	5,690	1,645	792.0-795.0	796.00	792.0-795.0	N/A	126,000	N/A	N/A	Clinch	2
Norris	Clinch	TN	2,912	46.1	10/1/1933	3/4/1936	7/28/1936	9/30/1936	110	2	79.6	265	1,860	C G E	N/A	129.0[u]	809.2	34,000	2,930	1000.0	1034.00	1,020.0	1,439,000	2,552,000	2,040,000	1,113,000	Clinch	2
Tellico	Little TN	TN	2,627	117.0	3/7/1967	11/29/1979	[o]	[o]	[o]	[o]	0.3	129[x]	3,238	C G E	[o]	33.2	357.0	15,600	2,133	807.0	815.00	813.0	304,000	424,000	392,000	120,000	Little TN	2
Fontana	Little TN	TN	1,571	69.1	1/1/1942	11/7/1944	1/20/1945	2/4/1954	304	3	61.0	480	2,365	C G	N/A	29.0	237.8	10,290	1,650	1653.0	1710.00	1703.0	929,000	1,443,000	1,370,000	514,000	Little TN	2
Douglas	French Broad	TN	4,541	83.0	2/2/1942	2/19/1943	3/21/1943	8/3/1954	111	4	32.3	202	1,705	C G	N/A	43.1	512.5	28,070	3,170	954.0	1002.00	994.0	379,000	1,461,000	1,223,500	1,082,000	French Broad	1
Cherokee	Holston	TN	3,428	29.3	8/1/1940	12/5/1941	4/16/1942	10/7/1953	148	4	52.3	175[x]	6,760	C G E R	N/A	54.0	394.5	29,560	2,426	1045.0	1075.00	1071.0	791,600	1,541,000	1,422,900	749,400	Holston	4
Fort Patrick Henry	South Fork Holston	TN	1,903	18.9	5/14/1951	10/27/1953	12/5/1953	2/22/1954	41	2	8.2	95	737	C G	N/A	10.4	31.0	840	339	1258.0-1,263.0	1263.00	1258.0-1263.0	N/A	26,900	N/A	N/A	Holston	4
Boone	South Fork Holston	TN	1,840	15.5	8/29/1950	12/16/1952	3/16/1953	9/3/1953	89	3	18.6	160	1,532	E C G	N/A	32.7()	126.6	4,130	719	1364.0	1385.00	1382.0	117,600	193,400	180,500	75,800	Holston	4
South Holston	South Fork Holston	TN	703	23.1	8/04/1947[p]	11/20/1950	2/13/1951	2/13/1951	44	1	49.8	285	1,600	E R	N/A	23.7	181.9	7,600	710	1708.0	1742.00	1729.0	511,300	764,000	658,000	252,800	Holston	4
Watauga	Watauga	TN	468	22.1	7/22/1946[p]	12/1/1948	8/30/1949	9/29/1949	66	2	36.7	332	900	E R	N/A	16.3	104.9	6,440	313	1952.0	1975.00	1959.0	524,200	677,000	568,500	152,800	Watauga	2
Wilbur[h]	Watauga	TN	471	1.6	00/00/1909	00/00/1912	0/0/1912	7/19/1950	11	4	34.0	76	375.5	C G	N/A	1.8	4.8	70		1641.0-1648.0	1650.00	1641.0-1648.0	N/A	714	N/A	N/A	Watauga	2
Great Falls[a][h]	Caney Fork	TN	1,675	21.4	12/7/1915	12/8/1916	0/0/1916	0/0/1925	36	2	91.1	92	800	C G	N/A	22.0	120.0	1,830	1,490	785.0	805.30	800.0	19,700	50,200	40,600	30,500	Caney Fork	1
Nolichucky (retired)[h][m]	Nolichucky	TN	1,183	0.1		00/00/1913			[q]	[q]	46.0	94	482	C G			26.0	380			1240.90						Nolichucky	1

Table 1

(Sheet 2 of 2)

FACTS ABOUT TVA DAMS AND RESERVOIRS

a) All in the Tennessee Valley, except for Great Falls which is in the Cumberland Valley.

b) Cost of plant including the inception balance of the plant and all additions and retirements from the plant. Transmission assets are not included.

c) Winter net dependable capacity as of October 2009. Winter net dependable capacity is the amount of power a plant can produce on an average winter day, minus the electricity used by the plant itself.

d) E: Earth; R: Rock fill; G: Gravity; C: Concrete; O: Other (Codes for each dam are listed in order of importance.)

e) At June 1 flood guide elevation.

f) Volume between the January 1 eleva ion and top of gates.

g) Connected to Barkley Reservoir by 1-1/2 mile canal, which opened July 14, 1966.

h) Acquired: Wilson by transfer from the U.S. Army Corps of Engineers in 1933; Ocoee 1, Ocoee 2, Blue Ridge, and Great Falls by purchase from Tennessee Electric Power Company in 1939; Wilbur and Nolichucky (re ired) by purchase from East Tennessee Power and Light Company in 1945. Subsequent to acquisition, TVA installed additional units at Wilson and Wilbur. Reconstructed flume at Ocoee 2 was placed in service in November 1983.

i) Main locks placed in operation in 1959 at Wilson, 1963 at Wheeler, 1965 at Guntersville, and 1984 at Pickwick Landing.

j) Construction of main lock at Nickajack limited to underwater construction.

k) Generating units at Raccoon Mountain are reversible Francis type pump-turbine units, each with 428,400 kW generator rating and 612,000 hp pump motor rating.

l) Unit 2 at Hiwassee is a reversible Francis type pump-turbine unit with 95,000 kW generator rating and 121,530 hp pump motor rating at 200 ft. net head.

m) Ocoee 1 creates Parksville Reservoir, Nolichucky (retired) creates Davy Crockett Reservoir, and Blue Ridge creates Toccoa Reservoir.

n) Construction of Blue Ridge discontinued early in 1926; resumed in March 1929.

o) Tellico project has no lock or powerhouse. Streamflow through navigable canal to Fort Loudoun Reservoir permits navigation and increases average annual energy output at Fort Loudoun.

p) Initial construction of South Holston and Watauga started February 16, 1942; temporarily discontinued to conserve critical materials during WWII.

q) Generating units at Nolichucky were removed from system generating capacity in August 1972. The dam was renovated and modified to convert the reservoir for use as a wildlife preserve.

r) Includes 72.4 miles up the Tennessee River to Fort Loudoun Dam and 23.1 miles up Clinch River to Melton Hill Dam.

s) Includes 6.5 miles up the French Broad River and 4.4 miles up the Holston River.

t) Includes 17.4 miles up the South Fork Holston River and 15.3 miles up the Watauga River.

u) Includes 73 miles up the Clinch River and 56 miles up he Powell River.

v) The U.S. Army Corps of Engineers is increasing the size of lock structures at Kentucky and Chickamauga.

w) The structural height of the dam is the vertical distance from the lowest point of the excavated foundation to the top of the dam. Top of dam refers to the highest point of the water barrier on an embankment (or top of parapet wall) and deck elevation (or top of parapet wall) for concrete structures.

x) As an interim measure to prevent overtopping, these four dams were raised by HESCO Concertainer floodline units.

Watts Bar - 3 feet: embankment at elevation 767 raised to elevation 770.

Fort Loudoun - 3.75 feet: embankment at elevation 830 was raised 7 feet to elevation 837 (3.75 feet above top of concrete wall at elevation 833.25).

Tellico - 4 feet: embankment at elevation 830 raised to elevation 834.

Cherokee - 3 feet: embankment at elevation 1089 raised to elevation 1092.

Table 2

(Sheet 1 of 2)

UNIT HYDROGRAPH DATA

Unit Area		GIS Drainage							
Number	Name	Area (sq.mi.)	Duration (hrs.)	Q_P	C_P	T_P	W_{50}	W_{75}	T_B
1	Asheville	944.4	6	14,000	0.21	12	39	15	168
2	Newport, French Broad	913.1	6	43,114	0.66	12	10	4	48
3	Newport, Pigeon	667.1	6	30,910	0.65	12	8	4	90
4	Embreeville	804.8	4	33,275	0.65	12	10	7	80
5	Nolichucky Local	378.7	6	11,740	0.44	12	14	6	90
6	Douglas Local	835	6	47,207	0.27	6	8	5	60
7	Little Pigeon River	352.1	4	17,000	0.75	12	10	6	66
8	French Broad Local	206.5	6	8,600	0.2	6	13	6	60
9	South Holston	703.2	6	15,958	0.53	18	25	17	96
10	Watauga	468.2	4	37,002	0.74	8	6	3	32
11	Boone Local	667.7	6	22,812	0.16	6	13	7	90
12	Fort Patrick Henry	62.8	6	2,550	0.19	6	12	7	66
13	Gate City	668.9	6	11,363	0.56	24	34	26	108
14&15	Total Cherokee Local	854.6	6	25,387	0.42	12	20	10	54
16	Holston River Local	289.6	6	8,400	0.27	9	18	12	96
17	Little River	378.6	4	11,726	0.68	16	15	7	96
18	Fort Loudoun Local	323.4	6	20,000	0.29	6	10	5	36
19	Needmore	436.5	6	9,130	0.49	18	22	12	126
20	Nantahala	90.9	2	3,130	0.38	8	16	11	54
21	Bryson City	653.8	6	26,000	0.43	10	13	7	60
22	Fontana Local	389.8	4	17,931	0.14	4	14	7	28
23	Little Tennessee Local - Fontana to Chilhowee Dam	404.7	6	16,613	0.58	12	10	4	84
24	Little Tennessee Local - Chilhowee to Tellico Dam	650.2	6	22,600	0.49	12	15	8	54
25	Watts Bar Local above Clinch River	295.3	6	11,063	0.18	6	10	4	90
26	Norris Dam	2912.8	6	43,773	0.07	6	18	6	102
27	Melton Hill Local	431.9	6	12,530	0.14	6	19	10	90
33	Local above mil 16	37.2	2	4,490	0.94	6	3	2	48
34	Poplar Creek	135.2	2	2,800	0.61	20	26	13	90
35	Emory River	868.8	4	36,090	0.39	8	11	6	84
36	Local Area at Mouth	29.3	2	3,703	0.99	6	3	2	48
37	Watts Bar Local below Clinch River	408.4	6	16,125	0.19	6	10	4	90
38	Chatuge	189.1	1	19,062	0.24	2	3	2	37
39	Nottely	214.3	1	44,477	0.16	1	1	1	12
40	Hiwassee Local	565.1	6	23,349	0.58	12	11	6	96
41	Apalachia	49.8	1	5,563	0.26	2	4	1	23
42	Blue Ridge	231.6	2	11,902	0.4	6	10	7	60
43	Ocoee No. 1 Local	362.6	6	17,517	0.23	6	12	8	36
44A	Hiwassee at Charleston	686.6	6	9,600	0.59	30	39	23	108
44B	Hiwassee at Mouth	396	6	16,870	1	18	11	6	78
45	Chickamauga Local	792.1	6	32,000	0.38	9	14	7	36
46	South Chickamauga Creek	428.1	6	6,267	0.48	24	39	18	132
47A	Nickajack Local	545.7	6	9,059	0.16	9	35	8	144
47B	North Chickamauga Creek Local	98.3	4	3,000	0.67	16	15	6	112

Table 2

(Sheet 2 of 2)

UNIT HYDROGRAPH DATA

Unit Area Number	Name	GIS Drainage Area (sq.mi.)	Duration (hrs.)	Q_P	C_P	T_P	W_{50}	W_{75}	T_B
48	Sequatchie	400	4	8,562	0.47	16	16	7	140
49	Guntersville North Local	1027.1	6	22,089	0.4	15	20	11	138
50	Guntersville South Local	1068.9	6	22,963	0.4	15	19	11	132
51	Paint Rock River near Woodville	321.1	6	11,363	1.00	18	10	5	102
52	Paint Rock Local	138.1	6	6,103	1.24	18	10	5	72
53	Flint River near Chase	343.1	6	16,356	0.89	12	12	8	60
54	Flint River Local	224.8	6	7,962	1.33	24	15	7	78
55	Cotaco Creek at Florette	136.2	6	3,174	0.66	18	21	11	96
56	Cotaco Creek Local	101.1	6	2,644	0.98	24	19	9	84
57	Limestone Creek near Athens	121.3	4	10,618	1.64	12	5	3	40
58	Limestone Creek Local	157.4	6	6,407	0.76	12	12	6	54
59	Tims Ford Dam	533.2	6	17,555	0.31	6	16	6	78
60	Elk River Local, Tims Ford to Fayetteville	293.3	6	7,044	0.68	18	24	14	78
61	Elk River Local, Fayetteville to Prospect	490.2	6	8,874	0.85	30	29	16	102
62	Richland Creek at Mouth	488.0	6	11,529	1.11	30	23	15	90
63	Sugar Creek at Mouth	177.0	4	8,512	1.20	16	16	9	92
64	Elk River Local, Mile 16.5 to Prospect Gage	145.1	6	5,913	1.53	24	12	6	72
65	Wheeler Local	1380.0	6	46,747	0.64	12	16	9	78

Definition of Symbols

Q_P = Peak discharge in cfs.

C_P = Snyder coefficient.

T_P = Time in hours from beginning of precipitation excess to peak of unit hydrograph.

W_{50} = Width in hours at 50 percent of peak discharge.

W_{75} = Width in hours at 75 percent of peak discharge.

T_B = Base length in hours of unit hydrograph.

Table 3
(Sheet 1 of 2)
PROBABLE MAXIMUM FLOOD
RAINFALL AND PRECIPITATION EXCESS

Index No.	Sub-basin Name	Antecedent Storm Rainfall (inches)	Antecedent Storm Runoff (inches)	Main Storm Rainfall (inches)	Main Storm Runoff (inches)
1	French Broad River at Asheville	6.18	2.91	18.12	15.44
2	French Broad River, Newport to Asheville	6.18	3.67	18.42	16.43
3	Pigeon River at Newport	6.18	2.91	19.26	16.58
4	Nolichucky River at Embreeville	6.18	3.67	15.30	13.31
5	Nolichucky local, Embreeville to Nolichucky Dam	6.18	3.67	15.42	13.43
6	Douglas Dam local	6.18	4.43	17.16	15.94
7	Little Pigeon River at Sevierville	6.18	3.81	21.12	19.13
8	French Broad River local	6.18	3.81	19.38	17.39
9	South Holston Dam	6.18	4.60	12.12	10.90
10	Watauga Dam	6.18	3.67	12.96	10.97
11	Boone local	6.18	3.81	13.86	11.87
12	Fort Patrick Henry	6.18	4.60	14.34	13.12
13	North Fork Holston River near Gate City	6.18	4.60	12.30	11.08
14-15	Cherokee and Holston River below Fort Pat & Gate City	6.18	4.60	15.42	14.20
16	Holston River local, Cherokee Dam to Knoxville gage	6.18	4.60	16.74	15.52
17	Little River at mouth	6.18	3.81	20.82	18.83
18	Fort Loudoun local	6.18	3.81	17.28	15.29
19	Little Tennessee River at Needmore	6.18	2.73	20.22	17.54
20	Nantahala	6.18	2.73	20.94	18.26
21	Tuckasegee River at Bryson City	6.18	2.91	20.04	17.36
22	Fontana local	6.18	2.91	19.56	16.88
23	Little Tennessee River local, Fontana Dam to Chilhowee Dam	6.18	2.91	22.50	19.82
24	Little Tennessee River local, Chilhowee Dam to Tellico Dam	6.18	2.91	19.26	16.58
25	Watts Bar local above Clinch River	6.18	3.81	15.84	13.85
26	Clinch River at Norris Dam	6.18	4.60	13.56	12.34
27	Melton Hill local	6.18	4.27	15.42	14.01
33	Clinch River local above mile 16	6.18	4.43	15.42	14.01
34	Poplar Creek at mouth	6.18	4.43	14.88	13.47
35	Emory River at mouth	6.18	4.43	12.78	11.37
36	Clinch River local, mouth to mile 16	6.18	4.43	14.94	13.53
37	Watts Bar local below Clinch River	6.18	4.43	14.28	12.87
38	Chatuge Dam	6.18	2.91	21.12	18.44
39	Nottely Dam	6.18	2.91	18.66	15.98
40	Hiwassee River local below Chatuge and Nottely	6.18	2.73	18.18	15.50
41	Apalachia local	6.18	3.81	18.18	16.19
42	Blue Ridge Dam	6.18	2.91	22.14	19.46
43	Ocoee No. 1 local, Ocoee No. 1 to Blue Ridge Dam	6.18	2.91	18.42	15.74
44A	Hiwassee River local, Charleston gage at mile 18.9 to Apalachia and Ocoee No. 1 Dams	6.18	3.81	15.48	13.49
44B	Hiwassee River local, mouth to Charleston gage at mile 18.9	6.18	4.27	14.52	13.11
45	Chickamauga local	6.18	4.27	13.56	12.15

Table 3
(Sheet 2 of 2)

PROBABLE MAXIMUM FLOOD
RAINFALL AND PRECIPITATION EXCESS

Index No.	Sub-basin Name	Antecedent Storm Rainfall (inches)	Antecedent Storm Runoff (inches)	Main Storm Rainfall (inches)	Main Storm Runoff (inches)
46	South Chickamauga Creek near Chattanooga	6.18	4.11	12.06	10.65
47A	Nickajack local below North Chickamauga Creek @ gage	6.18	4.27	11.46	10.05
47B	North Chickamauga Creek @ gage	6.18	4.27	12.30	10.89
48	Sequatchie River at Whitwell	6.18	4.27	12.06	10.65
49	Guntersville North local	6.18	4.27	10.44	9.03
50	Guntersville South local	6.18	4.27	9.90	8.49
51	Paint Rock River near Woodville	5.58	3.57	9.84	8.43
52	Paint Rock Local	5.58	3.57	9.84	8.43
53	Flint River near Chase	5.58	3.72	9.84	8.43
54	Flint River Local	5.58	3.43	9.84	8.43
55	Cotaco Creek at Florette	5.58	3.72	9.84	8.43
56	Cotaco Creek Local	5.58	3.72	9.84	8.43
57	Limestone Creek near Athens	5.58	3.72	9.84	8.43
58	Limestone Creek Local	5.58	3.72	9.84	8.43
59	Tims Ford Dam	5.58	3.28	9.84	8.24
60	Elk River Local, Tims Ford to Fayetteville	5.58	3.28	9.84	8.24
61	Elk River Local, Fayetteville to Prospect	5.58	3.28	9.84	8.24
62	Richland Creek at Mouth	5.58	3.72	9.84	8.43
63	Sugar Creek at Mouth	5.58	3.72	9.84	8.43
64	Elk River Local, Mile 16.5 to Prospect Gage	5.58	3.72	9.84	8.43
65	Wheeler Local	5.58	3.72	9.84	8.43
	Basin Averages (inches)	6.08	3.85	14.48	12.74

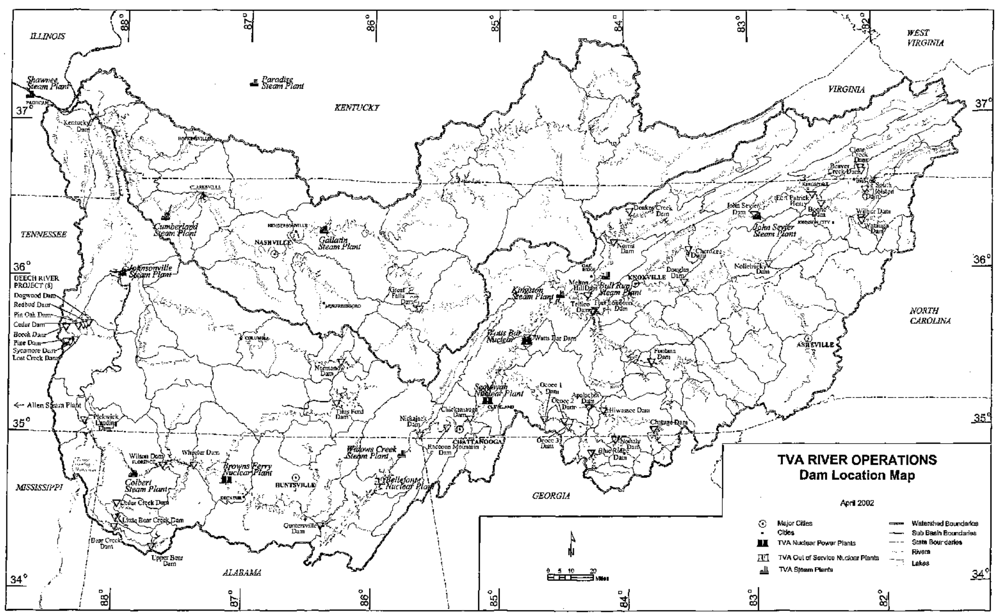
[a]Index No. corresponds to Figure 4 numbered areas.
[b]Adopted antecedent precipitation index prior to antecedent storm varies by unit area, ranging from 0.78-1.47 inches.
[c]Computed antecedent precipitatoin index prior to main storm, 3.65 inches.

Table 4

DAM FAILURE STATISTICS

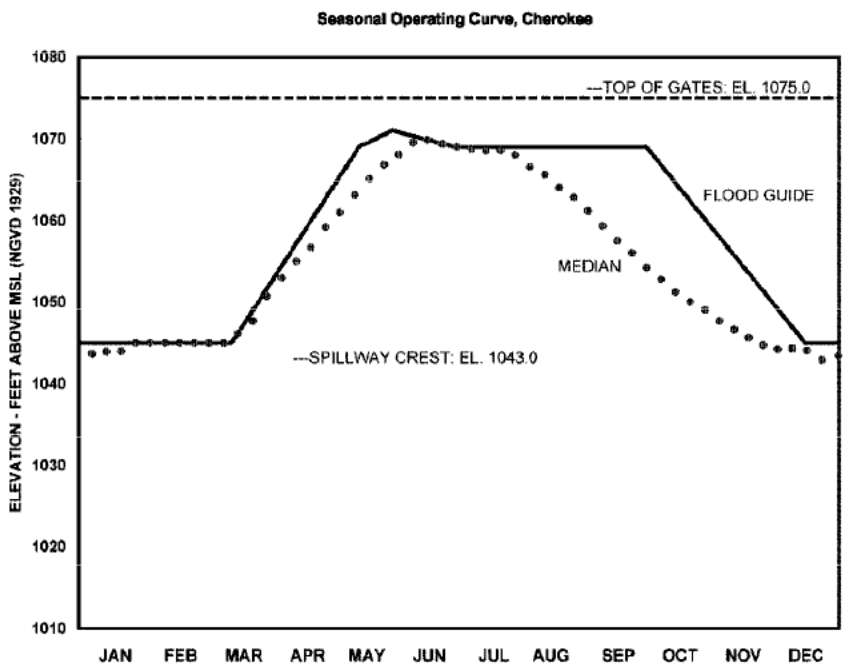
Deleted by Amendment 25

034) 2.4A Table 1 - Maximum Possible Flood has been revised and relocated to Item 033) 2.4A Table - Probable Maximum Flood



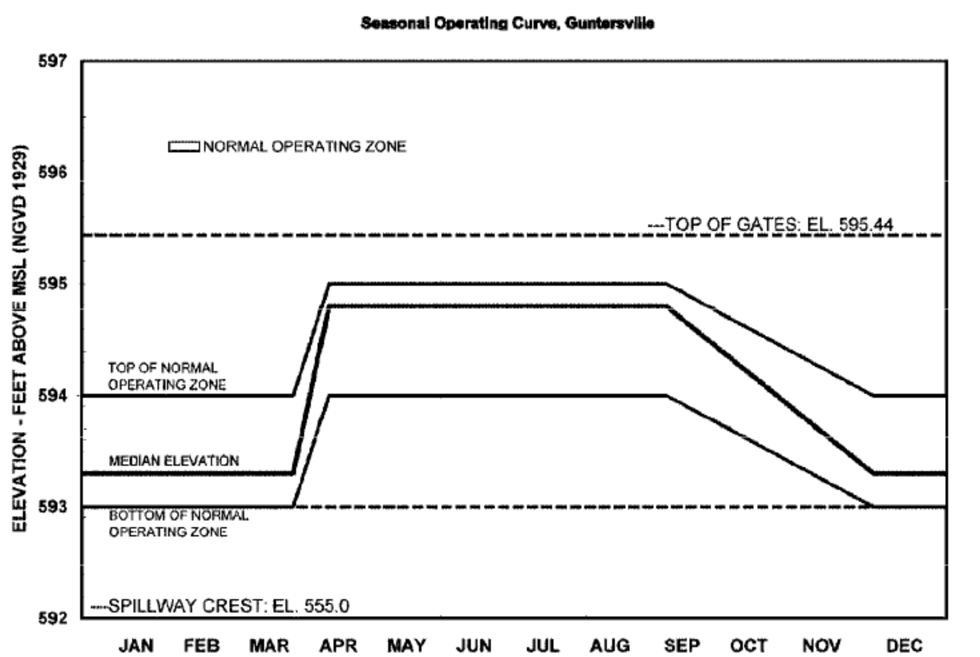
AMENDMENT 25

FIGURE 1



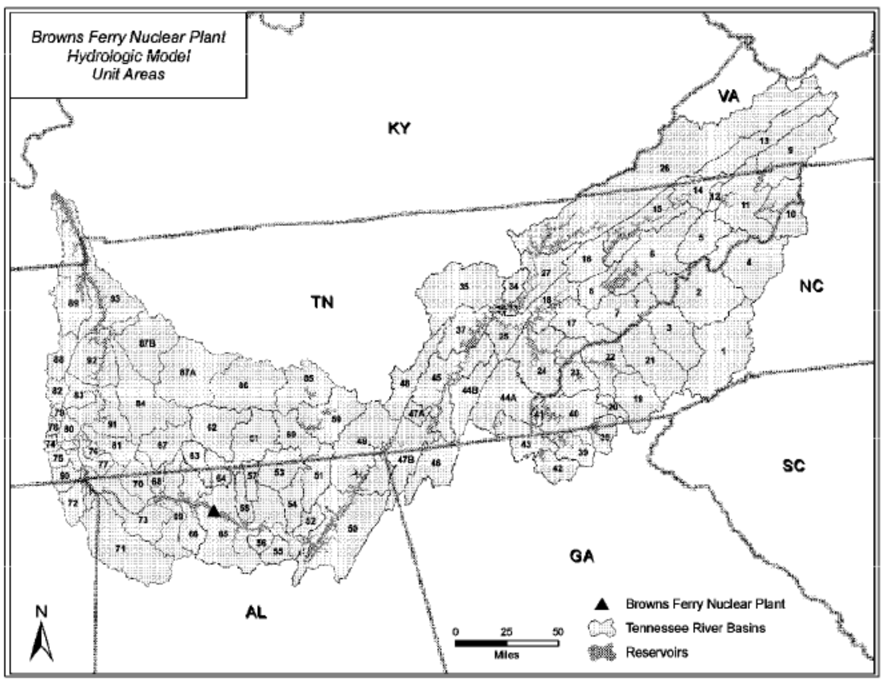
AMENDMENT 25

FIGURE 2



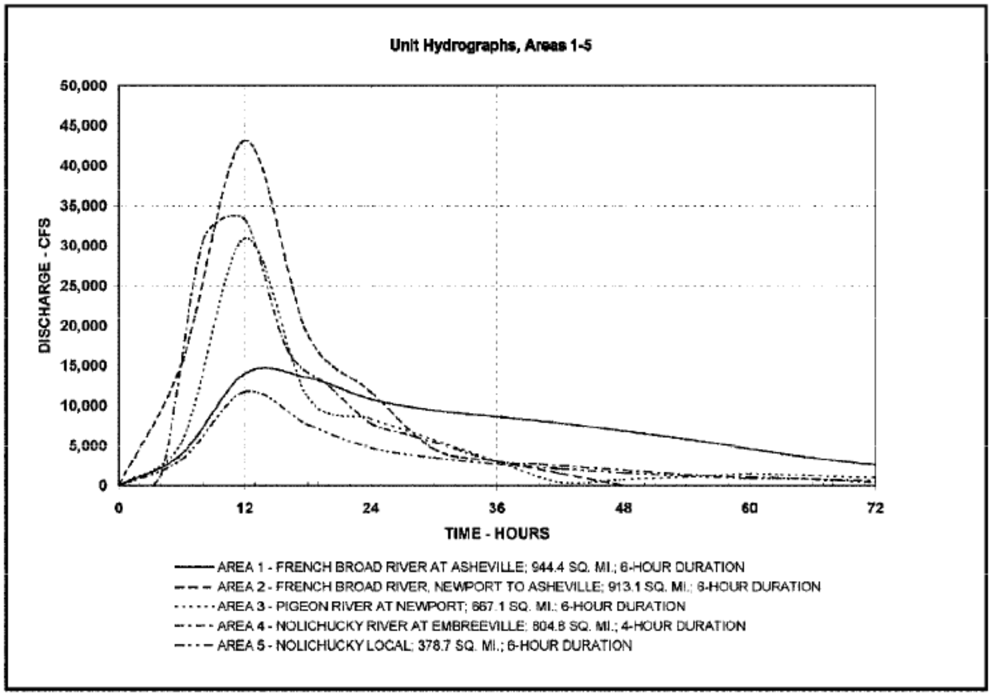
AMENDMENT 25

FIGURE 3



AMENDMENT 25

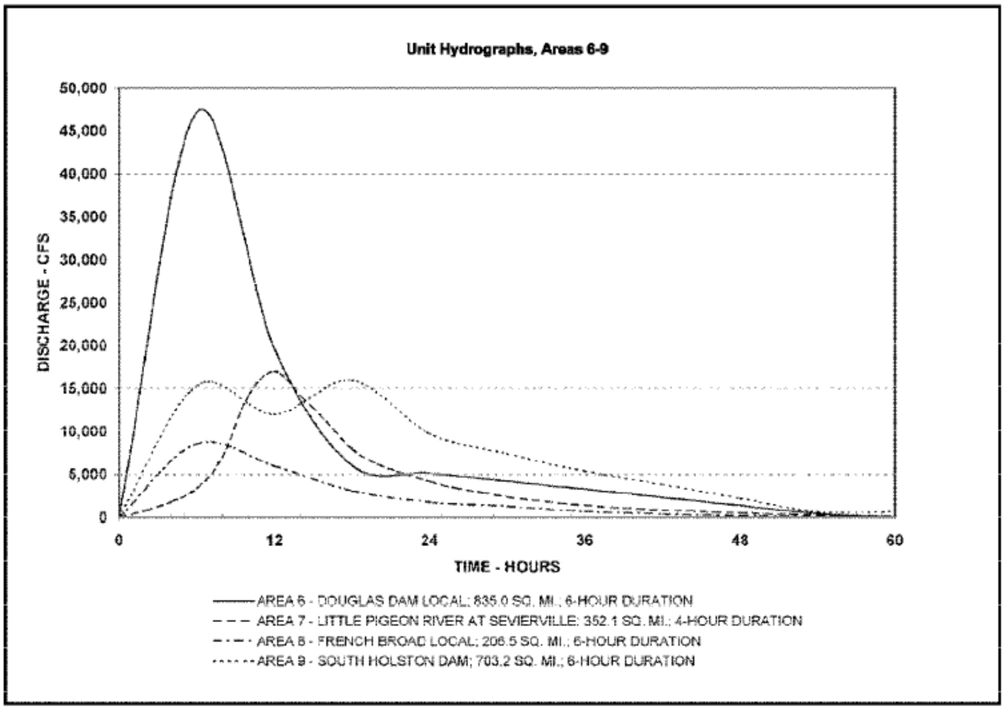
FIGURE 4



AMENDMENT 25

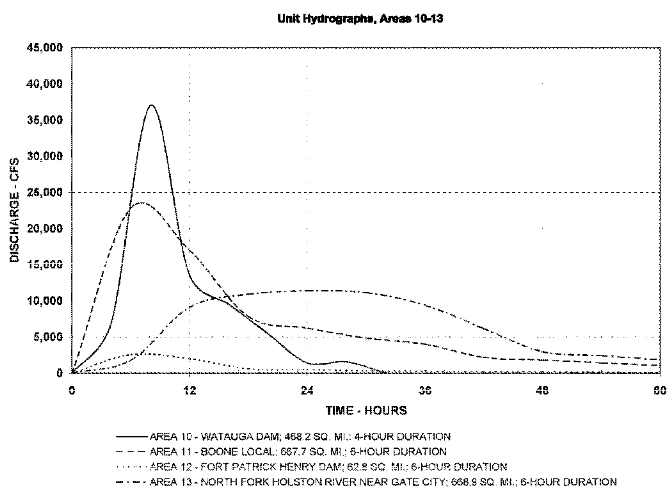
FIGURE 5

SHEET 1 OF 14



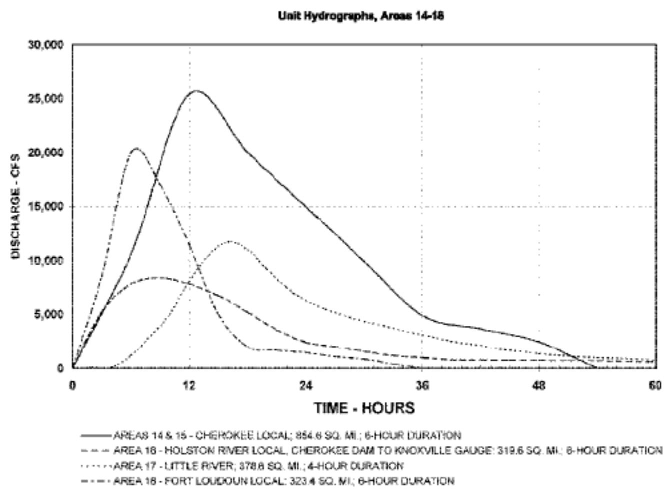
AMENDMENT 25

FIGURE 5
SHEET 2 OF 14



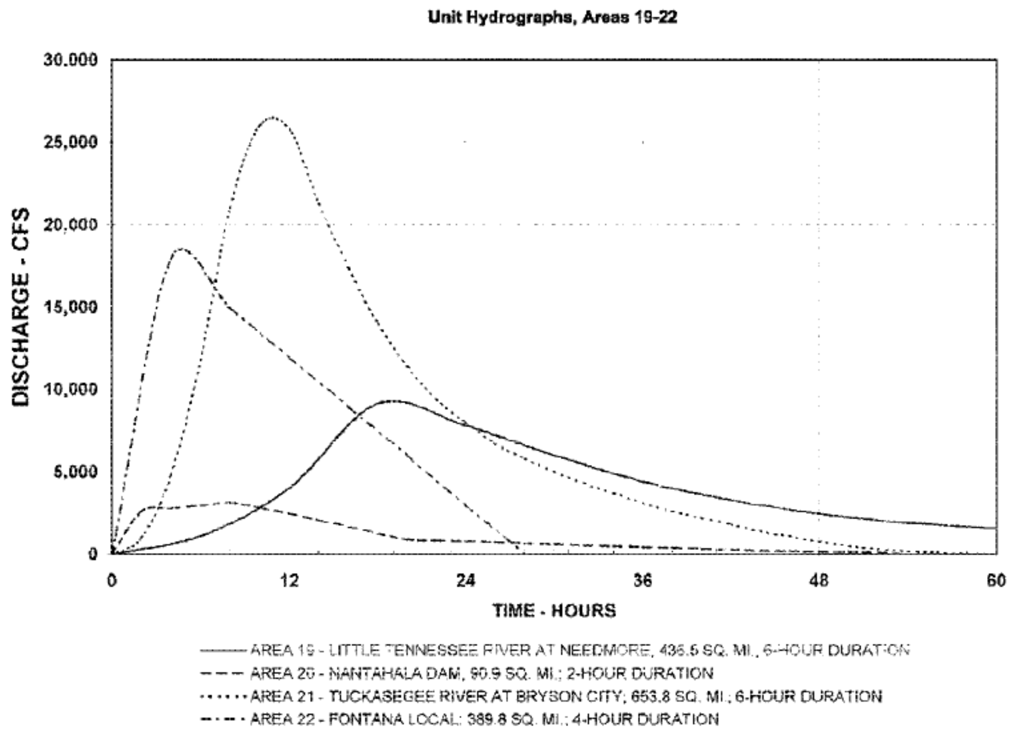
AMENDMENT 25

FIGURE 5
SHEET 3 OF 14



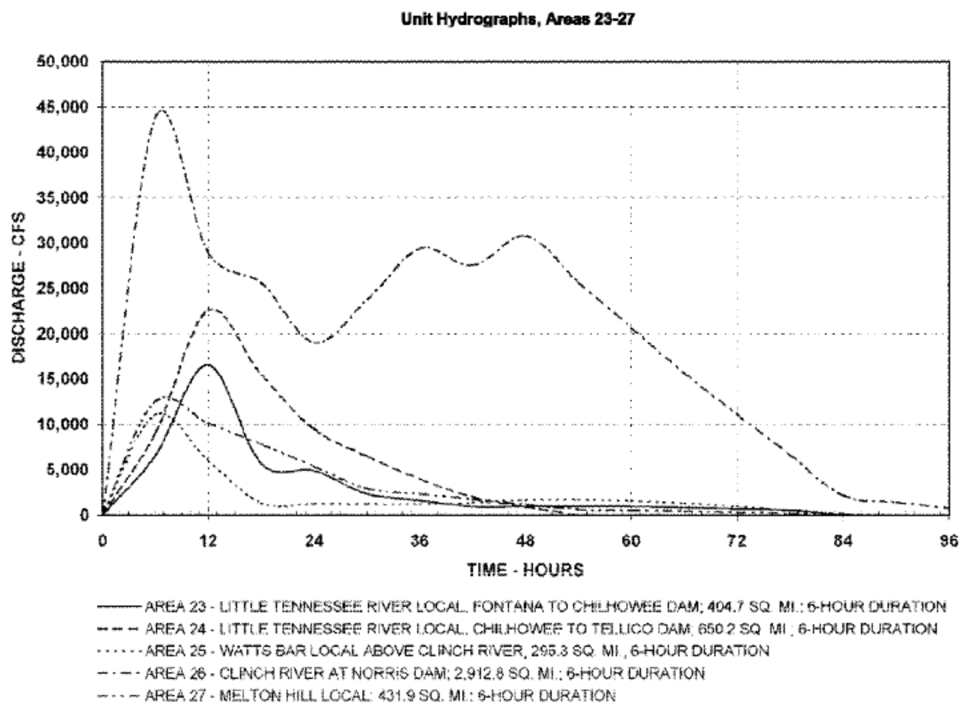
AMENDMENT 25

FIGURE 5



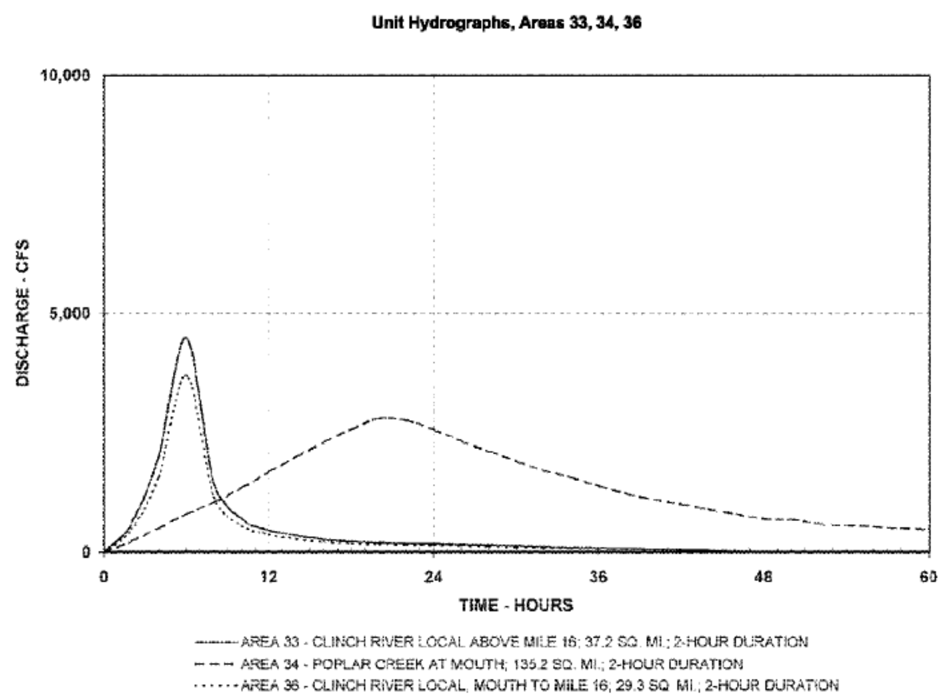
AMENDMENT 25

FIGURE 5
SHEET 5 OF 14



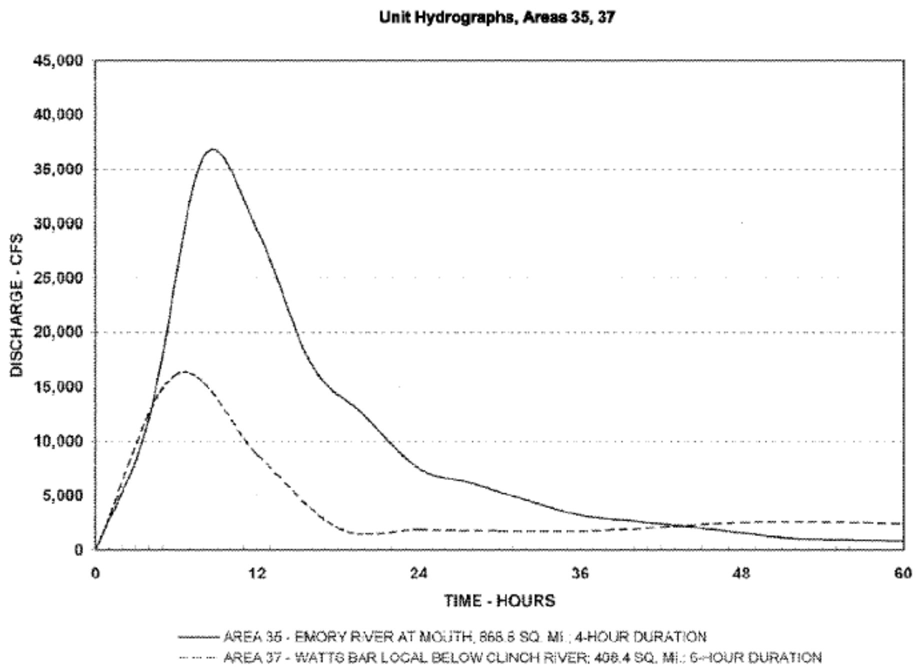
AMENDMENT 25

FIGURE 5
SHEET 6 OF 14



AMENDMENT 25

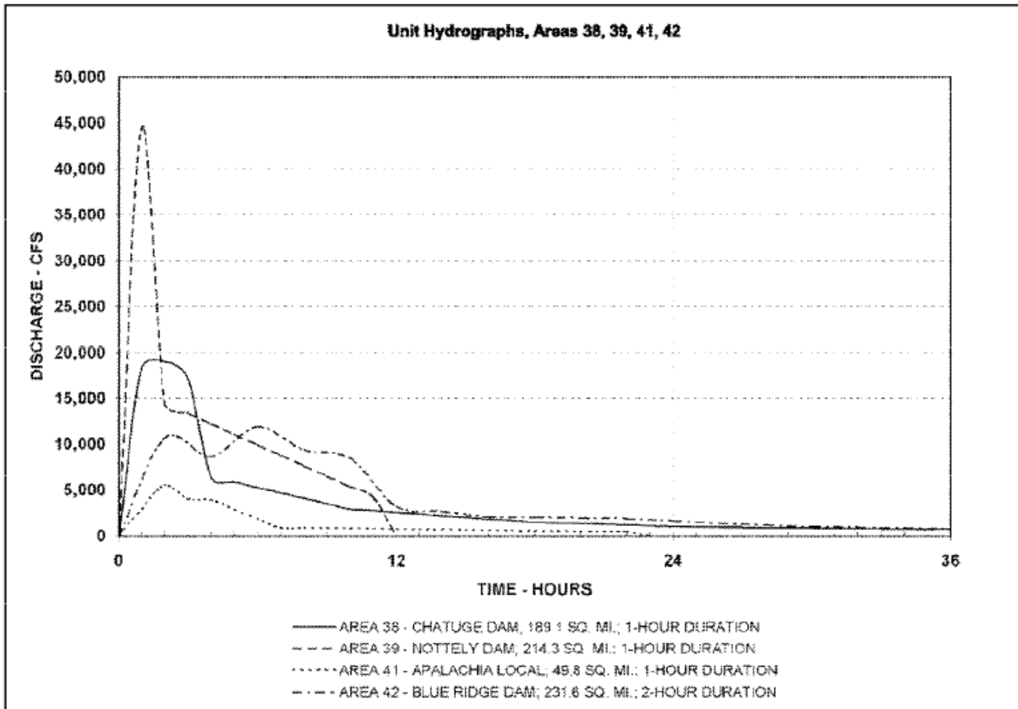
FIGURE 5
SHEET 7 OF 14



AMENDMENT 25

FIGURE 5

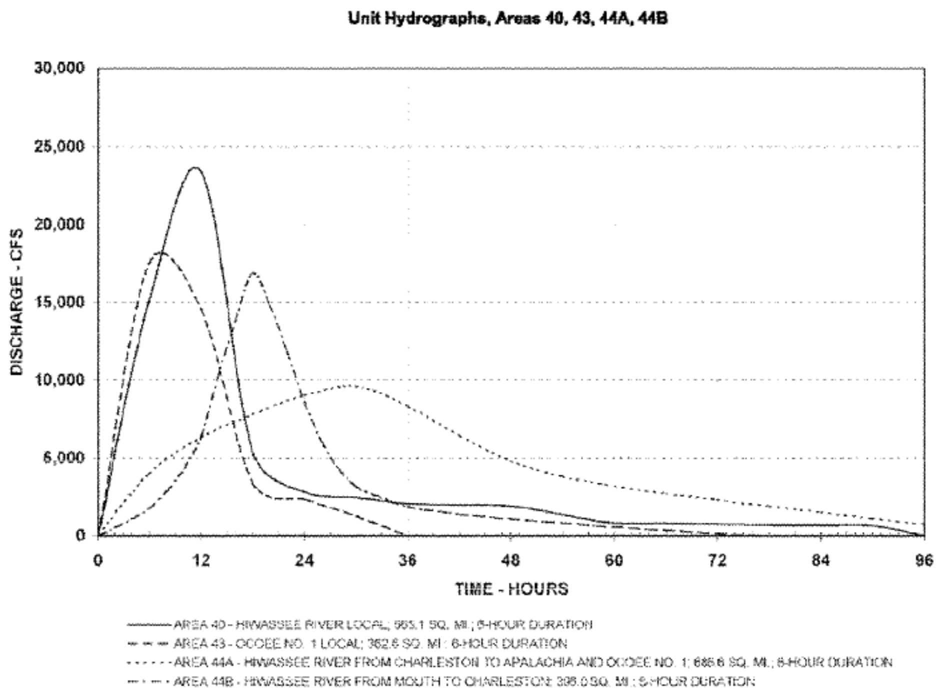
SHEET 8 OF 14



AMENDMENT 25

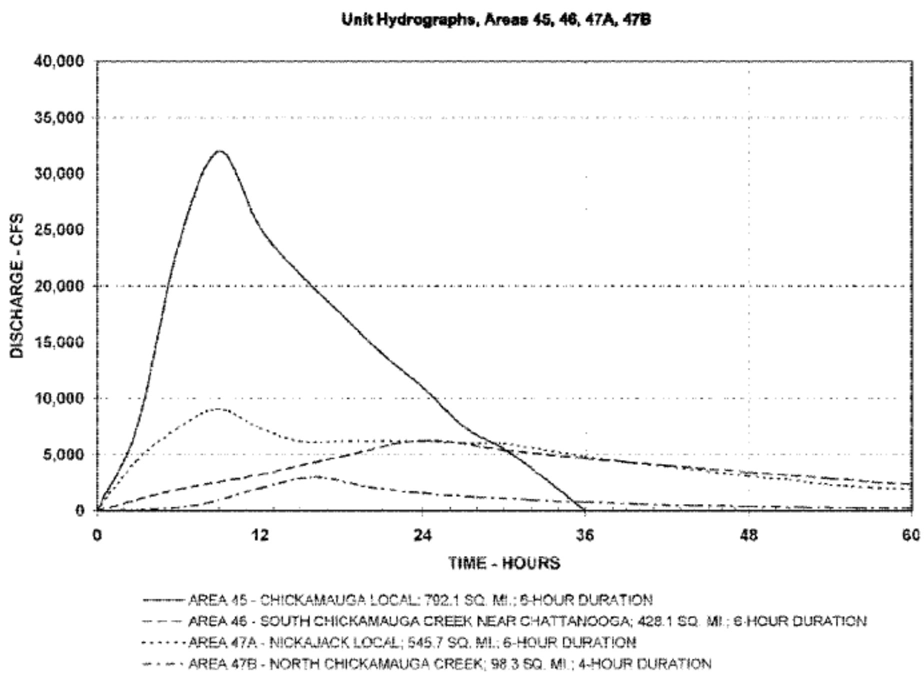
FIGURE 5

SHEET 9 OF 14



AMENDMENT 25

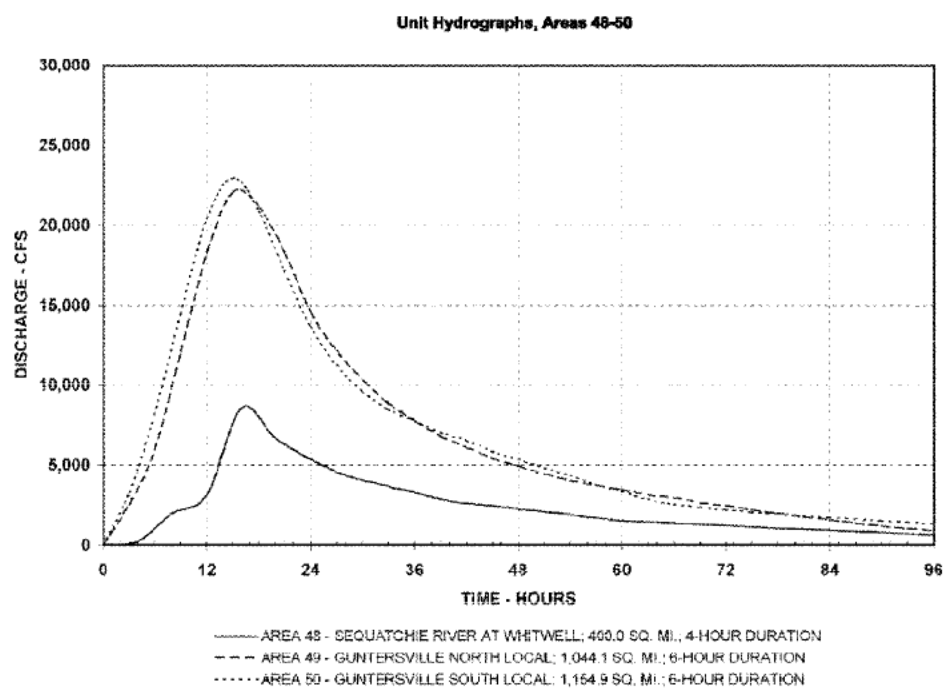
FIGURE 5
SHEET 10 OF 14



AMENDMENT 25

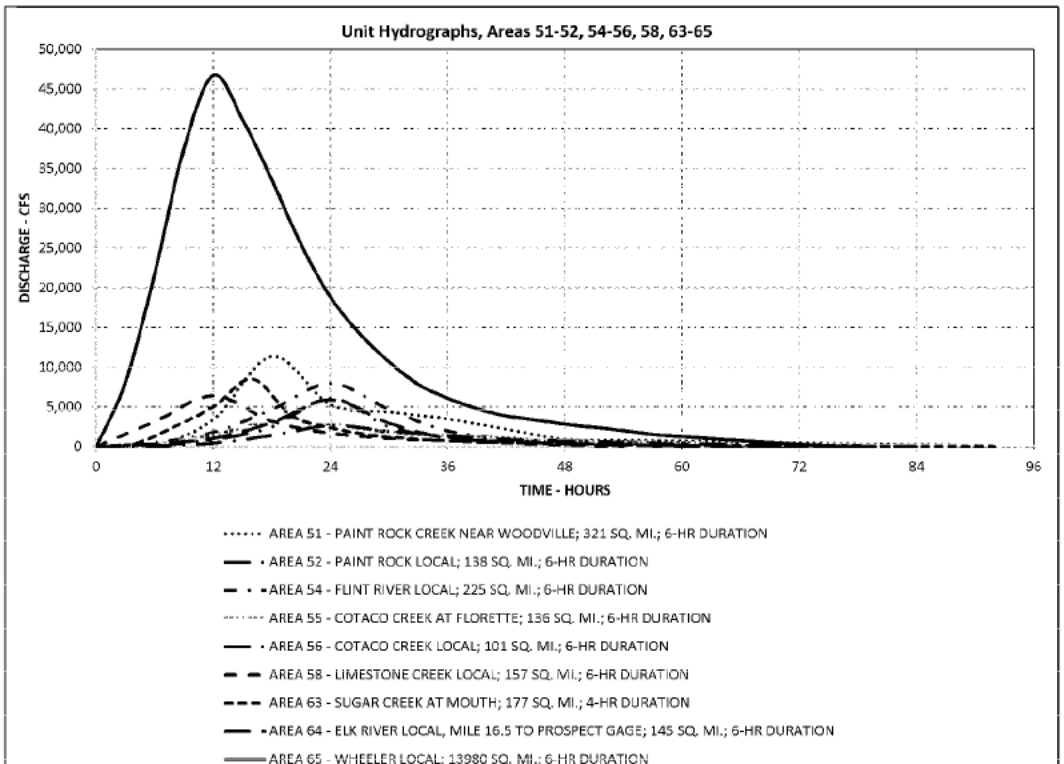
FIGURE 5

SHEET 11 OF 14



AMENDMENT 25

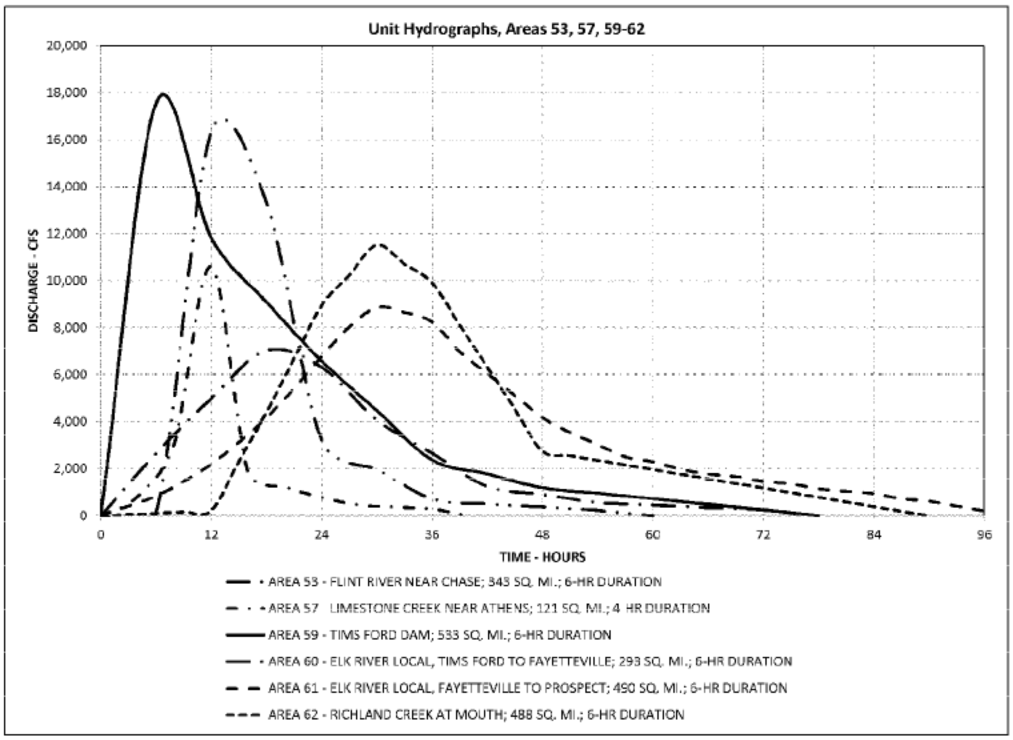
FIGURE 5
SHEET 12 OF 14



AMENDMENT 25

FIGURE 5

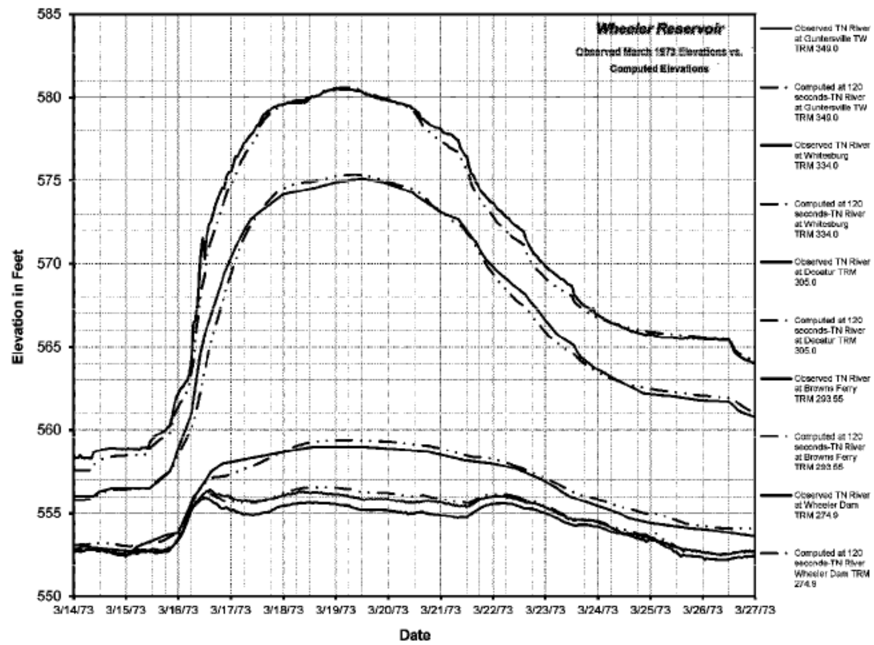
SHEET 13 OF 14



AMENDMENT 25

FIGURE 5

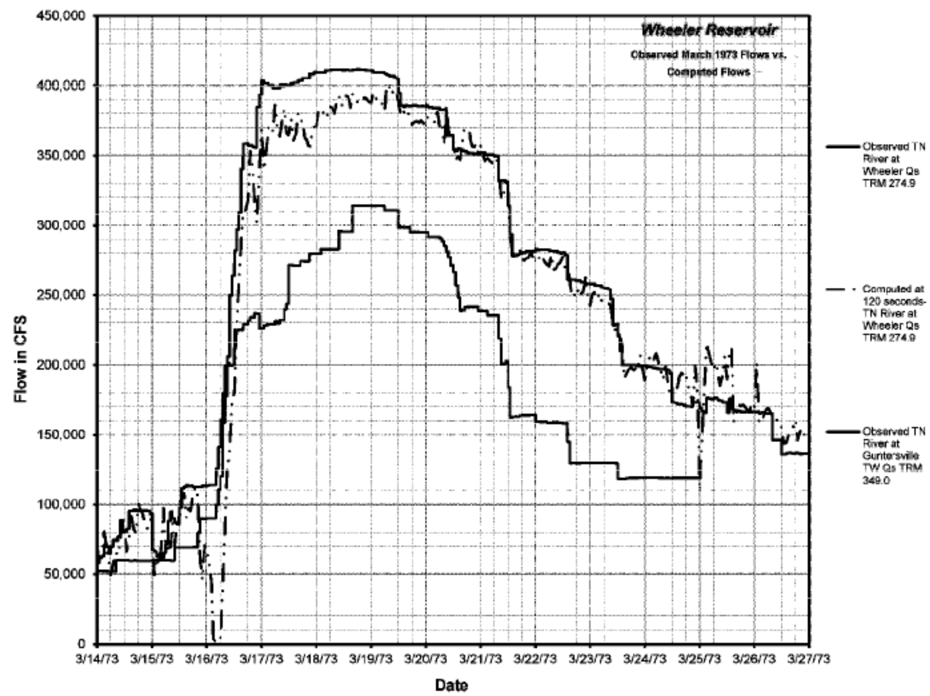
SHEET 14 OF 14



Hydrologic Model Verification - 1973 Flood

AMENDMENT 25

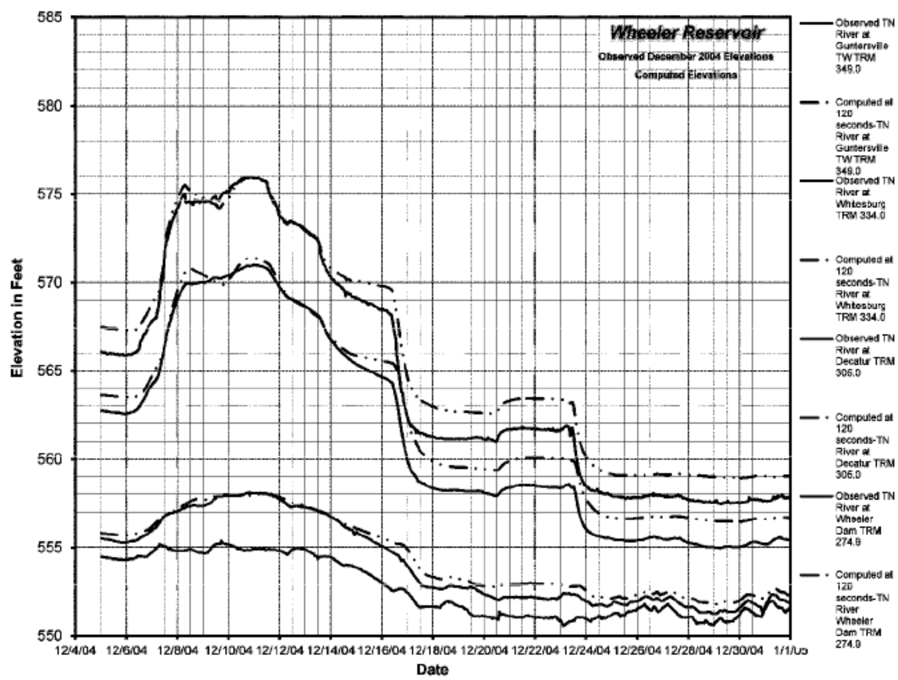
FIGURE 6



Hydrologic Model Verification - 1973 Flood

AMENDMENT 25

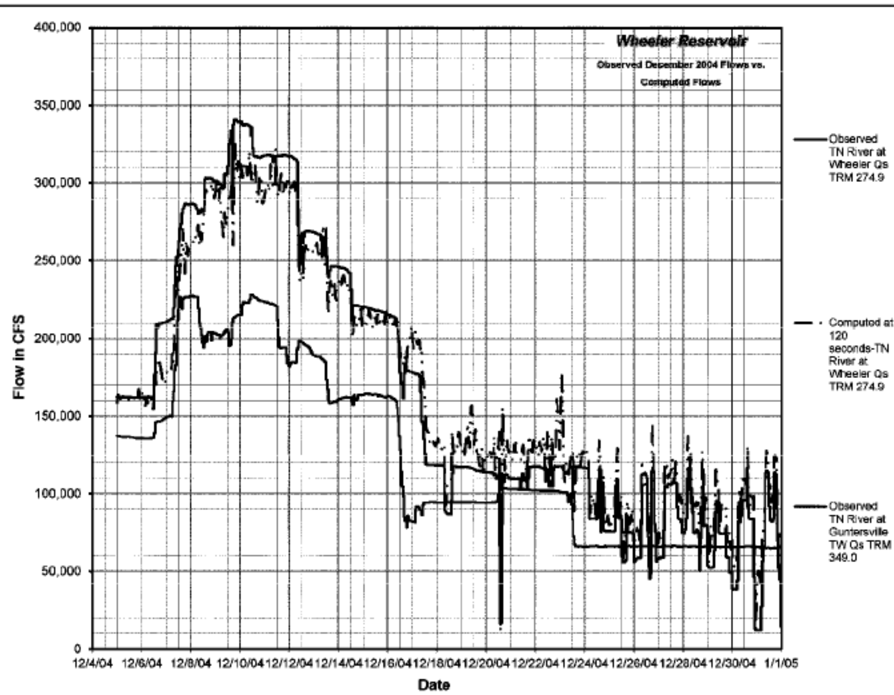
FIGURE 7



Hydrologic Model Verification - 2004 Flood

AMENDMENT 25

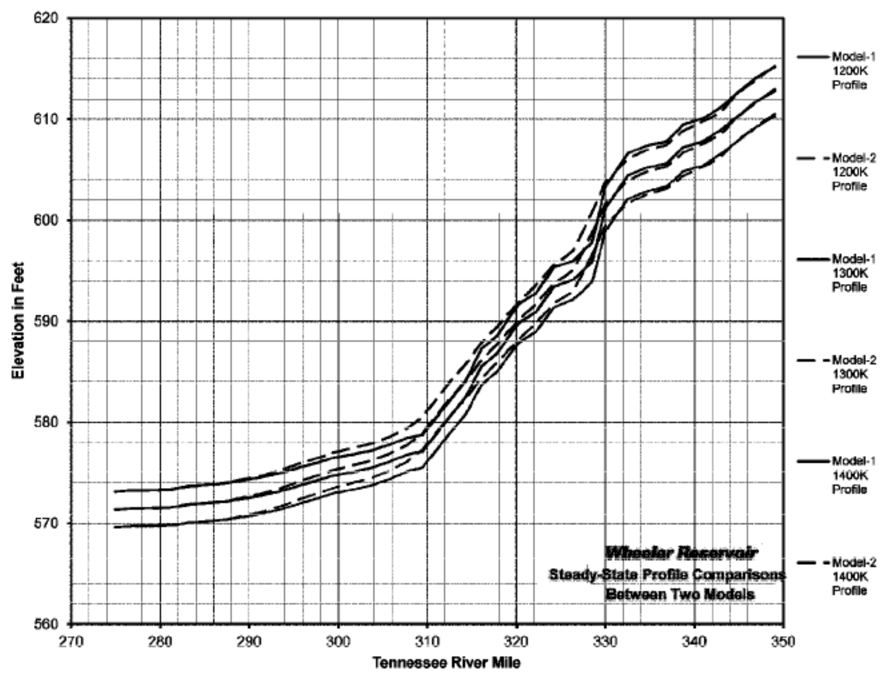
FIGURE 8



Hydrologic Model Verification - 2004 Flood

AMENDMENT 25

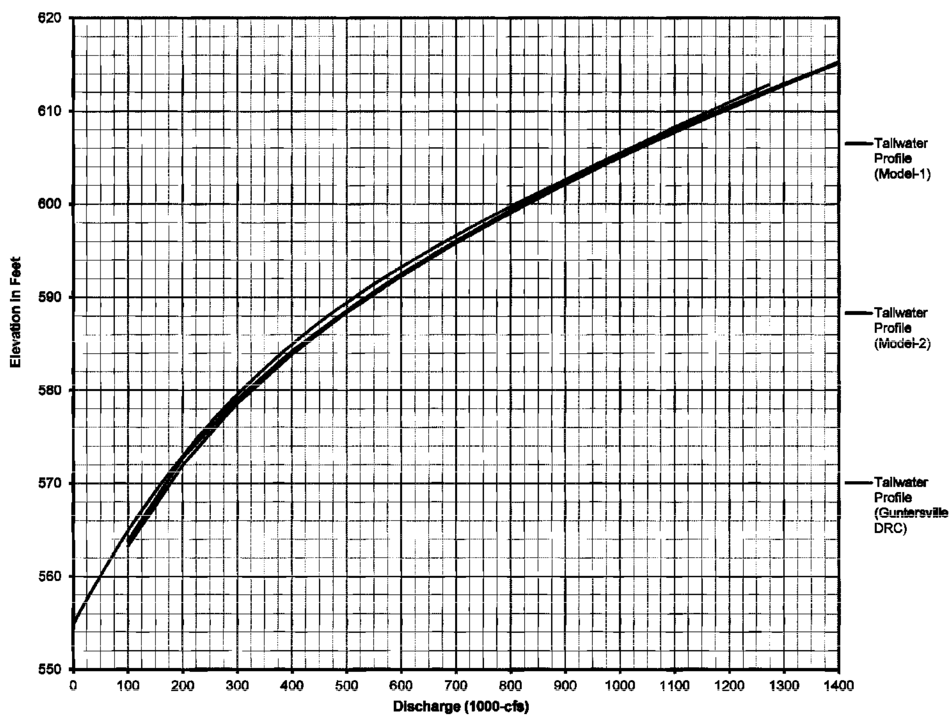
FIGURE 9



Hydrologic Model Verification - Steady-State Profiles

AMENDMENT 25

FIGURE 10



Hydrologic Model Verification - Guntersville Tailwater Curve

AMENDMENT 25

FIGURE 11

SECURITY RELATED INFORMATION
FIGURE WITHHELD UNDER 10 CFR 2.390

GENERAL PLAN
ELEVATION AND SECTIONS

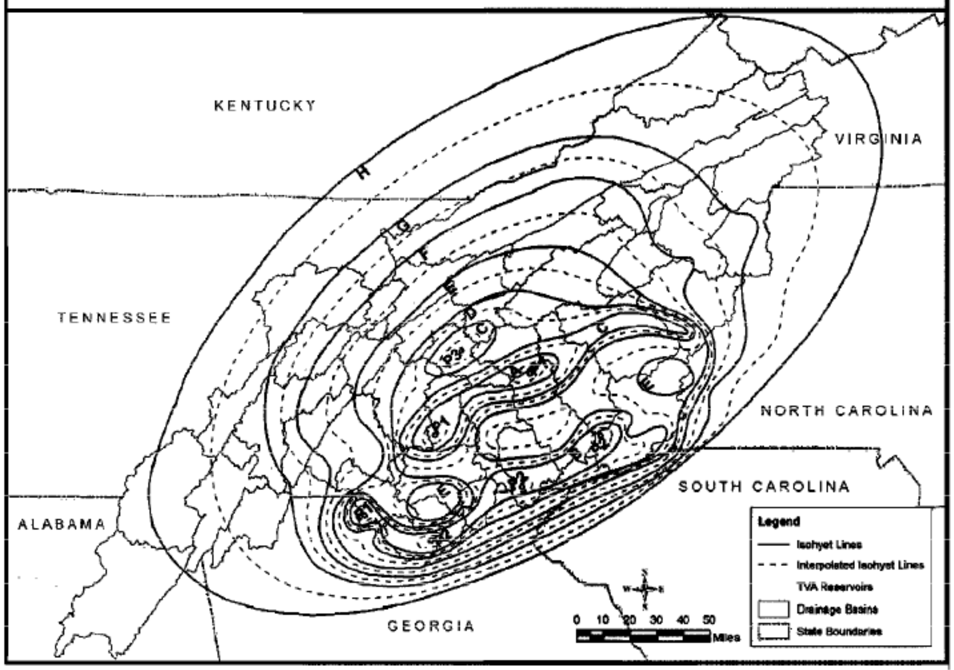
GUNTERSVILLE HYDRO PLANT
TENNESSEE VALLEY AUTHORITY

10W200

AMENDMENT 25

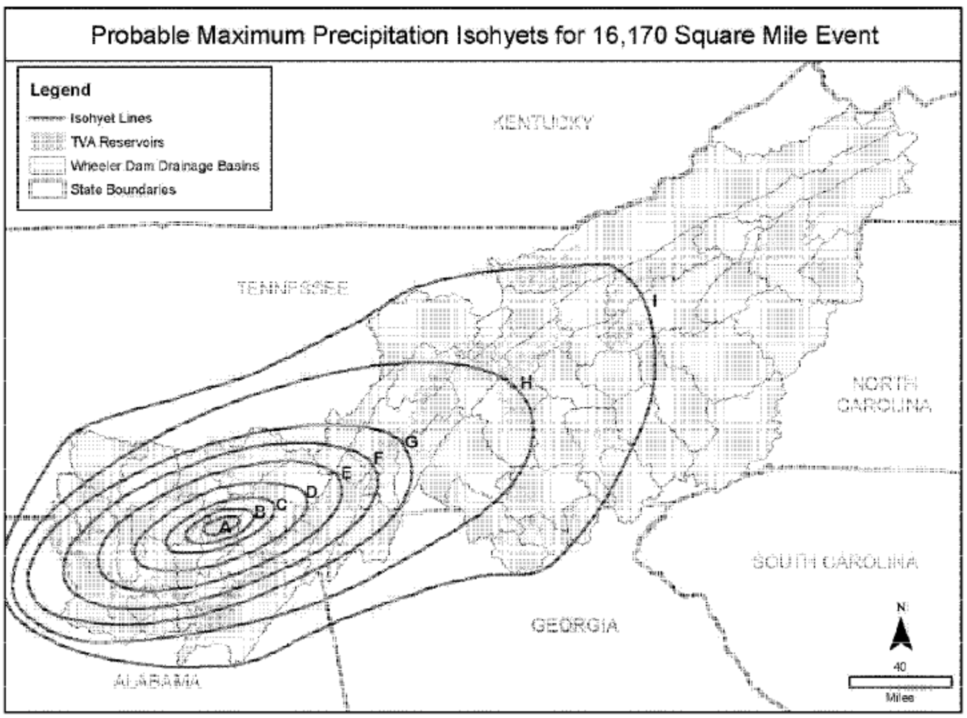
FIGURE 12

Probable Maximum Precipitation Isohyets for 21,400 Sq. Mi. Event, Downstream Placement



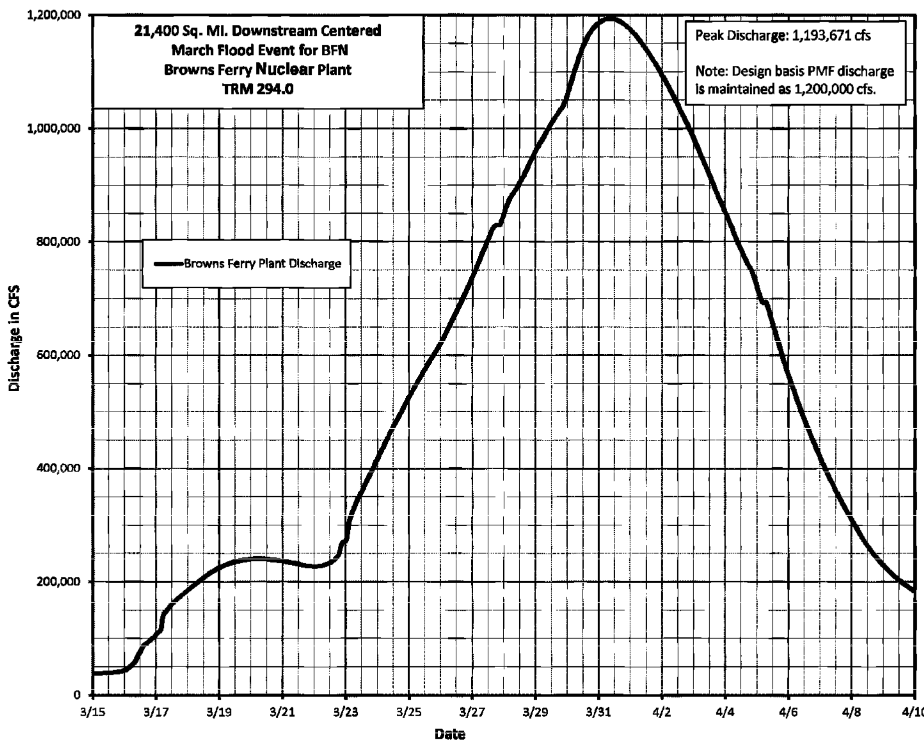
AMENDMENT 25

FIGURE 13



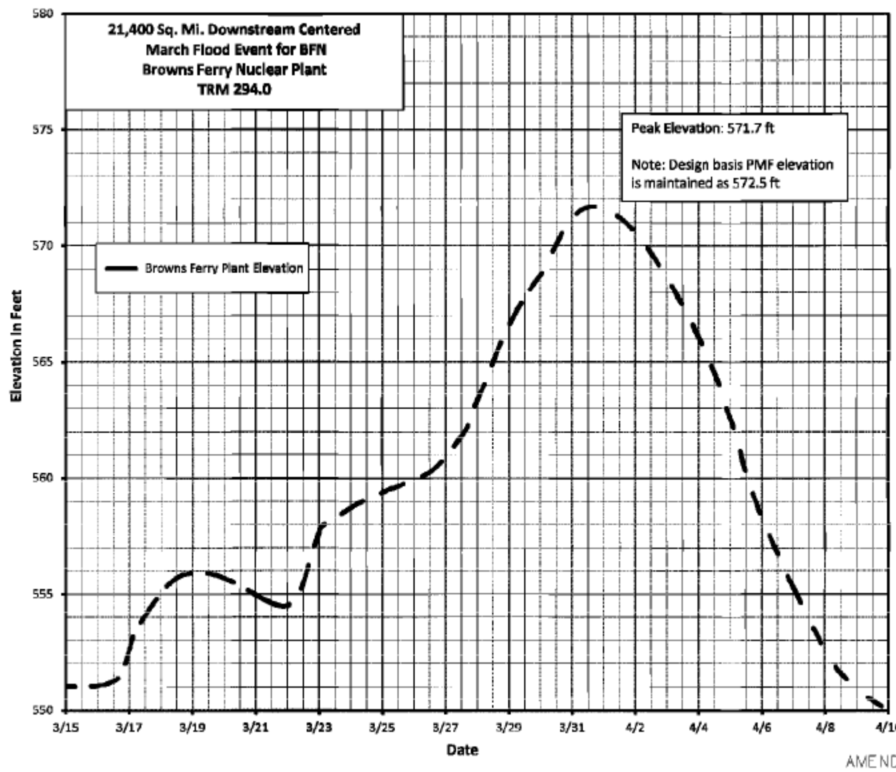
AMENDMENT 25

FIGURE 14



AMENDMENT 25

FIGURE 15



AMENDMENT 25

FIGURE 16

BFN-25

FIGURE 17

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BFN-25

FIGURE 18

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BFN-25

FIGURE 19

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FIGURE 20

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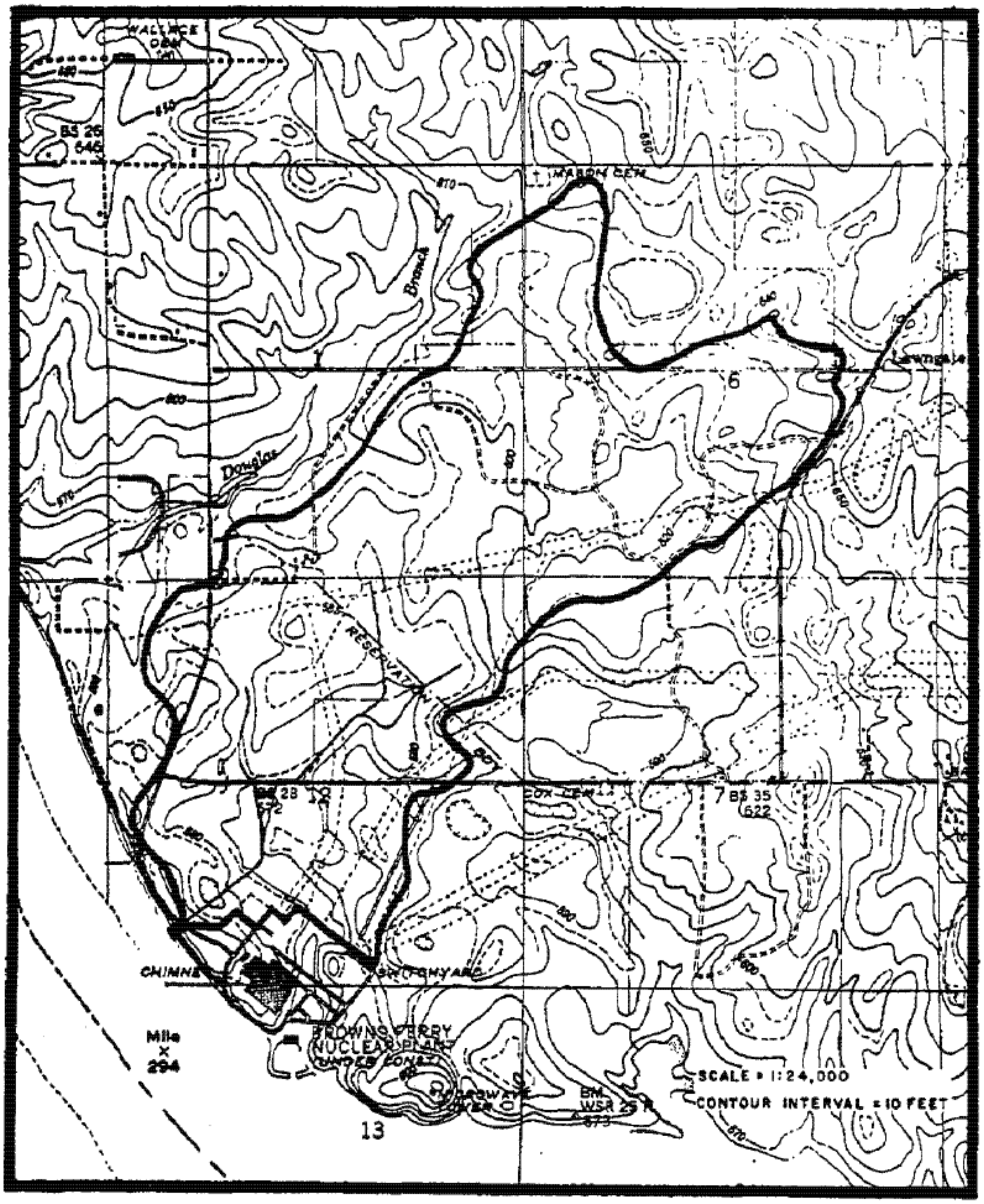
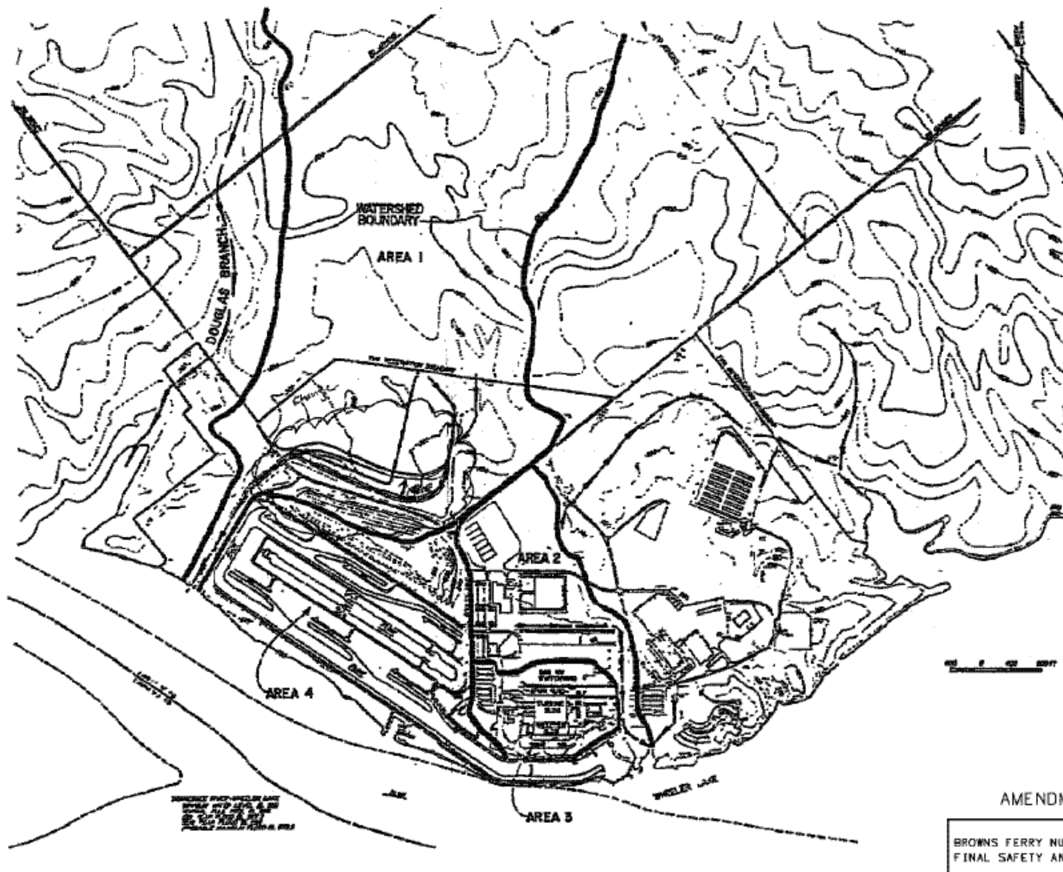


BROWNS FERRY NUCLEAR PLANT
WATERSHED, UNNAMED TRIBUTARY NORTHWEST OF PLANT

AMENDMENT 16

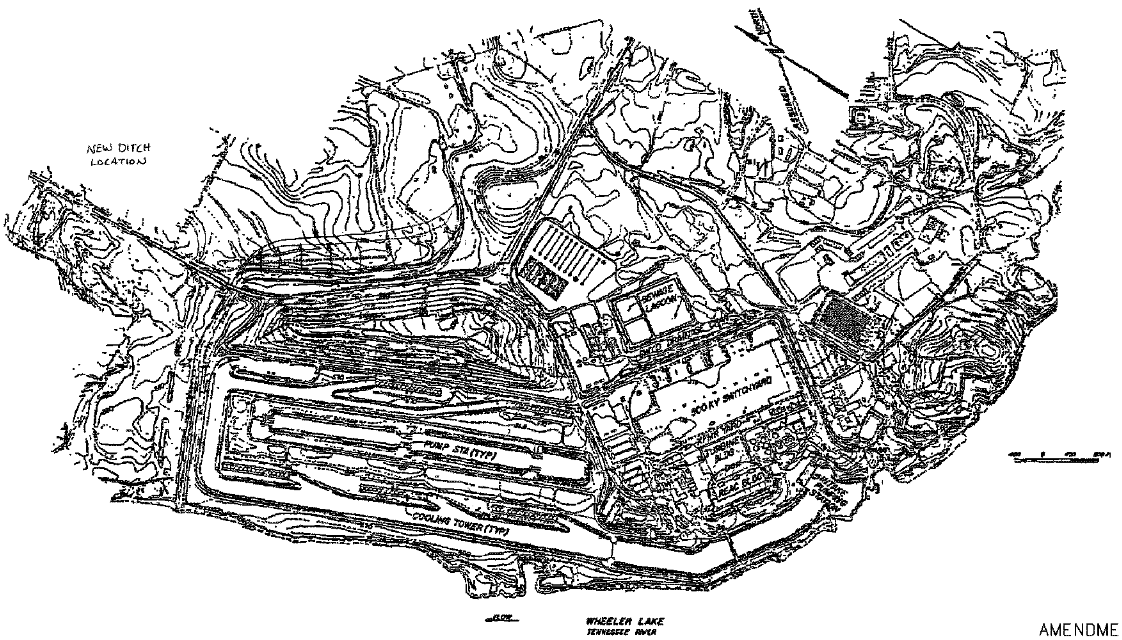


AMENDMENT 24

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

GENERAL PLAN

FIGURE 22



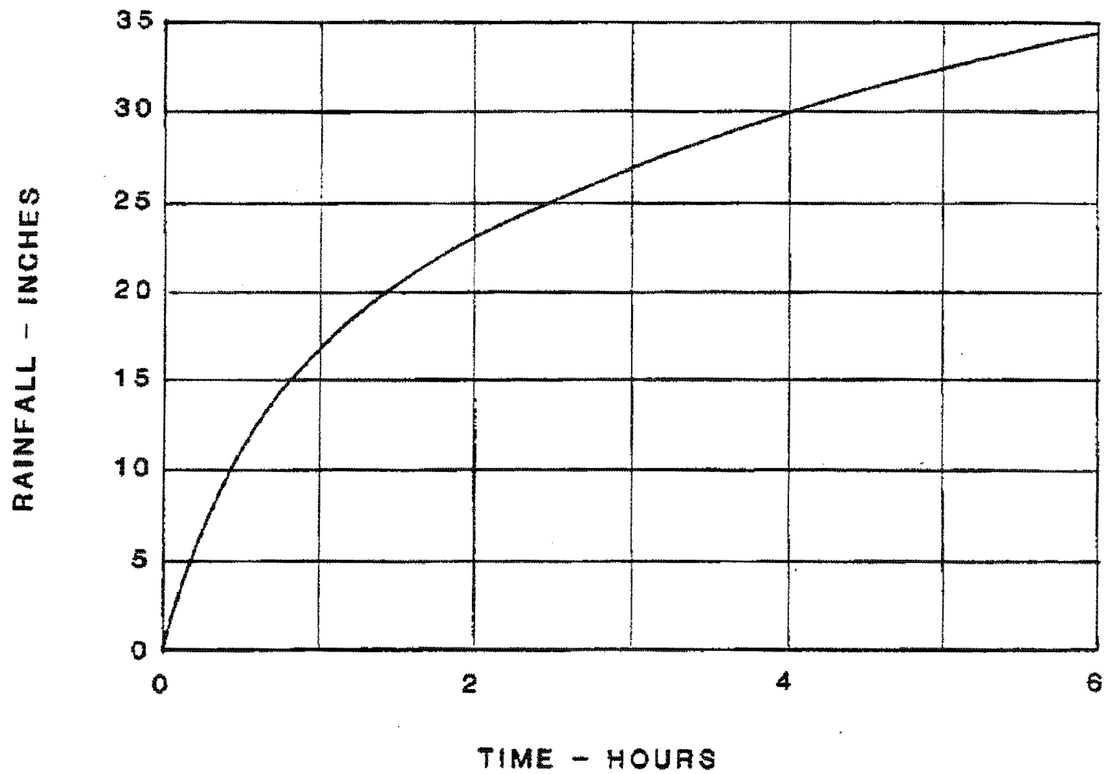
AMENDMENT 24

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

PLANT TOPOGRAPHY

FIGURE 22A

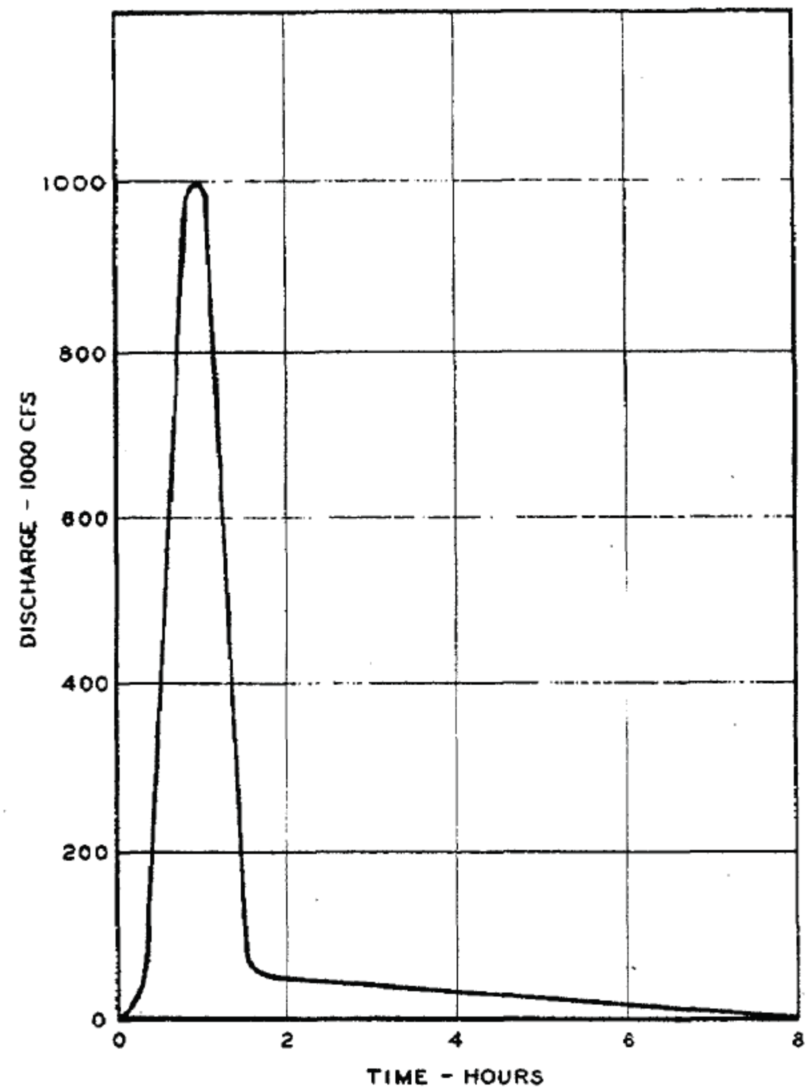
FIGURE NO. 22B



PROBABLE MAXIMUM PRECIPITATION

POINT RAINFALL

FIGURE 23

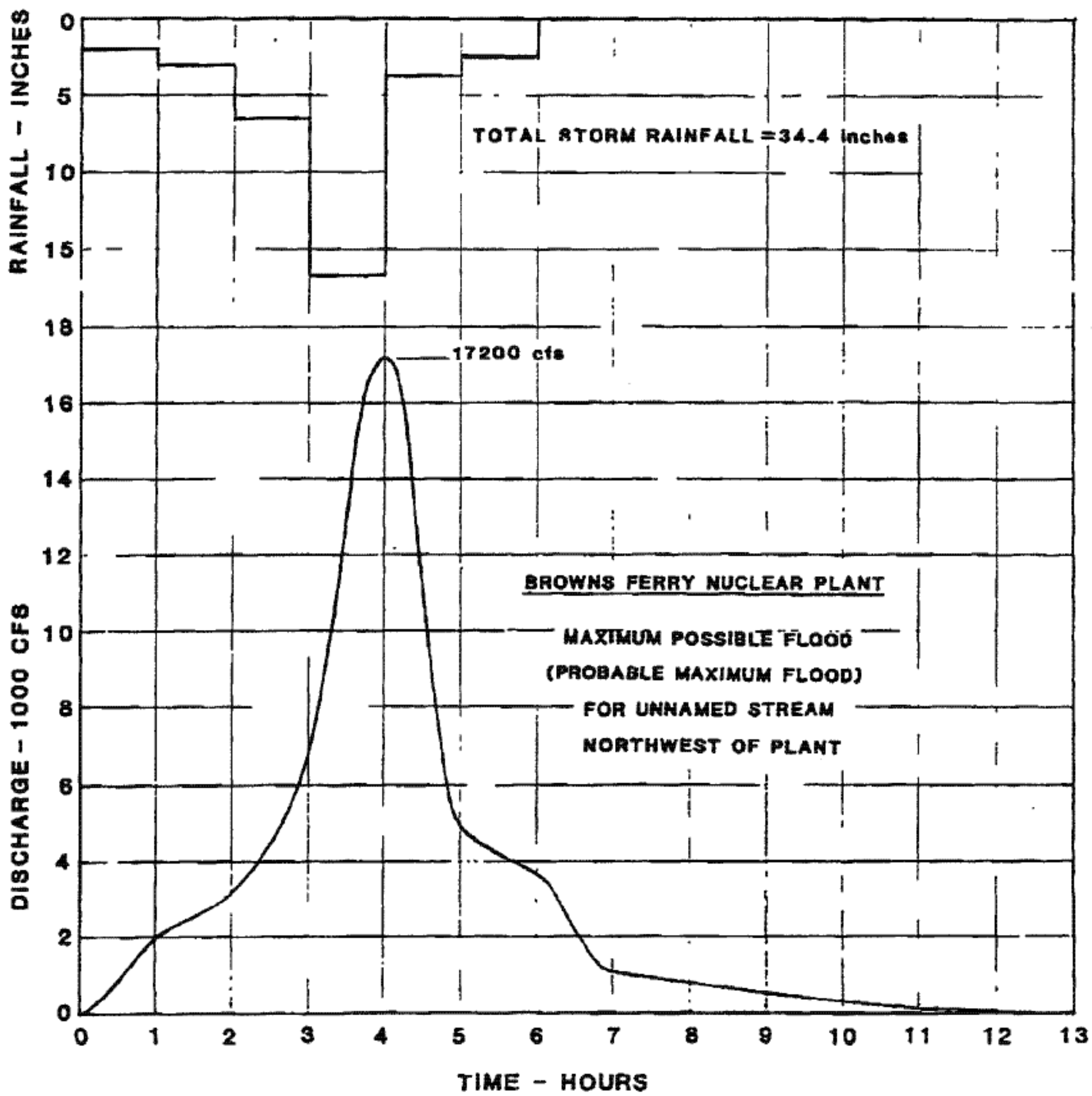


BROWNS FERRY NUCLEAR PLANT

ONE HOUR UNIT HYDROGRAPH FOR UNNAMED STREAM NORTH-WEST OF PLANT

AMENDMENT 16

Amendment 16



SECURITY RELATED INFORMATION
FIGURE WITHHELD UNDER 10 CFR 2.309

AMENDMENT 24

COOLING TOWERS
UNIT 0

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

CHANNEL RELOCATION
WEST OF COOLING TOWERS
TYPICAL SECTIONS

FIGURE 25

SECURITY RELATED INFORMATION
FIGURE WITHHELD UNDER 10 CFR 2.309

COOLING TOWER
UNIT 0

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

CHANNEL RELOCATION WEST
OF COOLING TOWERS

FIG 26 SH 1

SECURITY RELATED INFORMATION
FIGURE WITHHELD UNDER 10 CFR 2.309

COOLING TOWER
UNIT 0

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

CHANNEL RELOCATION WEST
OF COOLING TOWERS

FIGURE 26 SH 2

2.5 GEOLOGY AND SEISMOLOGY

2.5.1 General

The regional geologic features in the Browns Ferry site area and the local geologic formations in the immediate plant area have been investigated. The results of extensive drilling, excavation, and testing are presented in this subsection. These results show that the underlying bedrock will provide more than adequate foundation for Browns Ferry plant structures.

The seismicity of the site area has also been studied. Data from many earthquakes have been used to compile the seismic history of the area and to evaluate the earthquake hazard at the site.

2.5.2 Geology

2.5.2.1 Introduction

The Browns Ferry area was explored first in 1962 as one of several possible sites in the vicinity for a fossil fuel plant. The area is underlain by flat-lying, undeformed limestone of Mississippian age. Exploration indicated and subsequent excavation proved that no significant geologic problems would be encountered in developing satisfactory foundations for the major structures.

2.5.2.2 Geological Investigative Program

2.5.2.2.1 Site

Initial geologic investigations were made at the Browns Ferry site from January to May, 1962, and again during February and March, 1963. During these periods 80 holes totaling 5658.6 linear feet were drilled on 200-foot spacing along lettered ranges roughly parallel to the shoreline of Wheeler Lake and numbered sections at right angles to the ranges as shown in Figure 2.5-1. At this time the site was under consideration for a fossil fuel plant. For this reason drilling depth was limited to 10 feet of sound, unweathered rock and, therefore, the majority of the holes penetrated less than 20 feet of rock. The geologic conditions revealed by this drilling are shown on Figures 2.5-2 and 2.5-3.

2.5.2.2.2 Plant Foundations

With the decision in 1966 to utilize the site for a nuclear plant, additional exploration was done. As shown on Figure 2.5-4, 29 additional core drill holes and 95 percussion holes were drilled in the main plant area to provide additional geologic information. Graphic logs of the additional core drill holes are shown on

Figure 2.5-5. A summary of geological investigative programs from 1972 to 1980 is presented on Figure 2.5-5a.

2.5.2.2.3 Access Highway Bridge

In April of 1972 foundation investigations were conducted for the construction of an access highway bridge over a relocated channel. Ten Nx-wireline core holes were drilled and visually logged. The drill layout is presented on Figure 2.5-5b and the logs are on Figures 2.5-5c through 2.5-5l.

2.5.2.2.4 Deleted

2.5.2.2.5 Low-Level Radwaste Storage Facility

During the period from January to April 1980, TVA conducted foundation investigations at the site of the proposed Low Level Radwaste Facility (LLRW) (Figures 2.5-S1 through 2.5-S4). Core borings and various geophysical methods were used to determine the depth to rock, the configuration of the top of rock, and to locate and zone deficiencies in order to assess the ability of the bedrock to support the overlying soils and thus the LLRW facility. Three vertical Nx-wireline core holes were drilled through the near-horizontally bedded limestones of the Mississippian aged Fort Payne Formation into the undifferentiated shales, sandstones, and limestones below (Figure 2.5-S5). The cores from these holes were logged visually, and the holes were logged geophysically. The bedrock was found to lie an average of 50 feet below the ground surface and to have an undulating to slightly undulating top-of-rock surface containing narrow near-vertical solution features. Subsurface geophysical investigations that were carried out in 102 percussion holes drilled 50 feet into the rock, revealed no buried sinkholes or large near-surface cavities which could potentially collapse and cause settlement.

2.5.2.3 Regional Geology

2.5.2.3.1 Geological History

The Browns Ferry area lies on the southeastern flank of the Nashville structural dome where it merges into the foreland slope of the Appalachian geosyncline. Throughout most of the Paleozoic Era the region was at or slightly below sea level. During this time more than 5,000 feet of limestone, dolomite, and shale were deposited. Since the end of the Paleozoic Era, some 250,000,000 years ago, the area has been above sea level and has been subjected to numerous cycles of erosion resulting in a general peneplanation. During its history this immediate region has been one of little structural deformation. Major folds and faults are entirely absent. The rock strata are only slightly warped with regional dips of less than 1 degree to the southeast away from the Nashville dome and toward the foreslope of the Appalachian geosyncline.

2.5.2.3.2 Regional Stratigraphy (References 1 and 2)

The low plateau on which the Browns Ferry site lies is underlain by near-horizontal limestone strata of Mississippian age having an aggregate thickness of slightly over 1,000 feet. In ascending order the formations and their maximum thicknesses, according to the Alabama Geological Survey, are: Fort Payne, 207 feet; Tuscumbia, 200 feet; Ste. Genevieve, 43 feet; Bethel, 40 feet; Gasper, 160 feet; Cypress, 7 feet; Golconda, 70 feet; Hartselle, 200 feet; and Bangor, 90 feet. Bedrock is mantled by varying thicknesses of cherty clay, silt, sand, and gravel of residual and alluvial origin.

The only formations involved directly in the site area are the unconsolidated materials overlying bedrock and the Tuscumbia limestone and the Fort Payne Formation. A brief description of each of these follows.

Unconsolidated Deposits - Within the site area bedrock is mantled by an average thickness of 54 feet of red and yellow clay containing some residual chert boulders and lenses of sand and gravel. This material varies in thickness from a known minimum of 41 feet to a known maximum of 69 feet.

Tuscumbia Limestone - Only the lower 50 feet of the Tuscumbia formation was encountered at the Browns Ferry site. The Tuscumbia is characterized by medium-to-thick beds of light-gray, medium-to-coarse-crystalline, fossiliferous limestone. Inasmuch as the Tuscumbia Limestone is a relatively pure limestone, it is more affected by solution (than the Fort Payne Formation). Practically all the cavities encountered at the site were developed in this formation.

Fort Payne Formation - The maximum known thickness of the Fort Payne formation in northern Alabama is slightly over 200 feet. At the Browns Ferry site the total thickness, penetrated in one drill hole, is 145 feet. The formation consists of medium-bedded, medium to dark gray, silty dolomite and siliceous limestone with a few thin horizons of shale. Near the top of the formation, some of the beds are cherty and some of the cores showed zones which were slightly asphaltic. The most distinguishing lithologic feature is the presence of quartz-and calcite-filled vugs up to 1 inch in diameter. The silty, siliceous nature of the Fort Payne formation inhibits the development of solution cavities and very few were found in cores drilled from this formation. In general, excavation grades for the major structures of the Browns Ferry plant were set in the Fort Payne formation.

2.5.2.3.3 Regional Structure

The regional structure in the Browns Ferry area is controlled by the Nashville dome. The area lies on the southeast flank of this dome and the regional dip is a degree or less to the southeast. This regional trend is commonly obscured by the slight local variations in dip caused by minor warping and folding. In general, axes of these secondary flexures trend northwest-southeast which is compatible with a regional "cross grain" that has developed on the flank of the Nashville dome.

In the immediate site area the beds of the Tuscumbia and Fort Payne formations are essentially horizontal. Calculations based on the elevations at which the contact between the Tuscumbia and Fort Payne formations was encountered indicate that the direction of dip varies considerably but has an overall westward major component.

As is to be expected in near-horizontal strata, bedrock is cut by a pattern of near-vertical joints. Close to the surface of bedrock, solution channels have developed along these joints especially in the Tuscumbia Limestone. At depth, however, in the less soluble Fort Payne, the joints are tight and most are cemented with calcite.

Faulting is not a significant factor in considering the geologic structure in the Browns Ferry area. No active faults showing recent surface displacement are known within a 200-mile radius of the site. The nearest known ancient fault is in Lawrence County, Alabama, 16.5 miles to the west-southwest from the Browns Ferry site and is one of three apparently related near-vertical faults. The vertical displacement varies from 0 to 60 feet and cuts Mississippian bedrock.

At the site, the only indications of any rock movement are small shears along bedding planes which represent minor readjustments between beds when the area was uplifted at the end of the Paleozoic Era some 250,000,000 years ago. No accurate measurement of these displacements can be made, but movement was probably on the order of a few hundredths of a foot.

2.5.2.4 Site Geology

2.5.2.4.1 Physiography

The area surrounding the Browns Ferry site lies near the southern margin of the Highland Rim section of the Interior Low Plateaus as defined by Fenneman.[1] This physiographic subdivision is characterized by a young-to-mature plateau of moderate relief. The general level of the ground rises gradually from 600 feet above sea level at the north shore of Wheeler Lake to around 800 feet above sea level 10 miles north in the vicinity of Athens, Alabama. This surface is modified by the drainage patterns of Poplar, Round Island, and Mud Creeks, which flow across it from northeast to southwest.

1Fenneman, N.M., “Physiography of the Eastern United States,” pp.415-427.

The plant site is located on an old river terrace surface with an average elevation of 575 feet above sea level. This surface represents an old flood plain of the Tennessee River developed when the river was flowing at a higher level. The most recent flood plain is now inundated by the waters of Wheeler Lake. Plant grade is at El. 565.

2.5.2.4.2 Bedrock

The general description of the Tuscumbia and Fort Payne formations has been covered in Section 2.5.2.3.2, "Regional Stratigraphy." This section will deal with the foundation conditions as encountered and treated during the construction period.

The first bedrock uncovered was the lower portion of the Tuscumbia Limestone. As had been expected from the results of the exploratory drilling, the Tuscumbia was cut by frequent near-vertical solution channels developed along steeply dipping joints. Before El. 515 had been reached, the near-vertical solution channels had pinched out and the major indications of solution were near-horizontal zones of weathering developed along the bedding.

At this stage additional exploratory drilling was done to determine the detailed foundation conditions under the reactor building, turbine building, intake structure, and chimney areas. As shown on Figure 2.5-4 a combination of core drill and percussion holes was drilled. The core holes furnished detailed stratigraphic control, while the primary purpose of the closer spaced percussion holes was to ensure that no large cavities existed below the foundation.

Eleven specimens of core selected from holes drilled in the reactor area were tested for unconfined compressive strength in the TVA materials laboratory (Reference 3). The maximum value obtained was 17,200 psi; the minimum was 11,419 psi; and the average was 14,175 psi (Reference 4). Additional core samples from the same area were sent to John A. Blume and Associates for testing of other physical properties. The following data are taken from their report (Reference 5):

Elastic Modulus	8,200,000 psi
Shear Modulus	2,300,000 psi
Constrained Modulus..	10,000,000 psi
Poisson's Ratio	0.252

Ten selected percussion holes in the Unit 1 and Unit 2 areas were inspected with a borehole television camera to confirm the results of the drilling, and the continuity of horizontal seams was checked in four core drill holes by resistivity and gamma ray logs. In addition, test pits were dug at the centers of Units 1 and 2.

The exploration and initial excavation disclosed a persistent weathered zone at the base of the Tuscumbia Limestone, between El. 509 and 508 at the west side of the Unit 1 portion of the reactor building, which contained one or more partially open seams 0.1 foot to 0.15 foot thick. In some instances this seam was open, and in others it was clay-filled. This weathered zone sloped upward to the east along the contact between the Tuscumbia and Fort Payne formations. Midway between Unit 1 and Unit 2 this contact intersected the rock surface at approximately El. 511. As a result, only the Fort Payne formation is the foundation rock in the Unit 2 and Unit 3 areas, and no cavities or seams were present.

Special foundation treatment was required to ensure an adequate foundation for the structures. In the Unit 1 portion of the reactor building this was accomplished by a system of underpinning. Trenches were excavated through the Tuscumbia Limestone to the underlying Fort Payne Formation. These trenches are under the perimeter walls of the reactor building and a doughnut-shaped trench is under the periphery of the central mass under the drywell. These trenches were backfilled with concrete to El. 513, the bottom of the reactor building slab. (Figure 2.5-19)

Under the Unit 2 and Unit 3 portions of the reactor building where the Fort Payne formation was below the design elevation of 513, fill concrete was placed to that elevation over the entire area.

Foundation for the bearing pile cluster locations in the turbine building area was provided by grouting the seam at the Tuscumbia-Fort Payne contact by conventional consolidation grouting methods.

Surficial Deposits

Plant Area - A soils investigation program was initiated in the spring of 1966 for the purpose of establishing the allowable bearing value for soil-supported structures and identifying adequate borrow material (Reference 6).

The original ground surface occurred at approximately 15 feet above final plant grade in the area of plant structures, and approximately 2 feet above the final transformer and switchyard area grade.

The top 15-20 feet is classified as a red-to-reddish-brown, sandy clay and lean-to-medium silty clay with a maximum thickness of 30 feet. This is designated as the preferred borrow material.

Underlying these alluvial terrace deposits are approximately 40 feet of residual medium-to-fat clays and plastic silts interbedded with lenses of medium layers of gravelly chert. The ground water table was established at El. 555.1 foot, which corresponds to the level of Wheeler Reservoir.

A total of 13 borings was made. Of these, undisturbed samples were obtained from seven, using 3-inch and 5-inch Shelby Tubes. The remaining six were drilled with a 4-inch power auger, with disturbed samples taken. Undisturbed samples were taken at 3-foot intervals, while disturbed samples were taken at 5-foot intervals. Standard penetration tests were made using a 2-inch split-spoon.

Laboratory testing consisted of index tests, soil classification, consolidation tests, and vane shear tests. The laboratory testing and the standard penetration resistance result gave an allowable soil bearing capacity of 1.5 tons per square foot for a mat foundation and 2.0 tons per square foot for spread footings.

Intake Channel - To determine the seismic stability of materials in the intake channel, borings and samplings were made in depth at five locations in the side slopes of the channel connecting the intake structure with Wheeler Reservoir. Laboratory tests and analysis then established shear and other design values of this material (see Chapter 12). A vibroseismic survey was also made at the site to identify the shear wave and compression wave velocities of the soils. Using the values obtained, the seismic stability was evaluated and is described in Section 12.2.7.

Low Level Radwaste Storage Facility - A soils investigation program was initiated in the Winter of 1980 for the purpose of determining the in-situ and borrow soil properties. Figure 2.5-S1 shows the location of the LLRW facility in relation to main plant and Figure 2.5-S2 shows the location of in-situ soil borings for the LLRW facility.

The overburden thickness varies from 37 to 50 feet with existing grade varying from El. 588 to El. 570. Final grade is at approximate El. 580. Figures 2.5-S3 and -S4 are generalized soil profiles in the LLRW area.

A predominantly red lean clay layer extends from the ground surface to depths ranging from 2 to 18 feet and averaging 16 feet. This layer is continuous except where previously excavated for borrow. Typically, blow counts (N) from the standard penetration test (ASTM D-1586) fall within the stiff to very stiff consistency range. However, surficial weakness revealed by blow counts less than 10 is not uncommon. These clayey soils represent ancient terrace alluvium.

Underlying the lean clay is an intermediate layer consisting of predominantly tan to red, medium to highly plastic residual clay. This layer is not continuous. In places, it has a thickness up to 26 feet and averages about 16 feet. Inclusions of gravelly clay, lean clay, and silt are present. Penetration resistance indicates very stiff consistency with only scattered isolated weakness.

The intermediate layer extends to bedrock and is underlain by a basal cherty clay or clayey chert. The fine fraction of these soils is usually highly plastic, showing a wide variation in color ranging from red to yellow and tan to black. The gravelly clay containing over 10 percent gravel represents a transitional zone between the fat clay and the clayey gravel as shown on the general cross sections, Figures 2.5-S3 and 2.5-S4.

The residual clayey gravels sampled with the 2-inch split-spoon usually showed some particle breakage due to the penetration of the samplers. Thus, the in-place material is coarser than the samples grain size tests indicate. This gravel layer is continuous across the site and averages about 18 feet in thickness. Soil consistencies indicate wide areas of relative weakness ($N \leq 10$) which is most pronounced and persistent immediately above bedrock.

Water level readings were taken in borings 1 hour and 24 hours after completion of drilling. Water levels varied from El. 575 in the western area of structures A-1 and A-2 to about El. 569 on the eastern end of A and B structures and the southern end of the C structures. In some cases, water was not initially apparent at the established elevations. On penetrating the clayey gravel (GC) soils, however, water rose and adjusted rapidly, indicating the water is confined.

Laboratory testing consisted of index testing of split-spoon samples for classification. Moisture contents were obtained on all samples. Undisturbed samples were tested for moisture content, grain size, Atterberg limits, specific gravity, and unit weight. In addition, representative undisturbed samples were selected for determining engineering properties. Specifically, triaxial compression unconsolidated-undrained (Q-test), triaxial compression consolidated-undrained (R-test), and direct shear consolidated-drained (S-test) strengths were determined. Consolidation and permeability tests were conducted.

Three borrow areas were investigated to locate a suitable quantity of an acceptable borrow material. Each area was sampled with auger borings to collect bag samples for laboratory testing. Standard compaction curves (ASTM D-698) were developed for each borrow area, and shear strength, consolidation and permeability tests were conducted on remolded samples of each identified borrow soil class. Each borrow area was evaluated and determined to provide an adequate source for borrow material.

An evaluation of the in-situ and borrow soils was made. The results were used to determine the allowable bearing capacity and predicted settlement, which were found to be less than the design criteria limits.

In-situ dynamic soil properties were determined using cross hole, uphole, and downhole geophysical tests. The tests were performed at three locations. The tests were evaluated, and the results indicated a range of shear wave velocities between approximately 500 and 2300 feet per second.

2.5.3 Seismology (References 7 and 8)

2.5.3.1 Introduction

The Browns Ferry Nuclear Plant is located in an area far removed from any centers of significant seismic activity. A few major earthquakes centered at distant points, several light-to-moderate shocks at distant points, and several light-to-moderate shocks with nearer centers have affected the area at low-to-moderate intensity (Reference 9).

2.5.3.2 Seismic Investigation Program

In order to evaluate the earthquake hazard at the plant site, a study was made of the known seismic history of a large surrounding area. This study was greatly facilitated by research carried on over a period of more than three decades on the seismicity of the southeastern United States in general and the Tennessee Valley region in particular. Voluminous files of earthquake data, collected from a number of sources, were used in the compilation of seismic histories of the several states. By plotting the epicenters of hundreds of these earthquakes, the areas of continuing seismic activity became apparent. The more active areas are as follows:

a. Mississippi Valley, especially the New Madrid region of Missouri, Arkansas, Tennessee and Kentucky. This area has been seismically active since the appearance of the white man and very probably long before. The area has been the center of a few great earthquakes and very numerous lighter shocks which are still occurring at intervals. The New Madrid region is about 170 miles northwest of the plant site.

b. The Lower Wabash Valley of Indiana and Illinois. This area has been the center of several moderately strong earthquakes, some of which were felt as far south as Tennessee. The Lower Wabash Valley is about 225 miles north-northwest from the plant site.

c. Charleston area, South Carolina. One of the country's greatest earthquakes was centered in the Charleston area. Many other light-to-moderate earthquakes have occurred in this area and the activity has continued to the present time. Charleston is about 420 miles east of the plant site.

d. The Southern Appalachian area of western North Carolina and eastern Tennessee. Light-to-moderate earthquakes occur in this area at an average frequency of one or two per year. This area is centered about 200 miles east of Decatur.

In addition to these areas, shocks of light-to-moderate intensity have occurred at many other localities in the southeastern states at various distances from the Browns Ferry plant site. At many of these localities, only a few light-to-moderate shocks from widely scattered centers are known. Seismic history in the vicinity of the plant is discussed in Section 2.5.3.4.

Several scales have been devised to evaluate the force of earthquake shocks. Scales which rate earthquakes on the degree of shaking at any given locality are known as intensity scales. In general, the intensity of an earthquake is highest in the epicentral area and diminishes in all directions from the point of maximum intensity. Another factor affecting the intensity of an earthquake is the character of the ground in a given locality. The shaking is much less severe, other things being equal, at a place on bedrock than one on thick alluvium. The most widely used intensity scale is the modified Mercalli scale which has 12 degrees of intensity (see Figure 2.5-7). The degrees of intensity are expressed by Roman numerals from I to XII.

The Richter magnitude scale applies to an earthquake as a whole rather than the observations made at some point, or points, within the area affected. Earthquake magnitude is calculated from measurements on seismograms and is expressed by an Arabic numeral and a fraction, such as 6-3/4 or 5.5.

2.5.3.3 <u>Geologic and Tectonic Background</u>

As discussed in Section 2.5.2, Browns Ferry Nuclear Plant is founded on a thick succession of essentially horizontal sedimentary rocks. The site is 16.5 miles away from the nearest known inactive fault and approximately 200 miles from the New Madrid region of the Mississippi Valley. Since the site area is very low on the southeastern flank of the Nashville structural dome, it has undergone no tectonic movement except simple uplift. This movement probably ceased at the close of the Paleozoic Era.

2.5.3.4 <u>Seismic History</u>

A list of seismic events within a 200-mile radius of the plant site that occurred from 1699 through 1980 is presented in Table 2.5-1. Epicenters of earthquakes within a 200-mile radius of the plant site based on Table 2.5-1 are shown on Figure 2.5-6.

2.5.3.5 <u>Seismicity of the Area</u>

Light shocks have been centered near Huntsville, Hazel Green, Anniston, Cullman, Easonville, and Birmingham, but most of them were felt as low intensity shocks or not at all in the Decatur area. The shocks felt most strongly in the area have been major earthquakes centered at distant points, especially in the Mississippi Valley.

There is continuing seismic activity in the Mississippi Valley, and the possibility of another great earthquake in the New Madrid region of Missouri, Arkansas, Tennessee, and Kentucky cannot be discounted. An earthquake of intensity XI or XII at New Madrid might be felt in the Decatur area with an intensity of VII.

2.5.4 Conclusions (References 8 and 10)

The site is underlain by massive formations of bedrock, thus providing adequate foundations for all plant structures.

The major seismic activity experienced at the site has been caused by distant major earthquakes, especially those at New Madrid and Charleston. For design purposes, a conservative assumption was made that a seismic event at an unstated location could cause an intensity of VII at the plant site. Thus, the design of structures and equipment important to the plant safety features was based on a horizontal ground motion due to a peak acceleration of 0.10g. In addition, the design is such that the plant can be safely shut down during a peak horizontal ground acceleration of 0.20g. Vertical accelerations are two thirds of the horizontal accelerations. Details of the earthquake design of these structures are given in Chapter 12. Design based upon these ground accelerations provides a margin of protection against either minor shocks originating near the site or major shocks originating at New Madrid or Charleston.

Since the site is located in an area of extremely low seismicity, it has been principally affected, if at all, by distant, strong earthquakes. The response spectra chosen for the site are shown in Figures 2.5-8 and 2.5-9 for the OBE and DBE, respectively. The time-history method was used in analyzing all structures; and the El Centro, May 1940, N-S component was chosen for this purpose. This record was determined to adequately represent any potential threat to the site. A comparison of the response spectrum produced by this record and the spectrum used for design is shown in Figure 2.5-10. As an alternate basis for design of subsystems, an artificial acceleration time history input ground motion was used. Figure 2.5-11 depicts the acceleration, velocity, and displacement time history of this record. Figures 2.5-12 through 2.5-16 compare the response spectra of this time history to the site design spectra for the various damping levels. The artificial time history meets the enveloping requirements of Section 3.7.1, "Standard Review Plan."

2.5.5 Seismic Instrumentation Program

Seismic instrumentation is provided in order to assess the effects on the plant of earthquakes which may occur that exceed the ground acceleration for the Operating Basis Earthquake (OBE = 0.10g ground acceleration). The seismic instrumentation is not safety-related and does not have any effect on safety-related systems or equipment. The seismic instruments were selected to emphasize accuracy and reliability, while at the same time minimizing the maintenance and surveillance resources required to support the system. The instrumentation that is provided is described in the following sections.

2.5.5.1 Location and Description of Instrumentation

The seismic instrumentation locations are shown in Figure 2.5-17. It is solid state digital instrumentation which will enable the processing of data at the plant site within 4 hours of a seismic event. One of the sensors is located at the top-of-rock where the OBE design response spectrum is defined. Therefore, this instrumentation is sufficient to adopt the OBE exceedance criteria described in Reference 2.5.6-11 through 15.

The instrumentation consists of the following:

1. A strong-motion triaxial time-history accelerograph at each of the following locations:

   a. El. 519.5, Unit 1 Reactor Building, south corner of the Northwest Quad Room,

   b. El. 621.75, Unit 1 Reactor Building, upper level in Electrical Board Room 1A, and

   c. El. 566.0, Unit 1 and 2 Diesel Generator Building, on the base slab in Room B.

   These accelerographs have a full scale range of $\underline{+}$2g. The internal recorder is capable of digitally recording a minimum of 25 minutes of data with a minimum of 3 seconds of pre-event memory and 5 seconds of post-event memory. An internal seismic trigger with a bandwidth of 0.1Hz - 12.5 Hz actuates the recording system when a threshold acceleration level is sensed. The unit is equipped with an internal rechargeable battery and an external plug-in type battery charger.

2. The centralized seismic instrumentation panel components are located in the Unit 1 Main Control Room (Elevation 621.0’). This panel contains: a) central controller, b) alarm panel, and c) display panel. A description of each item is given below.

   a. A central controller consisting of an industrial computer and custom software, which provides a user interface in a multi-tasking operating system that supports simultaneous seismic data acquisition and interrogation. The controller is powered by 120V AC power. The central controller retrieves data files from the internal digital recorders in each remote accelerograph after an event and, for the top-of-rock sensor, performs automatic analysis of the data. The event-analysis capabilities include computation of the Cumulative Absolute Velocity (CAV), spectral content of the recorded data, and automatic comparison to the site OBE (OBE = ½ SSE) response spectrum. Hard copies of the operational data and event analysis will be printed to a Unit 1 Main Control Room printer. The central controller's software capabilities also include automatic event alarm and annunciation (See item 2b). The event analysis functions of the central controller may be performed off-line, if necessary.

b. An alarm panel containing visual alarms to indicate that a seismic event has been recorded, the OBE response spectrum has been exceeded in a damaging frequency range, and system trouble including either loss of AC or DC power. The seismic event alarm is triggered by the accelerographs, while the OBE exceedance and system trouble alarms are triggered by the central controller. Activation of either the event alarm, exceedance alarm, or system trouble alarm also causes corresponding windows on an annunciator panel in the Unit 1 Main Control Room.

c. A display panel to provide a visual display for operation of the centralized system.

3. Annunciator lights in the Unit 1 Main Control Room:

   a. Window Legends: START OF STRONG MOTION ACCELEROGRAPH - Any one of the three strong-motion accelerographs (Item 1) will activate this window if an acceleration greater than or equal to 0.01g is sensed.

   b. Window Legends: ½ SSE RESPONSE SPECTRUM EXCEEDED - The central controller in conjunction with the alarm panel (Items 2a and 2b) will activate this window if the central controller has determined the OBE response spectrum to be exceeded. This determination is based only on input received from the Reactor Building base slab accelerograph (Item 1a).

   c. Window Legends: SEISMIC MONITORING SYSTEM TROUBLE - The alarm panel will activate this window if the central controller detects a system trouble or if there is loss of AC or DC power.

The basis for selecting the Reactor Building for installation of seismic instruments is that it is the rock-supported building most important to safety. The basis for selecting the Diesel Generator Building is that it is the soil-supported building most important to safety.

2.5.5.2 Control Room Operator Notification

The seismic monitoring system provides three independent alarm windows in the Unit 1 Main Control Room. The first annunciator window indicates system trouble which serves to provide warning of equipment operability problems under normal power conditions as well as following a seismic event. The next annunciator window is provided by the accelerographs (Item 1) via the controller, Section 2.5.5.1, which alerts the operator that a seismic event is being recorded. This annunciation indicates that at least one of the accelerographs triggers has sensed seismic motion in excess of 0.01g.

The final annunciator window is actuated later and is provided by the central controller (Item 2a), Section 2.5.5.1, and is only received if the event-analysis software indicates that the site OBE design basis response spectrum has been exceeded in a potentially damaging frequency range, as described in Section 2.5.5.3.

The basis for establishing the OBE design basis response spectrum for the levels at which control room operator notification is required is that the design of Structures, Systems, and Components (SSCs) for loading combinations, which include OBE, are to design basis allowable stress levels which are well within the elastic limit of the materials.

2.5.5.3 Controlled Shutdown Logic

The operator will utilize input from multiple sources to determine the need for a controlled shutdown following the seismic event. The decision for a controlled shutdown will be based primarily on an assessment of the actual damage potential of the event, which will be available within 4 hours, and on the results of short-term inspections, which will be available within 8 hours. The operator may also confirm that ground motion was sensed by plant personnel and/or confirm the occurrence of the seismic event with the National Earthquake Information Center. The purpose of these actions are 1) to perform a preliminary assessment of the effect of the earthquake on the physical condition of SSCs, and 2) to determine if shutdown of the plant is warranted based on observed damage to SSCs, or because the OBE has been exceeded.

The walkdowns of plant SSCs in accessible areas of the plant will be performed witin 8 hours following the seismic event. The walkdowns will be performed using the general guidance in Chapter 4 of the Electrical Power Research Institute (EPRI) Report NP-6695 (ref. 2.5.6-12). These walkdowns will include a check of the neutron flux monitoring sensors for changes and an inspection of the containment isolation system to ensure continued containment integrity. The walkdown data will be compared to data previously obtained from baseline and Maintenance Rule inspections in order to obtain a clear understanding of any seismically induced damage.

The assessment of the damage potential of the event will be made within 4 hours following the event using the OBE Exceedance Criteria developed by EPRI and documented in references 2.5.6-11 through -15. As noted above, the indication of damage potential will be provided by event-analysis software installed on the centralized seismic monitoring system described in Section 2.5.5.1. The analysis will be performed for the uncorrected accelerograms recorded from the strong motion triaxial accelerograph located in the Unit 1 Reactor Building on the base slab (item 1a of Section 2.5.5.1). Use of the uncorrected accelerograms is known to be conservative. The basis for use of the seismic motion on the Reactor Building base slab is that the site OBE design response spectrum is defined at top-of-rock, which corresponds to the Reactor Building base slab location.

The EPRI OBE Exceedance Criteria uses two indicators of damage potential. The first indicator of damage potential is specified as the Cumulative Absolute Velocity (CAV) of the accelerogram. A meaningful usage of the CAV requires that the recorded data be obtained by the accelerometer mounted in the free-field. As noted above, the OBE design spectrum for Browns Ferry is defined as occurring at top-of-rock (i.e., foundation level of the rock-supported structures); whereas, free-field is defined as top-of-soil at sufficient distance from nearby structures to preclude interference/interaction effects. The Seismic Monitoring System for Browns Ferry does not have a free-field accelerometer. Therefore, the shutdown logic adopted for Browns Ferry will concede CAV exceedance and base the assessment of damage potential solely on the second indicator, as discussed below.

In the absence of data from a free-field accelerometer, the second indicator is an evaluation of the frequency range in which the OBE spectrum is exceeded. This criteria is based on research which indicates that exceedances above a frequency of 10 Hz are not damaging to nuclear plant SSCs. The following two measures of damaging potential are used.

- The OBE site design basis response spectrum is exceeded if the 5 percent damping response spectra generated for any one of the three components of the uncorrected accelerograms from the Reactor Building foundation accelerometer is larger than:

    1. The corresponding OBE design basis response spectral acceleration in a frequency range between 2-10 Hz, or

    2. The corresponding OBE design basis response spectral velocity for frequencies between 1-2 Hz.

Therefore, Browns Ferry will base the assessment of damage potential of the event on either a spectral acceleration exceedance between 2-10 Hz or a spectral velocity exceedance between 1-2 Hz.

Once the results of the walkdown and the assessment of damage potential of the event are available, the operators will determine 1) if a controlled shutdown is required and 2) the condition of the equipment needed to safely achieve shutdown. If the assessment of damage potential indicates that the OBE Exceedance Criteria were not met, and the walkdown results are favorable, the plant will continue to operate. Basing shutdown logic on the actual damage potential of the event and on the results of short-term inspection avoids unnecessary shutdowns while ensuring that the operator has the plant status information needed to make an informed reactor shutdown decision.

Post-shutdown actions, including retrieval of data, recalibration of seismic instruments, and comparison of measured and predicted responses will be based on the guidance in Chapters 5 and 6 of EPRI Report NP-6695 (Ref. 2.5.6-12).

2.5.6 References

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3. Memorandum - Berlin C. Moneymaker to Ralph O. Lane, "Browns Ferry Nuclear Plant Site - Compressive Strength Tests on Cores from Foundation," June 1, 1966. (R40990309901)

4. Memorandum - R. O. Lane to B. C. Moneymaker, "Tims Ford and Browns Ferry Sites - Rock Cores - Compressive Strength Test Results," June 10, 1966. (R40990309902)

5. "Static and Dynamic Rock Testing, Brown's Ferry Reactor Site," Prepared For: John Blume and Associates by Woodward - Clyde - Sherard & Associates, November 17, 1966. (R40990219897)

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7. TVA Division of Water Control Planning Geologic Branch - "Browns Ferry Nuclear Power Plant Section on Seismology," Berlin C. Moneymaker, May 3, 1966. (R40990219894)

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10. Memorandum - W. F. Emmons to W. C. Boop, “Browns Ferry Nuclear Plant - Recommended Earthquake Design Acceleration,” June 6, 1966. (R40990219895)

11. EPRI Report NP-5930, “A Criterion for Determining Exceedance of the Operating Basis Earthquake,” July 1988.

12. EPRI Report NP-6695, “Guidelines for Nuclear Plant Response to an Earthquake,” December 1989.

13. EPRI Report TR-100082, “Standardization of the Cumulative Absolute Velocity,” December 1991.

14. Nuclear Regulatory Commission Regulatory Guide 1.166, “Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-Earthquake Actions,” March 1997

15. Nuclear Regulatory Commission Regulatory Guide 1.12, “Nuclear Power Plant Instrumentation for Earthquakes,” March 1997

TABLE 2.5-1
Sheet 1
BROWNS FERRY NUCLEAR PLANT
HISTORICAL EARTHQUAKE LISTING
200 MILE RADIUS AROUND 87.11 W LON 34.71 N LAT
FEBRUARY 10, 1982

	YEAR	MONTH	DAY	INTENSITY	LOCATION	NLAT	WLON
1.	1699	Dec	25	IV	(Northeast AK)	35.2	90.5
2.	1812	Feb	7	XII	New Madrid, MO	36.6	89.5
3.	1816	Jul	25	IV	New Madrid, MO	36.6	89.5
4.	1818	Mar		V	Caruthersville, MO	36.2	89.7
5.	1820			IV	New Madrid, MO	36.6	89.5
6.	1824	Aug	22		Jackson, TN	35.6	88.8
7.	1825	Mar	19		Columbia, TN	35.6	87.0
8.	1829			<IV	Andrews, NC	35.2	83.8
9.	1829	May		IV	Jackson, TN	35.6	88.8
10.	1839	Sep	5	V	Mayfield, KY	36.7	88.6
11.	1841	Dec	28	V	Hickman, KY	36.6	89.2
12.	1842	Nov	4	IV	Hickman, KY	36.6	89.2
13.	1842	Mar	28	IV	Hickman, KY	36.6	89.2
14.	1843	Jan	5	VIII	Marked Tree, AK	35.5	90.4
15.	1843	Jun	13	III	Hickman, KY	36.6	89.2
16.	1843	Aug	9	IV	Columbia, TN	35.6	87.0
17.	1846	Mar	26	III	New Madrid, MO	36.6	89.5
18.	1849	Jan	24	IV	Hickman, KY	36.6	89.2
19.	1853	Aug	28	III	Hickman, KY	36.6	89.2
20.	1853	Dec	18	V	Hickman, KY	36.6	89.2
21.	1855	May	3	IV	Cairo, IL	37.0	89.2
22.	1857	Feb		IV	New Madrid, MO	36.6	89.5
23.	1858	Sep	21	V	Hickman, KY	36.6	89.2
24.	1860	Jan	20		NC-SC-GA	0.0	0.0
25.	1865	Aug	17	VII		36.5	89.5
26.	1865	Sep	7		New Madrid, MO	36.6	89.5
27.	1868	Nov	21		Hickman, KY	36.6	89.2
28.	1870	Dec	14		Hickman, KY	36.6	89.2
29.	1871	Jul	25	IV	Cairo, IL	37.0	89.2
30.	1872	Feb	8		Cairo, IL	37.0	89.2
31.	1872	Apr	20		Memphis, TN	35.1	90.1
32.	1872	Aug	20		Memphis, TN	35.1	90.1
33.	1873	May	3	IV		36.0	89.6
34.	1873	Aug	22		Memphis, TN	35.1	90.1
35.	1874	Jul	9	IV	Cairo, IL	37.0	89.2
36.	1875	Oct	7	IV		36.1	89.6
37.	1875	Oct	28	IV	Memphis, TN	35.1	90.1
38.	1877	Jul	15	IV	Cairo, IL	37.0	89.2
39.	1877	Nov	19		Cairo, IL	37.0	89.2
40.	1878	Jan	9		Cairo, IL	37.0	89.2
41.	1878	Mar	12	VII	Columbus, KY	36.8	89.1
42.	1878	Nov	19	VI		36.7	89.3
43.	1878	Nov	23	<IV	Murphy, NC	35.1	84.0
44.	1879	Jul	26		Cairo, IL	37.0	89.2
45.	1879	Sep	26	IV	NE AK	35.3	90.3
46.	1800	Jul	14	IV		35.3	90.3
47.	1881	Oct	7	IV	Memphis, TN	35.1	90.1
48.	1882	Jul	20	IV	Cairo, IL	37.0	89.2
49.	1882	Oct	15	<IV	Murphy, NC	35.1	84.0
50.	1883	Jan	1	IV	Ashwood, TN	35.6	87.1
51.	1883	Jan	11	V	Cairo, IL	37.0	89.2
52.	1883	Apr	12	VI	Cairo, IL	37.0	89.2
53.	1883	Jul	6		Cairo, IL	37.0	89.2
54.	1883	Jul	14	V	Wickliffe, KY	37.0	89.1
55.	1884	Apr	30	<IV	Ogretta, NC	35.2	84.2
56.	1884	Nov	30	IV		35.5	89.7

TABLE 2.5-1 (Cont'd)
Sheet 2
BROWNS FERRY NUCLEAR PLANT
HISTORICAL EARTHQUAKE LISTING
200 MILE RADIUS AROUND 87.11 W LON 34.71 N LAT
FEBRUARY 10, 1982

	YEAR	MONTH	DAY	INTENSITY	LOCATION	NLAT	WLON
57.	1886	Feb	5	IV	Valley Head, AL	34.6	85.6
58.	1886	Feb	13	VI	Demopolis, AL	32.5	87.8
59.	1886	Mar	18	IV	Cairo, IL	37.0	89.2
60.	1887	Aug	2	VI	Cairo, IL	37.0	89.2
61.	1888	Nov	3	IV	Memphis, TN	35.1	90.1
62.	1889	Jan	5		Memphis, TN	35.1	90.1
63.	1889	Jun	6		Memphis, TN	35.1	90.1
64.	1889	Jun	7	IV	Benton Co., TN	35.9	88.1
65.	1889	Jul	20	VI	Memphis, TN	35.1	90.1
66.	1889	Sep	28	<IV	Parksville, TN	35.1	84.6
67.	1891	Jan	14		Memphis, TN	35.1	90.1
68.	1891	Sep	27	IV	Cairo, IL	37.0	89.2
69.	1892	Jan	14	IV	Memphis, TN	35.1	90.1
70.	1892	Dec	2	V	Chattanooga, TN	35.0	85.3
71.	1894	Jul	18		Memphis, TN	35.1	90.1
72.	1895	Jul	27		Savannah, TN	35.2	88.3
73.	1895	Oct	3		Memphis, TN	35.1	90.1
74.	1895	Oct	18		New Madrid, MO	36.3	89.5
75.	1895	Nov	17		Charleston, MO	36.9	89.3
76.	1897	Apr	26	IV	Osceola, AK	35.7	90.0
77.	1898	Mar	30	<IV	Mt. Hermon, KY	36.8	85.8
78.	1898	Jun	14	IV	New Madrid, MO	36.6	89.5
79.	1901	Feb	15	IV		36.0	90.0
80.	1901	Sep	14		Memphis, TN	35.1	90.1
81.	1902	May	29	IV	Chattanooga, TN	35.0	85.3
82.	1902	Oct	18	V	Chattanooga, TN	35.0	85.3
83.	1903	Nov	4	VII	Charleston, MO	36.9	89.3
84.	1903	Nov	24		New Madrid, MO	36.6	89.5
85.	1903	Nov	27	IV	New Madrid, MO	36.6	89.5
86.	1904	Mar	5	<IV	Maryville, TN	35.8	84.0
87.	1908	Sep	28	IV	New Madrid, MO	36.6	89.5
88.	1908	Oct	28	IV	Cairo, IL	37.0	89.2
89.	1909	Oct	8	<IV	Dalton, GA	34.8	85.0
90.	1913	Mar	13	<IV	Calhoun, GA	34.5	85.0
91.	1913	Apr	17	V	Madisonville, TN	35.5	84.4
92.	1913	May	2	<IV	Madisonville, TN	35.5	84.4
93.	1913	Jun	9	IV	Humboldt, TN	35.8	88.9
94.	1914	Jan	24	IV	Sweetwater, TN	35.6	84.5
95.	1914	Mar	5	IV	Central GA	33.5	84.0
96.	1915	Feb	19	IV	Cairo, IL	37.0	89.2
97.	1915	Apr	28	IV	Tiptonville, TN	36.4	89.5
98.	1915	Oct	26	V	Mayfield, KY	36.7	88.6
99.	1915	Dec	7	V	Cairo, IL	37.0	89.2
100.	1916	May	21	IV	New Madrid, MO	36.6	89.5
101.	1916	Aug	24	IV	New Madrid, MO	36.6	89.5
102.	1916	Oct	18	VII	Irondale, AL	33.5	86.7
103.	1916	Oct	19		Mayfield, KY	36.7	88.6
104.	1916	Nov	4	IV	Birmingham, AL	33.5	86.8
105.	1916	Dec	19	VI	Hickman, KY	36.6	89.2
106.	1917	Jun	9	IV	New Madrid, MO	36.6	89.5
107.	1917	Jun	30	IV	Rosemary, AL	32.7	87.5
108.	1918	Feb	17		Cairo, IL	37.0	89.2
109.	1918	Jun	22	IV	Lenoir City, TN	35.8	84.3
110.	1918	Oct	16	IV		35.2	89.2
111.	1919	May	23			36.6	89.2

TABLE 2.5-1 (Cont'd)
Sheet 3
BROWNS FERRY NUCLEAR PLANT
HISTORICAL EARTHQUAKE LISTING
200 MILE RADIUS AROUND 87.11 W LON 34.71 N LAT
FEBRUARY 10, 1982

	YEAR	MONTH	DAY	INTENSITY	LOCATION	NLAT	WLON
112.	1919	May	28			36.6	89.2
113.	1920	Apr	7	II		36.3	88.2
114.	1920	Dec	24	IV	Glen Alice, TN	35.8	84.7
115.	1921	Jan	9	IV	New Madrid, MO	36.6	89.5
116.	1921	Feb	27	IV	Cairo, IL	37.0	89.2
117.	1921	Sep	2	IV	Statesville, TN	36.0	86.1
118.	1921	Dec	15	IV	Glen Alice, TN	35.0	84.7
119.	1922	Mar	30	<IV	Farmington, TN	35.5	86.7
120.	1922	Mar	30	V	Caruthersville, MO	36.1	89.7
121.	1923	Mar	27	IV	Wyatte, MS	34.6	89.7
122.	1923	May	6		Cairo, IL	37.0	89.2
123.	1923	May	15		Cairo, IL	37.0	89.2
124.	1923	Oct	28	VII	Marked Tree, AK	35.5	90.4
125.	1923	Nov	26	IV	Marked Tree, AK	35.5	90.4
126.	1923	Nov	28			37.5	87.3
127.	1923	Nov	29		Wickliffe, KY	37.0	89.1
128.	1924	Mar	2	IV		36.9	89.1
129.	1924	Jun	7	IV	Tiptonville, TN	36.4	89.5
130.	1925	May	13	IV	Mayfield, KY	36.7	88.6
131.	1926	Apr	28	IV	Kenton, TN	36.2	89.0
132.	1926	Dec	17	IV	Tiptonville, TN	36.4	89.5
133.	1927	Apr	18		Ridgely, TN	36.3	89.5
134.	1927	Jun	16	IV	Scottsboro, AL	34.7	86.0
135.	1927	Aug	13	IV	Tiptonville, TN	36.4	89.5
136.	1927	Oct	8	IV	Chattanooga, TN	35.0	85.3
137.	1928	Mar	7	IV	Columbia, TN	35.6	87.0
138.	1928	Apr	23		Hickman, KY	36.6	89.2
139.	1928	May	31		New Madrid, MO	36.6	89.5
140.	1929	May	13		Tiptonville, TN	36.4	89.5
141.	1930	Jan	2		Ripley, TN	35.7	89.5
142.	1930	Feb	18		Marked Tree, AK	35.5	90.4
143.	1930	Feb	25	IV	Cairo, IL	37.0	89.2
144.	1930	Mar	27	IV	Raleigh, TN	35.2	89.9
145.	1930	Apr	2	IV	Caruthersville, MO	36.2	89.7
146.	1930	Aug	13		New Madrid, MO	36.6	89.5
147.	1930	Aug	29	IV	Blandville, KY	36.9	88.9
148.	1930	Aug	30	V	Kingston, TN	35.9	84.5
149.	1930	Sep	1	V	Marston, MO	36.5	89.6
150.	1930	Sep	3		Blandville, KY	36.9	88.9
151.	1931	Apr	1		Hopkinsville, KY	36.9	87.5
152.	1931	Apr	6	IV	Berkeley, KY	36.8	89.1
153.	1931	May	5	VI	Birmingham, AL	33.5	86.8
154.	1931	Jul	18	IV	New Madrid, MO	36.6	89.5
155.	1931	Nov	27	<IV	Nashville, TN	36.2	86.8
156.	1931	Dec	10	IV	Blytheville, AK	35.9	89.9
157.	1931	Dec	17	VII	Charleston, MO	36.9	89.3
158.	1932	Nov	22	IV	Blytheville, AK	35.9	89.9
159.	1933	Dec	9	V	Manila, AK	35.9	90.2
160.	1934	Jul	3	IV	Memphis, TN	35.1	90.1
161.	1934	Aug	20	VII	Rodney, MO	37.0	89.2
162.	1935	Jul	24	IV	Tiptonville, TN	36.4	89.5
163.	1936	Jan	1	<IV	Blue Ridge, CA	34.9	84.3
164.	1936	Feb	17		Hayti, MO	36.2	89.7
165.	1936	Aug	2	IV	Tiptonville, TN	36.4	89.5
166.	1936	Oct	20		New Madrid, MO	36.6	89.5

TABLE 2.5-1 (Cont'd)
Sheet 4
BROWNS FERRY NUCLEAR PLANT
HISTORICAL EARTHQUAKE LISTING
200 MILE RADIUS AROUND 87.11 W LON 34.71 N LAT
FEBRUARY 10, 1982

	YEAR	MONTH	DAY	INTENSITY	LOCATION	NLAT	WLON
167.	1936	Oct	31		New Madrid, MO	36.6	89.5
168.	1937	Jan	30	V	Caruthersville, MO	36.2	89.7
169.	1937	Jun	23		Tiptonville, TN	36.4	89.5
170.	1937	Oct	5		New Madrid, MO	36.6	89.5
171.	1938	Mar	16		New Madrid, MO	36.6	89.5
172.	1938	Mar	31	IV	Tapoco, NC	35.5	84.0
173.	1938	Jun	17	IV		35.8	89.8
174.	1938	Sep	18	V		35.5	90.3
175.	1938	Sep	19		Tiptonville, TN	36.4	89.5
176.	1939	Apr	15	IV	New Madrid, MO	36.6	89.5
177.	1939	May	5	V	Anniston, AL	33.7	85.8
178.	1939	Jun	24	IV	Huntsville, AL	34.7	86.6
179.	1940	Feb	14		Blytheville, AK	35.9	89.9
180.	1940	May	31	V	Paducah, KY	37.1	88.6
181.	1940	Sep	19		New Madrid, MO	36.6	89.5
182.	1940	Oct	10			36.8	89.2
183.	1940	Oct	19	IV	Ryall Springs, TN	35.0	85.1
184.	1941	Sep	8	IV	Lookout Mt., TN	35.0	85.4
185.	1941	Oct	8	VI	Blytheville, AK	35.9	89.9
186.	1941	Oct	21	IV	Cairo, IL	37.0	89.2
187.	1941	Nov	15	IV	Memphis, TN	35.1	90.1
188.	1941	Nov	15		Memphis, TN	35.1	90.1
189.	1941	Nov	17	V	Covington, TN	35.6	89.6
190.	1942	Aug	31	IV	Cairo, IL	37.0	89.2
191.	1944	Dec	23		Caruthersville, MO	36.2	89.7
192.	1945	May	2	IV	Marston, MO	36.5	89.6
193.	1945	Jun	14	V	Cleveland, TN	35.2	84.9
194.	1945	Aug	6		Caruthersville, MO	36.2	89.7
195.	1945	Sep	23	IV	Cairo, IL	37.0	89.2
196.	1945	Oct	27		Point Pleasant, MO	36.5	89.6
197.	1945	Nov	13	IV	Cairo, IL	37.0	89.2
198.	1946	Apr	7	IV	Cleveland, TN	35.2	84.9
199.	1947	Jan	16		Cairo, IL	37.0	89.2
200.	1947	Mar	26	VI		37.0	88.4
201.	1947	Dec	16	IV	Lepanto, AK	35.6	90.3
202.	1947	Dec	28	IV	Ryall Springs, TN	35.0	85.1
203.	1949	Jan	14	V	Portageville, MO	36.4	89.7
204.	1949	Jan	31	V		36.3	89.7
205.	1949	Aug	13		Caruthersville, MO	36.2	89.7
206.	1950	May	1		Gideon, MO	36.4	89.9
207.	1950	Jun	19	IV	Tapoco, NC	35.5	84.0
208.	1950	Sep	17	IV		35.8	90.0
209.	1951	Dec	18	IV	New Madrid, MO	36.6	89.5
210.	1952	Feb	2	V	Tiptonville, TN	36.4	89.5
211.	1952	Feb	6	V	Birmingham, AL	33.5	86.8
212.	1952	Mar	17	IV		36.2	89.6
213.	1952	May	28		Catron, MO	36.6	89.7
214.	1952	Jul	16	V	Dyersburg, TN	36.0	89.4
215.	1952	Oct	18	IV	Dyersburg, TN	36.0	89.4
216.	1952	Dec	25	IV	Blytheville, AK	35.9	89.9
217.	1952	Dec	28		Caruthersville, MO	36.2	89.7
218.	1953	Jan	26	IV	Finley, TN	36.0	89.5
219.	1953	Feb	11	IV	New Madrid, MO	36.6	89.5
220.	1953	Feb	17	IV	Finley, TN	36.0	89.5
221.	1953	May	6		Cairo, IL	37.0	89.2

TABLE 2.5-1 (Cont'd)
Sheet 5
BROWNS FERRY NUCLEAR PLANT
HISTORICAL EARTHQUAKE LISTING
200 MILE RADIUS AROUND 87.11 W LON 34.71 N LAT
FEBRUARY 10, 1982

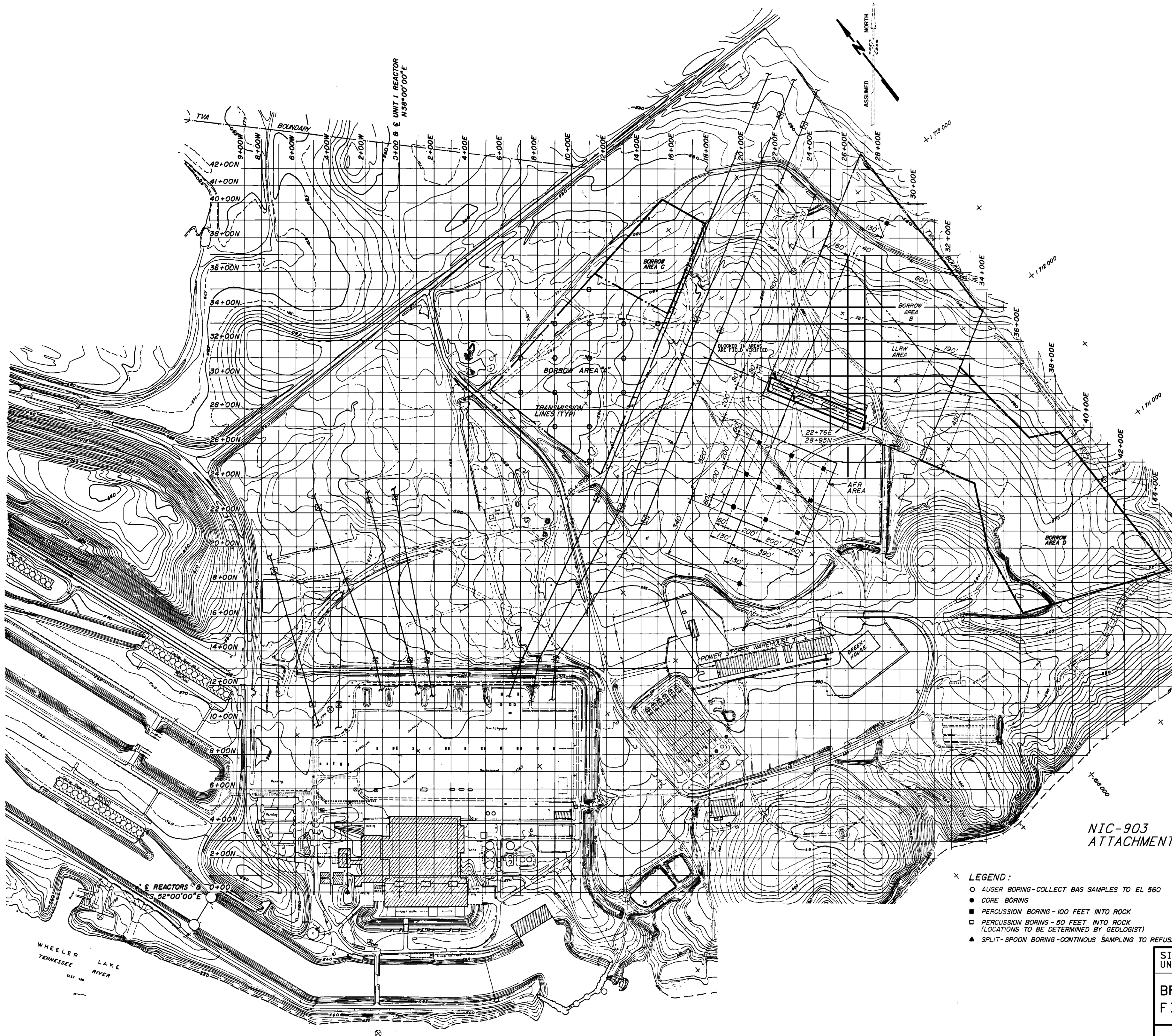
	YEAR	MONTH	DAY	INTENSITY	LOCATION	NLAT	WLON
222.	1953	May	12		Lepanto, AK	35.6	90.3
223.	1953	May	15	IV	Cairo, IL	37.0	89.2
224.	1954	Jan	17	IV	Dyersburg, TN	36.0	89.4
225.	1954	Jan	23	IV	Etowah, TN	35.3	84.5
226.	1954	Apr	27	V	Memphis, TN	35.1	90.1
227.	1955	Jan	12	IV	Maryville, TN	35.8	84.0
228.	1955	Jan	25	VI	Finley, TN	36.0	89.5
229.	1955	Mar	29	V	Finley, TN	36.0	89.5
230.	1955	Sep	5	IV	Finley, TN	36.0	89.5
231.	1955	Sep	24	IV	Tiptonville, TN	36.4	89.5
232.	1955	Dec	13	IV	Finley, TN	36.0	89.5
233.	1956	Jan	24		Caruthersville, MO	36.2	89.7
234.	1956	Jan	29	VI	Covington, TN	35.6	89.6
235.	1956	Sep	9	IV	College Grove, TN	35.8	86.7
236.	1956	Oct	29	IV	Caruthersville, MO	36.2	89.7
237.	1957	Mar	26	V	Paducah, KY	37.1	88.6
238.	1957	Apr	23	VI	Birmingham, AL	33.5	86.8
239.	1957	Jun	23	IV	Dixie Lee Junction, TN	35.9	84.2
240.	1957	Aug	17	IV	Bogota, TN	36.2	89.4
241.	1957	Nov	7	<IV	Powell, TN	36.0	84.0
242.	1958	Jan	26	V	Caruthersville, MO	36.2	89.7
243.	1958	Jan	28	V	Cairo, IL	37.0	89.2
244.	1958	Apr	8	IV	Troy, TN	36.3	89.2
245.	1958	Apr	26	IV	Tiptonville, TN	36.4	89.5
246.	1958	May	19	IV	Marked Tree, AK	35.5	90.4
247.	1959	Jan	21	V	Ridgely, TN	36.3	89.5
248.	1959	Feb	13	IV	Bogota, TN	36.2	89.4
249.	1959	Jun	13	IV	Tellico Plains, TN	35.4	84.3
250.	1959	Jul	20		Blytheville, AK	35.9	89.9
251.	1959	Aug	12	VI	Meridianville, AL	34.8	86.6
252.	1959	Dec	21	V	Finley, TN	36.0	89.5
253.	1960	Jan	28	IV	Finley, TN	36.0	89.5
254.	1960	Apr	15	IV	Maryville, TN	35.8	84.0
255.	1960	Apr	21	IV	Tiptonville, TN	36.4	89.5
256.	1962	Feb	2	VI		35.6	89.6
257.	1962	Jun	1			36.0	90.2
258.	1962	Jul	23	VI	Dyersburg, TN	36.0	89.4
259.	1963	Mar	31			36.5	89.5
260.	1963	Apr	6		New Madrid, MO	36.6	89.5
261.	1963	May	2		New Madrid, MO	36.6	89.5
262.	1963	Aug	3	V	Paduch, KY	37.1	88.6
263.	1963	Nov	14	<IV	Nashville, TN	36.2	86.8
264.	1963	Dec	5	<IV	Beechmont, KY	37.2	87.0
265.	1963	Dec	15	<IV	Beechmont, KY	37.2	87.0
266.	1964	Jan	16			36.8	89.5
267.	1964	Jan	25			36.5	89.5
268.	1964	Feb	18	V	Mentone, AL	34.6	85.6
269.	1964	Mar	17	IV	Caruthersville, MO	36.2	89.7
270.	1964	May	2		New Madrid, MO	36.6	89.5
271.	1964	May	23		New Madrid, MO	36.6	89.5
272.	1964	Jul	28	<IV	Inskip, TN	36.0	84.0
273.	1965	Feb	11			36.4	89.7
274.	1965	Mar	25	IV	New Madrid, MO	36.6	89.5
275.	1965	May	25			36.1	89.9
276.	1965	Jun	1			36.5	89.5

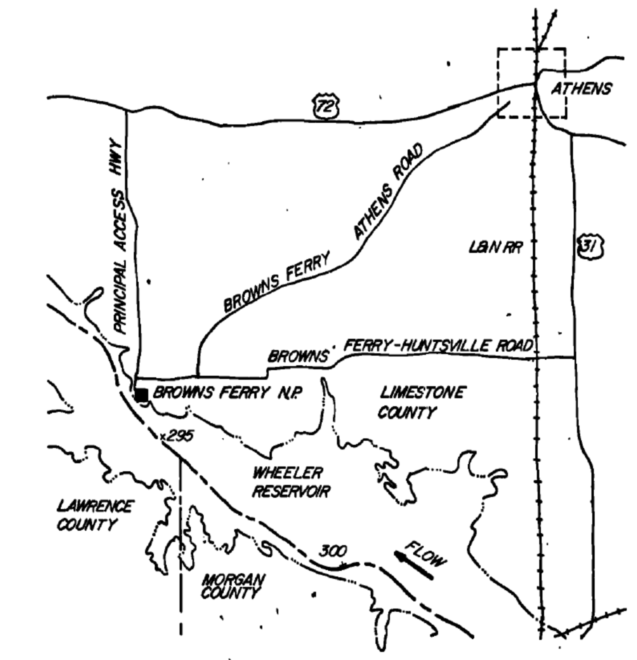
TABLE 2.5-1 (Cont'd)
Sheet 6
BROWNS FERRY NUCLEAR PLANT
HISTORICAL EARTHQUAKE LISTING
200 MILE RADIUS AROUND 87.11 W LON 34.71 N LAT
FEBRUARY 10, 1982

	YEAR	MONTH	DAY	INTENSITY	LOCATION	NLAT	WLON
277.	1965	Jul	8			36.5	89.5
278.	1965	Nov	8	<IV	Canton, GA	34.2	84.5
279.	1965	Dec	19			35.9	89.9
280.	1966	Feb	12			35.9	90.0
281.	1966	Feb	13	IV	Covington, TN	35.6	89.6
282.	1966	Mar	13			36.2	90.0
283.	1966	Aug	24	IV	Maryville, TN	35.8	84.0
284.	1967	Apr	11			36.1	89.7
285.	1967	Oct	18			36.5	89.5
286.	1968	Jan	23			36.5	89.5
287.	1968	May	30			36.5	89.5
288.	1968	Jul	15			36.5	89.5
289.	1970	Jan	7	IV	Raleigh, TN	35.2	89.9
290.	1970	Mar	27		New Madrid, MO	36.6	89.5
291.	1970	Nov	5			36.0	90.0
292.	1970	Nov	17	V	Blytheville, AK	35.9	89.9
293.	1970	Nov	30			36.3	89.5
294.	1970	Dec	14			35.7	90.0
295.	1970	Dec	24	IV	New Madrid, MO	36.6	89.5
296.	1971	Mar	14		Carrollton, AL	33.3	88.1
297.	1971	Apr	13			35.8	90.1
298.	1971	Jul	13	IV	Kingston, TN	35.9	84.5
299.	1971	Oct	18			36.7	89.6
300.	1972	Mar	29	V	New Madrid, MO	36.6	89.5
301.	1972	May	7	IV	Blytheville, AK	35.9	89.9
302.	1973	Jan	7		Madisonville, KY	37.4	87.5
303.	1973	Oct	3	IV		35.9	90.0
304.	1973	Oct	9	IV	New Madrid, MO	36.6	89.5
305.	1973	Nov	30	VI	Maryville, TN	35.8	84.0
306.	1973	Dec	20	IV	Caruthersville, MO	36.2	89.7
307.	1974	Jan	8	V	Bufordville, MO	36.2	89.4
308.	1974	Mar	4			35.7	90.4
309.	1974	Mar	10			36.2	89.5
310.	1974	Mar	12			35.7	89.8
311.	1974	May	13	V	East Prairie, MO	36.8	89.4
312.	1974	Dec	25	IV	Blytheville, AK	35.9	89.9
313.	1975	Feb	13	V	Conran, MO	36.5	89.6
314.	1975	Mar	1		Smithville, MS	34.1	88.4
315.	1975	May	2		Oakdale, TN	36.0	84.6
316.	1975	May	14		Oak Ridge, TN	36.0	84.3
317.	1975	Jun	13	VI	Lilbourn, MO	36.6	89.6
318.	1975	Jun	24	IV	Fayette, AL	33.7	87.8
319.	1975	Jul	6		Miston, TN	36.2	89.5
320.	1975	Aug	25			36.0	89.8
321.	1975	Aug	29	VI	Palmerdale, AL	33.8	86.6
322.	1975	Nov	7		Samantha, AL	33.4	87.6
323.	1975	Dec	3	V	New Madrid, MO	36.6	89.5
324.	1976	Feb	4	VI	Conasauga, TN	35.0	84.7
325.	1976	Apr	15	V	Sacramento, KY	37.4	87.3
326.	1976	May	22	V		36.0	89.8
327.	1976	Oct	23			32.2	88.7
328.	1977	Mar	28	II	Marston, MO	36.5	89.6
329.	1977	Jul	27	V	Athens, TN	35.4	84.6
330.	1977	Nov	4	V	Vardaman, MS	33.6	89.2
331.	1978	Jan	8		near Gainsville, AL	32.8	88.2

TABLE 2.5-1 (Cont'd)
Sheet 7
BROWNS FERRY NUCLEAR PLANT
HISTORICAL EARTHQUAKE LISTING
200 MILE RADIUS AROUND 87.11 W LON 34.71 N LAT
FEBRUARY 10, 1982

	YEAR	MONTH	DAY	INTENSITY	LOCATION	NLAT	WLON
332.	1978	Jan	18	III	Ridgely, TN	36.3	89.5
333.	1978	Mar	1	III	near Huntsville, AL	34.4	86.6
334.	1978	Aug	31	V	Dyersburg, TN	36.0	89.4
335.	1978	Oct	27		near Jasper, AL	33.8	87.5
336.	1978	Nov	21	II	Blytheville, AK	35.9	89.9
337.	1979	Feb	2	III	Ridgely, TN	36.3	89.5
338.	1979	Feb	2	II	Ridgely, TN	36.3	89.5
339.	1979	Feb	2	III	Ridgely, TN	36.3	89.5
340.	1979	Feb	3		Ridgely, TN	36.3	89.5
341.	1979	Feb	5	IV	Blytheville, AK	35.9	89.9
342.	1979	Feb	27		Pine Bluff, AK	34.2	90.2
343.	1979	Jun	11	IV	near Marston, MO	36.2	89.7
344.	1979	Jun	25	IV	Marked Tree, AK	35.5	90.4
345.	1979	Jul	8	IV	Wyatt, MO	36.9	89.2
346.	1979	Jul	13	IV	near Campbell, MO	36.1	89.8
347.	1979	Aug	13	V	near Cleveland, TN	35.2	84.4
348.	1979	Sep	12	V	Maryville, TN	35.8	84.0
349.	1980	Apr	21		Maryville, TN	35.8	84.0
350.	1980	Jun	25	IV	Maryville, TN	35.8	84.0
351.	1980	Jul	5	IV	New Madrid, MO	36.6	89.5
352.	1980	Jul	12	III	near Horse Branch, KY	37.3	87.0
353.	1980	Dec	2	V	Ridgely, TN	36.3	89.5





LOCALITY MAP

NOT TO SCALE

NOTES:

1. TOPOGRAPHY TAKEN FROM KELSH TWO FOOT CONTOUR INTERVAL TOPOGRAPHY DATED FEBRUARY 1, 1977.
2. ALABAMA "WEST" COORDINATES ARE INDICATED IN THE MARGIN.
3. LAYOUT A GRID, WITH STAKES ON 25 FOOT CENTERS, IN THE LLRW AND AFR AREAS. ORIENT THE GRID WITH THE BASE LINES FOR THE LLRW AREA. GRID STAKES ARE TO HAVE COORDINATES, WITH RESPECT TO THE LLRW AREA BASE LINES, AND GRADE ELEVATION.
4. THE GEOLOGIST WILL DETERMINE THE, SEQUENCE OF DRILLING FOR THE ROCK INVESTIGATION, DEPTH OF THE CORE BORINGS, AND LOCATION OF THE PERCUSSION BORINGS IN THE LLRW AREA.
5. ALL SOIL BORINGS ARE TO BE MADE USING DRY DRILLING TECHNIQUES.
6. FOR BORING LOCATION PURPOSES EACH LONG STORAGE STRUCTURE IN THE LLRW AREA SHOULD BE ASSUMED TO BE 250' LONG.
7. A STANDARD PENETRATION SPLIT-SPOON BORING IS NEEDED NEAR PLANT GRID COORDINATES 0+00N AND 3+00W. THE BORING IS FOR A FUTURE LOW LEVEL RADWASTE VOLUME REDUCTION BUILDING. SAMPLING IS TO BE CONTINOUS TO REFUSAL. A PRECISE LOCATION WILL BE PROVIDED LATER THIS BORING SHOULD BE MADE AFTER BALANCE OF FIELD WORK IS COMPLETED ON OTHER BORINGS.
8. BORROW AREA D SOILS ARE TO BE USED ONLY ON NON-SAFETY-RELATED FEATURES (SEE 10A800-1).

NIC-903
ATTACHMENT B

LEGEND:

- ○ AUGER BORING-COLLECT BAG SAMPLES TO EL 560
- ● CORE BORING
- ■ PERCUSSION BORING-100 FEET INTO ROCK
- □ PERCUSSION BORING-50 FEET INTO ROCK (LOCATIONS TO BE DETERMINED BY GEOLOGIST)
- ▲ SPLIT-SPOON BORING-CONTINOUS SAMPLING TO REFUSAL

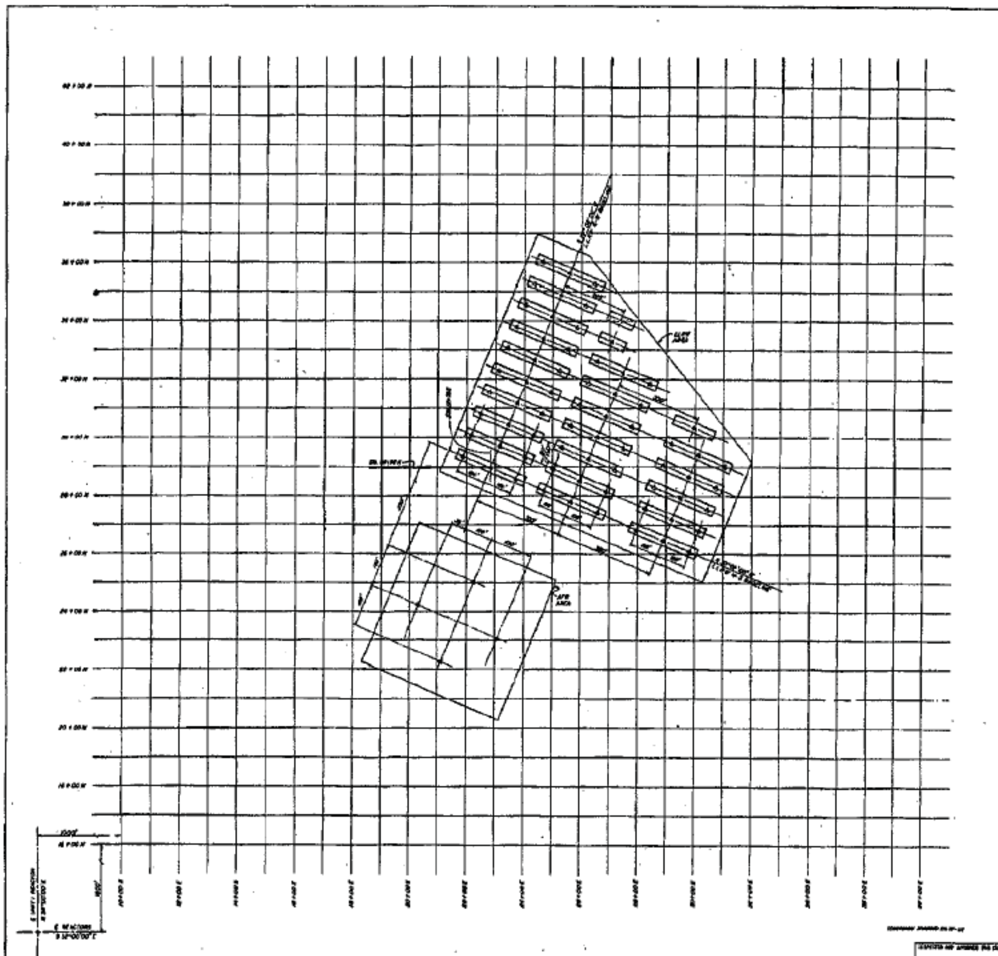
AMENDMENT 28

SITE STUDIES
UNIT 0

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

FOUNDATION INVESTIGATION GRID
LOW LEVEL RADWASTE STORAGE

FIGURE 2.5-S1

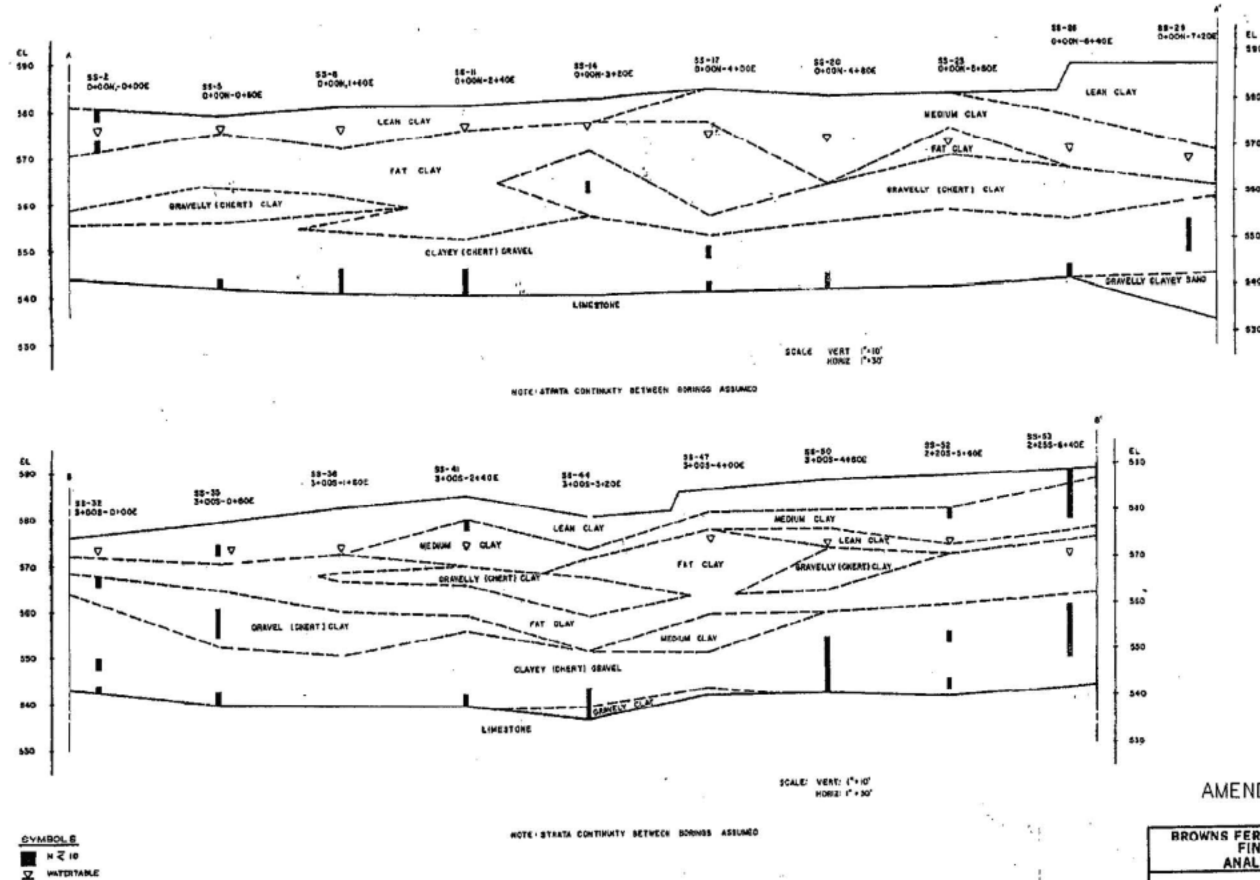


AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

FOUNDATION INVESTIGATION GRID
LOW LEVEL RADWASTE STORAGE
SOILS INVESTIGATION

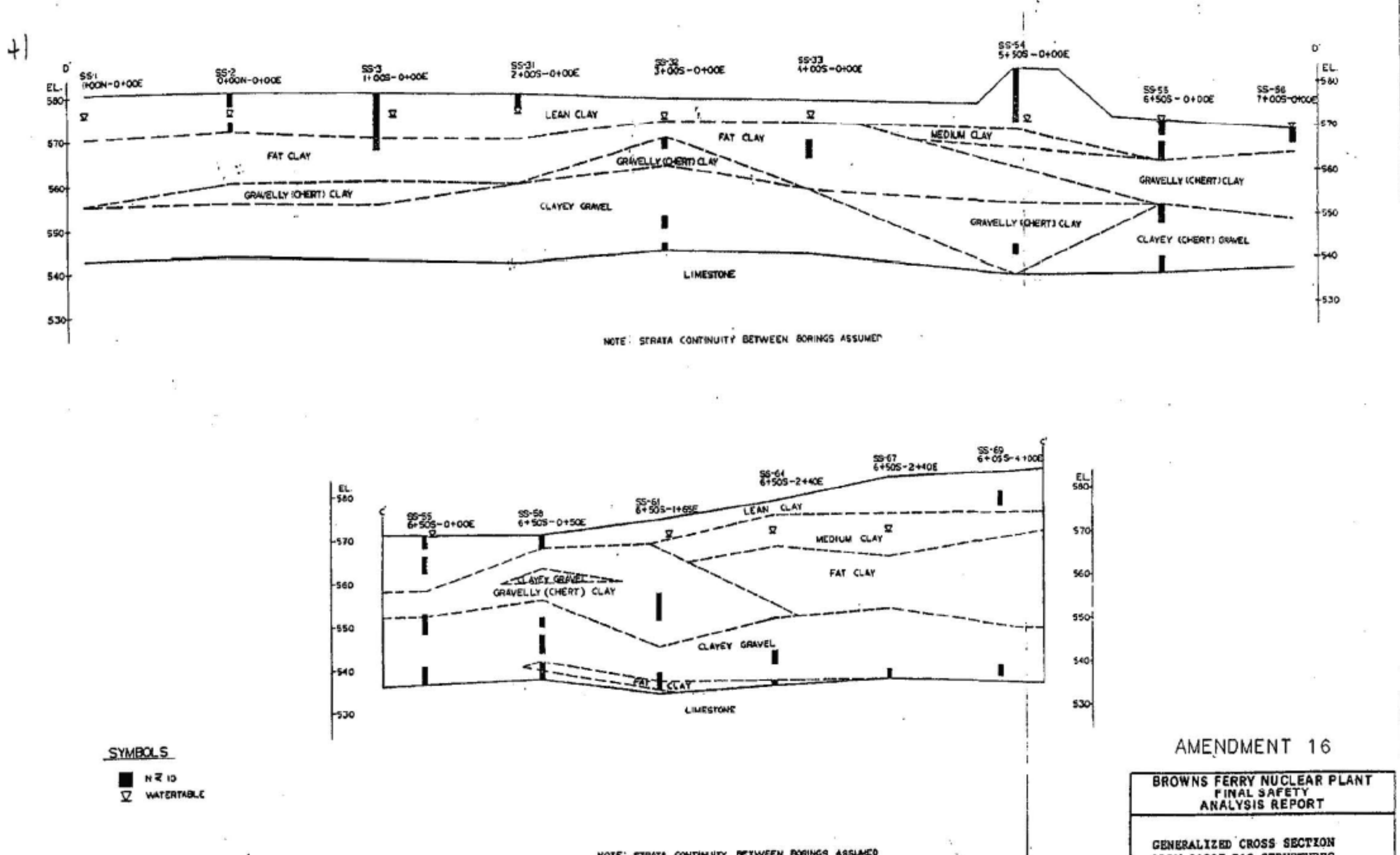
FIGURE 2 5 S2
(Added by Amendment 1)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

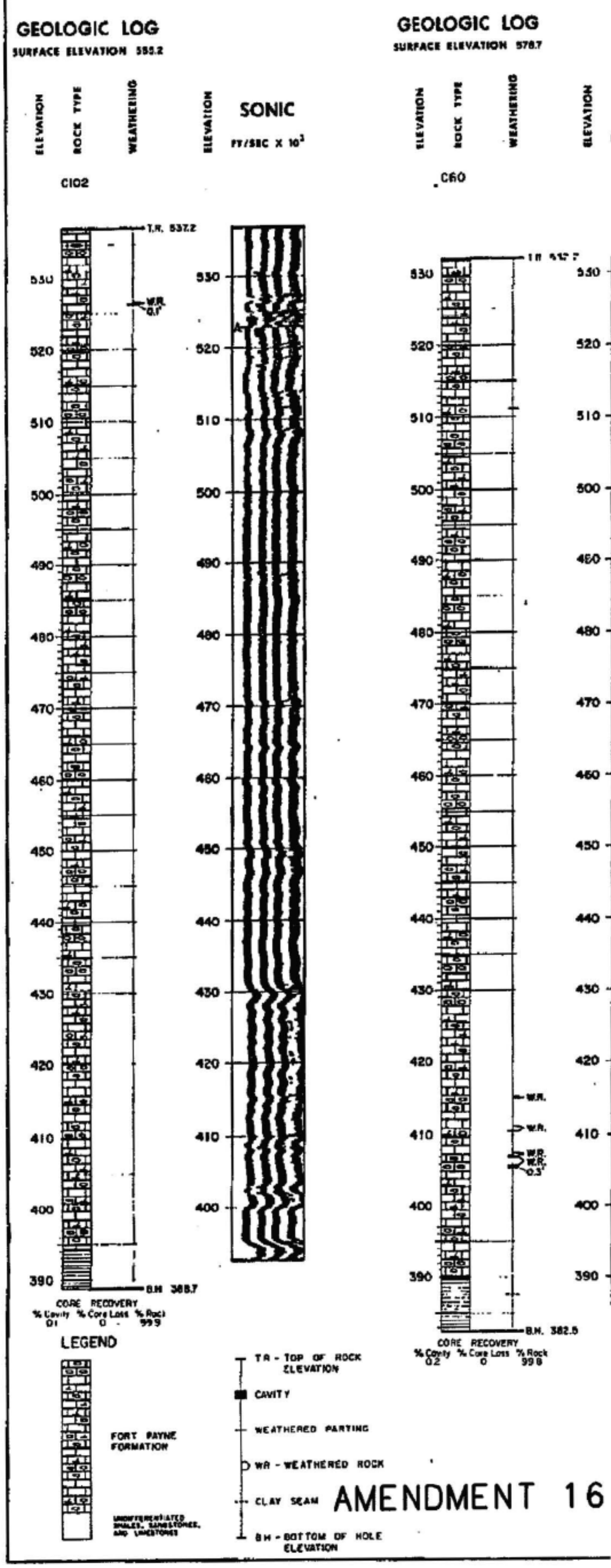
GENERALIZED CROSS SECTION
LLRW & A&B STRUCTURES
Figure 2.5-S3
(Added by Amendment 1)



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

GENERALIZED CROSS SECTION
LLRW 0600E B&C STRUCTURES
Figure 2.5-54
(Added by Amendment 1)

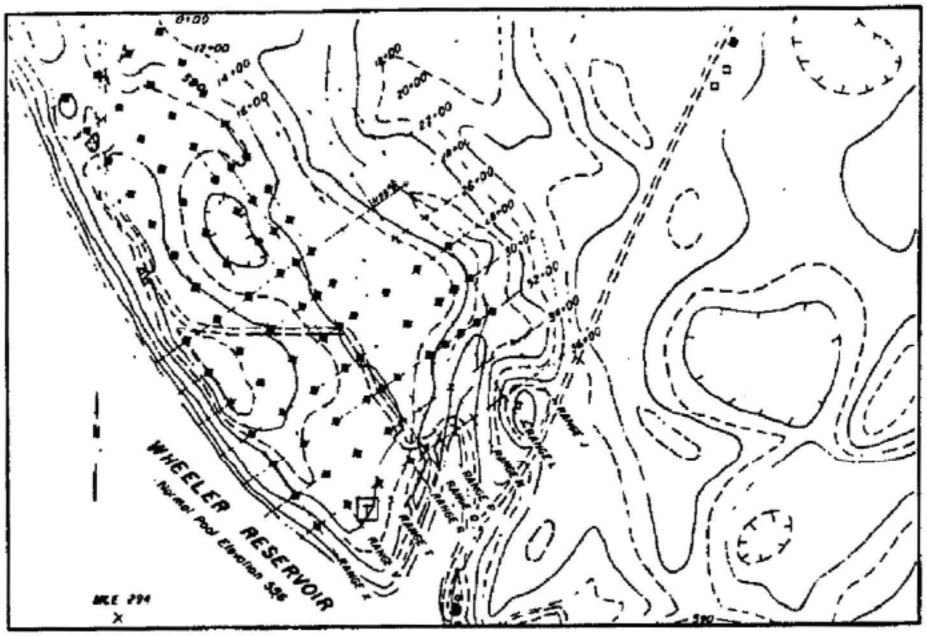


AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT FINAL SAFETY ANALYSIS REPORT

CORE HOLE CORRELATION

Figure 2.5-S5
(Added by Amendment 1)



BROWNS FERRY SITE

HOLE NUMBER	SURFACE	TOP OF ROCK	TOP OF SOUND ROCK	BOTTOM OF HOLE
	ELEVATION			
J-28+00	566.4	509.4	507.6	494.4
J-30+00	564.8	510.8	506.2	499.8
J-32+00	560.7	516.7	515.7	499.7
K-30+00	571.8	514.8	510.8	499.8
K-32+00	562.3	518.8	518.8	500.3
L-28+00	577.2	533.6	509.2	496.7
L-30+00	576.3	511.3	511.3	499.3
L-32+00	564.4	516.7	516.2	498.7
M-32+00	575.4	517.5	514.3	500.4
N-28+00	574.9	510.9	504.6	479.9
N-30+00	574.4	509.6	509.1	500.4
N-32+00	579.4	517.4	513.6	503.7
P-10+00	575.6	524.2	524.2	514.2
P-12+00	574.7	526.7	526.5	474.3
P-14+00	579.4	533.5	533.5	523.4
P-16+00	584.5	529.7	528.4	519.2
P-18+00	582.7	521.4	521.4	501.1
P-20+00	580.5	523.4	523.4	500.5
P-22+00	579.4	520.3	520.3	497.7
P-24+00	579.3	518.0	518.0	500.8
P-26+00	576.6	515.2	514.4	499.6
P-28+00	575.6	508.9	501.4	495.6
P-32+00	574.4	516.4	512.0	500.4
Q-18+00	583.1	531.4	530.0	518.9
Q-20+00	580.3	526.3	526.1	516.3
Q-22+00	579.8	530.3	530.1	519.3
Q-24+00	582.8	532.8	525.6	515.3
Q-26+00	579.8	526.1	524.8	513.8
Q-28+00	584.5	531.5	530.5	515.5
Q-30+00	579.5	531.3	526.3	515.3
Q-32+00	577.6	517.6	517.6	501.6
R-10+00	580.8	526.5	526.3	514.8
R-12+00	585.0	536.9	536.6	524.0
R-14+00	585.4	534.1	534.1	521.9
R-16+00	582.4	533.6	532.5	521.9
R-18+00	580.6	529.7	528.9	519.1
R-20+00	577.7	534.9	532.7	512.1
R-22+00	577.9	532.5	530.9	515.9
R-24+00	584.9	534.9	534.3	522.1
R-26+00	587.0	534.2	534.2	523.0
R-28+00	588.4	535.4	535.4	521.0
R-30+00	587.1	532.5	531.7	526.2
R-32+00	580.8	516.2	516.2	495.8
R-34+00	579.9	518.2	518.2	221.6
R-36+00	572.5	511.5	511.5	500.0

HOLE NUMBER	SURFACE	TOP OF ROCK	TOP OF SOUND ROCK	BOTTOM OF HOLE
	ELEVATION			
T-10+00	584.0	533.0	528.7	523.0
T-12+00	587.5	531.3	531.3	521.0
T-14+00	587.2	534.4	534.4	523.7
T-16+00	582.3	535.6	534.6	524.6
T-18+00	580.4	535.2	532.3	521.4
T-20+00	579.6	538.6	538.6	528.6
T-22+00	582.5	535.9	535.5	522.5
T-24+00	587.2	536.2	536.2	525.9
T-26+00	589.5	536.5	534.5	525.0
T-28+00	587.6	536.6	537.1	523.6
T-30+00	587.7	534.2	534.2	520.7
T-32+00	581.5	515.3	513.5	499.5
T-34+00	583.1	515.1	516.2	500.1
T-36+00	582.4	513.4	512.4	500.9
V-10+00	583.4	535.4	530.4	523.5
V-12+00	588.9	534.1	534.1	521.4
V-14+00	590.0	534.5	534.5	524.2
V-16+00	590.2	534.6	534.6	524.6
V-18+00	590.9	537.9	537.5	524.7
V-20+00	590.0	547.2	547.2	525.0
V-22+00	590.8	537.8	537.3	525.3
V-24+00	596.7	546.7	546.7	525.2
V-26+00	595.4	537.6	537.6	524.4
V-28+00	595.5	540.8	538.0	528.0
V-30+00	587.7	534.1	532.2	520.3
V-32+00	583.2	529.6	529.6	512.2
V-34+00	581.2	517.2	516.8	500.2
V-36+00	581.1	520.1	529.6	506.1
X-24+00	595.3	542.7	540.6	523.1
X-26+00	598.0	545.0	544.5	523.5
X-28+00	596.7	544.3	544.3	520.7
X-30+00	585.2	542.2	539.2	523.5
X-32+00	586.7	533.7	531.7	506.0
X-34+00	582.0	517.0	516.5	498.0
X-36+00	578.9	517.1	517.1	502.9

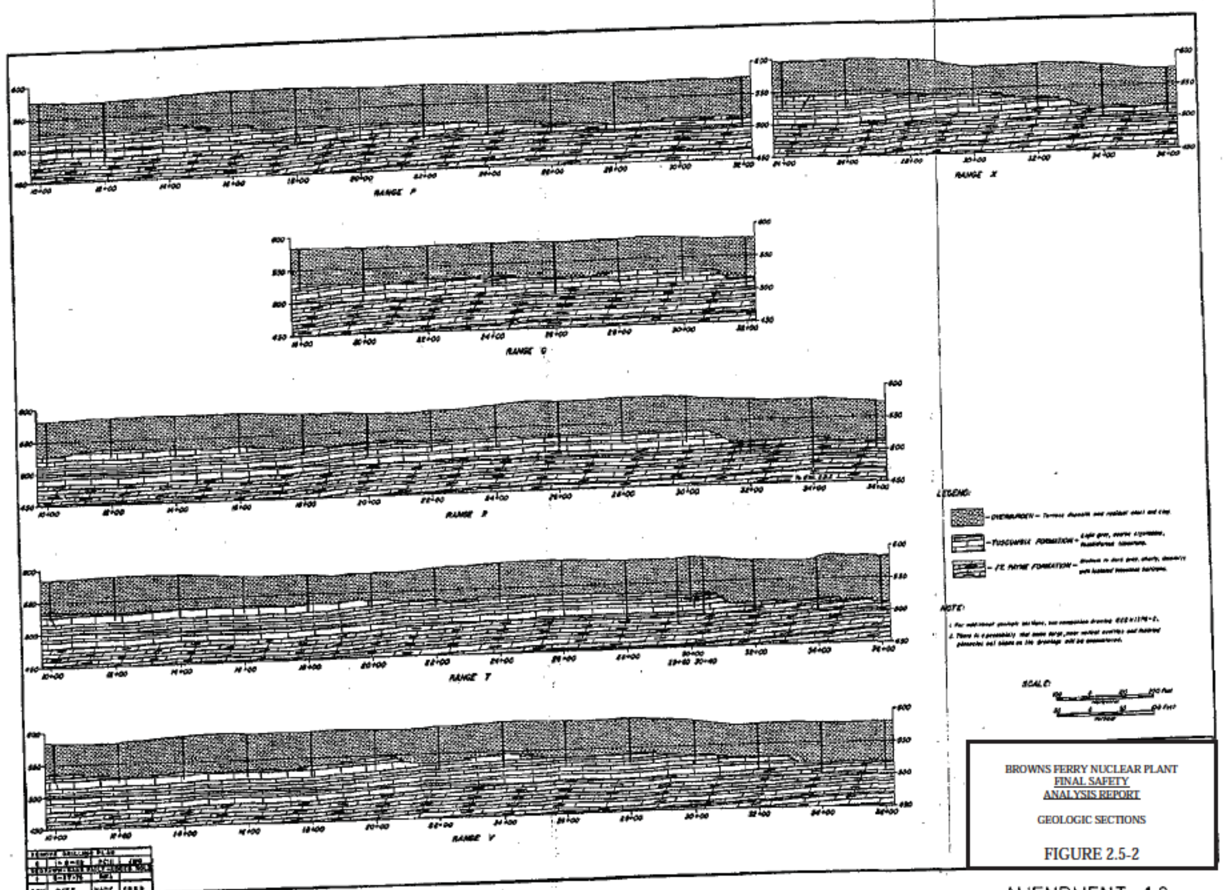
SCALE:

400 0 400 800 Feet

AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

Location and Summary of Exploratory Drilling
FIGURE 2.5-1

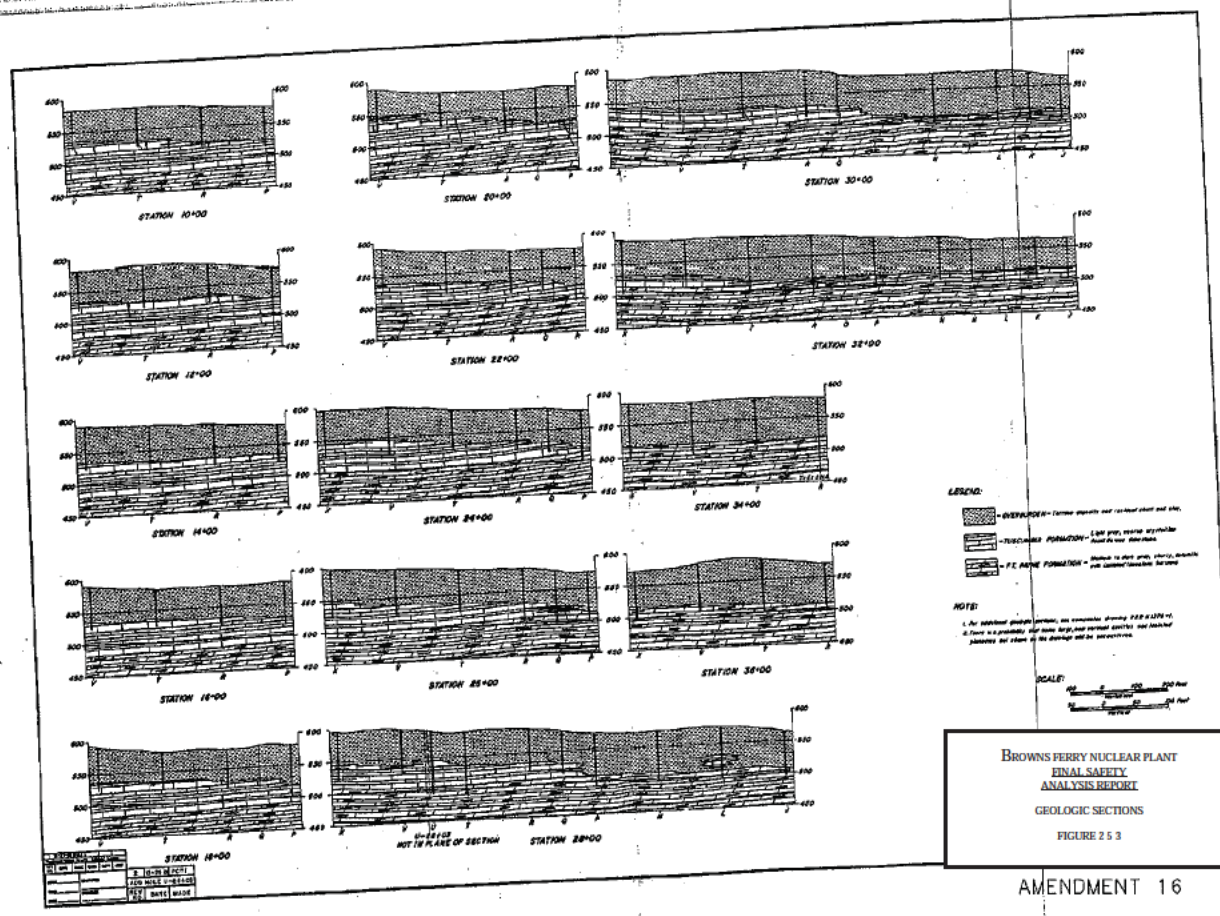


BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

GEOLOGIC SECTIONS

FIGURE 2.5-2

AMENDMENT 16

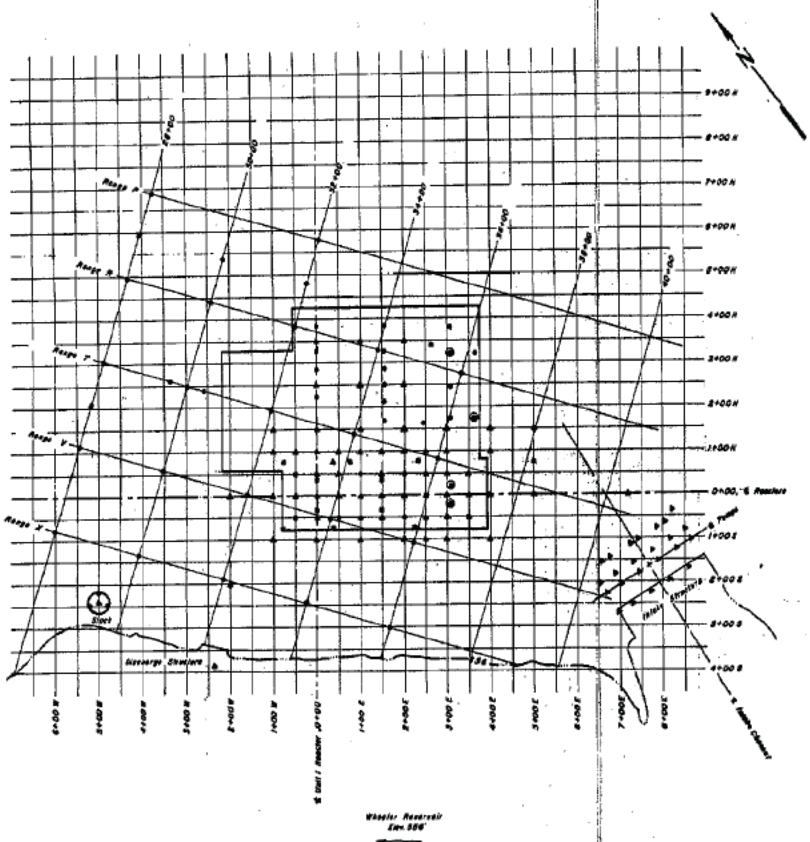


BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

GEOLOGIC SECTIONS

FIGURE 2 5 3

AMENDMENT 16



CORE DRILL SUMMARY

Station	Surface Elevation	Top of Rock Elevation	Top of Sound Rock Elevation	Bottom of Hole Elevation
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

LEGEND:

- ● - Diamond drill core hole.
- ⬤ - Core hole investigated with resistivity - gamma logger.
- ▲ - Percussion drill hole.
- ■ - Percussion drill hole inspected with borehole television.

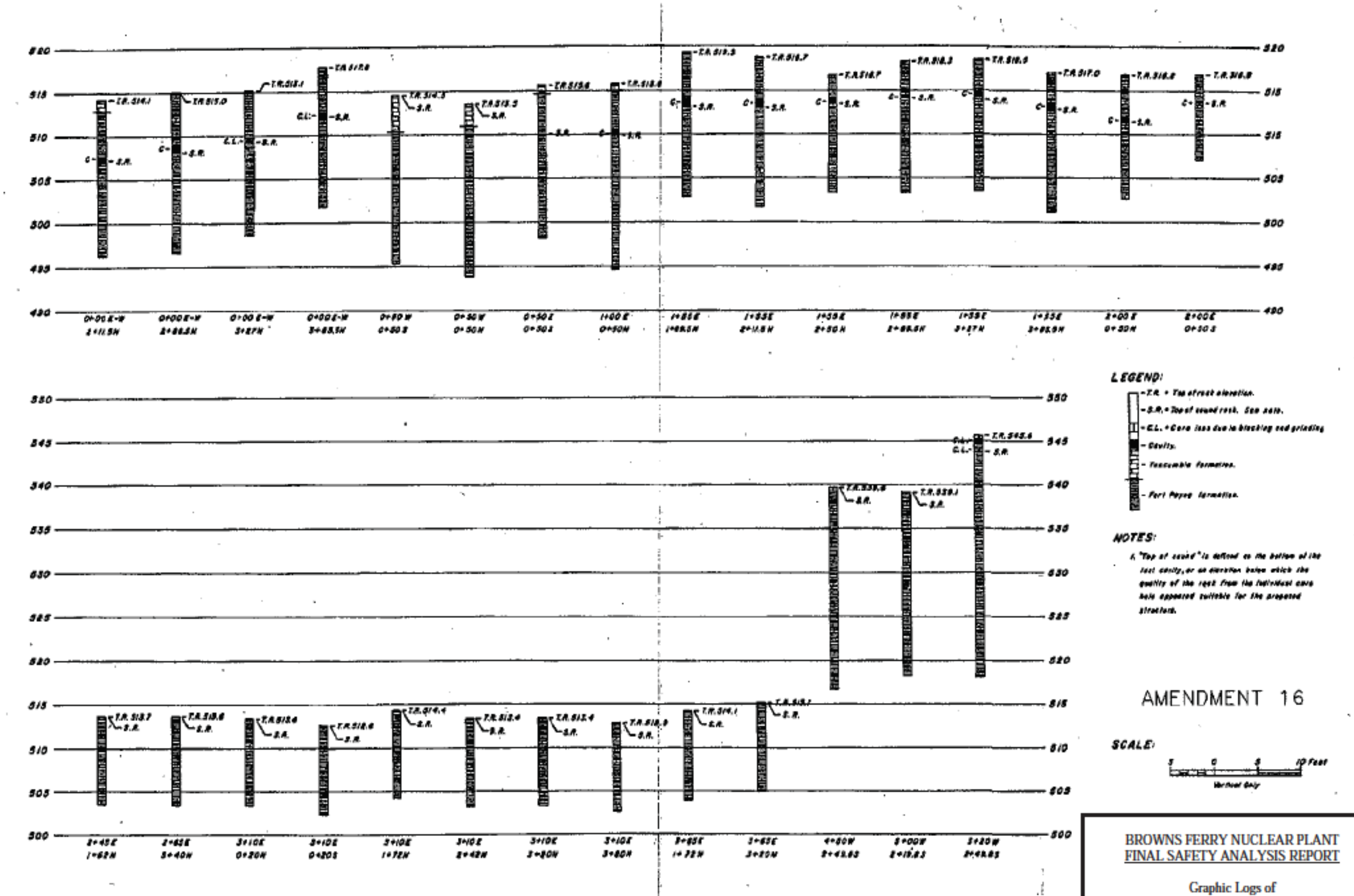
AMENDMENT 16

SCALE: 100 0 100 200 Feet

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

Drill Hole Locations
and
Core Drill Summary

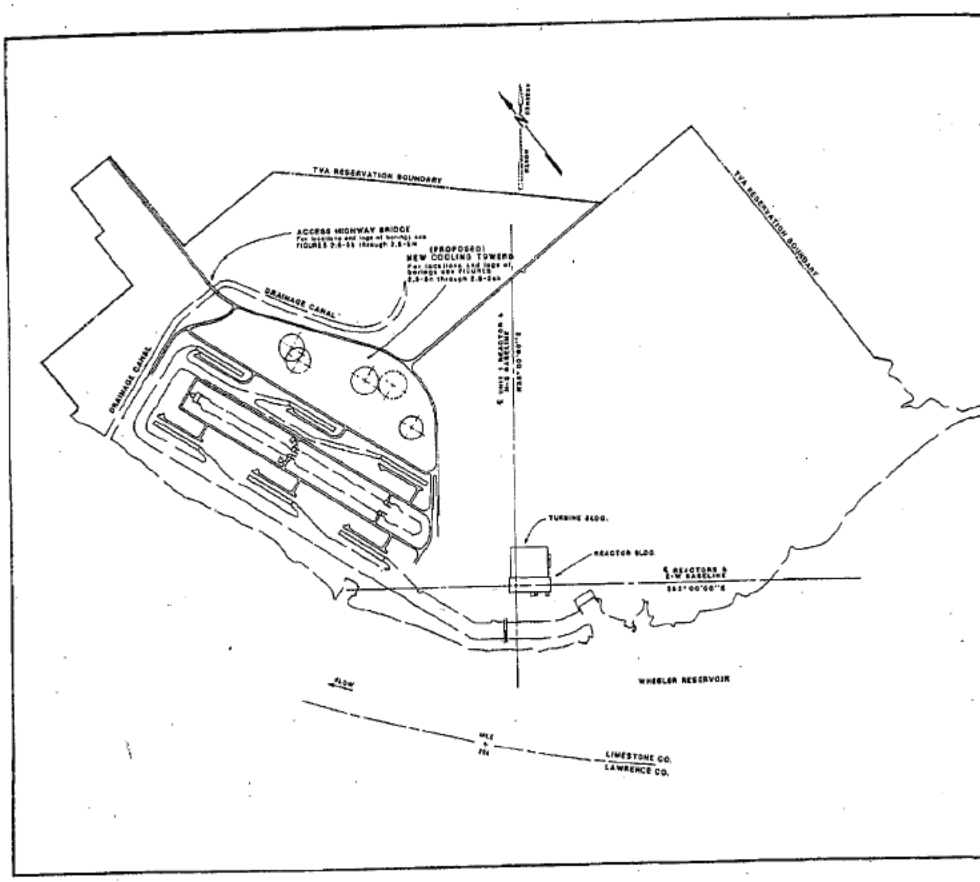
FIGURE 2.5-4



BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

Graphic Logs of
Core Drill Holes

FIGURE 2.5-5

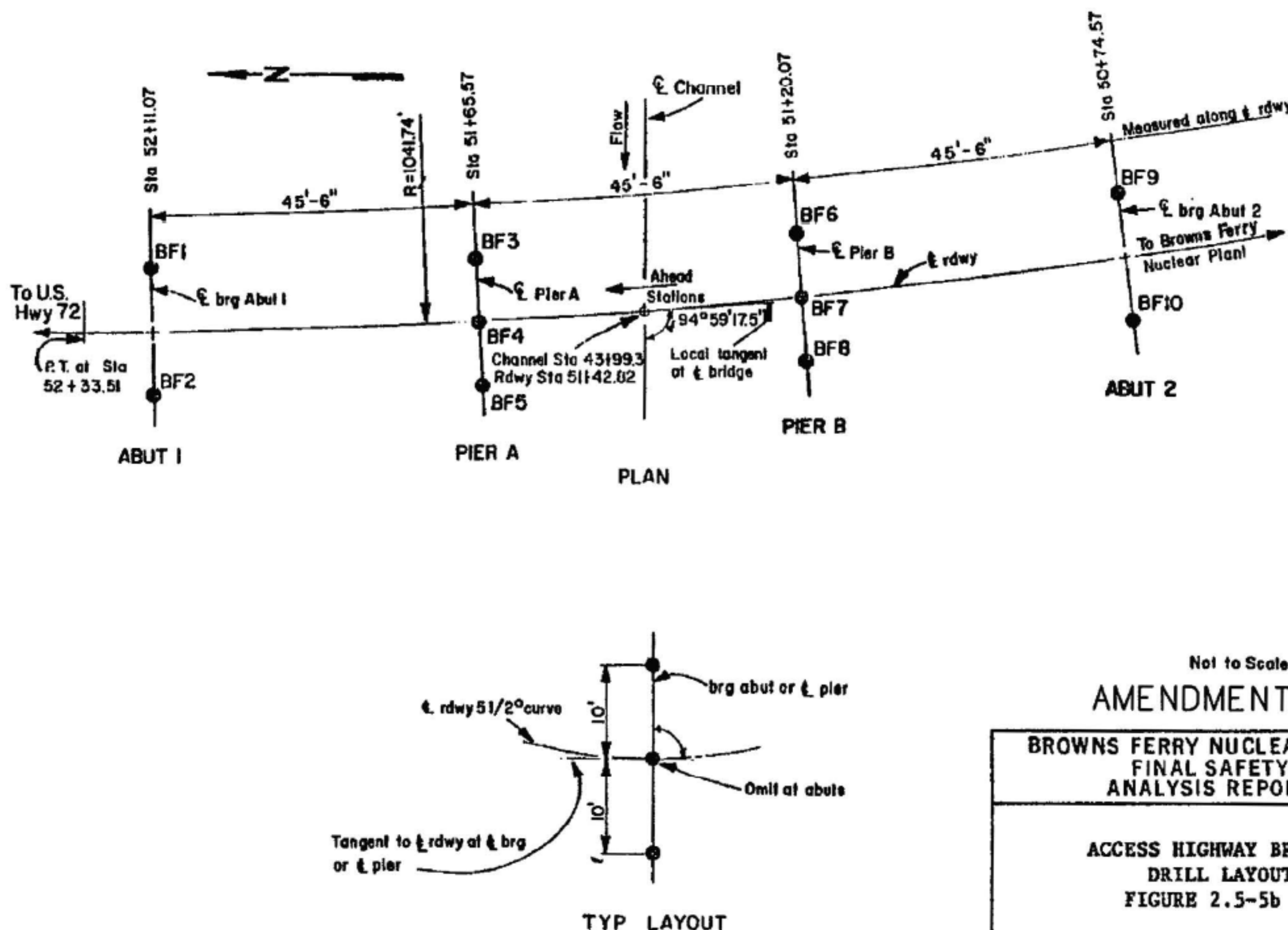


AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

MISCELLANEOUS FOUNDATION
INVESTIGATIONS 1972 TO 1980

FIGURE 2.5-5a



AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE
DRILL LAYOUT
FIGURE 2.5-5b

TVA 4215A (WCP-8-71)

GEOLOGIC RECORD OF DRILL HOLE

PROJECT BROWNS FERRY BRIDGE

Hole Number	Location	Geologic Formation	
BF-1	Exploration Abutment #1	Ft. Payne	
Elevation of Surface: 579.6		Elevation of Water Loss: None	
Elevation Top of Bedrock: 531.0	Thickness of Overburden: 48.6	Elevation of Water Gained: None	
Elevation Bottom of Hole: 525.2	Size of Core: Nx-wireline	Driller: Collins	
Recommended Foundation Grade: -----	Bottom of Weathering Encountered: 530.7	Date Started: 4/25/72	Date Completed:

Material	Elevation of Stratum	Depth From Surface	Thickness of Stratum	Dip	Description
		OVERBURDEN			
Red clay	579.6	0.0	3.0		
Gray clay	576.6	3.0	6.0		
Yellow clay	570.6	9.0	12.0		
Yellow clay and chert	558.6	21.0	27.6		
		ROCK DRILLING			
Limestone	531.0	48.6	5.8		Light gray, fine grain, broken and ground to 530.7; calcite vug at 528.7, 528.3, 525.2
BOTTOM OF HOLE	525.2	54.4			

REMARKS:

Water test:
Elevation G.P.M. P.S.I.

For location of boring, see figure 2.5-5b.

AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE
HOLE BF-1
FIGURE 2.5-5c

Logged By A. D. Soderberg

TVA 4215A (WCP-8-71)

GEOLOGIC RECORD OF DRILL HOLE

PROJECT BROWNS FERRY BRIDGE

Hole Number	Location	Geologic Formation	
BF-2	Exploration Abutment #2	Ft. Payne	
Elevation of Surface: 578.8		Elevation of Water Loss: ------	
Elevation Top of Bedrock: 531.7	Thickness of Overburden: 47.1	Elevation of Water Gained: ------	
Elevation Bottom of Hole: 524.4	Size of Core: Nx-wireline	Driller: Collins	
Recommended Foundation Grade: ------	Bottom of Weathering Encountered: 531.7	Date Started: 4/28/72	Date Completed: 4/28/72

Material	Elevation of Stratum	Depth From Surface	Thickness of Stratum	Dip	Description
		OVERBURDEN			
Red and yellow clay	578.8	0.0	3.0		
Clay and chert	575.8	3.0	44.1		
		ROCK DRILLING			
Limestone	531.7	47.1	7.3		Light gray, fine grain, calcite vug at 528.8, 527.8, 5274., 525.3; 0.1' clay seam at 527.2
BOTTOM OF HOLE	524.4	54.4			

REMARKS:

Water test:
Elevation G.P.M. P.S.I.

For location of boring, see figure 2.5-5b.

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE
HOLE BF-2
FIGURE 2.5-5d

AMENDMENT 16

Logged By A. D. Soderberg

TVA 4215A (WCP-8-71)

GEOLOGIC RECORD OF DRILL HOLE

PROJECT BROWNS FERRY BRIDGE

Hole Number	Location	Geologic Formation	
BF-3	Exploration Pier A	Ft. Payne	
Elevation of Surface: 579.5		Elevation of Water Loss: None	
Elevation Top of Bedrock: 531.8	Thickness of Overburden: 47.7	Elevation of Water Gained: None	
Elevation Bottom of Hole: 515.2	Size of Core: Nx-wireline	Driller: Anderson	
Recommended Foundation Grade: -----	Bottom of Weathering Encountered: 531.8	Date Started: 4/25/72	Date Completed: 4/25/72

Material	Elevation of Stratum	Depth From Surface	Thickness of Stratum	Dip	Description
			OVERBURDEN		
Red clay	579.5	0.0	3.0		
Brown clay	576.5	3.0	2.0		
Gray clay	574.5	5.0	5.0		
Brown clay and boulders	569.5	10.0	37.7		
			ROCK DRILLING		
Limestone	531.8	47.7	16.6		Light to medium gray, fine grain, calcite vug at 528.5, 528.1, 527.2, 522.8, 515.6; 0.1' shale at 523.0; near vertical joint 522.5 to 521.9
BOTTOM OF HOLE	515.2	64.3			

REMARKS:

Water test:
Elevation G.P.M. P.S.I.

For location of boring, see figure 2.5-5b.

AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT FINAL SAFETY ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE HOLE BF-3 FIGURE 2.5-5e

Logged By A. D. Soderberg

TVA 4215A (WCP-8-71)

GEOLOGIC RECORD OF DRILL HOLE

PROJECT BROWNS FERRY BRIDGE

Hole Number: BF-4	Location: Exploration Pier A	Geologic Formation: Ft. Payne
Elevation of Surface: 579.4		Elevation of Water Loss: None
Elevation Top of Bedrock:	Thickness of Overburden: 46.9	Elevation of Water Gained: None
Elevation Bottom of Hole:	Size of Core: Nx-wireline	Driller: Collins
Recommended Foundation Grade:	Bottom of Weathering Encountered: 532.3	Date Started: 4/27/72 / Date Completed: 4/27/72

Material	Elevation of Stratum	Depth From Surface	Thickness of Stratum	Dip	Description
		OVERBURDEN			
Yellow and red clay	579.4	0.0	2.0		
Yellow clay & chert	577.4	2.0	44.9		
		ROCK DRILLING			
Limestone	532.5	46.9	15.6		Light gray, fine grain, weathered to 532.3; calcite vug at 531.8, 529.0, 528.0; 0.1' clay seam at 529.4; weathered parting 519.8; cherty 518.5 to 518.1
BOTTOM OF HOLE	516.9	62.5			

REMARKS:

Water test:
Elevation G.P.M. P.S.I.

For location of boring, see figure 2.5-5b.

AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE
HOLE BF-4
FIGURE 2.5-5f

Logged By A. D. Soderberg

TVA 4215A (WCP-8-71)

GEOLOGIC RECORD OF DRILL HOLE

PROJECT BROWNS FERRY BRIDGE

Hole Number	Location	Geologic Formation	
BF-5	Exploration Pier A	Ft. Payne	
Elevation of Surface		Elevation of Water Loss	
578.7		None	
Elevation Top of Bedrock	Thickness of Overburden	Elevation of Water Gained	
532.2	46.5	None	
Elevation Bottom of Hole	Size of Core	Driller	
516.6	Nx-wireline	Collins	
Recommended Foundation Grade	Bottom of Weathering Encountered	Date Started	Date Completed
	532.2	4/27/72	4/27/72

Material	Elevation of Stratum	Depth From Surface	Thickness of Stratum	Dip	Description
		OVERBURDEN			
Clay and chert	578.7	0.0	46.5		
		ROCK DRILLING			
Limestone	532.2	46.5	15.6		Light gray, fine grain, calcite vug at 531.2, 517.5; 0.1' clay seam 527.7
BOTTOM OF HOLE	516.6	62.1			

REMARKS:

Water test:
Elevation G.P.M. P.S.I.

For location of boring, see figure 2.5-5b.

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE
HOLE BF-5
FIGURE 2.5-5g

AMENDMENT 16

Logged By A. D. Soderberg

TVA 4215A (WCP-8-71)

GEOLOGIC RECORD OF DRILL HOLE

PROJECT ______

Hole Number	Location	Geologic Formation	
BF-6	Exploration Pier B	Ft. Payne	
Elevation of Surface		Elevation of Water Loss	
579.6		None	
Elevation Top of Bedrock	Thickness of Overburden	Elevation of Water Gained	
540.8	48.8	None	
Elevation Bottom of Hole	Size of Core	Driller	
515.2	Nx-wireline	Collins	
Recommended Foundation Grade	Bottom of Weathering Encountered	Date Started	Date Completed
540.8	526.1	4/24/72	4/24/72

Material	Elevation of Stratum	Depth From Surface	Thickness of Stratum	Dip	Description
			OVERBURDEN		
Red clay	579.6	0.0	5.0		
Gray clay	574.6	5.0	6.0		
Yellow clay	568.6	11.0	7.0		
Red & yellow clay	561.6	18.0	17.0		
Brown clay and sand	544.6	35.0	13.8		
			ROCK DRILLING		
Limestone	540.8	48.8	15.6		Medium gray, fine grain, weathered parting 530.5, vuggy 528.8, weathered parting 526.1, near vertical joint 525.6 to 525.4, 524.7 to 524.3, cherty 525.8 to 525.3
BOTTOM OF HOLE	515.2	64.4			

REMARKS:

Water test:
Elevation G.P.M. P.S.I.

For location of boring, see figure 2.5-5b.

AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE
HOLE BF-6
FIGURE 2.5-5h

Logged By A. D. Soderberg

TVA 4215A (WCP-8-71)

GEOLOGIC RECORD OF DRILL HOLE

PROJECT BROWNS FERRY BRIDGE

Hole Number	Location	Geologic Formation	
BF-7	Exploration Pier B	Ft. Payne	
Elevation of Surface: 579.8		Elevation of Water Loss: None	
Elevation Top of Bedrock: 532.4	Thickness of Overburden: 47.4	Elevation of Water Gained: None	
Elevation Bottom of Hole: 516.0	Size of Core: Nx-wireline	Driller: Anderson	
Recommended Foundation Grade	Bottom of Weathering Encountered: 531.1	Date Started: 4/27/72	Date Completed: 4/27/72

Material	Elevation of Stratum	Depth From Surface	Thickness of Stratum	Dip	Description
			OVERBURDEN		
Red clay	579.8	0.0	2.0		
Brown clay	577.8	2.0	3.0		
Yellow clay	574.8	5.0	2.0		
Brown clay and boulders	572.8	7.0			
			ROCK DRILLING		
Limestone	532.4	47.4	6.1		Light gray, fine grain; weathered to 531.1; calcite vug at 527.9, 527.7; near vertical joint 529.4; clay seam 528.1
Limestone	526.3	53.5	10.3		Medium gray, fine grain with scattered shale
BOTTOM OF HOLE	516.0	63.8			

REMARKS:

Water test:
Elevation G.P.M. P.S.I.

For location of boring, see figure 2.5-5b.

AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE
HOLE BF-7
FIGURE 2.5-51

Logged By A. D. Soderberg

TVA 4215A (WCP-8-71)

GEOLOGIC RECORD OF DRILL HOLE

PROJECT BROWNS FERRY BRIDGE

Hole Number BF-8	Location Exploration Pier B	Geologic Formation Ft. Payne	
Elevation of Surface 579.1		Elevation of Water Loss None	
Elevation Top of Bedrock 531.1	Thickness of Overburden 48.0	Elevation of Water Gained None	
Elevation Bottom of Hole 516.0	Size of Core Nx-wireline	Driller Anderson	
Recommended Foundation Grade	Bottom of Weathering Encountered 530.8	Date Started 4/27/72	Date Completed 4/27/72

Material	Elevation of Stratum	Depth From Surface	Thickness of Stratum	Dip	Description
			OVERBURDEN		
Red clay	579.1	0.0	2.0		
Brown clay	577.1	2.0	3.6		
Gray clay	573.5	5.6	3.0		
Red clay and boulders	570.5	8.6	39.4		
			ROCK DRILLING		
Limestone	531.1	48.0	15.1		Light gray, fine grain, weathered to 530.8; calcite vug at 529.6, 528.6; calcite on near vertical joint 525.9; clay seam at 526.4, 526.0; calcite on weathered near vertical joint 517.1 to 516.9
BOTTOM OF HOLE	516.0	63.1			

REMARKS:

Water test:
Elevation G.P.M. P.S.I.

For location of boring, see figure 2.5-5b.

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE
HOLE BF-8
FIGURE 2.5-5j

AMENDMENT 16

Logged By A. D. Soderberg

TVA 4215A (WCP-8-71)

GEOLOGIC RECORD OF DRILL HOLE

PROJECT BROWNS FERRY BRIDGE

Hole Number	Location	Geologic Formation	
BF-9	Exploration Abutment #2	Ft. Payne	
Elevation of Surface: 579.0		Elevation of Water Loss: None	
Elevation Top of Bedrock: 531.5	Thickness of Overburden: 47.5	Elevation of Water Gained: None	
Elevation Bottom of Hole: 516.5	Size of Core: Nx-wireline	Driller: Anderson	
Recommended Foundation Grade: 531.5	Bottom of Weathering Encountered: 519.0	Date Started: 4/24/72	Date Completed: 4/25/72

Material	Elevation of Stratum	Depth From Surface	Thickness of Stratum	Dip	Description
			OVERBURDEN		
Red clay	579.0	0.0	2.0		
Brown clay	577.0	2.0	1.0		
Gray clay	576.0	3.0	3.0		
Brown clay and boulders	573.0	6.0	41.5		
			ROCK DRILLING		
Limestone	531.5	47.5	15.0		Medium gray, fine grain, near vertical joint 531.5 to 531.0;
					calcite filled vuggy at 530.5; clay seam 527.2 to 527.1; chert
					524.1 to 523.3; weathered parting 519.0
BOTTOM OF HOLE	516.5	62.5			

REMARKS:

Water test:
Elevation G.P.M. P.S.I.

For location of boring, see figure 2.5-5b.

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE
HOLE BF-9
FIGURE 2.5-5k

AMENDMENT 16

Logged By A. D. Soderberg

TVA 4215A (WCP-8-71)

GEOLOGIC RECORD OF DRILL HOLE

PROJECT BROWNS FERRY BRIDGE

Hole Number	Location	Geologic Formation	
BF-10	Exploration Abutment #2	Ft. Payne	
Elevation of Surface		Elevation of Water Loss	
579.75		None	
Elevation Top of Bedrock	Thickness of Overburden	Elevation of Water Gained	
527.8	52.0	None	
Elevation Bottom of Hole	Size of Core	Driller	
522.1	Nx-wireline	Anderson	
Recommended Foundation Grade	Bottom of Weathering Encountered	Date Started	Date Completed
	527.8	4/28/72	

Material	Elevation of Stratum	Depth From Surface	Thickness of Stratum	Dip	Description
		OVERBURDEN			
Red clay	579.8	0.0	3.0		
Gray clay	576.8	3.0	6.0		
Brown clay	570.8	9.0	41.0		
Gray clay and boulders	529.8	50.0	2.0		
		ROCK DRILLING			
Limestone	527.8	52.0	5.7		Light gray, fine grain
BOTTOM OF HOLE	522.1	57.7			

REMARKS:

Water test:
Elevation G.P.M. P.S.I.

For location of boring, see figure 2.5-5b.

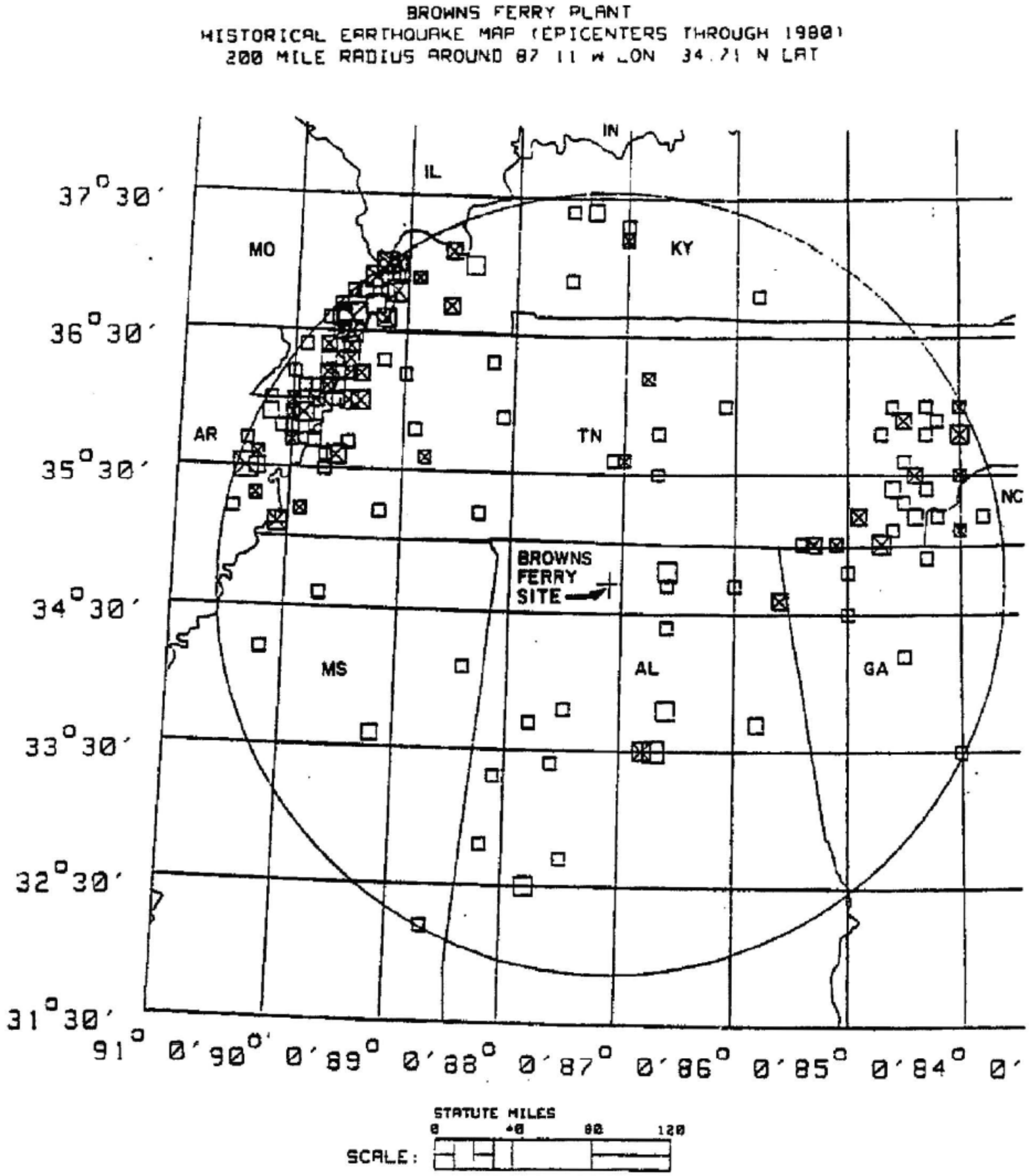
AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

ACCESS HIGHWAY BRIDGE
HOLE BF-10
FIGURE 2.5-51

Logged By A. D. Soderberg

Figures 2.5-5m through 2.5-5aj
(Deleted by Amendment 13)



LEGEND:
- INTENSITY <= IV
- INTENSITY = V
- INTENSITY = VI
- INTENSITY = VII
- INTENSITY = VIII
- INTENSITY >= IX
- MULTIPLE EVENTS

NOTE:
SYMBOL REPRESENTS LARGEST EVENT AT THAT LOCATION

AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

HISTORICAL EARTHQUAKE MAP

FIGURE 2.5-6

THE MODIFIED MERCALI INTENSITY SCALE OF 1931

(ABRIDGED)

I. Not felt except by a very few under specially favorable circumstances. (I Rossi-Forel Scale.)

II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale.)

III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibration like passing of truck. Duration estimated. (III Rossi-Forel Scale.)

IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably. (IV to V Rossi-Forel Scale.)

V. Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel Scale.)

VI. Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale.)

VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motorcars. (VIII Rossi-Forel Scale.)

VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motorcars disturbed. (VIII+ to IX– Rossi-Forel Scale.)

IX. Damage considerable in specially designed frame structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. (IX+ Rossi-Forel Scale.)

X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. (X Rossi-Forel Scale.)

XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.

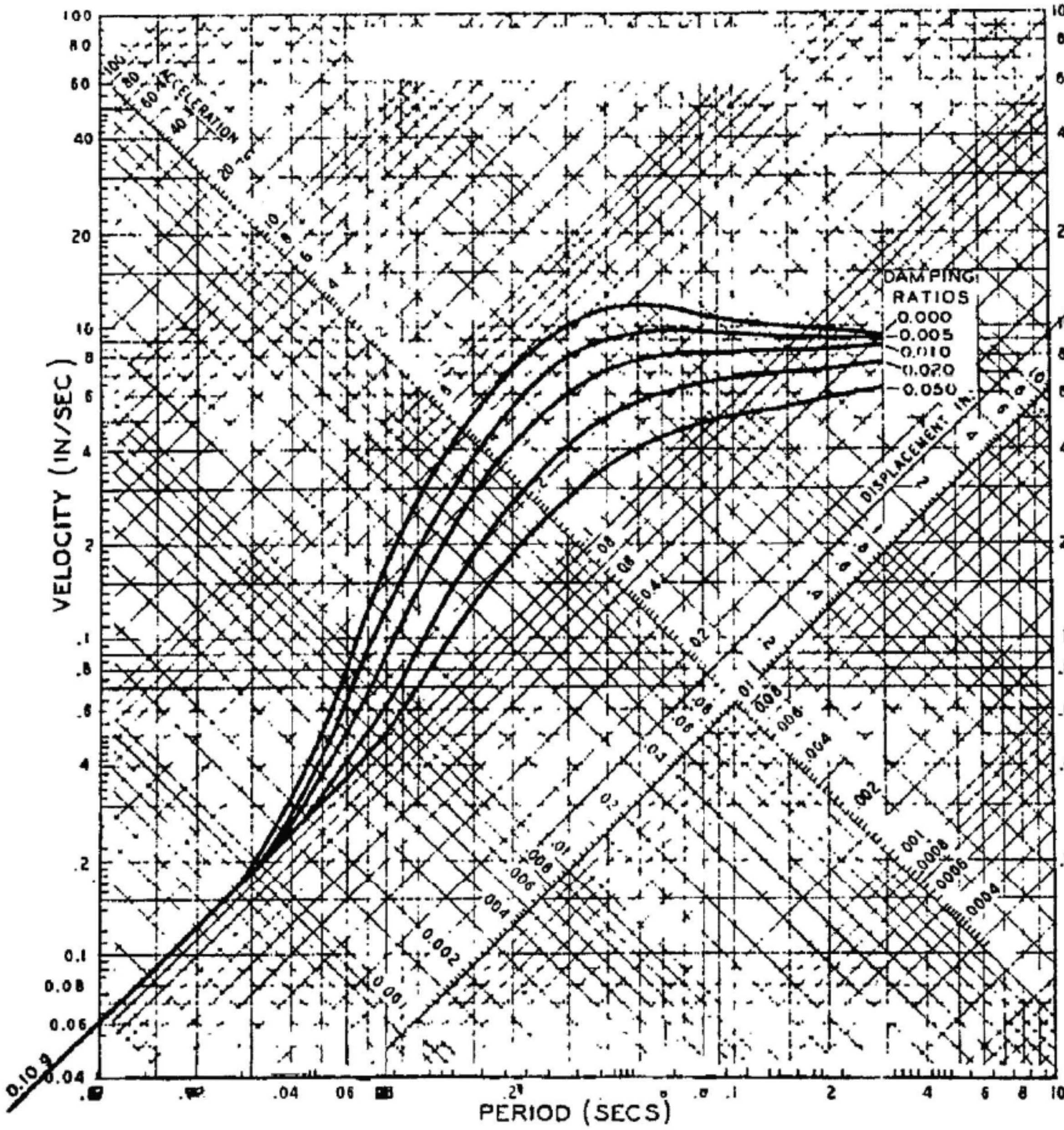
XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into air.

AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

MODIFIED MERCALLI INTENSITY
SCALE OF 1931 (ABRIDGED)

FIGURE 2.5-7

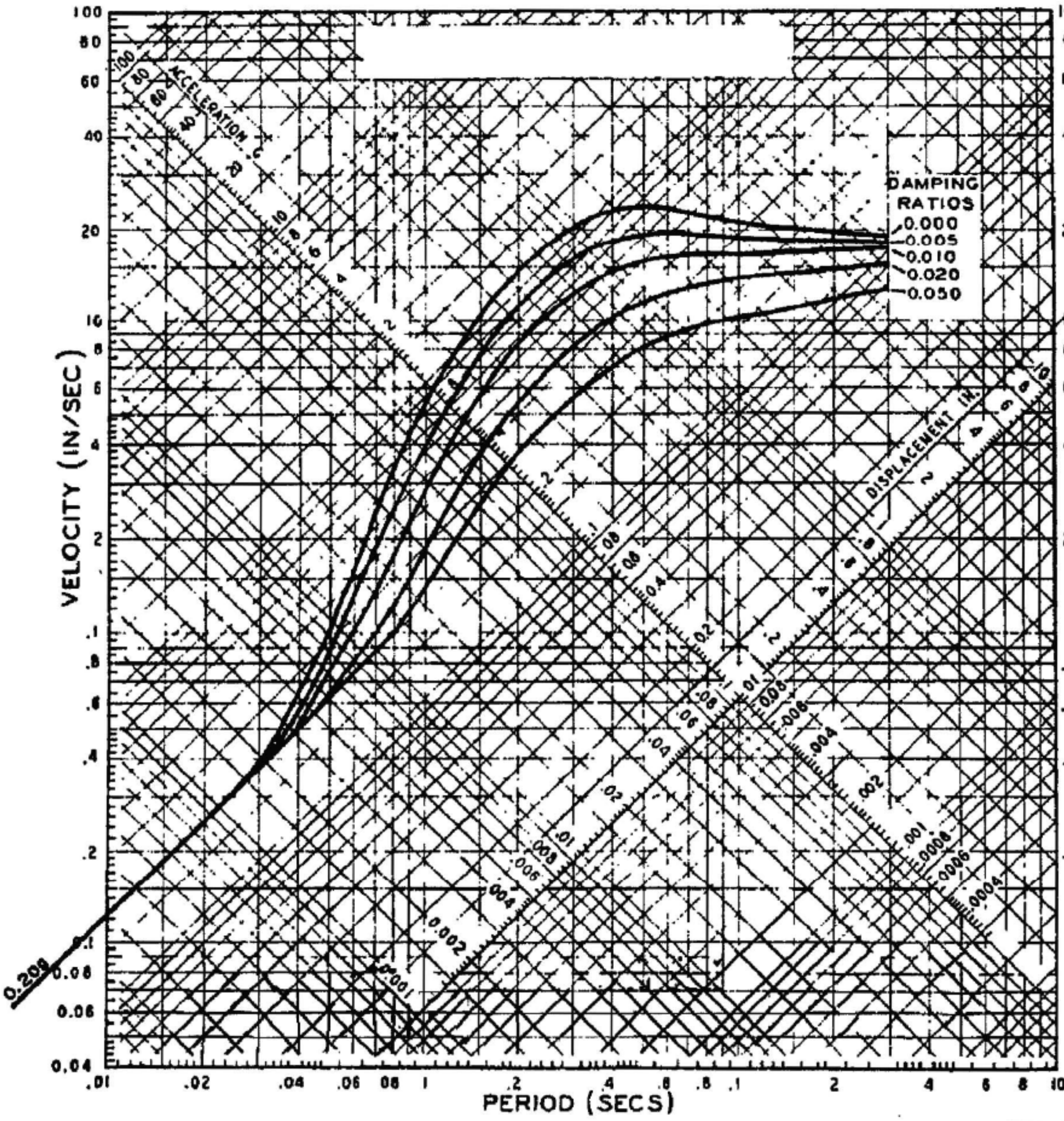


AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

SITE DESIGN SPECTRUM
OPERATIONAL BASIS EARTHQUAKE
HORIZONTAL

FIGURE 2.5-8



BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

SITE DESIGN SPECTRUM
DESIGN BASIS EARTHQUAKE
HORIZONTAL

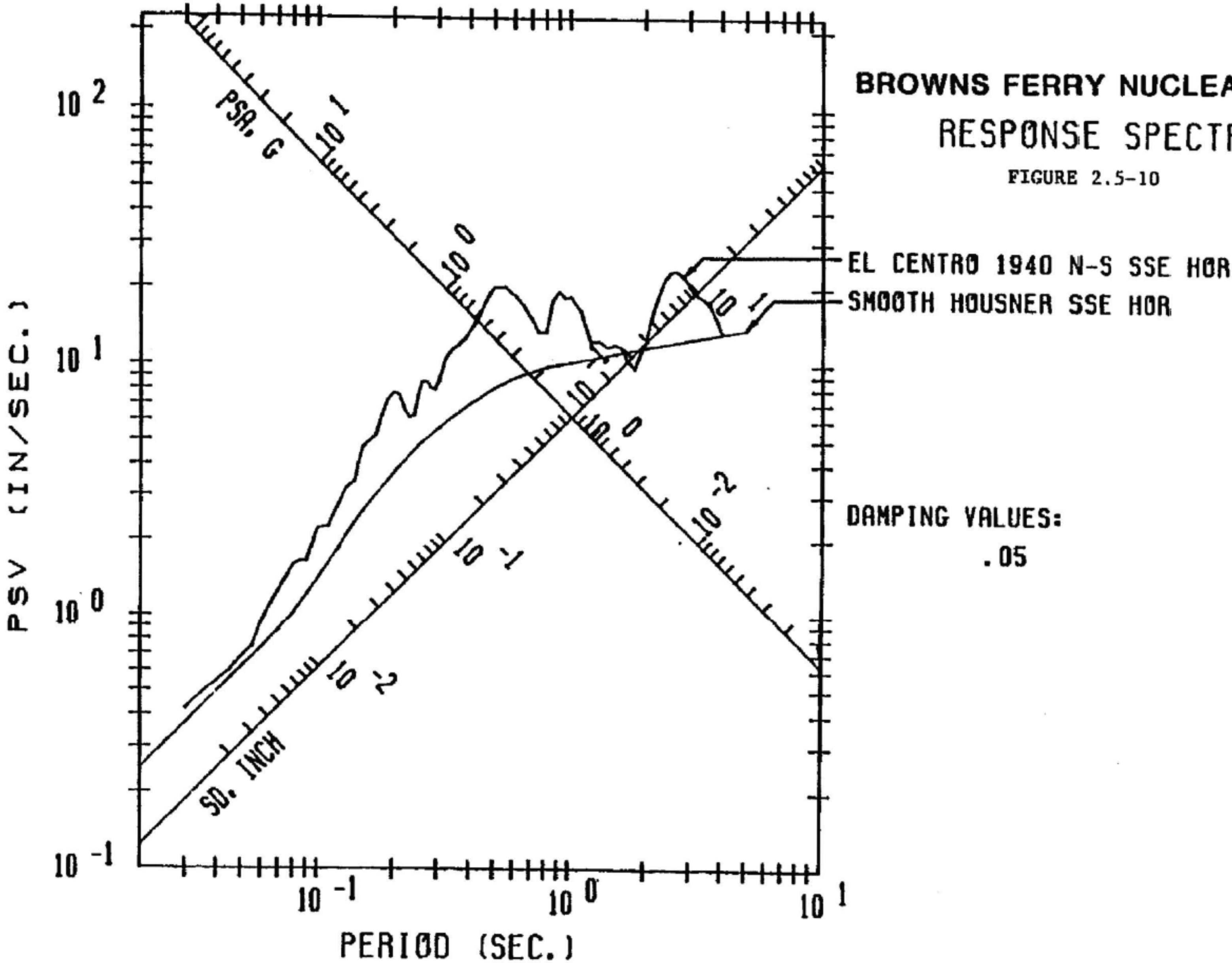
FIGURE 2.5-9

AMENDMENT 16

BROWNS FERRY NUCLEAR PLANT

RESPONSE SPECTRUM

FIGURE 2.5-10



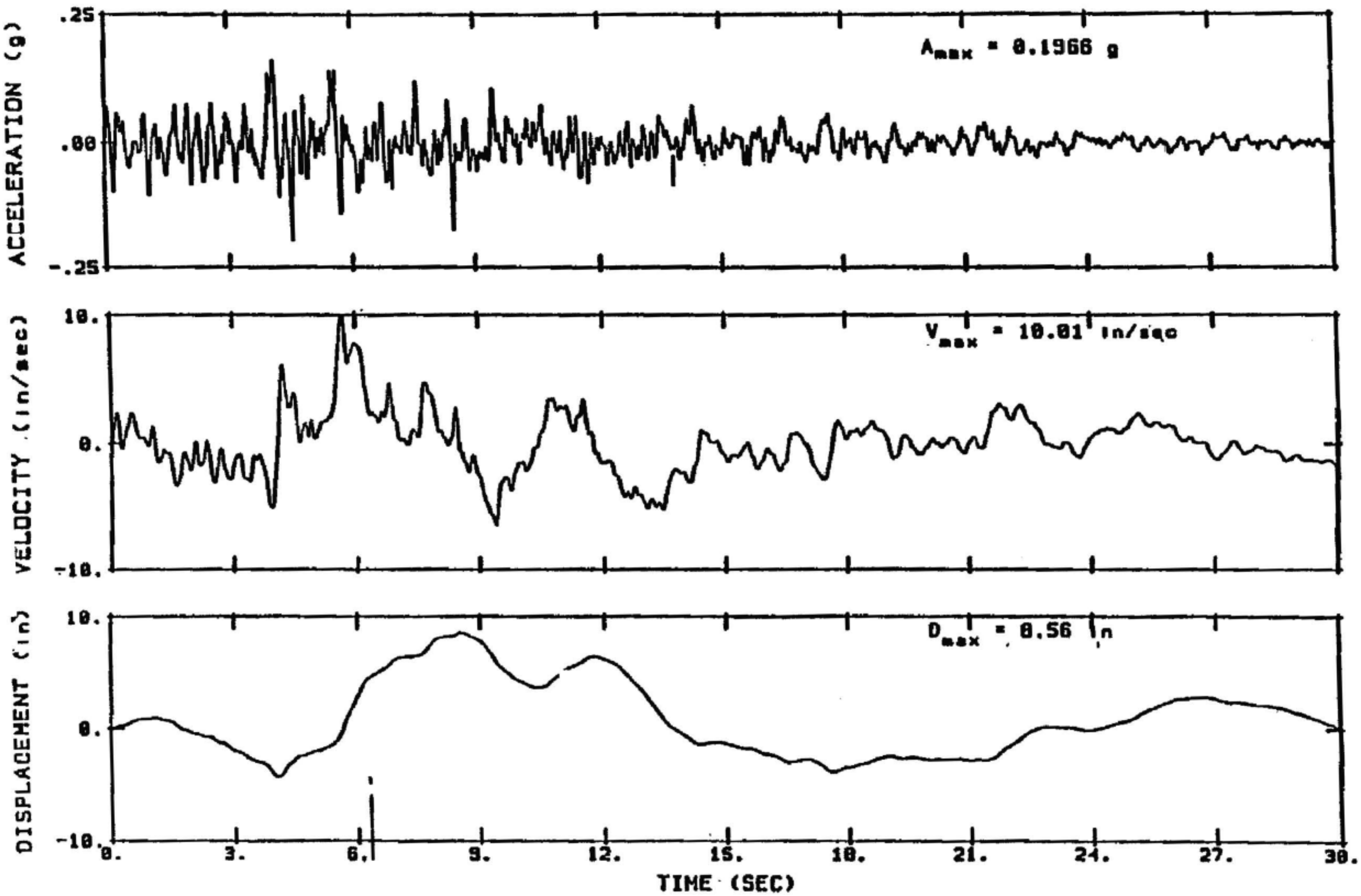


FIGURE 2.5-11 BFNP SITE SPECTRUM - COMPATIBLE TIME HISTORY

AMENDMENT 16

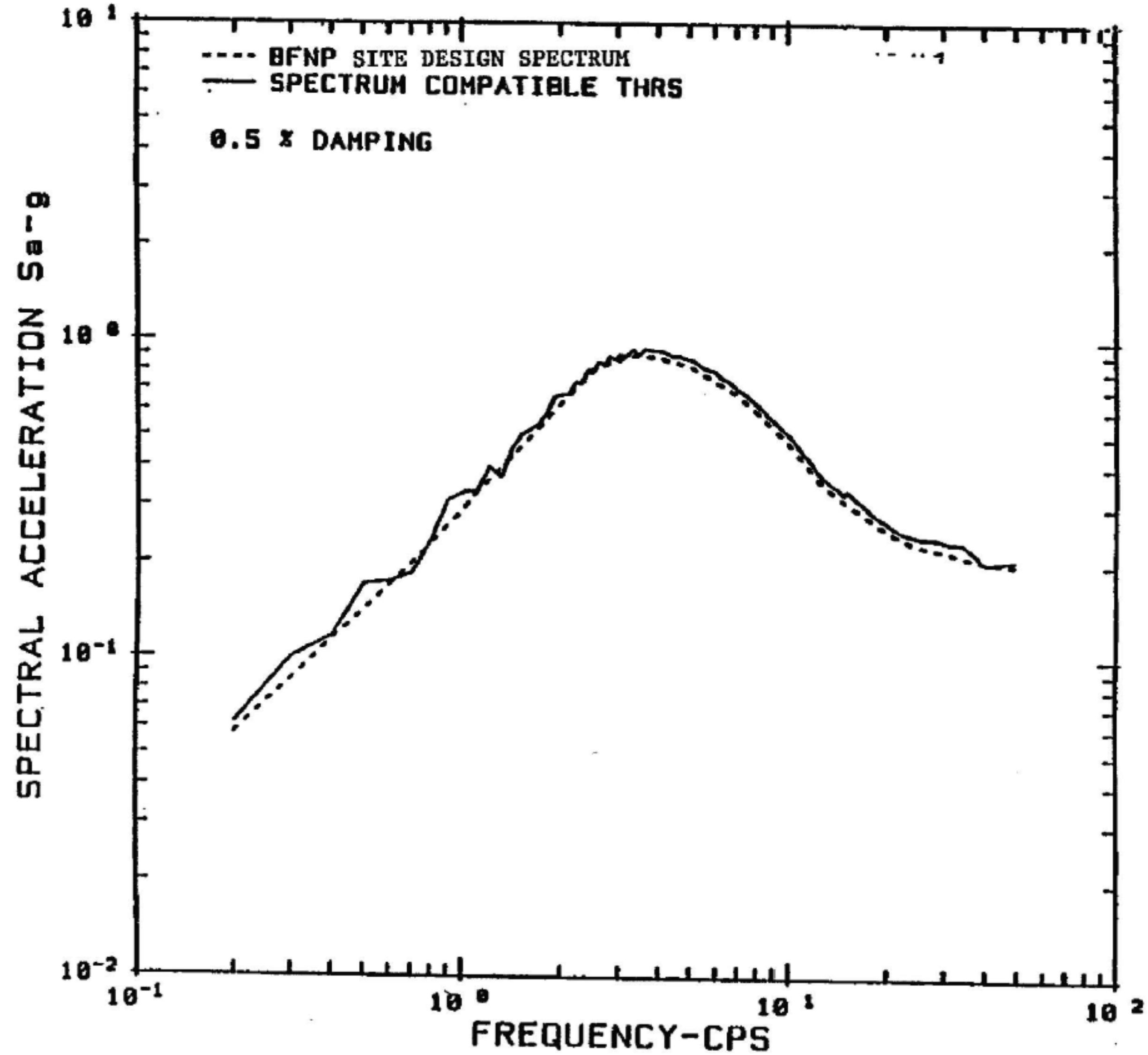


Figure 2.5-12 Comparison of Site Spectrum and Spectrum of Acceleration Time History - 0.5 percent damping

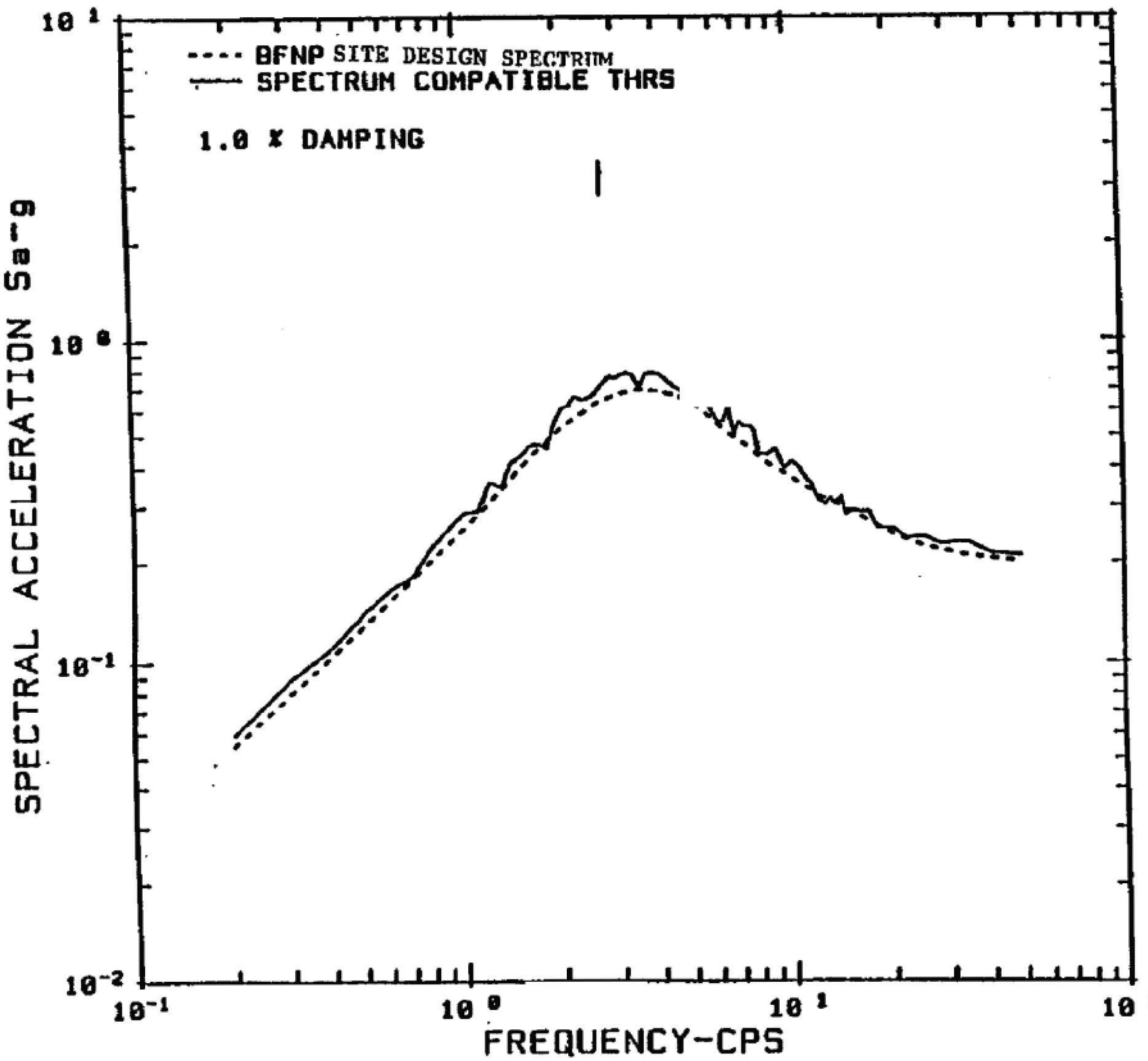


Figure 2.5-13 Comparison of Site Spectrum and Spectrum of Acceleration Time History - 1 percent damping

AMENDMENT 16

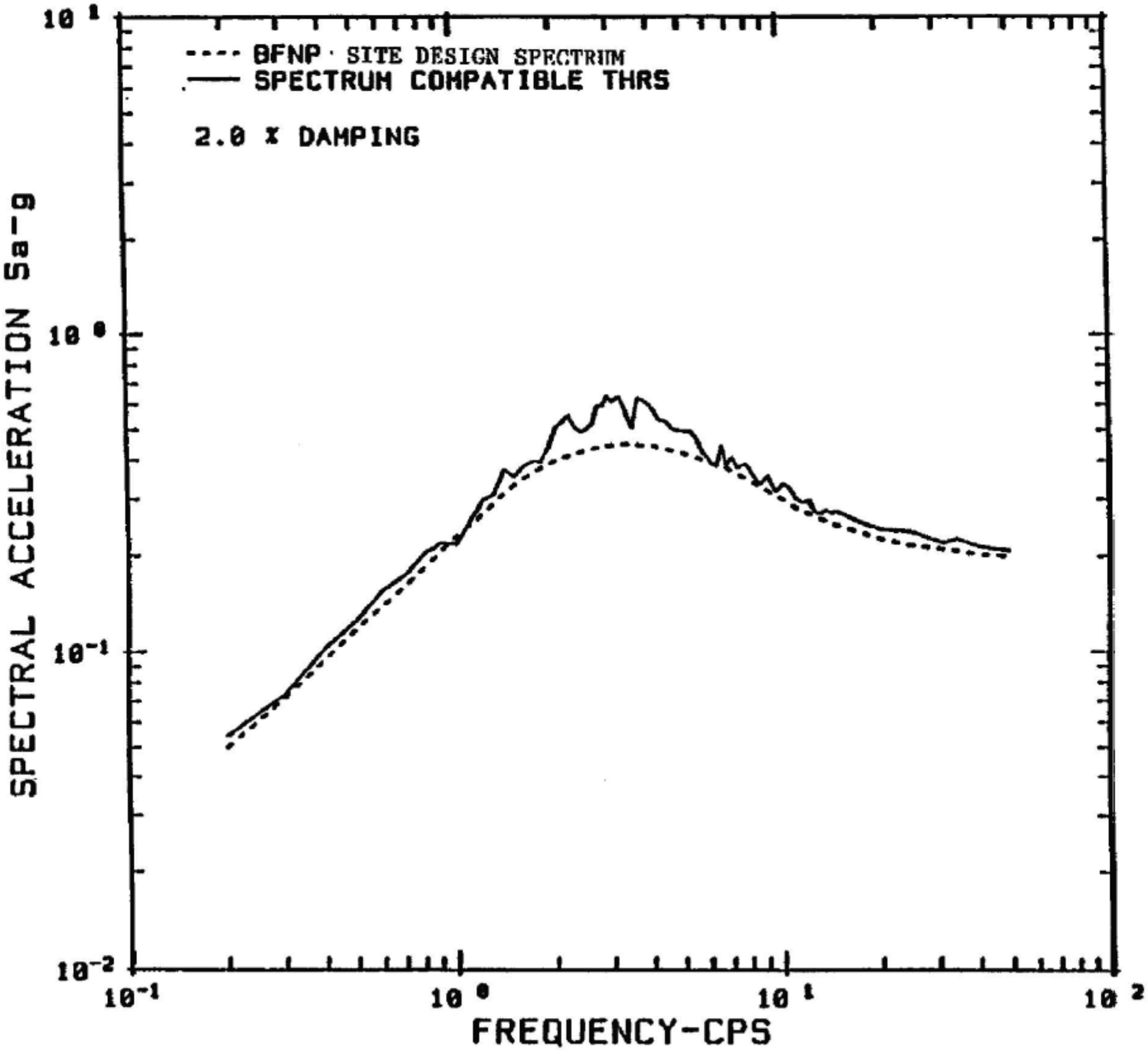


Figure 2.5-14 Comparison of Site Spectrum and Spectrum of Acceleration Time History - 2 percent damping

AMENDMENT 16

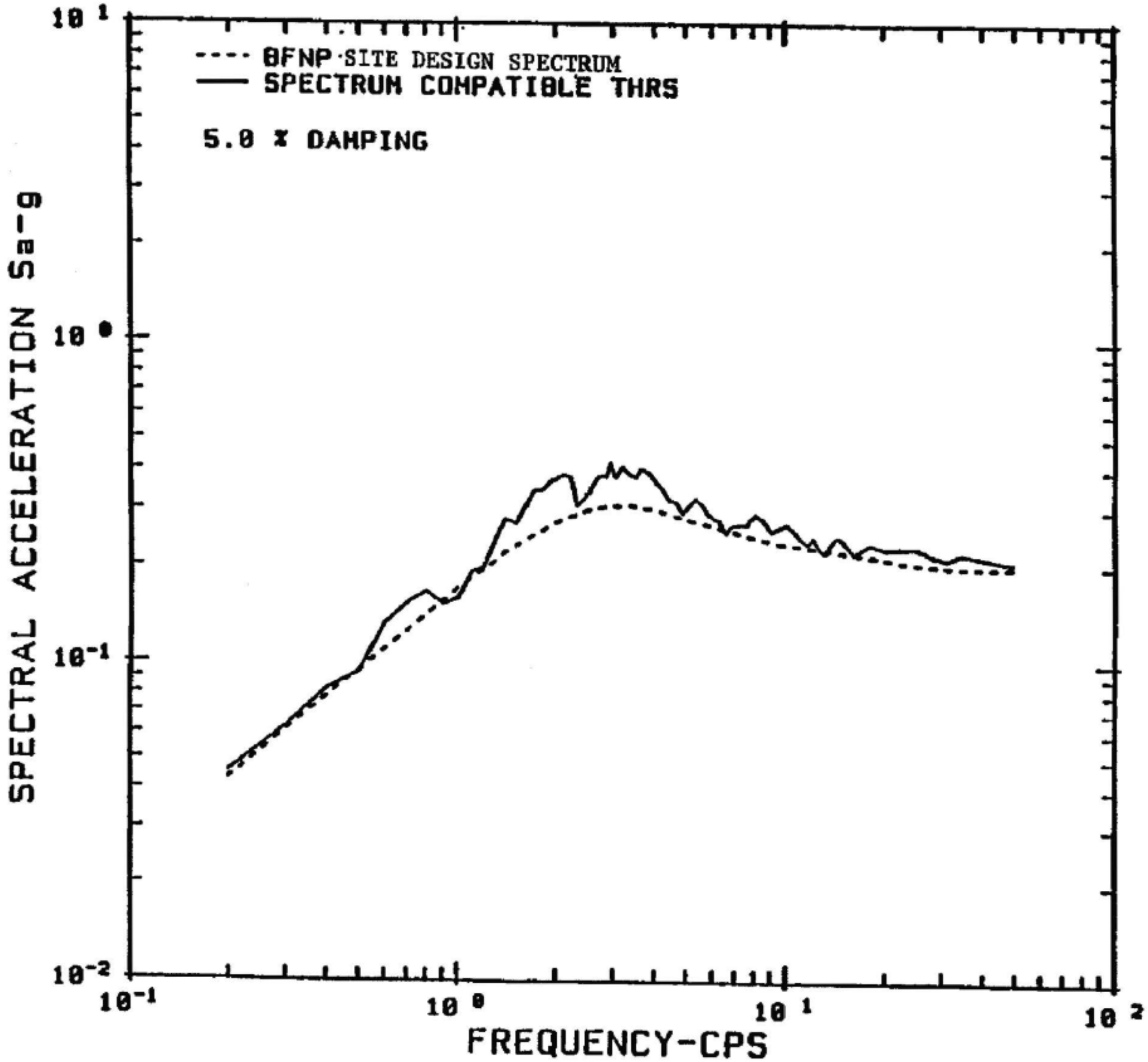


Figure 2.5-15 Comparison of Site Spectrum and Spectrum of Acceleration Time History - 5 percent damping

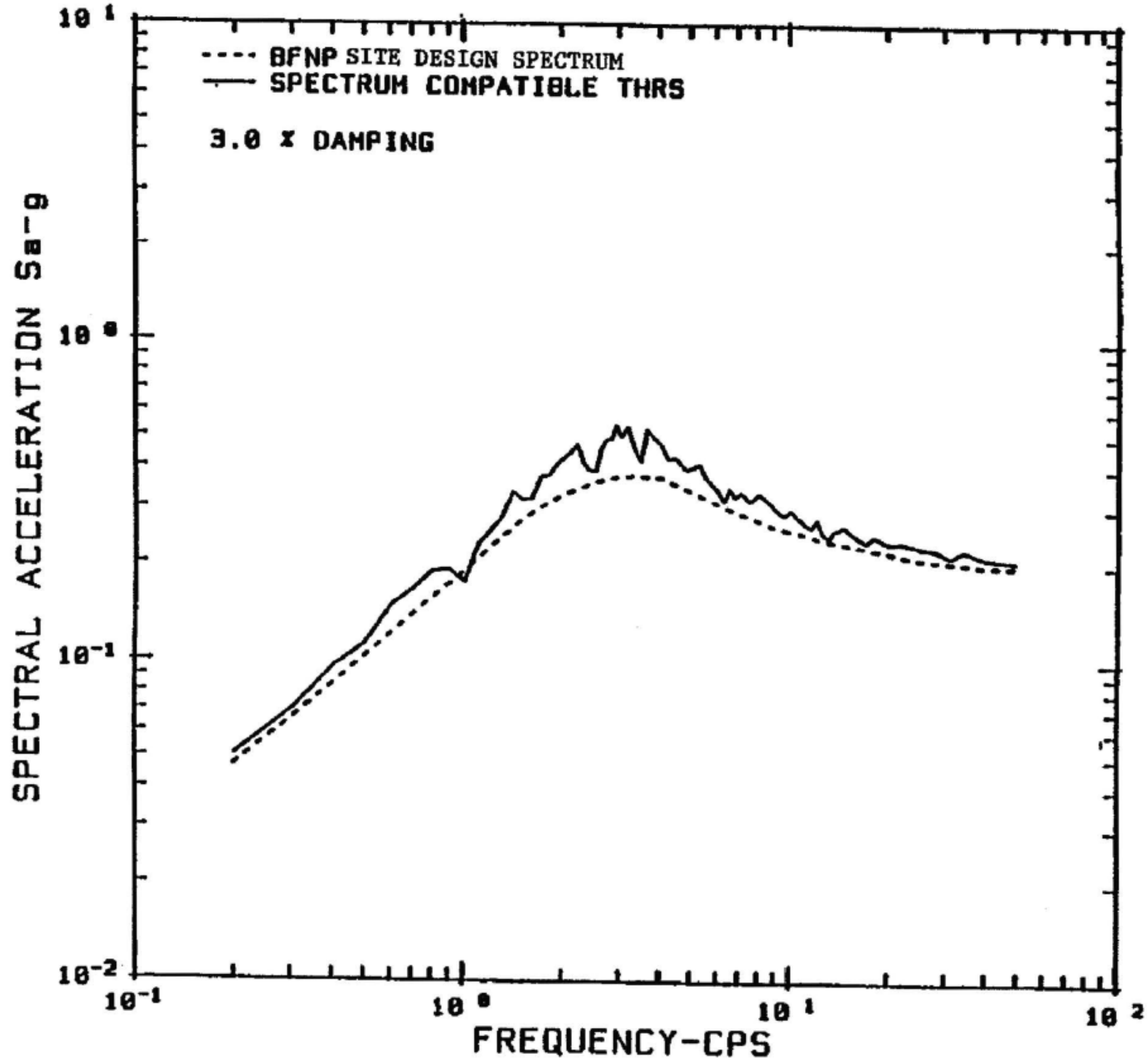


Figure 2.5-16 Comparison of Site Spectrum and Spectrum of Acceleration Time History - 3 percent damping

SECURITY RELATED INFORMATION
FIGURE WITHHELD UNDER 10 CFR 2.309

POWERHOUSE
UNIT 3

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

MECH INSTRUMENTS & CONTROLS

FIGURE 2.5-17

Figure 2.5-18
(Deleted)

SECURITY RELATED INFORMATION
FIGURE WITHHELD UNDER 10 CFR 2.309

POWERHOUSE REACTOR BUILDING
UNITS 1 2 & 3

BROWNS FERRY NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

ROCK EXCAVATION

FIGURE 2.5-19

2.6 ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM

2.6.1 General

The preoperational environmental radiological monitoring program established a baseline of data on the distribution of natural and manmade radioactivity in the environment near the plant site. By comparing data from the operational program with this background information and with data from control monitoring stations, accumulation or buildup of radioactivity in the environment can be identified.

Sample collection and analysis was initiated in April 1968 and will continue indefinitely.

TVA participates in an Interlaboratory Comparison Program. Samples supplied by the comparison laboratory are analyzed by TVA and the results submitted to the laboratory for comparison.

Reports describing the results of the environmental radiological monitoring activities are submitted routinely to the Nuclear Regulatory Commission as required by the plant Technical Specifications.

2.6.2 Monitoring Program

A general discussion of the environmental radiological monitoring program follows. More specific information can be found in the BFN Offsite Dose Calculation Manual.

2.6.2.1 Atmospheric Monitoring

The atmospheric monitoring network is divided into three subgroups. Local air monitors are located on or adjacent to the plant site. Perimeter monitors are located in areas of high population density out to approximately 10 miles from the plant. Remote air monitors are located at distances greater than 15 miles.

Each monitor is capable of continuously sampling air through a particulate filter. In series with, but downstream of the particulate filter, is a charcoal filter used to collect iodine.

2.6.2.2 Terrestrial Monitoring

External gamma radiation levels are monitored at selected locations near the site boundary in different sectors around the plant.

Samples of fresh milk are collected routinely from selected dairy farms in the vicinity of the plant. In addition, vegetation grown near the plant is sampled during the growing season. Municipal water systems downstream from the plant as specified in the BFN Offsite Dose Calculation Manual are also sampled on a routine basis.

Six groundwater monitoring wells near the Low-Level Radwaste Storage Area were sampled quarterly for one year (9/82 to 6/83) to obtain baseline radiological data. The wells are all hydrologically downgradient from the storage area. Parameters analyzed were: gamma scan, gross beta count, strontium 89 and 90, and tritium. Results show very low background levels of radioactivity.

2.6.2.3 Reservoir Monitoring

Reservoir water samples are collected from sampling locations upstream and downstream from the plant. In addition, samples of sediment and biological media are also taken from the reservoir in the vicinity of the plant.

Due to the expected low concentrations of radioisotopes in the plant effluent and the dilution provided by the streamflow past the plant site, it is expected that the radioactivity levels in the reservoir will be well below the limits established in Plant Technical Specifications. Radioactivity levels in the river at the nearest downstream water supply intake resulting from accidental slug release are expected to be well below the effluent concentration limits in 10 CFR 20, particularly since public water supplies are located at considerable distances from the site. Adequate environmental monitoring shall be provided to ensure the potable water supplies will not exceed regulatory limits for radioactivity due to operations at Browns Ferry Nuclear Plant. Both public and private potable water supplies taking water from the Tennessee River downstream from the plant will be monitored periodically. One upstream water supply will also be monitored and used as a control station.

2.6.2.4 Other Monitoring

Samples of terrestrial biological specimens may be collected and analyzed at periodic intervals as required to aid in the evaluation of overall radiological control programs. Types and frequencies of such samples shall be determined by TVA.