INSERTION INSTRUCTIONS FOR AMENDMENT 6

Remove old pages and insert Amendment 6 pages as instructed below.

Transmittal letters along with these insertion instructions should either be filed or entered in Volume 1 in front of any existing letters, instructions, distribution lists, etc.

LEGEND

Remove/Insert Columns

Entries beginning with "T" or "F" designate table or figure numbers, respectively. All other entries are page numbers:

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1.2-5/1.2-6 = Page 1.2-5 backed by Page 1.2-6

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Ch = Chapter, S = Section, Ap = Appendix

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2.1-7/2.1-8 thru 2.1-15/blank	2.1-7/2.1-8 2.1-15/blank	S 2.1
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F2.4-9	0
F2.4-10	0
F2.4-11	0
F2.4-12	0
2.5-1 thru 2.5-2	1
2.5-3	0
F2.5-1	0
2.6-1 thru 2.6-4	4
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in St. Clair Township and the town of Calcutta. In addition, there are a number of large industrial plants supplied by the system. There are no significant seasonal fluctuations in demand, and there are no plans for further expansion in the near future (Municipal Water Authority of East Liverpool, Ohio 1977). Public water intakes, withdrawal rates, and distance from BVPS-2 are itemized in Table 2.1-6.

2.1.3.1.4.2 Recreation

The Ohio River access point closest to BVPS-2 is at the western site boundary. The nearest point that is generally used for fishing is the old lock and dam site about 1.5 radial miles downstream from the plant. The nearest boat launching ramp is in East Liverpool, Ohio, over 5 radial miles west of the station (West Virginia Department of Natural Resources 1983a).

2.1.3.2 Land and Water Use Within 50 Miles

The area within 50 miles of BVPS-2 contains portions or all of 12 Pennsylvania counties, 10 Ohio counties, and 4 West Virginia counties. Major urban areas in the 50-mile region include Pittsburgh, Pennsylvania, and Youngstown, Ohio. Smaller cities include Canton and Steubenville, Ohio, and Wheeling, West Virginia.

The urban and industrialized centers of the region are connected by several state and interstate highways and railroads. In addition, the Ohio River serves as a major shipping route for the movement of cargo. Figure 2.1-1 shows major urban areas, waterways, and transportation routes within the 50-mile region.

2.1.3.2.1 Agriculture

The grazing season within this region varies considerably from north to south and is largely dependent upon the farming and land management practices employed. Within Pennsylvania and West Virginia, the pasture season extends from May to late September, with some variation in exact dates depending upon yearly weather conditions and local topography (Pennsylvania State Crop Reporting Service 1978; District Soil Conservation Office 1978a, 1978b).

The Ohio growing season is longer in both the northern and southern sectors of the 50-mile area. The northern region has a grazing season lasting from May 15 to October 15 or November 1 (Ohio Cooperative Extension Service 1978a), while in the southern counties the season is from April 15 to November 15 (Ohio Cooperative Extension Service 1978b). In the West Virginia counties, it was reported that the season may be lengthened into December through use of the extended grazing system (District Soil Conservation Office 1978a, 1978b).

There is substantial variation in the feeding regimes throughout this area; however, there are some general practices that are employed in nearly all counties. Most of the silage, especially corn silage that is used for feed, is grown by the farmer or raised nearby (Pennsylvania State Crop Reporting Service 1978; District Soil Conservation Office 1978a, 1978b; Ohio Cooperative Extension Service 1978a, 1978b). Some protein supplements fed to the dairy cattle are imported. In some cases, West Virginia farmers import feed, but generally this comes from Ohio which is a net exporter of forage (District Soil Conservation Office 1978b; Ohio Cooperative Extension Service 1978a).

For the dairy cattle within the 50-mile area, pasture is a source of 25 to 40 percent of feed supplies, with the remainder consisting of hay and silage (District Soil Conservation Office 1978a, 1978b; Ohio Cooperative Extension Service 1978a, 1978b). The feeding of beef cattle varies more substantially. In the southern Ohio counties within the region, pasture accounts for 60 percent of total feed, with hay providing the remaining 40 percent during the winter months (Ohio River Basin Commission 1978). In the northern sector of Ohio, pasture may account for as little as 25 percent of the animals' food (Ohio Cooperative Extension Service 1978b). In both cases, however, a large portion of the remaining hay and silage is grown within the immediate area.

Tables 2.1-8, 2.1-9, and 2.1-10 provide statistics for beef, milk, and vegetable production within 50 miles of BVPS-2.

2.1.3.2.2 Water Use

2.1.3.2.2.1 Consumption

Table 2.1-6 identifies potable water intakes within 50 miles of BVPS-2. None of these systems experience any significant seasonal fluctuations in use, and only one, Wheeling, anticipates any future expansion or curtailment of services. The Wheeling Water Department has expanded its service area to include West Alexander Township in Washington County, Pennsylvania (Wheeling, W. Va., Water Department 1983).

A report by the Ohio River Basin Commission finds that consumptive water use in the Ohio basin is expected to increase 2.3 times between 1975 and 2000. Half of this increased use will be required by energy facilities. However, there appears to be adequate water in the river to meet all demands through the year 2000 and beyond (Ohio River Basin Commission 1978).

Within the 50-mile radius of the station, there are locations where residential water supplies are obtained from wells located near the river. This is particularly true for municipalities along the river that do not have public water supply systems. The closest river bank well is in Georgetown Borough, approximately 1.8 radial miles from the station. As discussed in NRC Question Response E240.02, the normal ground water flow path is toward the river. Therefore, there is little potential for residential wells near the river to be impacted by station effluents.

Locations of water uses within 50 miles downstream of BVPS-2 are identified on Figure 2.1-6. Consumptive water use by BVPS-2 is discussed in Section 3.3.

2.1.3.2.2.2 Irrigation

The farmlands adjacent to and downstream of BVPS are generally not irrigated. In times of extensive drought and extreme emergency, irrigation will be employed to prevent crop losses. The typical water sources for irrigation are ponds and nearby streams. In nearly all instances, the farmlands are on high ground many hundreds of feet above the Ohio River, and the river is not a practical source of water (U.S. Department of Agriculture, Soil Conservation Service - W. Va. State Office 1983; U.S. Department of Agriculture, Soil Conservation Service - Ohio State Office 1983; Soil Conservation Service - Moundsville, W. Va., Office 1983; Soil Conservation Service - St. Clairsville, Ohio, Office 1983; Soil Conservation Service - Cadiz, Ohio, Office 1983; Soil Conservation Service - Lisbon, Ohio, Office 1983; Beaver County Agricultural Office 1983; Soil Conservation Service - Beaver, Pa., Office 1983).

2.1.3.2.2.3 Recreation

Due to poor water quality, the Ohio River has not been a major source of recreational activity in the past. However, recreational activity on the Ohio River is increasing. The new system of high-lift locks and dams has provided large water areas suitable for recreational boating. Due to this upgrading, recreational boating is projected to increase by about 27 percent by the year 2000 (Ohio River Basin Commission 1978).

There are, at present, no water-oriented federal or state parks along the Ohio River shoreline within 50 air miles of the station (Ohio River Basin Commission 1978; Ohio Department of Natural Resources 1970; Jefferson County, Ohio, Regional Planning Agency 1978; Belmont County, Ohio, Engineer's Office 1978; West Virginia State Parks Department 1978; Hancock County, W. Va., Parks and Recreation Department 1978; Ohio County, W. Va., 1978; Brooke County, W. Va., County Commissioner's Office 1978; Marshall County, W. Va., Department of Parks and Recreation 1978). The major recreational uses of the river are found at the lock and dam sites and at the many boat launching ramps. Recreational water uses on the Ohio River within a 50-mile radius are listed in Table 2.1-11 and shown on Figure 2.1-6.

2.1.3.2.2.4 Transportation

The Ohio River has always been an important transportation link in this region. In the areas where the topography is very rugged, the river and its banks have provided the only travel path. The waterway was the prime corridor for the original settlement of the Ohio Valley and the Northwest Territory. Today it continues to provide low cost transportation, especially for bulky cargo.

With the construction of high-lift locks, the river now carries more freight than any waterway in the country except the lower Mississippi. The amount of cargo carried on the Ohio River has increased steadily over the years with cargo tonnage exceeding 158 million in 1981 (U.S. Army Corps of Engineers 1983).

2.1.3.2.3 Commercial and Recreational Fishing and Hunting

2.1.3.2.3.1 Fishing

Within a 50-mile radius of BVPS-2, the Ohio River runs through the states of Pennsylvania, Ohio, and West Virginia. No commercial fishing is allowed in the Pennsylvania portion of the river, and commercial fishing licenses have never been issued in the West Virginia portion of the Ohio River within the 50-mile radius of BVPS (Pennsylvania Fish Commission 1983; West Virginia Department of Natural Resources 1983b).

There is no indication of any commercial harvest of any other aquatic life or vegetation for use as human food within the portion of the Ohio River 50 air miles downstream from BVPS.

Recreational fishing catch statistics are available for a large portion of the Ohio River within 50 air miles downstream of BVPS. No recreational catch data are available for an approximately 8-mile-long portion of the New Cumberland Pool in Pennsylvania. Pierce (et al 1983) provides data on numbers of fish harvested from the Pike Island Pool and the Ohio and West Virginia portions of the New Cumberland Pool. Unpublished length data (McDonald 1983) collected during the study by Pierce et al (1983) were used with published accounts of fish length-weight relationships (Carlander 1969; Carlander 1977; Scott and Crossman 1973) to estimate total weight of recreational catch by species (Table 2.1-14).

The Ohio Department of Natural Resources, Division of Wildlife, identifies four public fishing locations on the Ohio River within 50 radial miles of the plant. These are the Wellsville Public Ramp, the Island Creek Boat Ramp, and the Steubenville and Indian Short Creek access points. The fish species caught at these locations include largemouth bass, white crappie, channel catfish, carp, and suckers (Ohio Department of Natural Resources 1977b).

2.1.3.2.3.2 Hunting

The 50-mile area surrounding the station is used quite extensively for hunting. The Commonwealth of Pennsylvania game lands (No. 173, located about 4 miles northwest of the station), are regularly stocked with small game and are open for hunting. Other public land and much private property sustains heavy hunting pressure for both big and small game.

A review of hunting licenses and game kill data shows that many urban residents are licensed hunters and travel to surrounding rural country to hunt. Although these hunters may travel significant distances, their residences also fall within the 50-mile area. This is true for urban counties with many registered hunters, such as Allegheny County (Pennsylvania Game Commission 1981).

Hunting statistics for Ohio and Pennsylvania are presented in Tables 2.1-12 and 2.1-13, respectively.

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TABLE 2.1-3

LOCATION OF NEAREST MILK AND MEAT ANIMALS, VEGETABLE GARDENS, AND RESIDENCES WITHIN FIVE MILES OF BVPS-2*

	Distance in Miles from BVPS-2				
Direction	Milk Cow	Milk Goat	Meat	Garden >500 ft^2	Residence
N	-	2.89	1.65	1.63	1.57
NNE	-	3.90	1.77	1.68	1.64
NE	4.8	-	4.81	0.62	0.44
ENE	-	4.24	-	1.04	0.44
E	4.39	2.65	2.65	1.23	0.47
ESE	-	1.78	0.98	0.98	0.98
SE	3.56	3.56	2.05	1.55	1.14
SSE	3.14	3.30	1.10	1.08	1.08
S	2.08	2.20	1.40	1.95	1.36
SSW	2.08	3.49	1.44	1.44	0.76
SW	-	1.86	1.50	1.53	1.38
WSW	3.22	-	1.52	1.43	1.43
W	3.18	-	2.54	2.21	2.21
WNW	2.82	4.81	2.24	2.24	1.78**
NW	-	-	2.84	0.91	0.89
NNW	-	-	2.46	0.96	0.71

NOTES:

*Porter Consultants 1981a.
**Mr. Bub Crane 1984; Mrs. Paul Hunt 1984.

TABLE 2.1-4

1981 VEGETABLE PRODUCTION (kg) WITHIN
FIVE MILES OF BVPS-2

	Distance from Site (miles)					
Direction	0-1*	1-2*	2-3*	3-4*	4-5**	Total
N	0	5.3	73.0	0	0.2	78.5
NNE	0	9.5	8.1	8.5	0.2	26.3
NE	8.7	0	21.5	1.2	0.2	31.6
ENE	0	16.5	11.8	4.8	0.2	33.3
E	0	3.6	54.5	1.9	0.2	60.2
ESE	0.1	16.4	12.9	4.5	0.2	34.1
SE	0	14.6	21.2	0.4	0.2	36.4
SSE	0	0.2	5.9	0	0.2	6.3
S	0	0.1	12.2	4.7	0.2	17.2
SSW	0	17.5	20.7	0	0.2	38.4
SW	0	10.9	23.7	13.6	0.2	48.4
WSW	0	0.3	10.9	0	0.2	11.4
W	0	0	1.2	0.8	0.2	2.2
WNW	0	0	10.8	0	0.2	11.0
NW	1.0	2.2	0	0	0.2	3.4
NNW	0.3	9.0	14.0	0	0.2	23.5
Total	10.1	106.1	302.4	40.4	3.2	462.2

NOTES:

*Based on gardens from Porter Consultants 1981b and 1980 yield per acre from Pennsylvania Agricultural Statistics.

**Based on county production from 1980 Pennsylvania Agricultural Statistics.

TABLE 2.1-5

1981 BEEF PRODUCTION (kg) WITHIN FIVE MILES OF BVPS-2*

Direction	Distance from Site (miles) 0-1	1-2	2-3	3-4	4-5	Total
N	0	1,032	2,064	26,315	12,384	41,796
NNE	0	1,032	0	11,868	7,740	20,640
NE	0	0	0	0	9,288	9,288
ENE	0	0	0	0	0	0
E	0	0	6,192	1,032	21,672	28,896
ESE	4,128	1,032	3,612	1,032	8,772	18,576
SE	0	0	23,736	35,604	0	59,340
SSE	0	19,608	2,064	11,352	7,224	40,248
S	0	4,644	8,772	1,548	9,288	24,252
SSW	0	9,288	20,124	15,996	20,124	65,532
SW	0	4,644	46,440	27,348	5,676	84,108
WSW	0	51,600	27,864	38,184	20,640	138,288
W	0	0	516	3,096	0	3,612
WNW	0	0	5,676	21,156	0	26,832
NW	0	0	5,676	0	0	5,676
NNW	0	0	24,768	1,032	36,120	61,920
Total	4,128	92,880	177,504	195,564	158,928	629,004

NOTE:

*Porter Consultants 1981a.

TABLE 2.1-6

OHIO RIVER WATER INTAKES WITHIN A 50-MILE RADIUS OF BVPS-2[1,2,3,4,5,6,7,8,9,10]

Location	Population Served	Withdrawal Rate (millions of gallons/day)	River Miles Down-stream of Station	Radial Miles from Station
Midland, Pennsylvania	7,000-9,000	5	1.3	1
East Liverpool, Ohio	15,000-20,000	3.2	5.2	5
Chester, West Virginia	3,800	Not available	7.1	11
Toronto, Ohio	8,000	0.5	24.1	14
Steubenville, Ohio	35,000	6	30.2	20
Wierton, West Virginia[11]	30,000	4	30.2	20
Mingo Junction, Ohio[11]	15,000	2.0-2.2	36.0	24
Wheeling, West Virginia	65,000	10.5-11	51.8	41
Bellaire, Ohio[11]	9,500	1.5	59.0	45

NOTES:

1. Bellaire City Water System 1978.
2. Midland Borough, Pa., Water System 1978.
3. Mingo Junction Water Department 1978.
4. Municipal Water Authority of East Liverpool, Ohio 1977.
5. Ohio Department of Natural Resources 1977a
6. Steubenville, Ohio, Water Department 1978.
7. Wierton Water Department 1984.
8. Toronto, Ohio, Water Department 1978.
9. West Virginia State Department of Health 1977.
10. Wheeling, W. Va., Water Department 1978.
11. Employs Ranney Collector.

TABLE 2.1-7

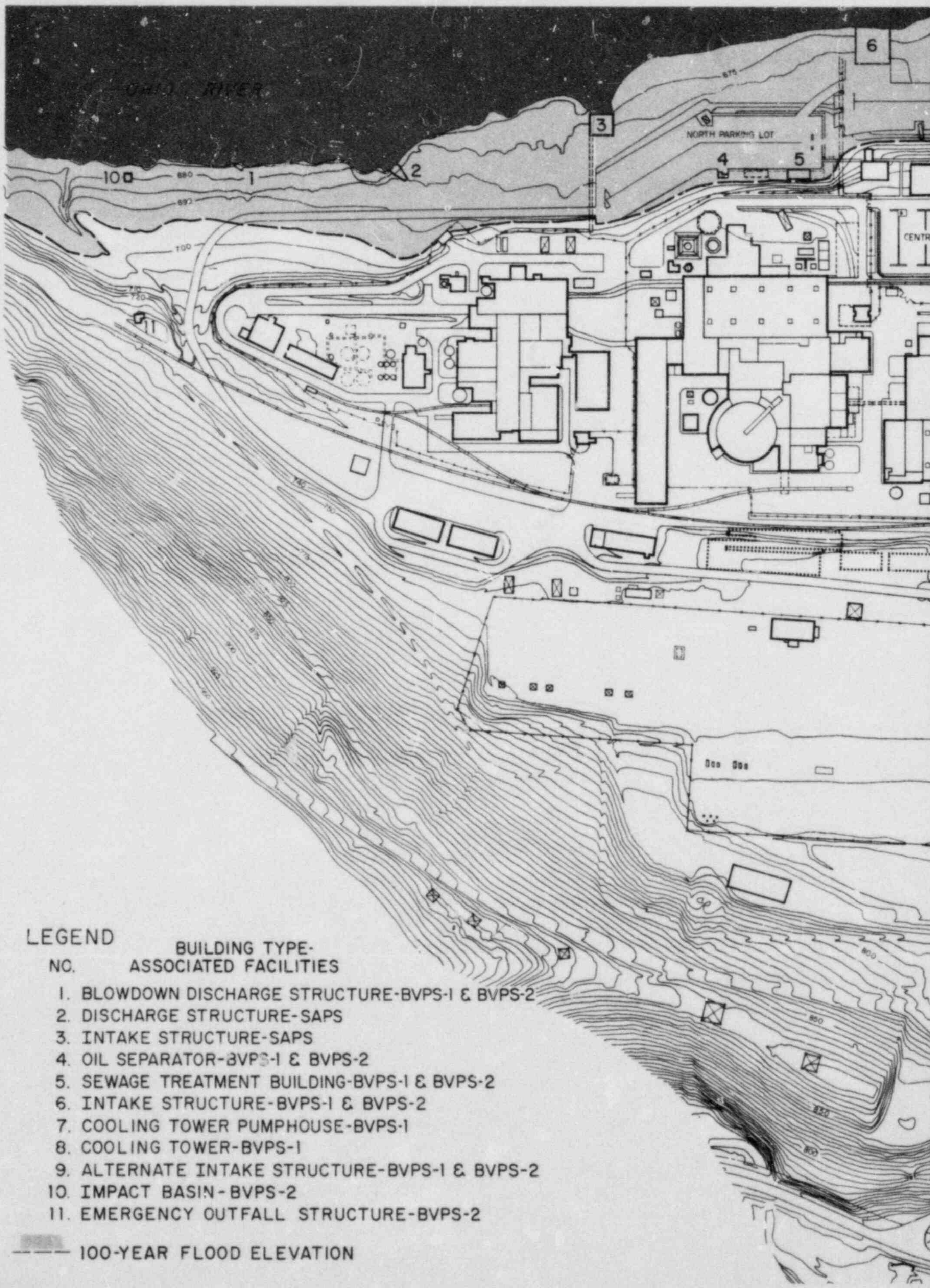
RIVER BANK WELL DATA WITHIN 50 MILES OF BVPS-2

This table has been intentionally deleted.

TABLE 2.1-8

1980 BEEF PRODUCTION (kg) WITHIN 50 MILES OF BVPS-2

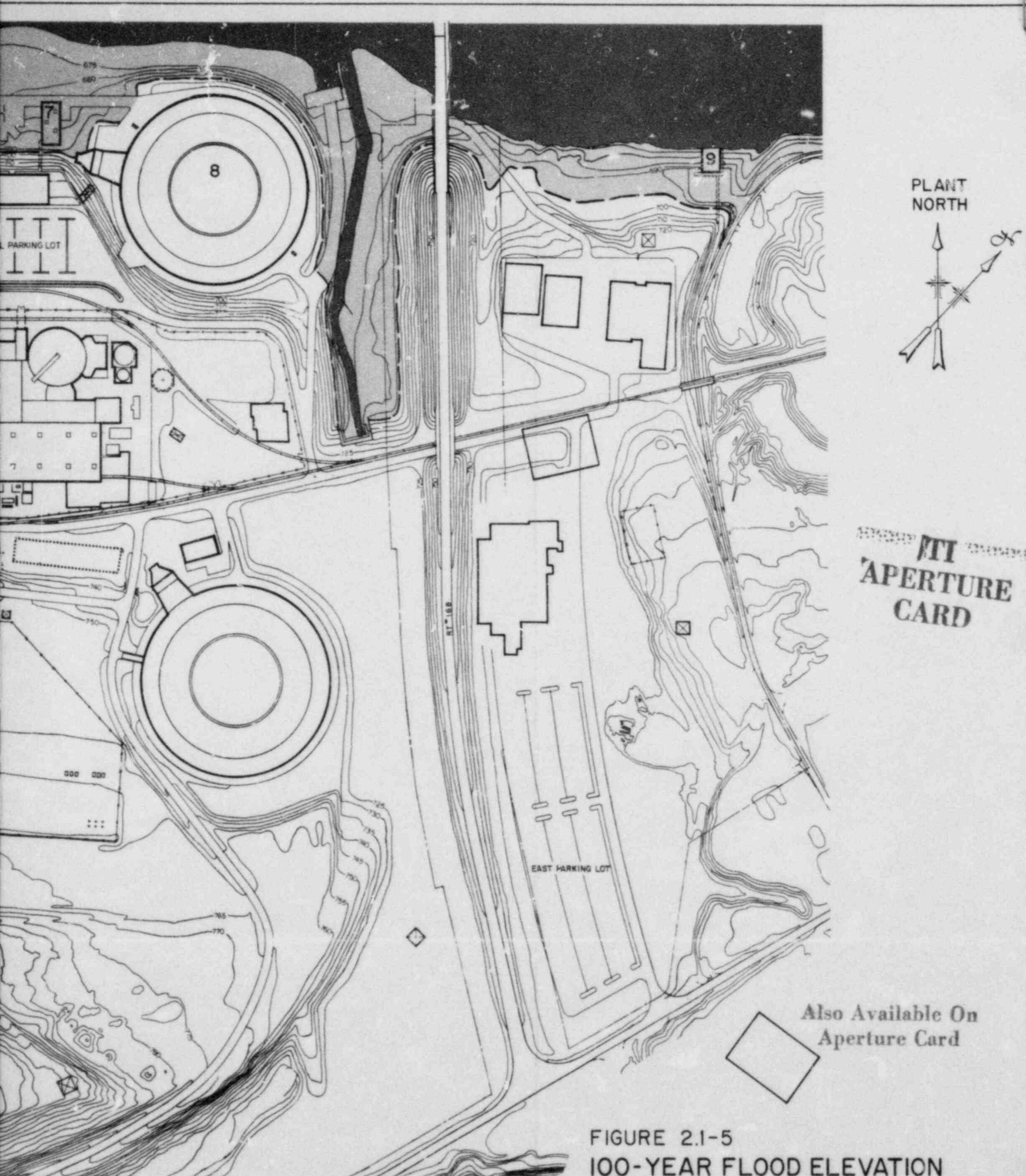
Direction	Distance from Site (miles)						
	0-5	5-10	10-20	20-30	30-40	40-50	Total
N	41,796	233,400	1,407,800	3,171,600	4,075,700	4,815,600	13,745,896
NNE	20,640	232,000	1,216,200	3,073,800	3,969,200	4,765,900	13,277,740
NE	9,288	211,800	952,300	1,820,300	2,440,100	3,145,600	8,579,388
ENE	0	218,000	1,007,700	1,804,900	2,527,700	2,996,900	8,555,200
E	28,896	216,600	332,600	636,100	1,483,700	2,937,800	5,635,696
ESE	18,576	232,000	265,000	373,500	644,300	3,208,000	4,741,376
SE	59,340	227,600	228,200	573,100	1,794,500	3,254,400	6,137,140
SSE	40,248	233,400	1,118,600	2,606,700	3,840,400	4,496,400	12,335,748
S	24,252	233,400	1,625,900	2,718,800	3,818,700	4,091,600	12,512,652
SSW	65,532	235,300	889,700	1,269,400	2,562,500	3,724,800	8,747,232
SW	84,108	119,900	565,200	1,237,800	2,479,900	3,790,100	8,277,008
WSW	138,288	79,600	642,300	1,483,500	3,478,800	4,130,700	9,953,188
W	3,612	230,900	1,526,200	2,620,700	3,838,800	4,932,200	13,152,412
WNW	26,832	426,000	1,716,300	2,854,000	3,868,300	4,7[illegible]4,100	13,665,532
NW	5,676	366,500	1,716,300	2,573,800	2,713,300	2,754,600	10,130,176
NNW	61,920	237,800	1,520,100	1,980,900	2,448,800	2,475,600	8,725,120
Total	629,004	3,734,200	16,730,400	30,798,900	45,984,700	60,294,300	158,171,504



LEGEND

NO.	BUILDING TYPE-ASSOCIATED FACILITIES
1.	BLOWDOWN DISCHARGE STRUCTURE-BVPS-1 & BVPS-2
2.	DISCHARGE STRUCTURE-SAPS
3.	INTAKE STRUCTURE-SAPS
4.	OIL SEPARATOR-BVPS-1 & BVPS-2
5.	SEWAGE TREATMENT BUILDING-BVPS-1 & BVPS-2
6.	INTAKE STRUCTURE-BVPS-1 & BVPS-2
7.	COOLING TOWER PUMPHOUSE-BVPS-1
8.	COOLING TOWER-BVPS-1
9.	ALTERNATE INTAKE STRUCTURE-BVPS-1 & BVPS-2
10.	IMPACT BASIN-BVPS-2
11.	EMERGENCY OUTFALL STRUCTURE-BVPS-2

---- 100-YEAR FLOOD ELEVATION



APERTURE CARD

Also Available On Aperture Card

FIGURE 2.1-5
100-YEAR FLOOD ELEVATION
BEAVER VALLEY POWER STATION-UNIT 2
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE

AMENDMENT 6 MAY 1984

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2.2 ECOLOGY

Intensive terrestrial ecological studies were conducted on the site from April 1974 to June 1975. Results are detailed in the NUS Corporation (1976a) report on the studies. The material reported in Section 2.2.1 and the accompanying tables and figures are primarily new information, collected after the publication of the Environmental Report - Construction Permit Stage (ER-CPS). Baseline aquatic ecological studies were conducted at the site (Beaver Valley Power Station - Unit 1 (BVPS-1) preoperational studies) and were discussed in the Beaver Valley Power Station - Unit 2 (BVPS-2) ER-CPS. Aquatic ecological information presented in Section 2.2.2 is based on studies conducted from 1976 to the present.

2.2.1 Terrestrial Ecology

The Beaver Valley Power Station (BVPS) site encompasses approximately 501 acres of the Ohio River floodplain and adjacent uplands of Beaver County, Pennsylvania. The county receives about 35 inches or more of rainfall annually, and the frost-free season averages 241 days (FSAR Section 2.3.1.1). Deciduous forest covers more than half of the site while existing power plants and associated facilities occupy less than 40 percent. Approximately 7 percent of the site consists largely of scrubland, old fields, and paved roads. (Table 2.2-1, Figure 2.2-1).

2.2.1.1 Soils

Most soils on the site have been formed from residual material weathered from sandstone, siltstone, and shale. Notable exceptions are the soils formed from materials transported and deposited by stream action (Table 2.2-2). Depth to bedrock on the ridge to the south of the facility varies from 20 inches to greater than 60 inches. Most soils are fine textured loams, silt loams, or silty clay loams, are well drained, and are moderately permeable (Table 2.2-2). Much of the site is on steep slopes on which soils are liable to erode easily when denuded of vegetation. The soils underlaying the facility proper are discussed in FSAR Section 2.5.

With few exceptions, the soils are marginal for crop production because of the steep slopes. Woodland productivity and wildlife potential, however, are fair to good on most soils (Table 2.2-3).

The distribution of various soils on the BVPS site is shown on Figure 2.2-2. The acreages and potential land use of the soils on the site and in the county are presented in Table 2.2-3.

2.2.1.2 Vegetation

The site has a proportion of wooded land similar to that of Beaver County. Much of the deciduous forest on the site is in early successional or subclimax stages due to man-induced and natural perturbations. The structure and composition of the site vegetation (Tables 2.2-4 and 2.2-5) have been greatly influenced by spoil banks from coal mining, abandoned road beds, past farming on the more level uplands, maintenance of transmission corridors and pipelines, and selective logging. Natural perturbations which also affect the floral community on the site include the locust leaf miner (prevalent during 1977 and 1978), Dutch elm disease, ice, and wind storms.

The ridge tops are dominated by black locust and black cherry, east- to south-facing slopes by mixed oak and sugar maple, south- to southwest-facing slopes by mixed oak and mountain laurel, lower slopes by beech, and the floodplain by silver maple and sycamore. The north-facing slopes are covered by second growth mixed mesophytic forests (Table 2.2-1, Figure 2.2-1). The amount of vegetative cover (Table 2.2-4) varies with slope, aspect, and land use. The tree canopy of slope forests generally shades 60 to 80 percent of the ground. Shrub cover is low (10 to 20 percent) except in more disturbed forests where it increases to 60 percent under a sparse tree canopy. Herbaceous cover is substantially higher in mixed mesophytic communities than in other upland forest communities. More disturbed areas such as the floodplain and transmission corridors also support a heavy herbaceous cover. No endangered or threatened plants (U.S. Department of Interior 1983) occur on the site.

2.2.1.3 Mammals

About 48 species of mammals have geographic ranges that include the site (Table 2.2-6). Of these mammals, 27 were seen, captured, or evidence of their presence was noted. No endangered or threatened mammals (U.S. Department of Interior 1983; Pennsylvania Game Commission 1983) are known to occur on the site. Game species and furbearers are discussed in Section 2.2.1.5.

Most of the common mammals on the site are characteristic of wooded and shrubby areas in southwestern Pennsylvania. The site provides few open habitats for mammals, except along transmission corridors or adjacent to construction areas.

Tables 2.2-7 through 2.2-9 provide information on count and distribution of cows, doe goats, and beef cattle (Porter Consultants 1981). These are the major groups of domestic fauna that may be involved in the radiological exposure of man via the iodine-milk route. These tables show animal counts by compass direction in one-mile increments from the midpoint of the BVPS-1 and BVPS-2 reactors.

2.2.1.4 Birds

About 238 species of birds may be expected in southwestern Pennsylvania in habitats similar to those on, or immediately adjacent to, the site (Table 2.2-10). During terrestrial ecological studies on the site (NUS Corporation 1976a), 112 bird species were identified on the site or in the site region (Tables 2.2-10 through 2.2-13). Of these, 20 were year-round residents, 41 were summer visitors, 13 were winter visitors, and 34 were transients on the site or in the adjacent site region (Table 2.2-10).

Land use patterns have influenced bird populations onsite. Transmission lines through the woods and logging have changed the structure and composition of the vegetation by increasing early seral stages. These changes in vegetation have provided habitats for more species and greater numbers of birds than a closed forest would support. On the other hand, plant construction has reduced habitat for breeding birds in some areas.

Bird populations on the site are similar to those found elsewhere in the region. No endangered or threatened species (U.S. Department of Interior 1983; Pennsylvania Game Commission 1983) were found and none are likely to use the site, except as a temporary resting area during migration.

2.2.1.5 Game Species and Furbearers

About 15 game mammals or furbearers and at least 29 gamebirds (23 waterfowl species - Table 2.2-10) occur in Beaver County. Table 2.2-14 presents a comparison of the habitat quality for game species and furbearers on the site in particular and the habitat quality in Beaver County in general. Table 2.2-14 also presents an estimate of the level of harvest in Beaver County of each species. Good habitat exists for grouse and fair habitat is found for deer, gray squirrel, gray fox, opossum, and raccoon. The lack of meadows, pastures, croplands, and fence rows makes the site unsuitable for many of the other local game species which require the ecotones and high levels of pioneer vegetation associated with these conditions.

2.2.1.6 Reptiles and Amphibians

Ten amphibian and five reptile species were observed on the site (Tables 2.2-15 and 2.2-16). The species found on the site are typical of the region. No endangered reptiles or amphibians (U.S. Department of Interior 1983) occur on the site.

2.2.2 Aquatic Ecology

The following description of the aquatic ecology at BVPS-2 is an update of information collected since the publication of the BVPS-2 ER-CPS and summarizes the changes which have occurred since that time. Section 2.7.2 of that report provides a description of the existing aquatic ecology of the BVPS-2 site in 1970 and 1971.

Most of the aquatic ecology field data were collected at three transects on the Ohio River: one transect was located upstream of the site, one downstream, and one at the site. The 1974 baseline report (NUS Corporation 1975) and the Duquesne Light Company (DLC) annual reports from 1975 through 1980 (NUS Corporation 1976b; DLC 1977, 1978, 1979, 1980, 1981) contain a more detailed description of sampling locations, schedules, and methods. Detailed results of plankton (phytoplankton and zooplankton), benthos, and fish egg, larval, and adult data are also described in the baseline and annual reports. The following discussion presents a summary of the results since the publication of the BVPS-2 ER-CPS.

Phytoplankton at the BVPS site continued to be dominated by green algae (Chlorophyta) and diatoms (Chrysophyta). Phytoplankton usually continued to exhibit a bimodal seasonal peak in abundance. Different species dominated the collections each year but some ubiquitous genera such as Navicula and Scenedesmus were abundant nearly every year. The DLC 1976, 1977, and 1978 annual reports indicate higher abundance at the upstream control transect than at downstream transects. The differences in abundance were attributed to natural variation.

Zooplankton data collected before July 1974 are not directly comparable to more recently collected data since the laboratory preparation methods were changed at that time. Additional changes in laboratory analysis methods in later studies make it impossible to directly compare 1974-1975 data to operational data. The methods used since July 1974 tend to collect more protozoa than previous methods. Since the ER-CPS was published, rotifers and protozoans have dominated zooplankton samples. Zooplankton density continued to peak in summer and early fall. In general, few if any differences exist in seasonal abundance patterns or taxonomic group presence since 1974. When differences were noted, these were not attributable to station operation.

Oligochaeta continued to be the dominant benthic group in the river at the BVPS site. However, the Asiatic clam, Corbicula, constituted a portion of the benthos from 1974 to 1977. Graney (et al 1980) reports that Corbicula have invaded many river systems of the Ohio River drainage since the introduction of Corbicula to the Pacific coast in 1938. In 1978 Corbicula declined in abundance in the river at the BVPS site, and in 1979 and 1980 no Corbicula were found in benthos samples.

Fish sampling procedures used have changed many times since the issuance of the ER-CPS. No long-term spatial patterns of abundance have been revealed. However, some general observations of fish population size and diversity have been made. Electroshock sampling has been conducted since 1975. Electroshocking has revealed that Cyprinids including shiners and minnows are the most abundant fish species in the Ohio River near BVPS. As stated in the ER-CPS, gillnet and piscicide sampling revealed evidence of increased numbers of sport fish in this section of the Ohio River, compared to data collected from 1957 to 1969. Continued sampling with gillnets at BVPS has provided additional evidence of this trend in population size of sport fishes. The increasing incidence of capture of species such as tiger muskellunge, muskellunge, northern pike, sauger, and smallmouth bass indicates a greater diversity of sport fishes as well. No consistent long- or short-term spatial patterns of abundance have been revealed in sampling. A list of fish species collected from 1970 to 1980 is provided in Table 2.2-17. A list of additional fish species with likely or probable occurrence in the study area is provided in Table 2.2-18.

Operation of BVPS-1 began in May 1976. Evidence provided in the annual environmental reports (DLC 1977, 1978, 1979, 1980, 1981) indicates that changes in fish, benthos, phytoplankton, or zooplankton populations are not attributable to operation of the power plant. Impingement and entrainment sampling has been conducted since start-up of the plant. Impingement sampling collected smaller sizes and species of fish than river samples. Entrainment sampling showed that Cyprinids constitute the greatest portion of entrained ichthyoplankton and that phytoplankton and zooplankton were entrained in proportion to their abundance in the river.

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TABLE 2.2-5 (Cont)

Dominant Plant Species*

Vegetation Study Area**	Ground Stratum: Spring	Ground Stratum: Summer	Ground Stratum: Fall
4,16,18	Claytonia caroliniana (5) Impatiens pallida (5) Viola papilionacea (3) Dentaria laciniata (3)	Impatiens pallida (3) Rhus radicans (3) Polystichum acrostichoides (2)	Polystichum arostichoides (3) Rhus radicans (3) Aster macrophyllus (3) Impatiens pallida (3) Polygonum virginianum (3)
5	Impatiens sp. (4) Viola papilionacea (4) Poa sp. (3) Lycopodium complanatum (3) Vaccinium vacillans (3)	Lycopodium comolanatum (3) Vaccinium vacillans (3) Impatiens sp. (4)	Lycopodium complanatum (3) Vaccinium vacillans (3) Impatiens sp. (3)
6, 9	Sedum ternatum (3) Vaccinium vacillans (3) Agrostis stolonifera (3) Gaultheria procumbens (3)	Gaultheria procumbens (3) Carex pensylvanica (3) Vaccinium vacillans (3) Sedum ternatum (3) Agrostis stolonifera (3)	Vaccinium vacillans (3) Gaultheria procumbens (3) Carex pensylvanica (3) Agrostis stolonifera (3)
7,10,11,12,13, 14,17	Sedum ternatum (3) Podophyllum peltatum (3) Dentaria laciniata (3) Poa sp. (3)	Impatiens pallida (2) Podophyllum peltatum (2) Polystichum acrostichoides (2) Sedum ternatum (3) Poa pretensis (3)	Polystichum acrostichoides (2) Aster macrophyllus (3) Solidago caesia (3) Poa pretensis (3) Sedum ternatum (3)
8, 15	Impatiens pallida (4) Claytonia caroliniana (3) Carex pensylvanica (2)	Impatiens pallida (4) Polystichum acrostichoides (2) Danthonia spicata (2)	Impatiens pallida (3) Solidago bicolor (2) Hystrix patula (2)
Transmission corridors	Rubus allegheniensis (4) Dryopteris sp. (4) Podophyllum peltatum (3) Claytonia caroliniana (3)	Rubus allegheniensis (4) Galium aparine (3) Agrostis stolonifera (4) Phytolacca americana (3)	Rubus allegheniensis (4) Potentilla simplex (4) Solidago graminifolia (4) Agrostis stolonifera (5) Eupatorium rugosum (4)

NOTES:

*Numbers in parentheses are estimates of relative abundance as follows: (1) very rare, (2) rare, (3) occasional, (4) abundant, (5) very abundant.
**The location of these areas is indicated on Figure 2.2-1.

TABLE 2.2-6

MAMMALS WHOSE GEOGRAPHIC RANGES INCLUDE THE SITE*

Common Name	Scientific Name	Status/ Presence Verified
Virginia opossum	Didelphis virginiana	Tracks
Masked shrew	Sorex cinereus	
Smoky shrew	Sorex fumeus	Captured
Thompson's pygmy shrew	Microsorex thompsoni	
Short-tailed shrew	Blarina brevicauda	Captured
Least shrew	Cryptotis parva	
Hairy-tailed mole	Parascalops breweri	Sign
Star-nosed mole	Condylura cristata	
Little brown myotis	Myotis lucifugus	Captured
Keen's myotis	Myotis keenii	
Indiana myotis	Myotis sodalis	Endangered**,***
Small-footed myotis	Myotis leibii	Endangered***
Silver-haired bat	Lasionycteris noctivagans	
Eastern pipistrelle	Pipistrellus subflavus	Captured
Big brown bat	Eptesicus fuscus	
Red bat	Lasiurus borealis	Captured
Hoary bat	Lasiurus cinereus	
Evening bat	Nycticeius humeralis	
Eastern cottontail	Sylvilagus floridanus	Observed
New England cottontail	Sylvilagus transitionalis	
Eastern chipmunk	Tamias striatus	Captured
Woodchuck	Marmota monax	Observed
Gray squirrel	Sciurus carolinensis	Observed
Fox squirrel	Sciurus niger	Observed
Red squirrel	Tamiasciurus hudsonicus	Observed
Southern flying squirrel	Glaucomys volans	Captured
Beaver	Castor canadensis	Sign
Deer mouse	Peromyscus maniculatus	
White-footed mouse	Peromyscus leucopus	Captured
Eastern woodrat	Neotoma floridana	Endangered***
Meadow vole	Microtus pennsylvanicus	Captured
Woodland vole	Microtus pinetorum	Captured
Muskrat	Ondatra zibethicus	Tracks
Southern bog lemming	Synaptomys cooperi	
Norway rat	Rattus norvegicus	
House mouse	Mus musculus	
Meadow jumping mouse	Zapus hudsonius	Captured
Woodland jumping mouse	Napaeozapus insignis	Captured
Red fox	Vulpes vulpes	Reported
Gray fox	Urocyon cinereoargenteus	Reported
Raccoon	Procyon lotor	Tracks
Weasel	Mustela nivalis	
Long-tailed weasel	Mustela frenata	Captured
Mink	Mustela vison	
Striped skunk	Mephitis mephitis	Tracks

TABLE 2.2-6 (Cont)

Common Name	Scientific Name	Status/ Presence Verified
River otter	Lontra canadensis	
Bobcat	Lynx rufus	
White-tailed deer	Odocoileus virginianus	Observed

NOTES:

*Ranges from Burt, W.H. and Grossenheider 1964. Nomenclature from Jones, J.C. et al 1975.
**US Department of Interior Fish and Wildlife Service 1983.
***Pennsylvania Game Commission 1983.

TABLE 2.2-7

MILK COWS WITHIN FIVE MILES OF BVPS-2
(NUMBER OF HEAD)

	Distance from Site (miles)					
Direction	0-1	1-2	2-3	3-4	4-5	Total
N	0	0	0	0	0	0
NNE	0	0	0	0	0	0
NE	0	0	0	0	1	1
ENE	0	0	0	0	0	0
E	0	0	0	0	1	1
ESE	0	0	0	0	0	0
SE	0	0	0	17	0	17
SSE	0	0	0	1	5	6
S	0	0	1	1	2	4
SSW	0	0	64	1	1	66
SW	0	0	0	0	0	0
WSW	0	0	0	164	0	164
W	0	0	0	2	0	2
WNW	0	0	1	0	0	1
NW	0	0	0	0	0	0
NNW	0	0	0	0	0	0
Total	0	0	66	186	10	262

TABLE 2.2-10

BIRDS WHOSE GEOGRAPHIC RANGES INCLUDE THE SITE [1]

Species [2,3]	Special Status	Periods of Occurrence [4] Summer	Winter	Fall and Spring	Habitat Notes
Common loon	-	NE	RA	OC	River
Horned grebe	-	NE	RA	OC	River
Pied-billed grebe	-	RA	VE	OC	Poor breeding habitat
Double-crested cormorant	-	NE	NE	NE	
Great blue heron	-	RA	RA	VE	Poor breeding habitat
Little blue heron	-	NE	NE	NE	
Great egret	-	NE	NE	OC	River shore
Cattle egret	-	RA	NE	NE	
Green heron	-	RA	NE	OC	Poor breeding habitat
Black-crowned night heron	Declining [5]	NE	NE	RA	Poor quality habitat
American bittern	Threatened [7]	RA	NE	RA	Poor quality habitat
Least bittern	Threatened [7]	RA	NE	RA	Poor quality habitat
Whistling swan	Game	NE	NE	RA	River
Snow goose	-	NE	NE	NE	
Canada goose	Game	NE	NE	RA	River
Brant	-	NE	NE	NE	
Mallard	Game	RA	VE	OC	Poor breeding habitat
Black duck	Game	OC	OC	OC	Poor breeding habitat
Gadwall	Game	NE	NE	RA	River
American wigeon	Game	NE	RA	OC	River
Pintail	Game	NE	RA	OC	River
American green-winged teal	Game	NE	RA	OC	River
Blue-winged teal	Game	RA	NE	OC	Poor breeding habitat
Shoveler	Game	NE	RA	OC	River
Wood duck	Game	RA	RA	OC	River and river shore
Redhead	Game	NE	RA	OC	River
Ring-necked duck	Game	NE	RA	OC	River
Canvasback	Game	NE	RA	OC	River
Lesser scaup	Game	NE	RA	OC	River
Greater scaup	Game	NE	NE	OC	River
Common goldeneye	Game	NE	OC	OC	River
Bufflehead	Game	NE	RA	OC	River
Oldsquaw	Game	NE	NE	OC	River
White-winged scoter	Game	NE	NE	RA	River
Black scoter	Game	NE	NE	RA	River
Ruddy duck	Game	NE	RA	OC	River
Hooded merganser	Game	NE	RA	OC	River
Common merganser	Game	NE	OC	OC	River

TABLE 2.2-10 (Cont)

Species[2,3]	Special Status	Periods of Occurrence[4] Summer	Winter	Fall and Spring	Habitat Notes
Red-breasted merganser	Game	NE	RA	OC	River
Turkey vulture	-	OC	RA	VE	
Black vulture	-	NE	NE	NE	
Goshawk	-	NE	RA	RA	
Sharp-shinned hawk	Declining[5]	OC	OC	OC	
Cooper's hawk	Declining[5]	OC	OC	VE	
Red-tailed hawk	-	VE	VE	VE	
Rough-legged hawk	-	NE	NE	NE	
Red-shouldered hawk	Declining[5]	OC	OC	OC	Poor quality habitat
Broad-winged hawk	-	OC	NE	OC	
Bald eagle	Endangered[6,7]	RA	RA	RA	Poor quality habitat
Golden eagle	-	NE	NE	NE	
Marsh hawk	Declining[5]	OC	OC	OC	Poor quality habitat
Osprey	Declining[5]	NE	NE	RA	River and river edge
Peregrine falcon	Endangered[6]	NE	RA	RA	Poor quality habitat
Merlin	Declining[5]	NE	RA	RA	
American kestrel	Declining[5]	VE	OC	VE	
Turkey	Game	NE	NE	NE	
Ruffed grouse	Game	VE	VE	VE	
Bobwhite	Game	OC	OC	OC	Poor quality habitat
Ringed-necked pheasant	Game	OC	OC	OC	Poor quality habitat
Virginia rail	Game	RA	NE	OC	Poor quality habitat
King rail	Endangered[7]	NE	NE	NE	
Sora rail	Game	RA	NE	OC	Poor quality habitat
Common gallinule	Game	RA	NE	OC	Poor quality habitat
American coot	Game	RA	RA	OC	Poor quality habitat
Semipalmated plover	-	NE	NE	OC	River shore
Killdeer	-	VE	RA	VE	River shore
Black-bellied plover	-	NE	NE	OC	River shore
Ruddy turnstone	-	NE	NE	OC	River shore
American woodcock	Game	OC	RA	OC	
Common snipe	Game	RA	RA	OC	Poor breeding habitat
Spotted sandpiper	-	RA	NE	OC	Poor breeding habitat
Solitary sandpiper	-	NE	NE	OC	River shore
Greater yellowlegs	-	NE	NE	OC	River shore
Lesser yellowlegs	-	NE	NE	OC	River shore
Pectoral sandpiper	-	NE	NE	RA	River shore
Baird's sandpiper	-	NE	NE	OC	River shore
Least sandpiper	-	NE	NE	OC	River shore
Dunlin	-	NE	NE	OC	River shore

TABLE 2.2-10 (Cont)

Species[2,3]	Special Status	Periods of Occurrence[4] Summer	Winter	Fall and Spring	Habitat Notes
Semipalmated sandpiper	-	NE	NE	OC	River shore
Sanderling	-	NE	NE	RA	River shore
Dowitcher short-billed	-	NE	NE	RA	River shore
Herring gull	-	RA	OC	OC	River and shore
Ring-billed gull	-	RA	OC	VE	River and shore
Bonaparte's gull	-	NE	OC	OC	River and shore
Caspian tern	-	NE	NE	NE	River and shore
Common tern	-	RA	NE	OC	River and shore
Black tern	Threatened [7]	RA	NE	OC	Poor breeding habitat
Rock dove	-	RA	VE	VE	
Mourning dove	Game	VE	VE	VE	
Yellow-billed cuckoo	-	VE	NE	VE	
Black-billed cuckoo	-	VE	NE	VE	
Barn owl	Declining [5]	RA	RA	RA	Poor breeding habitat
Screech owl	-	VE	VE	VE	
Great horned owl	-	OC	OC	OC	
Barred owl	-	OC	OC	OC	
Long-eared owl	-	RA	RA	RA	
Short-eared owl	Endangered [7]	RA	RA	RA	Poor quality habitat
Snowy owl	-	NE	NE	NE	
Saw-whet owl	-	RA	RA	RA	Poor quality habitat
Whip-poor-will	-	OC	NE	OC	
Common nighthawk	-	OC	NE	OC	
Chimney swift	-	VE	NE	VE	
Ruby-throated hummingbird	-	VE	NE	VE	
Belted kingfisher	-	VE	VE	VE	River and shore
Common flicker	-	VE	RA	VE	
Pileated woodpecker	-	VE	VE	VE	
Red-bellied woodpecker	-	VE	VE	VE	
Red-headed woodpecker	-	OC	OC	OC	
Yellow-bellied sapsucker	-	OC	RA	OC	
Hairy woodpecker	-	VE	VE	VE	
Downy woodpecker	-	VE	VE	VE	
Eastern kingbird	-	OC	NE	OC	
Acadian flycatcher	-	NE	NE	NE	
Great crested flycatcher	-	VE	NE	VE	
Eastern phoebe	-	VE	NE	VE	
Yellow-bellied flycatcher	-	VE	NE	OC	
American flycatcher	-	VE	NE	VE	
Willow flycatcher	-	VE	NE	OC	

TABLE 2.2-10 (Cont)

Species[2,3]	Special Status	Periods of Occurrence[4] Summer	Winter	Fall and Spring	Habitat Notes
Least flycatcher	-	VE	NE	OC	
Eastern wood pewee	-	VE	NE	VE	
Olive-sided flycatcher	-	NE	NE	VE	
Horned lark	-	OC	NE	OC	Poor quality habitat
Tree swallow	-	OC	NE	OC	River and shore
Bank swallow	-	OC	NE	VE	River and shore
Rough-winged swallow	-	VE	NE	OC	
Barn swallow	-	OC	NE	OC	
Cliff swallow	-	RA	NE	RA	
Purple martin	-	OC	NE	OC	
Blue jay	-	VE	VE	VE	
Northern raven	-	NE	NE	NE	
Common crow	-	VE	VE	VE	
Black-capped chickadee	-	NE	VE	OC	
Carolina chickadee	-	VE	VE	VE	
Tufted titmouse	-	VE	VE	VE	
White-breasted nuthatch	-	VE	VE	VE	
Red-breasted nuthatch	-	NE	RA	OC	
Brown creeper	-	OC	VE	VE	Poor breeding habitat
House wren	-	VE	NE	VE	
Winter wren	-	RA	VE	VE	Poor breeding habitat
Marsh wren	-	RA	NE	NE	
Sedge wren	Threatened[7]	RA	NE	NE	
Bewick's wren	Declining[6] Endangered[7]	RA	RA	RA	Poor quality habitat
Carolina wren	-	VE	VE	VE	
Mockingbird	-	RA	RA	VE	Poor breeding habitat
Gray catbird	-	VE	NE	VE	
Brown thrasher	-	OC	RA	VE	
American robin	-	VE	NE	VE	
Wood thrush	-	VE	NE	VE	
Hermit thrush	-	OC	NE	OC	Poor breeding habitat
Swainson's thrush	-	OC	NE	VE	
Gray-checked thrush	-	NE	NE	VE	
Veery	-	OC	NE	VE	Poor breeding habitat
Eastern bluebird	-	OC	RA	OC	Poor breeding habitat
Blue-gray gnatcatcher	-	VE	NE	VE	
Golden-crowned kinglet	-	NE	VE	NE	
Ruby-crowned kinglet	-	NE	RA	VE	
American (water) pipit	-	NE	NE	OC	Poor quality habitat
Cedar waxwing	-	NE	VE	VE	

TABLE 2.2-10 (Cont)

Species(2,3)	Special Status	Periods of Occurrence(4) Summer	Winter	Fall and Spring	Habitat Notes
Loggerhead shrike	Declining(5)	RA	RA	RA	
Starling	-	VE	VE	VE	
White-eyed vireo	-	RA	NE	RA	
Yellow-throated vireo	-	VE	NE	VE	
Solitary vireo	-	OC	NE	VE	
Red-eyed vireo	-	VE	NE	VE	
Philadelphia vireo	-	NE	NE	VE	
Warbling vireo	-	OC	NE	VE	Poor breeding habitat
Black and white warbler	-	OC	NE	VE	Poor breeding habitat
Worm-eating warbler	-	VE	NE	VE	
Golden-winged warbler	-	OC	NE	OC	
Blue-winged warbler	-	VE	NE	VE	
Tennessee warbler	-	NE	NE	VE	
Nashville warbler	-	NE	NE	VE	
Northern parula	-	OC	NE	VE	Poor breeding habitat
Yellow throated warbler	-	NE	NE	VE	
Yellow warbler	-	VE	NE	VE	
Magnolia warbler	-	OC	NE	VE	Poor breeding habitat
Cape May warbler	-	NE	RA	VE	
Black-throated blue warbler	-	OC	NE	VE	Poor breeding habitat
Yellow-rumped warbler	-	NE	VE	VE	
Black-throated green warbler	-	OC	NE	VE	Poor breeding habitat
Cerulean warbler	-	VE	NE	VE	
Blackburnian warbler	-	OC	NE	VE	Poor breeding habitat
Chestnut-sided warbler	-	OC	NE	VE	Poor breeding habitat
Bay-breasted warbler	-	NE	NE	VE	
Blackpoll warbler	-	NE	NE	VE	
Pine warbler	-	NE	NE	VE	
Praire warbler	-	OC	NE	NE	Poor quality habitat
Palm warbler	-	NE	NE	OC	
Ovenbird	-	VE	NE	VE	
Northern waterthrush	-	NE	NE	OC	
Louisiana waterthrush	-	OC	NE	VE	
Kentucky warbler	-	VE	NE	VE	
Connecticut warbler	-	NE	NE	VE	
Mourning warbler	-	OC	NE	VE	
Common yellowthroat	-	OC	NE	VE	Poor breeding habitat
Yellow-breasted chat	-	VE	NE	VE	
Hooded warbler	-	VE	NE	VE	
Wilson's warbler	-	NE	NE	VE	

TABLE 2.2-10 (Cont)

Species [2,3]	Special Status	Periods of Occurrence [4] Summer	Winter	Fall and Spring	Habitat Notes
Canada warbler	-	OC	NE	VE	Poor breeding habitat
American redstart	-	VE	NE	VE	
House sparrow	-	OC	VE	OC	
Eastern meadowlark	-	OC	OC	VE	Poor quality habitat
Redwinged blackbird	-	VE	RA	VE	
Orchard oriole	-	RA	NE	RA	
Northern oriole	-	VE	NE	VE	
Rusty blackbird	-	NE	RA	OC	
Common grackle	-	VE	RA	VE	
Brown-headed cowbird	-	VE	RA	VE	
Scarlet tanager	-	VE	NE	VE	
Summer tanager	-	RA	NE	RA	
Cardinal	-	VE	VE	VE	
Rose-breasted grosbeak	-	VE	NE	VE	
Indigo bunting	-	VE	NE	VE	
Evening grosbeak	-	NE	OC	OC	Erratic
Common redpoll	-	NE	RA	NE	
House finch	Spreading	RA	RA	RA	
Purple finch	-	NE	OC	OC	Erratic
Pine siskin	-	NE	OC	OC	Erratic
American goldfinch	-	VE	VE	VE	
Red crossbill	-	NE	OC	OC	Poor quality habitat
White-winged crossbill	-	NE	RA	RA	
Rufous-sided towhee	-	VE	RA	VE	
Savannah sparrow	-	OC	NE	OC	Poor quality habitat
Grasshopper sparrow	Declining [5]	RA	NE	RA	Poor quality habitat
Henslow's sparrow	Declining [6] Threatened [7]	RA	NE	RA	Poor quality habitat
Vesper sparrow	-	OC	NE	OC	Poor quality habitat
Lark sparrow	-	RA	NE	RA	
Dark-eyed junco	-	OC	VE	OC	Poor breeding habitat
Tree sparrow	-	NE	VE	VE	
Chipping sparrow	-	OC	NE	VE	
Field sparrow	-	VE	VE	VE	
White-crowned sparrow	-	NE	RA	RA	
White-throated sparrow	-	RA	VE	VE	Poor breeding habitat
Fox sparrow	-	NE	NE	OC	
Lincoln's sparrow	-	NE	NE	OC	
Swamp sparrow	-	OC	RA	OC	Poor quality habitat
Song sparrow	-	VE	VE	VE	
Snow bunting	-	NE	RA	RA	Poor quality habitat

Table 2.2-10 (Cont)

NOTES:
1. NUS Corporation 1976a.
2. American Ornithologists' Union 1957.
3. American Ornithologists' Union 1973.
4. RA = Rare in regional habitats similar to those on the site;
   NE = Not expected;
   OC = Occurs in regional habitats similar to those on the site; and
   VE = Verified on the site during this study.
5. National Audubon Society 1973.
6. U.S. Department of Interior 1980.
7. Pennsylvania Game Commission 1983.

TABLE 2.2-14 (Cont)

NOTES: (Cont)

5. Pennsylvania Game Commission undated.
6. Habitat quality criteria include food, cover, and water.
7. Pennsylvania Game Commission 1981.
8. N/A = Not Available.

TABLE 2.2-15

AMPHIBIAN SPECIES WITH RANGES INCLUDING THE SITE*

Common Name	Scientific Name
Eastern hellbender	Cryptobronchus alleganiensis alleganiensis
Mudpuppy	Necturus maculosus maculosus
Red-spotted newt	Notophthalmus viridescens
Jefferson salamander	Ambystoma jeffersonianum
Silvery salamander	Ambystoma platineum
Spotted salamander	Ambystoma maculatum
Marbled salamander	Ambystoma opacum
Dusky salamander**	Desmognathus fuscus
Mountain salamander	Desmognathus ocrophaeus
Seal salamander	Desmognathus monticola
Red-backed salamander	Plethodon cinereus
Slimy salamander**	Plethodon glutinosus
Wehrle's salamander	Plethodon wehrlei
Ravine salamander	Plethodon richmondi
Spring salamander	Gyrinophilus porphyriticus
Four-toed salamander	Hemidactylium scutatum
Red salamander	Pseudotriton ruber
Long-tailed salamander	Eurycea longicauda
Two-lined salamander**	Eurycea bislineata
American toad**	Bufo americanus
Fowler's toad**	Bufo woodhousei
Spring peeper**	Hyla crucifer
Gray treefrog	Hyla versicolor
Western chorus frog	Pseudacris triseriata
Mountain chorus frog**	Pseudacris brachyphona
Green frog**	Rana clamitans
Pickerel frog	Rana palustris
Leopard frog**	Rana pipiens
Bullfrog	Rana catesbeiana
Woodfrog**	Rana sylvatica

NOTES:

*Ranges and nomenclature from Conant 1958.
**Observed on the BVPS site.

TABLE 2.2-16

REPTILE SPECIES WITH RANGES INCLUDING THE SITE*

Common Name	Scientific Name
Snapping turtle	Chelydra serpentina
Wood turtle	Clemmys insculpta
Spotted turtle	Clemmys guttata
Stinkpot	Sternotherus odoratus
Painted turtle	Chrysemys picta
Eastern box turtle**	Terrapene carolina
Smooth softshell	Trionyx muticus
Spiny softshell	Trionyx spinifer
Map turtle	Graptemys geographica
Fence lizard	Sceloporus undulatus
Five-lined skink	Eumeces fasciatus
Red-bellied snake	Storeria occipitomaculata
Brown snake	Storeria dekayi
Northern water snake	Natrix sipedon
Kirtland's water snake	Natrix kirtlandi
Queen snake	Regina septemvittata
Eastern garter snake**	Thamnophis sirtalis
Eastern ribbon snake	Thamnophis sauritus
Northern ribbon snake***	Thamnophis sauritus septenirionolis
Eastern hognose snake	Heterodon platyrhinos
Ringneck snake**	Diadophis punctatus
Racer	Coluber constrictor
Smooth green snake	Opheodrys vernalis
Rat snake**	Elaphe obsoleta
Northern milk snake	Lampropeltis doliata
Copperhead**	Agkistrodon contortrix
Massasauga	Sistrurus catenatus
Timber rattlesnake	Crotalus horridus

NOTES:

*Ranges and nomenclature from Conant 1958.
**Observed on the BVPS site.
***Ranges and nomenclature from Pennsylvania Game Commission 1983.

TABLE 2.2-17

FISH SPECIES COLLECTED IN THE VICINITY OF BVPS
FROM 1970 TO 1980

Common Name	Species and Family Name	Sampling Seasons of Capture
	Lepisosteidae (gars)	
Longnose gar	Lepisosteus osseus	1976
	Clupeidae (herrings)	
Gizzard shad	Dorosoma cepedianum	1980, 1979, 1978, 1977, 1976, 1975, 1973-74, 1972-73, 1970-72
Skipjack herring	Alosa chrysochloris	1970-72
	Esocidae (pikes)	
Northern pike	Esox lucius	1980, 1978, 1977, 1975
Muskellunge	E. masquinongy	1979, 1978
Tiger muskellunge	E. lucius X E. masquinongy	1980, 1978, 1977
	Cyprinidae (minnows and carps)	
Goldfish	Carassius auratus*,**,***	1980, 1977, 1976, 1973-74, 1972-73, 1970-72
Carp	Cyprinus carpio****	1980, 1979, 1978, 1977, 1976, 1975, 1973-74, 1972-73, 1970-72
Goldfish-carp hybrid	C. auratus X cyprinus carpio	1977, 1975, 1972-73, 1970-72
Silverjaw minnow	Ericymba buccata	1972-73
Common shiner	Notropis cornutus	1980, 1972-73
Emerald shiner	N. atherinoides**,****	1980, 1979, 1978, 1977, 1976, 1975, 1973-74, 1972-73, 1970-72
Spottail shiner	N. hudsonius	1973-74
Rosyface shiner	N. rubellus	1973-74, 1972-73
Spotfin shiner	N. spilopterus	1980, 1979, 1978, 1977, 1976, 1975, 1973-74, 1972-73, 1970-72
Sand shiner	N. stramineus**,****	1980, 1979, 1978, 1977, 1976, 1975, 1973-74, 1972-73, 1970-72
Mimic shiner	N. volucellus	1980, 1979, 1978, 1977, 1976, 1973-74
Bluntnose minnow	Pimephales notatus****	1980, 1979, 1978, 1977, 1976, 1975, 1973-74, 1972-73, 1970-72
Creek chub	Semotilus atromaculatus	1977, 1976, 1973-74, 1972-73
Central stoneroller	Campostoma anomalum	1979, 1973-74
Blacknose dace	Rhinichthys atratulus	1979, 1972-73
Golden shiner	Notemigonus crysoleucas	1973-74
	Catostomidae (suckers)	
Quillback	Carpiodes cyprinus	1980, 1979, 1978, 1977, 1976, 1975, 1973-74, 1972-73, 1970-72
White sucker	Catostomus commersoni	1980, 1979, 1978, 1977, 1976, 1975, 1973-74, 1972-73, 1970-72
Northern hog sucker	Hypentelium nigricans	1980, 1979, 1978, 1977, 1973-74

TABLE 2.2-18

OTHER FISH SPECIES WITH LIKELY OR PROBABLE OCCURRENCE IN THE BVPS AREA*

Common Name	Species Name	Resident Status in PA
River chub	*Nocomis micropogon*	Recently invaded Delaware River watershed
Longnose dace	*Rhinichthys cataractae*	Widespread in all drainages
Southern redbelly dace	*Phoxinus erythrogaster*	Restricted to Ohio River drainage
Fantail darter	*Etheostoma fabellare*	Absent only from Delaware River drainage
Rainbow darter	*E. caeruleum*	Absent from Atlantic Coast streams
Variegate darter	*E. variatum*	Scattered in Ohio River drainage
Mottled sculpin	*Cottus bairdi*	Absent only from Delaware River basin
Striped shiner	*Notropis chrysocephalus*	Does not occur in Atlantic Coast streams

NOTE:

*Pennsylvania Game Commission 1983.

TABLE 2.4-11

SPATIAL VARIATIONS OF PHENOL LEVELS IN THE OHIO RIVER

Station No.*	Phenol (μg/l)
1S	5.5
1B	5.2
2S	5.4
2B	5.7
3S	5.8
3B	5.8
4S	5.7
4B	5.2
5S	5.3
5B	5.2

NOTE:

*Sampling transects are shown on Figure 6.1-1.
S = River Surface Station
B = River Bottom Station

TABLE 2.4-12

SEASONAL NUTRIENT VALUES*

Nutrient	Fall 11/15/73 (mg/l)	Winter 2/20/74 (mg/l)	Spring 4/20/74 (mg/l)	Summer 8/14/74 (mg/l)
Nitrate (NO_3)	6.1	5.5	6.3	5.0
Nitrite (NO_2)	0.10	0.05	0.07	0.33
Ammonia (NH_3)	0.54	0.75	0.26	1.00
Phosphate, total (PO_4)	0.31	0.32	0.27	0.26
Phosphate, ortho (PO_4)	0.05	0.03	0.04	0.10
Silica (SiO_2)	6.7	6.6	10.3	8.5

NOTE:

*Values shown represent the means for all sampling stations, depths, and replicate samples combined. Sampling transects are shown on Figure 6.1-1.

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T3.5-14 (1 of 1)	0
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F3.5-4	0
F3.5-5	0
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3.6-7 thru 3.6-8	4
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T3.6-2 (1 thru 2 of 2)	1
T3.6-3 (1 thru 2 of 2)	6
3.7-1 thru 3.7-3	2
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Page, Table (T), or Figure (F)	Amendment Number
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3.9-1 thru 3.9-2	1
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T3.9-1 (1 of 1)	0
T3.9-2 (1 of 1)	0
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3.4-2	Outfall Structure
3.4-3	Cooling Tower Blowdown Low Level Discharge Chamber
3.4-4	Circulating Water System Piping Arrangement
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3.9-2	Beaver Valley - Crescent 345 kV Transmission Line
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3.9-4	345 kV Transmission Tower

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generator coolers, and the containment air recirculation cooling coils.

3.4.2.4 Safeguards Area Air-Conditioning Units

The safeguards area is divided into two identical areas: south safeguard area and north safeguard area. Two identical 15,000 cfm ventilation systems are provided, one unit for each area.

Each ventilation system consists of an air-conditioning unit with fan and service water cooling coil, volume control damper, supply grilles, and distribution ductwork.

The unit operates on 100 percent recirculation mode. Service water runs through the coil at all times. Each service water coil has a capacity of 468.64 MBH and requires approximately 300 gpm at 3°F temperature rise. A room thermostat controls the fan operation according to desired area temperature. Exhaust for this area is provided by the supplementary leak collection system. Design maximum room temperature during normal operating conditions is 104°F.

Electric unit heaters are installed to maintain room temperature above 65°F in the winter.

3.4.2.5 Main Steam Valve Area Cooling Coils

The main steam valve area ventilation system consists of two 100-percent capacity recirculation fans and associated service water coils. Approximately 31,400 cfm of recirculated air is drawn through main steam valve area coils and fans and discharged through ductwork throughout the area. Additional ductwork is provided to maintain the main steam valve area under a negative pressure by the supplementary leak collection system. The total heat rejected is approximately 1,108.9 MBH and the required service water flow rate is approximately 240 gpm at 10°F temperature rise. Normal design maximum operating temperature is 120°F in the main steam valve area.

3.4.2.6 Motor Control Center Cooling Units

The motor control center cooling units service two identical motor control center enclosures. Each ventilation system consists of a 2,800-cfm fan and a service water coil. Each service water coil rejects approximately 52 MBH and requires approximately 15 gpm at 7°F temperature rise.

The unit operates on 100-percent recirculation mode. Service water runs through the coil at all times. A room thermostat controls the fan operation according to desired area temperature. Design maximum operating temperature in the motor control center is 104°F.

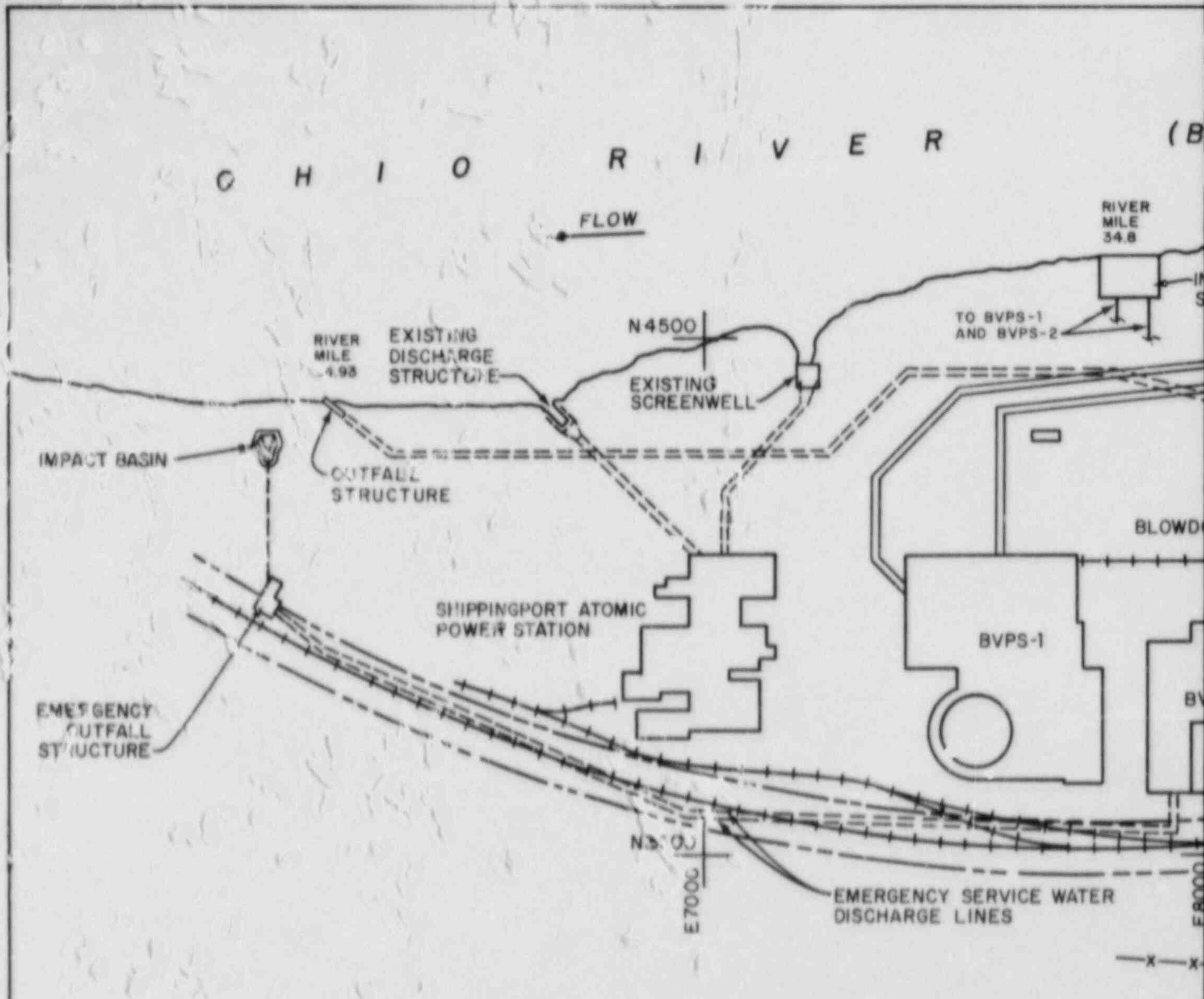
3.4.2.7 System Design Details and Operational Procedures

The primary intake structure is equipped with the traveling screens and trash racks which are part of BVPS-1 equipment. The auxiliary sheet pile intake structure (Figure 3.4-6) serves as a backup to BVPS-1 and BVPS-2 in the event of a loss of the main concrete intake structure. The traveling screens in the auxiliary intake structure are made of 3/8-inch-mesh copper wire cloth fabricated with a minimum of 14 BWG wire gauge units. The screens have a minimum 10-year cloth life under present conditions of water quality in the Ohio River at BVPS-2.

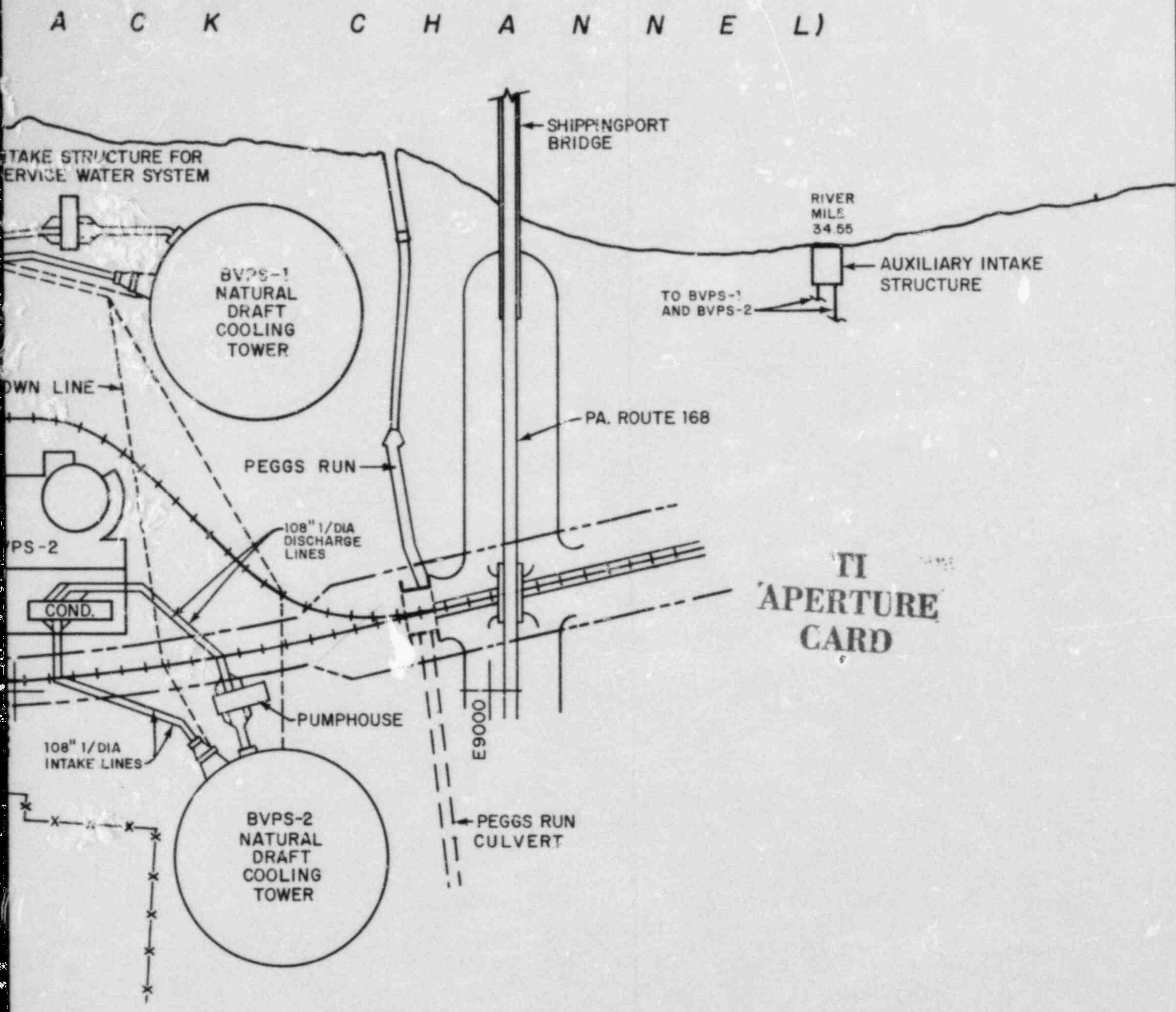
The motorized trash rake in the primary intake structure is used intermittently to remove floating debris, ice, and accumulated marine or plant life from the racks, which are placed upstream of the two traveling water screens. The rake operates on the trash rack, which extends from the bottom mat of the screenwell structure to the operating floor of the screenwell. It is a cable-operated raking device employing mechanical hydraulic controls.

Of the total service water flow of 27,573 gpm, 19,173 gpm is discharged into the main circulating water system downstream of the main surface condenser after being used in the primary and secondary heat exchangers to serve as makeup for the water loss from the cooling tower by evaporation, drift, and blowdown. The remaining service water flow of about 8,400 gpm is discharged directly to the river through the EOS. A portion of this flow, approximately 755 gpm, is used by the control room air conditioning condensers, redundant cooling coils, and safeguards area charging pump lube oil coolers. The remainder of this flow is directed from the primary component cooling water heat exchangers. The range of temperature rise of this water above inlet temperature is from 5° to 10°F. Velocity of the discharge of this water from the stilling basin of the outfall structure to the river at normal river pool elevation (664.5 feet) is about 2 fps. During emergency diesel generator testing, an additional 1,170 gpm is discharged to the outfall structure. The service water temperature rise for this circuit is 19.4°F. There are two diesel generators, each of which is tested at least once a month for approximately one hour.

Trash and any biological slimes are cleaned from bar racks and screens as necessary and deposited offsite at a land disposal site. Section 3.6.8 describes the screenwash system. It is anticipated that silt will collect both inside and in front of the intake structure and also in the cooling tower basin. Periodic dredging will be performed to remove silt from within and in front of the intake structure, and the dredged material will be deposited at an approved disposal location. It is planned to clean silt from the cooling tower basin on a periodic basis. Silt cleaned from the cooling tower basin will be deposited offsite at an approved land disposal site.



NOTE:
U.S. ARMY CORPS OF ENGINEERS, PITTSBURGH DISTRICT 1978.



APERTURE CARD

FIGURE 3.4-4
CIRCULATING WATER SYSTEM PIPING ARRANGEMENT
BEAVER VALLEY POWER STATION-UNIT 2
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE

In 1977-1978, a Chlorine Minimization Study was performed on the BVPS-1 circulating water system (Duquesne Light Company 1978). The study showed that under full load conditions with the chlorination system operating at full rate the maximum allowable free chlorine residual in the cooling tower blowdown was never exceeded. The maximum measured free available chlorine concentration was 0.32 mg/l and the average of the daily maximum concentrations was 0.08 mg/l. The maximum total residual chlorine concentration measured was 0.65 mg/l while the average of the daily maximum concentrations was 0.20 mg/l. The results of the Chlorine Minimization Study are a good indication of the chlorine concentrations expected in the BVPS-2 cooling tower blowdown.

To prevent the deposition of metal oxides and silt and the formation of calcium scale, a chemical manufactured by Calgon Corporation, Cl-4000, is added to the circulating water system. The concentration of Cl-4000 is maintained at an average of 2.2 ppm.

3.6.2 Floor and Equipment Drainage and Roof Drainage

Potentially radioactive floor drainage is processed by the liquid radwaste treatment system, as discussed in Section 3.5.2. Nonradioactive floor and equipment drainage is discharged to the yard storm sewer system. Potentially oil-contaminated floor and equipment drainage is conveyed to oil separators for removal of oil prior to being discharged to the storm sewer system. Oil removed by the oil separators is collected and stored in drums prior to offsite disposal. The floor and equipment drainage discharged to the Ohio River complies with the effluent limitations of 40 CFR 423 (suspended solids 30 mg/l; oil and grease 15 mg/l average).

The roof drainage and noncontaminated floor and equipment drainage systems discharge to the Ohio River via the yard storm sewer.

3.6.3 Service Water Discharge System

Service water from BVPS-2 is normally discharged to the circulating water system. In addition, a portion of the service water will be discharged into the Ohio River through the emergency outfall structure (EOS) approximately 200 feet downstream from the cooling tower blowdown structure. The service water system is described in Section 3.4.

Design and normal operating flows for the EOS are:

Design flow	40,000 gpm
Normal continuous flow	8,400 gpm

The normal water flow through the EOS consists of 755 gpm of cooling water from the heating, ventilating, and air conditioning (HVAC) systems in the safeguards area and in the control room area. An additional 7,645 gpm of service water is discharged through the two 30-inch discharge headers to prevent the buildup of silt in these lines. The chemical composition of this water will be the same as that of the Ohio River (Table 3.6-2).

During emergency diesel generator testing, an additional 1,170 gpm of diesel generator cooling water will be discharged through the EOS. There are two diesel generators provided for BVPS-2. Each generator will be tested at least once per month for approximately 1 hour.

Intermittent chlorination of the service water system is required to control biological growths on tube surfaces in the heat exchangers. Chlorine is added in the header pipes upstream of each set of heat exchangers in doses sufficient to maintain a maximum free available chlorine concentration of 0.5 mg/l at the discharge from the heat exchanger in each set that is the farthest downstream. Each set of heat exchangers will be chlorinated at one time for a period of one-half hour twice per day. Chlorination of the service water system will occur at the same time as the chlorination of the circulating water system. The chlorinator setting for the service water system will range from 400 to 2,000 lb/day, depending on the cleanness of the heat exchangers. The chlorine demand of the water in the remainder of the system is expected to reduce the residual chlorine so that discharge through the EOS will be less than or equal to 0.2 mg/l (average) and 0.5 mg/l (maximum) free available chlorine.

The total residual chlorine concentration in the EOS discharge will be somewhat greater than the free available chlorine concentration. The BVPS-1 circulating water system Chlorine Minimization Study (DLC 1978) indicates that the total residual chlorine concentration can be expected to be roughly twice the free available concentration.

3.6.4 Corrosion Products

The BVPS-1 and BVPS-2 condenser tubes are fabricated of Type 304 stainless steel. Assuming the corrosion rate of Ohio River water on stainless steel is comparable to the rates found for rivers cited by LaQue and Copson (1963), the corrosion rate should be less than 0.1 mil per year per unit. Based on the surface area of the main condenser tubes in each unit, the corrosion rate has been calculated to be less than 6 ft^3/year per unit. Assuming a stainless steel density of 0.29 lb/in^3 and an average annual river flow of 1.75×10^7 gpm, the increase in the total metal concentration in the Ohio River is expected to be 0.078 part per billion (ppb) due to the operation of BVPS-1 and BVPS-2.

3.6.5 Water Treatment Wastes

Demineralized water, required as makeup to the BVPS-2 feedwater system, is supplied by the BVPS-1 makeup water treatment system. Potable water for BVPS-2 is supplied from onsite wells. The well water is softened prior to use. The following sections describe the wastes generated by the BVPS-1 water treatment and BVPS-2 softener systems. Estimated chemical usage by the plant water treatment systems is presented in Table 3.6-3.

3.6.5.1 Demineralizer System

The BVPS-1 makeup demineralizer system provides high quality demineralized water for both BVPS-1 and BVPS-2 feedwater systems to replace steam generator blowdown and other system losses. The treatment system includes pretreatment of Ohio River water by clarification and filtration prior to demineralization.

Makeup water from the Ohio River is treated for suspended solids removal in a single clarifier with a design capacity of 1,000 gpm. Hydrated lime and ferric sulfate are added to the clarifier to promote flocculation, and a coagulant aid and/or clay may also be added to enhance flocculation and settling. Clarified effluent is conveyed to three gravity sand filters to remove any remaining

To control the chemistry of the water in the auxiliary boiler, morpholine or ammonium hydroxide is added to control the pH, and hydrazine is added to control corrosion by scavenging oxygen.

TABLE 3.6-2 (Cont)

Parameter	Ohio River[5]		Cooling Tower Blowdown[6]		Demineralizer Regeneration[7]		Softener Regeneration[7]		Auxiliary Boiler Blowdown	Liquid Radwaste[8]	Clarifier Blowdown		Filter Backwash	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Max	Max	Avg	Max	Avg	Max
Aluminum	0.42	0.90	0.76	2.16	-	-	-	-	-	-	0.42	0.90	0.42	0.90
Sodium	18.6	31.0	33.5	74.4	5,549	5,906	6,243	6,243	3	0	18.6	31.0	18.6	31.0
Potassium	3.4	5.3	6.1	12.7	98	152	-	-	-	-	3.4	5.3	3.4	5.3
Sulfate	86.6	162.0	155.9	388.8	20,240	22,410	-	-	4.5	0	86.6	162	86.6	162
Silica	8.0	17.1	14.4	41.0	230	492	-	-	0.5	0	8.0	17	8.0	17
Mercury	<0.0013	0.0083	<0.0025	0.02	-	-	-	-	-	-	<0.0013	0.008	<0.0013	0.008
Chloride	22.2	33.4	40.0	80.2	638	1,599	9,637	9,637	0	0	22.2	33	22.2	33

NOTES:

1. All concentrations are expressed in mg/l as the ion, unless otherwise indicated.
2. With the exception of cooling tower blowdown, all liquid wastes shown are discharged from BVPS-1. BVPS-1 and BVPS-2 cooling tower blowdowns are independent waste streams discharged through a common outfall
3. The wastewater concentrations shown are those which occur during actual discharge.
4. Effluent limitations for plant discharges are described in Section 5.3. BVPS-1 discharges are regulated by NPDES Permit No. PA 0025615.
5. NUS Corporation 1975.
6. Cooling tower blowdown concentrations are based on average and maximum concentration factors of 1.8 and 2.4, respectively, multiplied by the average and maximum Ohio River concentrations, respectively.
7. Demineralizer regeneration wastes are discharged to the BVPS-1 cooling tower blowdown, and water softener regeneration wastes are discharged to the BVPS-1 circulating water system.
8. Liquid radwastes can be discharged through either the BVPS-1 or BVPS-2 cooling tower blowdown.

TABLE 3.6-3

CHEMICAL USE AT BVPS*

Chemical	Average (lb/day)	Maximum (lb/day)	Annual (lb/yr)	Frequency of Use	Use
Lime**	175.3	451	64,000	Continuous	River water treatment
Ferric sulfate**	228.8	590	83,500	Continuous	River water treatment
Coagulant aid**	1.6	6.0	584	Continuous	River water treatment
Clay**,***	32.9	120	12,000	Continuous	River water treatment
Sodium chloride**	805	2,790	293,800	1/day	Water softener regeneration
Sulfuric acid**	2,013.7	2,534	735,000	1/day	Demineralizer regeneration
Sodium hydroxide**	1,405.5	2,073	513,000	1/day	Demineralizer regeneration
Chlorine	521	1,667	189,850	2 hr/day	Biofouling control
Hydrazine	67.5	90.0	24,665	Continuous	Condensate treatment
Morpholine	25.9	34.5	9,450	Continuous	Condensate treatment
Ammonium hydroxide	4.7	6.3	1,715	Continuous	Condensate treatment
Corrshield K-8****	23.3	31.1	8,490	Continuous	Secondary (turbine plant) component cooling water treatment
Calgon Cl-4000	482.3	870	176,000	Continuous	Cooling tower treatment

TABLE 3.6-3 (Cont)

Chemical	Average (lb/day)	Maximum (lb/day)	Annual (lb/yr)	Frequency of Use	Use
Potassium chromate****	0.24	0.32	87.5	Continuous	Primary component cooling water treatment

NOTES:

*Significant chemical usage during BVPS-1 and BVPS-2 operation.

**These chemicals are used in BVPS-1 systems shared by BVPS-2. Chemical usage values are those occurring with both units in operation.

***Clay has not been used at BVPS-1. Values shown are theoretical dosages, if required.

****Not normally discharged. Potassium chromate is never discharged; cooling water collected during maintenance is stored and reused.

LIST OF EFFECTIVE PAGES

Page, Table (T), or Figure (F)	Amendment Number
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5C-i thru 5C-iii	0
5C-1 thru 5C-15	0
T5C-1 (1 of 1)	0
T5C-2 (1 of 2)	0
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TABLE 5C-2 (Cont)

Parameter	Values Assigned: Deer	Rabbit	Grouse	Pheasant
D/Q ($1/m^2$)				
Release point 1	2.86×10^{-9}	2.27×10^{-7}	2.27×10^{-7}	2.27×10^{-7}
Release point 2	3.56×10^{-9}	7.06×10^{-8}	7.06×10^{-8}	7.06×10^{-8}
Release point 3	6.39×10^{-9}	4.47×10^{-10}	4.47×10^{-10}	4.47×10^{-10}
Release point 4	3.56×10^{-9}	7.06×10^{-8}	7.06×10^{-8}	7.06×10^{-8}
C-14 fractional equilibrium				
Release point 1	0.0073	0.0073	0.0073	0.0073
Release point 2	1.0	1.0	1.0	1.0
Release point 3	1.0	1.0	1.0	1.0
Release point 4	1.0	1.0	1.0	1.0

NOTES:

1. BVPS-1 elevated release and BVPS-2 ventilation vent.

2. BVPS-1 ventilation vent.

3. BVPS-1 and BVPS-2 process vent.

4. BVPS-2 elevated release.

5. Deer is assumed to graze at the location of the maximum beef animal, 1,577 meters east-southeast.

6. Location of analysis is the site boundary, 567 meters northwest (sector with highest χ/Q and D/Q values).

TABLE 5C-3

DILUTION FACTORS, POPULATION SERVED, AND TRAVEL TIMES FROM SITE

Public Water Supply Systems [1]	Distance from Site to Point of Intake (river mile)	Dilution Factor	Population Served (people/yr)	Transit Time, Release to Intake (hour)
Midland, Pa.	1.3	623	9,600	1.4
East Liverpool, Ohio	5.2	623	26,000	5.7
Chester, W. Va. [2]	7.1	545	3,800	7.7
Toronto, Ohio	24.1	623	8,000	26.2
Wierton, W. Va. [3]	27.0	623	30,000	29.3
Steubenville, Ohio	30.2	623	35,000	32.8
Mingo Junction, Ohio	36.0	623	15,000	39.1
Wheeling, W. Va.	51.8	623	65,000	56.3
Martins Ferry, Ohio [3]	53.6	623	19,000	58.2
Bellaire, Ohio [3]	59.0	623	9,500	64.1

Incremental Regions [4] (river mile)	Distance from Site to Point of Analysis (river mile)	Dilution Factor	Population Usage [5] (annual attendance)	Transit Time, Release to Point of Analysis (hour)
0-11	5.5	489	65,812	6.0
11-22	16.5	621	65,812	17.9
22-33	27.5	623	65,812	29.9
33-44	38.5	623	65,812	41.8
44-55	49.5	623	65,812	53.8
55-66	60.5	623	65,812	65.7
Other Locations				
Discharge outfall [6]	0.0	1	-	0.0
Edge of initial mixing zone [7]	0.1	3	-	0.3
Junction of Little Beaver Creek [8]	4.0	623	-	4.4

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6.1-2	Water Quality Parameters Baseline Water Quality Study - 1974
6.1-3	Water Quality Constituents and Methods of Analysis
6.1-4	Meteorological System Equipment Specifications for BVPS
6.1-4a	Alternate Meteorological System Equipment Specifications for BVPS
6.1-5	Nuclear Regulatory Commission ΔT Stability Categories
6.1-6	BVPS Monthly and Annual Data Recovery for the Period from January 1, 1976 to December 31, 1980 (Percent)
6.1-7	BVPS Monthly and Annual Joint ΔT and Wind Data Recovery for the Period from January 1, 1976 to December 31, 1980 (Percent)
6.4-1	Environmental Radiological Monitoring Program Summary Annual 1981 Data

4. Precipitation instrumentation

   One Belfort tipping bucket rain gauge at the surface near the tower,

5. Recorders

   a. Three Leeds and Northrop analog strip-chart recorders that record wind direction and wind speed at each level,

   b. Three Esterline - Angus analog strip chart recorders that record wind direction and wind speed at each level,

   c. One multipoint Leeds and Northrop recorder that records temperature at 35 feet, temperature differential between the 150- and 35-foot levels (ΔT_{150} feet-$_{35}$ feet) and between the 500- and 35-foot levels (ΔT_{500} feet-$_{35}$ feet), precipitation data, and dew point data,

   d. One Esterline- Angus multipoint recorder that records temperature at the 35-foot level and records temperature differential between the 150- and 35-foot levels and between the 500- and 35-foot levels.

6. Computer

   a. One Digital Equipment Corporation PDP8/E 12-bit mini-computer,

   b. One Climet digital clock.

The specifications for this equipment are summarized in Table 6.1-4. This equipment follows the guidance of Regulatory Guide 1.23.

The meteorological data acquisition system consisted of a computerized data processing system which collected and reduced data on a real-time basis. The average wind direction, wind speed, temperature differential (ΔT), ambient temperature, dew point, and total precipitation were determined for four 15-minute samples each hour. The sampling rate for each parameter for each level was approximately 10 times per second. Standard statistical equations were used to compute the 15-minute average values from the instantaneous samples. The standard deviation of the wind direction was calculated every 15 minutes, with 10-second smoothing of the instantaneous wind direction.

An analog system served as a backup to the digital system. When necessary to supplement digital data, the strip chart data were manually reduced. Hourly averages centered on each hour were obtained for temperature, dew point, and temperature differential data. The precipitation trace recorded cumulative precipitation amounts and recycled every 15 minutes. Average values of the wind direction were obtained from 15-minute samples of wind data centered on the hour. Hourly averages of 35-foot wind speed from analog data were electronically digitized to avoid human biases in the wind speed distribution for accident χ/Q calculations. Atmospheric stability, based on the temperature differential, was classified according to Regulatory Guide 1.23. Table 6.1-5 presents the USNRC ΔT stability categories.

Monthly and annual meteorological data recovery rates of combined analog and digital data for 35-, 150-, and 500-foot wind; ambient temperature; 35-foot dew point; ΔT_{150} feet-$_{35}$ feet, ΔT_{500} feet-$_{35}$ feet; and precipitation are provided in Table 6.1-6 for the period January 1, 1976 to December 31, 1980. Table 6.1-7 provides the monthly and annual data recovery rate for joint 35-foot wind and ΔT_{150} feet-$_{35}$ feet and joint 500-foot wind and ΔT_{500} feet-$_{35}$ feet from January 1, 1976 to December 31, 1980.

The data recording and signal conditioning equipment were maintained in three separate locations. The signal conditioning equipment was located in an environmentally controlled trailer shelter located approximately 10 feet east of the base of the tower. The shelter was approximately 8 feet wide, 16 feet long, and 9 feet high. It is not expected that the trailer shelter affected precipitation measurements.

The strip chart recorders and TermiNet were located in the BVPS-1 control room. The PDP8 digital computer was located in the DLC offices in downtown Pittsburgh. Both analog and digital data were telemetered to the control room, and the digital data were telemetered to the computer in Pittsburgh. Digital data, outputted at 15-minute intervals on the TermiNet in the control room, were transmitted daily via dialable telecommunications to the project meteorologist to be examined daily for any anomalous conditions or instrumentation problems. The analog data were examined on a weekly basis for any anomalous conditions.

The meteorological instrumentation was calibrated quarterly. System surveillance included daily checks of the system by onsite personnel, computer calibration on a real-time basis, and computer annunciation of any malfunctions every 15 minutes. As soon as a malfunction was detected, field maintenance personnel were dispatched to correct the problem.

Monthly and annual joint frequency distribution tables for the 5-year data period (January 1, 1976 to December 31, 1980) for ΔT_{150} feet-$_{35}$ feet and 35-foot wind and ΔT_{500} feet-$_{35}$ feet and 500-foot wind are presented in FSAR Appendices 2.3C and 2.3D, respectively.

From the time of the collection of the 5-year data base (1976-1980) for the dispersion analyses to the present, several modifications have been made to the onsite meteorological program. In December 1981, an alternate set of instruments to measure wind speed and wind direction at the 35-, 150-, and 500-foot elevations became operational. Instruments to measure ambient temperature at the 35-foot level and temperature differential between 35- and 150-foot levels and 35- and 500-foot levels were included with the equipment added to the guyed meteorological tower. The ground surface in the immediate area of the tower is currently composed of slag and dirt, but a warehouse will be constructed in this area before plant operation commences. This warehouse is not expected to affect the meteorological measurements at the tower.

The data recording and signal conditioning equipment were maintained in three separate locations until May 1980. The signal conditioning equipment is currently contained in two environmentally controlled shelters (trailers) located near the base of the meteorological tower, within the enclosed fenced area. Strip chart recorders and TermiNet are located in the BVPS control room. The PDP8 digital computer originally located in the DLC office building in downtown Pittsburgh was moved to shelter No. 1 in May 1980.

An alternate set of instruments was installed, which includes signal conditioning equipment, strip chart recorders, and an environmentally controlled shelter No. 2 to house this equipment. To provide an alternate source of power to shelters 1 and 2 in the event of a loss of power from the main power source, a diesel generator was installed inside the fenced area. A transfer switch to monitor the main power source and switch to the alternate source during power failure was installed in shelter No. 2. Protection equipment was also included in this shelter. Upgrading the existing meteorological instrumentation was started in 1981, and it became operational in December 1981.

Analog data from the primary set of meteorological instruments are telemetered to the BVPS-1 control room charts. Before May 1, 1980, digital data were transmitted via microwave telemetry to the computer in Pittsburgh where averages were processed at 15-minute intervals. After May 1980, the computer was hard-wired to the meteorological sensors. The 15-minute averages are telemetered to the BVPS-1 site, where they are outputted on the TermiNet in the control room and are transmitted via dialable telecommunication to NUS Corporation, Rockville, Maryland, to be examined daily for any anamolous conditions or instrumentation problems. The analog data are examined on a weekly basis for any anamolous conditions.

Present onsite instrumentation for the 500-foot guyed tower includes:

1. Wind instrumentation

   Teledyne Geotech wind speed and wind direction sensors at the 35-, 150-, and 500-foot levels,

2. Temperature instrumentation

   a. Teledyne Geotech RTBs at the 35-, 150-, and 500-foot levels,

   b. Teledyne Geotech T/ΔT signal conditioner and processor,

c. Teledyne Geotech aspirated radiation shields to house the RTBs at the 35-, 150-, and 500-foot levels

3. Recorders - located in meteorological shelter No. 2

a. Three Esterline-Angus analog strip chart recorders that record wind direction and wind speed at the 35-, 150-, and 500-foot tower levels, and

b. One Esterline-Angus multipoint recorder that records temperature at the 35-foot level and records temperature differential between the 150- and 35-foot levels and between the 500- and 35-foot levels.

The specifications for this equipment, which follow the guidance of Regulatory Guide 1.23, are summarized in Table 6.1-4a.

Meteorological shelter No. 2, which contains the signal conditioning equipment, is located approximately 40 feet southwest of the tower base.

Onsite alternate power source includes:

1. One Kohler Co. 30 kW Fast Response Generator set,
2. Kohler Co. weather housing for the generator set,
3. One diesel fuel tank with a 100-gallon capacity, and
4. One Kohler automatic transfer switch (located in shelter No. 2).

In addition to the tower equipment, a new computer will be installed with appropriate software to meet the intent of the real-time plume trajectory and dispersion calculation requirements of Appendix 2 to NUREG-0654 (USNRC 1980).

6.1.3.2 Models

The atmospheric models used to derive estimates of radiological effluent dispersion are described in detail in FSAR Sections 2.3.4 and 2.3.5.

6.1.4 Land

6.1.4.1 Geology and Soils

Preoperational monitoring of geology and soils was not discussed in the ER-CPS.

Conductivity and pH of the soils at the BVPS-2 site were studied as part of a program to monitor the impact of BVPS-1 cooling tower drift on the terrestrial ecosystem (DLC 1976a, 1977, and 1979). Soil samples were collected in winter and summer during alternate years and analyzed for pH and soluble salt concentration. Soil samples

TABLE 6.1-4

METEOROLOGICAL SYSTEM EQUIPMENT SPECIFICATIONS FOR BVPS

Instrument	Manufacturer	Model	Level	Specifications
Wind speed-direction (WS/WD)	Climet	Wind direction WD-012-10	35 feet 150 feet	Threshold 0.75 mph. Accuracy ±3 degrees for direction.
		Wind speed WS-011-1	500 feet	Threshold 0.6 mph. Accuracy ±1 percent of the wind speed reading or 0.2 mph, whichever is greater.
		Translator 025-2		
Temperature	Endevco	4470.114 Universal Sig. Cond	T_{35}ft	T accuracy ±1°F ΔT accuracy ±0.18°F
		4473.2 RTB Conditioner	ΔT_{150-35}ft	(T = -20°F to 100°F, ΔT_{150} = -4.0° to +8.0°F
	Geotech	M327 Aspirators	ΔT_{500-35}ft	ΔT_{500} = -6.0° to +12.0°F)
	Rosemont	104MB12ADCA four wire RTB		
Precipitation	Belfort	5-405 rain gauge	Ground	Accuracy ±2 percent for 1 in/hr
Dew point	Cambridge	Dew point measuring set 110S-M	35 feet	Accuracy ±0.5°F
Multipoint recorder (Temperature, precip., dew point)	Leeds and Northrup	Speedomax W	T_{35} ft ΔT_{150-35} ft ΔT_{500-35} ft	Accuracy ±0.3 percent of full scale
Multipoint recorder (Temperature)	Esterline-Angus	Speed Servo II	T_{35} ft ΔT_{150-35} ft ΔT_{500-35} ft	Accuracy ±0.35 percent of full scale
Strip recorders (3 each) (WS/WD)	Leeds and Northrup	Speedomax W/L		Accuracy ±0.3 percent of full scale WD = 0 to 540° WS = 0 to 50 mph

TABLE 6.1-4 (Cont)

METEOROLOGICAL SYSTEM EQUIPMENT SPECIFICATIONS FOR BVPS

Instrument	Manufacturer	Model	Level	Specifications
Strip recorders (3 each) (WS/WD)	Esterline-Angus	Speed Servo II		Accuracy ±0.35 percent of full scale WD = 0 to 540° WS = 0 to 50 mph
Mini-computer	Digital Equipment Corporation	PDP8/E AD01 Analog to Digital converter		Accuracy of converter is 0.1 percent full scale
Digital clock	Climet	Model 0130		Line frequency

TABLE 6.1-4a

ALTERNATE METEOROLOGICAL SYSTEM EQUIPMENT SPECIFICATIONS FOR BVPS

Instrument	Manufacturer	Model	Level	Specifications
Wind Speed-Direction (WS/WD)	Teledyne-Geotech	Wind Direction WD-1565B Wind Speed WS-1564B	35 ft 150 ft 500 ft	Wind Direction: Accuracy ±2.3° Threshold 0.75 mph Accuracy 0.3 mph for speeds less than 5 mph; ±1.1% for speeds between 5 and 50 mph
Temperature	Teledyne-Geotech	40.35 Processor 327C Aspirators Platinum Wire RTB	T(35 ft) ΔT(150-35 ft) ΔT(500-150 ft)	T Accuracy ±0.1°F ΔT Accuracy ±0.14°F T= -20°F to 100°F; ΔT(150-35 ft) = -4.0 to +8.0°F ΔT(500-35 ft) = -6.0 to +12.0°F
Multipoint Recorder (Temperature)	Esterline-Angus	Speed Servo II	T(35) ft ΔT(150-35 ft) ΔT(500-35 ft)	Accuracy ±0.35% of full scale
Strip Recorders (3 each)(WS/WD)	Esterline-Angus	Speed Servo II		Accuracy ±0.35% of full scale WD = 0 to 540° WS = 0 to 50 mph

TABLE 6.1-5

NUCLEAR REGULATORY COMMISSION
ΔT STABILITY CATEGORIES

Stability Category	Range of Vertical Temperature Gradient (°C/100m)
A	$\Delta T < -1.9$
B	$-1.9 \leq \Delta T < -1.7$
C	$-1.7 \leq \Delta T < -1.5$
D	$-1.5 \leq \Delta T < -0.5$
E	$-0.5 \leq \Delta T < 1.5$
F	$1.5 \leq \Delta T < 4.0$
G	$4.0 \leq \Delta T$

8.2 COSTS

This section supplements the costs of operation described in Chapter 8 of the Environmental Report - Construction Permit Stage by providing the latest cost estimates, in 1986 dollars, associated with the operation of Beaver Valley Power Station - Unit 2 (BVPS-2).

8.2.1 Internal Costs

The operating plant life of BVPS-2 is 40 years. As summarized in Table 8.2-1, the costs associated with the construction and operation of BVPS-2 include the following:

1. The total cost of the plant and transmission line construction is estimated to be $3,076 million (in 1986 dollars).

2. The total cost of fuel for the plant over its operating life is estimated to be $772.763 million (in 1986 dollars).

3. The projected operation and maintenance costs are expected to be $30.654 million in 1986 and $49.551 million in 1987, the first full year of plant operation. The present value of operation and maintenance costs expressed in 1986 dollars is calculated to be $939.292 million.

4. There is a one-time U.S. Nuclear Regulatory Commission (USNRC) fee of $1,069,000 for the construction permit and a one-time fee of $1,024,500 for the operating license of BVPS-2. In addition, under the current schedule, USNRC operating fees amount to approximately $70,000 per year; thus, the total USNRC fees over the life of the facility will be approximately $4.8935 million in 1986 dollars. These fees are in accordance with the current schedules published in 10 CFR 170.

5. Plant decommissioning alternatives and costs are discussed in Section 5.8. The highest cost alternative, mothballing with delayed dismantlement, is used herein. The estimated cost for this alternative for BVPS-2 is approximately $48 million in 1982 dollars. Expressed as a present worth cost in 1986 dollars using the Central Area Power Coordination Group escalation guidelines for the period 1982 to 1986, the estimated cost for decommissioning is $65.8 million.

6. Research and development costs associated with operation and maintenance are included in the overall operation and maintenance costs (that is, Item 3).

As shown in Table 8.2-1, the present worth in 1986 dollars of the operational costs for the anticipated 40-year operational life of the plant is $1,783 million, and the total cost in 1986 dollars is $4,859 million.

8.2.2 External Costs

The principal long-term cost of BVPS-2 is from the allocation of land for power plant use, rather than for existing or alternate uses. Some land in the vicinity had already been dedicated to the operation of the Shippingport Atomic Power Station and Beaver Valley Power Station - Unit 1. This land was not used intensely, and allocating it for power plant use did not significantly reduce the regional amount of land for forest, cultivation, or wildlife habitat.

The impact of the plant on scenic views or aesthetic values is not significantly adverse. Design structure and landscaping make the facility as unobtrusive as possible. Also, the land will be returned to its original condition, depending on decommissioning alternatives.

Present forecasts indicate that 465 personnel will be employed at BVPS-2 during its operation. About 20 percent of the operating personnel have already been hired. Duquesne Light Company is responsible for operating the plant, and personnel will be drawn primarily from within the company. It is expected that most of the personnel will be residents of the Pittsburgh metropolitan area which is within a 1-hour driving distance of the site, so there would be little incentive to relocate closer to the plant. It is possible, nevertheless, that some operating personnel may become residents of Beaver County. Since the number of relocations are expected to be small, and since relocating personnel are likely to be dispersed throughout several towns within the county, no notable impacts to community service, facilities, or housing are expected.

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TABLE 12.1-1

ENVIRONMENTAL APPROVALS AND CONSULTATION

Agency	Permit or Approval	Statutory Authority	Purpose	Status
I. FEDERAL AGENCIES				
U.S. Nuclear Regulatory Commission	Construction Permit	Atomic Energy Act of 1954, as amended; 10 CFR 50	Construct BVPS-2	Permit #CPPR-105 issued 5/3/74 renewed 1/30/80
	Operating License	Atomic Energy Act of 1954, as amended; 10 CFR 50	Operate BVPS-2	Application filed 12/21/82 FSAR, ER tendered 1/26/83 Application docketed 5/18/83
	Special Nuclear Materials License	Atomic Energy Act of 1954, as amended; 10 CFR 70	Reactor neutron sources, RPV surveillance capsules, Udeg enriched fuel	Application to be filed
	Source and By-Product Materials License	Atomic Energy Act of 1954, as amended; 10 CFR 30	Instrumentation calibration	Application to be filed
U.S. Department of Energy	Contract with the Secretary of Energy	Nuclear Waste Policy Act of 1982 P.L. 97-425	High-level radioactive waste disposal	Contract to be negotiated
U.S. Environmental Protection Agency	NPDES Permit*	FWPCA Section 402, P.L. 92-500; 33 USC 1251	Discharge from site construction sedimentation pond	Permit #PA 0027707 issued 6/17/76
			Discharge from construction sedimentation pond for auxiliary intake structure	Permit #PA 0025615 (Amendment 1) issued 12/16/75
			Test and operate auxiliary intake	Permit #PA 0025615 (Amendment 3) issued 6/7/76

TABLE 12.1-1 (Cont)

Agency	Permit or Approval	Statutory Authority	Purpose	Status
U.S. Environmental Protection Agency (Cont)	RCRA Hazardous Waste Facility Permanent Identification Number	Resource Conservation and Recovery Act, P.L. 74-580; 40 CFR 122-125, 260-266	Facility tracking under RCRA hazardous waste program	Identification Number PAD 98 071 4661 issued 7/23/82
Federal Aviation Administration	Air Navigation Clearance for Structures Approval	Federal Aviation Act of 1958; 14 CFR 77	Construct cooling tower	Permit #80 AEA-155-OE issued 4/1/80
Federal Communications Commission	Radio Frequency Approval	47 USC Section 151	Operate overhead monorail crane	Application to be filed
Army Corps of Engineers	Work in Navigable Waters, Dredge and Fill Permit	Rivers and Harbors Act, Section 10, 33 USC 403; Federal Water Pollution Control Act, Section 404, 86 Stat. 816, P.L. 92-500	Construct auxiliary intake	Permit #75089 issued 10/6/75
			Construct barge slip and haul road	Permit #77029 issued 7/12/77
			Construct parking lot	Permit #77030 issued 8/4/77
			Construct slope protection structure and impact basin	Application filed 2/15/84
			Construct Peggs Run culvert	Permit #83036 issued 7/18/83
Department of Transportation - U.S. Coast Guard	Navigation Lighting Approval	33 CFR 66.01-35	Navigation aid for barge slip	Issued 8/17/77
II. STATE AGENCIES				
Pennsylvania Department of Environmental Resources	NPDES Permit*	Federal Water Pollution Control Act, Section 402, P.L. 92-500	Discharge liquids from BVPS-2	Application filed 3/15/83

TABLE 12.1-1 (Cont)

Agency	Permit or Approval	Statutory Authority	Purpose	Status
Pennsylvania Department of Environmental Resources (Cont)	Water Quality Management Permit*	Clean Streams Law, P.L. 1987, as amended; 35 P.S. 691.1 et seq.; Water Obstruction Act, P.L. 555, as amended; 32 P.S. 681 et seq.	Discharge industrial waste	Permit #0473211 issued 4/11/74 amended 3/18/76 for auxiliary intake structure
			Construct sewage treatment facilities	Permit #0479403 issued 4/1/80
			Construct BVPS-2 sewage treatment facilities	Permit #0482[illegible] issued 11/10/82
	State Water Quality Certification	Federal Water Pollution Control Act, Section 401, P.L. 92-500	Construct BVPS-2	Certification granted 1/23/74
			Construct auxiliary intake structure	Certification for Permit #0475711 issued 9/19/75
			Construct barge slip and haul road	Certification for Permit #0477705 issued 4/29/77
			Construct parking lot	Issued 7/12/77
			Construct discharge channel and impact basin	Certification requested 2/15/84
			Construct Peggs Run culvert extension	Certification granted 9/1/83
	Encroachment Permit	P.L. 555, as amended, 71 P.S. 51 et seq.	Construct Peggs Run sheet piling retaining wall	Permit #0473734 issued 2/26/74
			Construct auxiliary intake structure	Permit #0475711 issued 8/29/75

TABLE 12.1-1 (Cont)

Agency	Permit or Approval	Statutory Authority	Purpose	Status
Pennsylvania Department of Environmental Resources (Cont)	Encroachment Permit (Cont)	P.L. 555, as amended, 71 P.S. 51 et seq. (Cont)	Construct barge slip and haul road	Permit #0477705 issued 4/21/77
			Construct parking lot	Issued 4/21/77
			Construct Peggs Run culvert extension	Permit #0477723 Issued 12/8/77 Revision approved 9/22/83
	Erosion and Sedimentation Control Plan Approval	Clean Streams Law, P.L. 1987; 35 P.S. Section 691 et seq.	Construct BVPS-2	Permit #0473802 Approved 1/16/74
			Construct auxiliary intake structure	Approved 8/4/75
			Construct barge slip and haul road	Approved 3/8/77
			Construct parking lot	Approved 3/8/77
			Construct emergency outfall structure	Application filed 2/15/84
			Construct Peggs Run culvert extension	Approved 11/17/77 Modification approved 6/9/83
	Plan Approval	Air Pollution Control Act, P.L. 2119, as amended	Construct air contamination source - radiological	Approval #04-306-002 issued 1/6/76 extension not required 5/26/82
			Operate air contamination source - radiological	Approval not required 5/26/82
			Construct air contamination source - auxiliary boilers	Application to be filed

TABLE 12.1-1 (Cont)

Agency	Permit or Approval	Statutory Authority	Purpose	Status
Pennsylvania Department of Environmental Resources (Cont)	Plan Approval(Cont)	Air Pollution Control Act, P.L. 2119, as amended (Cont)	Construct air contamination source - standby diesel generator	Application to be filed
			Construct air contamination source - diesel generators	Application to be filed
			Construct air contamination source - temporary auxiliary boiler	Permit #04-302-053 issued 2/7/84
	PPC Plan	25 Pa. Code, Chapters 75 and 101; 40 CFR 125, Subpart K and 40 CFR 151	Prevention and management of accidental pollution releases	Application to be filed
Pennsylvania Department of Labor and Industry	Plan Approval	Fire and Panic Act, P.L. 465, as amended	Building permit - construct various buildings	Issued 10/24/73 amended as required
			Panic hardware variance	Application to be filed
			Install diesel fuel oil tanks	Issued 10/23/78
	ASME Stamp	35 P.S. Section 1301 et seq.	Install reactor containment liner	Issued 10/1/79
Pennsylvania Department of Transportation	Highway Occupancy Permit	Pennsylvania Act No. 287	Place fill within highway right-of-way	Permit #P-328799 issued 10/12/77 Supplement #67114 issued 7/13/82

TABLE 12.1-1 (Cont)

Agency	Permit or Approval	Statutory Authority	Purpose	Status
Pennsylvania State Police	Installation Approval for Combustible Liquid Storage	P.L. 450, Section 1, as amended; 35 P.S. 1181	Embankment alteration	Permit #P-424295 issued 5/5/83
			Install underground auxiliary boiler tanks	Approved #196,733 issued 4/24/84
			Install emergency response facility diesel tanks	Permit issued 11/1/82
III. LOCAL AGENCIES				
Borough of Shippingport	Planning Module for Land Development	Pennsylvania Sewage Facilities Act, Act 537	Construct sewage treatment system	Issued 6/8/78

NOTE:

*NPDES Permit is now under the jurisdiction of the Pennsylvania Department of Environmental Resources (DER). Pennsylvania DER permit combines the establishment of effluent limitations with a permit to construct waste treatment facilities.

NRC LETTER DATED
MAY 4, 1983
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NRC Letter: May 4, 1983

Question E240.02 (ER Section 2.4.1.2)

Figure 2.4-2 shows that the groundwater gradient is toward the Ohio River. Section 2.4.1.2 states, "Use of ground water at the site is not expected to deplete regional or local supplies because the alluvium is hydrostatically connected with the Ohio River which recharges the aquifer and prevents excessive drawdown due to well pumping." There appears to be a contradiction in terms here. Does the river recharge the groundwater or is it the other way around?

Response:

In a near-river area undisturbed by well pumping, there is a net discharge of ground water to the Ohio River. This behavior is characterized by normal river conditions and depicted by Figure 2.4-2, wherein the ground-water gradient is toward the river. As discussed in Section 2.4.1.2, during periods of rising river level, flow reversal occurs, and the river recharges the aquifer. The amount recharged is then discharged as the river level falls.

If well pumping occurs, a cone of ground water level depression results. For major river-bank production wells, the ground-water gradient can be directed from the river to the aquifer, toward the well. The water withdrawn will be partly of river origin and partly of aquifer origin, thus diminishing the use of ground water which constitutes regional or local supplies.

Private residential wells, typically serving single families, have such small withdrawal rates that local gradients are not significantly affected. These wells may be located close to the river and yet draw exclusively from the aquifer.

NRC Letter: May 4, 1983 1.8

Question E240.03 (ER Section 2.4.2)

Discuss the affects of plant features (channel modifications, soil fill, etc.) on erosion and discuss any erosion protection incorporated in plant design and construction.

Response:

Design and construction of BVPS-2 has been performed in a manner minimizing the potential for erosion. An erosion and sedimentation control plan which addressed all site work associated with BVPS-2 was approved by the U.S. Department of Agriculture Soil Conservation Service in November 1973. Subsequent earth work on the BVPS site which was not considered in the original plan was addressed in a number of supplementary plans. These plans have been part of the standard project procedures in the design and construction of BVPS-2.

Erosion protection during construction has included the use of sedimentation basins, early installation of storm sewers, use of straw bales as sedimentation barriers, etc. These practices have helped reduce the quantity of sediment carried off the site and into Peggs Run and the Ohio River.

The channel for Peggs Run has been relocated, and a 1,400-foot section has been enclosed in a 15-foot diameter culvert. This channel modification was intended to minimize the quantity of sediment carried to the lower portion of Peggs Run and the Ohio River. Riprap will be placed at the downstream end of Peggs Run culvert in order to prevent local scour due to possible high velocity discharges during storm runoff.

A landscaping specification is being developed. The specification will address long-term erosion and sedimentation control.

NRC LETTER DATED
OCTOBER 20, 1983
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NRC Letter: October 20, 1983

Question E310.3

Identify the likely residential location (i.e., names of communities, counties) of the workers. Identify any anticipated impacts on the affected communities' facilities and services (i.e., schools, hospitals, water and waste treatment, fire, police) that would result from the workers' residence. List facilities and services that would require expansion or additions to capacity. Provide the same information for any BVPS-2 demands on community services.

Response:

Of the 800 DLC employees currently working at the site (operating BVPS-1 and constructing BVPS-2) approximately 50 percent live within 10 miles of the site while the rest commute from the Pittsburgh metropolitan area. The residential locations of employees already supporting the operation of BVPS-1, with percentages of the total work force in parentheses, follow. The residential locations for BVPS-2 employees should be similar.

State:	Pennsylvania	West Virginia	Ohio
County:	Allegheny (37)	Hancock (1)	Columbiana (4)
	Armstrong (2)		
	Beaver (51)		
	Butler (2)		
	Fayette (1)		
	Washington (1)		
	Westmoreland (1)		
Towns:	Aliquippa (10)	Chester (1)	East Liverpool (4)
	Ambridge (1)		
	Beaver (8)		
	Beaver Falls (6)		
	Bridgewater (1)		
	Georgetown (1)		
	Industry (3)		
	Midland (1)		
	Monaca (5)		
	New Brighton (1)		
	Pittsburgh Metropolitan Area (37)		
	Rochester (1)		
	Shippingport (1)		

It is anticipated that the DLC employees constructing BVPS-2 will remain onsite to support its operation.

Approximately 205 employees will become available for assignment to BVPS-2 when DLC's contract with the Department of Energy for operating Shippingport Atomic Power Station is ended in 1985. These employees are not expected to change their residential locations.

Therefore, no impacts on schools, hospitals, water and waste treatment, and fire and police services are anticipated to result from worker relocations. Also, no facilities or services would require expansion, nor would demands on community services increase significantly.

NRC Letter: October 20, 1983

Question E451.5

(ER Section 2.3)

In the assesssment of long-term (routine) diffusion estimates (which is cross referenced to FSAR Section 2.3.5), a methodology is described. Releases from the process vent, attached to the Beaver Valley Power Station Unit 1 natural draft cooling tower, are considered to be totally elevated. According to staff review of effluents expected to be emitted from this process vent, radioiodines will be released. The diffusion models are based on the assumption that all radioactive material is in gaseous form. Provide a transport and deposition assessment of radioiodines captured by the cooling tower drift.

Response:

An assessment of the quantity of radioiodines that may be captured by the cooling tower drift and its subsequent transport and deposition has been performed. This assessment leads to the conclusion that less than 0.1 percent of radioiodines leaving the process vent will be captured by drift and that the FSAR analysis of relative deposition (Section 2.3.5) due to gaseous emissions from the process vent is more conservative than that of drift deposition of radioiodines. The details of this assessment are discussed below.

The amount of radioiodines that may be captured by cooling tower drift is proportional to the ratio of the drift volume to exit air volume leaving the tower. Based on a drift loss percentage of 0.05 of the circulating water flow and an exit air volume of approximately 35×10^6 cfm at the design condition, this volume ratio is less than 1×10^{-6}. Due to the turbulent flow characteristic of the cooling tower/process vent system interface, the contact time between the radioiodines and the drift droplets is unfavorable for sustaining a radioiodine-drift water reaction. Therefore, the maximum amount of radioiodines leaving the process vent and becoming suspended in the drift droplets is estimated to be less than 0.1 percent of the total iodine released from this vent. It is assumed that once iodine becomes associated with a drift droplet, it will remain with the droplet throughout its flight path.

In order to assess the transport and deposition of the very small amount of radioiodines that may be captured by the drift, the results of the existing salt drift modeling analysis (ER Section 3.6.9) were adapated to produce values of normalized deposition rate (D/Q) similar to those in FSAR Tables 2.3-53 and 2.3-54. This was done by dividing the predicated salt depositon amounts by the quantity of solids leaving the cooling tower in the drift. The solids emission rate was determined from the drift rate (0.05 percent of the circulating water flow), the circulating water flow rate (507,400 gpm), and the concentration of dissolved solids in the water (412 ppm). This yields an emission rate of 458,278 lbs of salt per year which can be used to transform salt deposition (lbs/acre/year) to values of D/Q (M^{-2}). These D/Q values are indicative of how drift is transported and dispersed without considering the actual amount of radioiodines being emitted from the vent and captured by drift.

The results of this dispersion analysis are presented in Tables E451.5-1 and 2 which give the highest D/Q values for both the annual-average and grazing season periods in each sector for the individual receptors (vegetable garden, milk cow, milk goat, meat animal, and residents), at the site boundary, and at the 10 radial population distances. These tables can be compared directly to FSAR Tables 2.3-53 and 54 which provide D/Q values for gaseous emissions from the process vent in the absence of cooling tower drift. Although two different meteorological data periods were used to generate these tables (1976 for drift D/Q values and 1976-1980 for gaseous D/Q values), year to year variation in meteorological parameters should not significantly affect the comparison of the magnitudes of the D/Q values.

The analysis indicates that the magnitude of drift dispersion is somewhat similar to gaseous dispersion as evidenced by the similarity of the two sets of D/Q values. The highest annual drift D/Q value is 3.75×10^{-9} M^{-2} compared with a gaseous D/Q value of 1.10×10^{-8} M^{-2}. The major differences between the two kinds of D/Q values lie in their spatial distribution. The drift D/Q values at the closest set of distances (site boundary) are generally much smaller than the gaseous D/Q values. Although the different meteorological data periods may be responsible in part for the smaller drift D/Q values, the larger plume rise of the warm, buoyant cooling tower effluent, which carries the drift well above the top of the cooling tower before it begins to fall to the ground, most likely accounts for most of these differences. Although drift D/Q values are higher than the gaseous D/Q values by small amounts, the maximum drift D/Q value for each set of distances is always less than the gaseous D/Q value (except for grazing season value at 2,412 m). This fact, combined with the low percentage (<0.1 percent) of entrained iodine in the drift, leads to the conclusion that the FSAR analysis of relative deposition (Section 2.3.5) due to gaseous emissions from the process vent is more conservative than an assessment of drift deposition of radioiodines.

TABLE E451.5-1

MAXIMUM ANNUAL AVERAGE D/Q VALUES ($\times 10^{-9}$ M^{-2}) FOR THE BVPS-1 COOLING TOWER DRIFT

Downwind Sector	Individual Receptors* Site Boundary	Veg. Garden	Milk Cow	Milk Goat	Meat Animal	Residence	Population Distances (meters) 805	2,412	4,023	5,633	7,242	12,070	24,140	40,230	56,330	72,420
N	0.03	1.41	-	0.55	0.75	1.48	1.08	1.37	0.70	0.33	0.22	<0.20	<0.20	<0.20	<0.20	<0.20
NNE	0.66	1.73	-	0.45	1.68	1.76	1.25	1.74	1.00	0.54	0.32	<0.30	<0.30	<0.30	<0.30	<0.30
NE	0.00	1.49	0.46	0.46	0.46	1.18	1.22	2.49	1.41	0.77	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
ENE	0.00	3.43	-	0.43	-	3.43	1.66	2.63	1.36	0.62	0.41	<0.40	<0.40	<0.40	<0.40	<0.40
E	0.46	3.75	0.51	1.42	1.42	3.75	2.35	3.04	1.53	0.76	0.54	<0.50	<0.50	<0.50	<0.50	<0.50
ESE	0.71	1.98	-	1.22	1.98	2.00	1.02	1.47	0.79	0.40	0.27	<0.25	<0.25	<0.25	<0.25	<0.25
SE	0.66	1.19	0.22	0.22	0.72	1.19	0.62	0.96	0.54	0.25	0.21	<0.20	<0.20	<0.20	<0.20	<0.20
SSE	1.26	1.04	0.27	0.13	1.03	1.23	1.11	0.84	0.43	0.23	0.14	<0.13	<0.13	<0.13	<0.13	<0.13
S	1.58	0.93	0.86	-	1.41	1.44	1.05	1.43	0.63	0.32	0.23	<0.20	<0.20	<0.20	<0.20	<0.20
SSW	1.08	0.59	0.32	0.13	0.59	0.94	0.97	0.61	0.26	0.17	0.09	<0.09	<0.09	<0.09	<0.09	<0.09
SW	1.39	0.88	-	0.58	0.76	0.88	1.32	0.88	0.39	0.16	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
WSW	1.57	1.12	0.30	-	1.03	1.12	1.90	1.13	0.52	0.26	0.14	<0.13	<0.13	<0.13	<0.13	<0.13
W	1.54	0.94	0.50	-	0.80	0.94	2.00	1.80	0.83	0.37	0.19	<0.18	<0.18	<0.18	<0.18	<0.18
WNW	1.46	0.48	0.34	0.10	0.48	0.48	1.83	0.93	0.41	0.24	0.11	<0.10	<0.10	<0.10	<0.10	<0.10
NW	0.04	1.62	-	0.12	0.45	1.62	0.74	1.14	0.51	0.24	0.13	<0.12	<0.12	<0.12	<0.12	<0.12
NNW	0.00	0.85	-	0.08	0.36	0.85	0.51	0.75	0.33	0.14	0.09	<0.08	<0.08	<0.08	<0.08	<0.08

NOTE:

*Distances from the BVPS-1 cooling tower to these receptors are the same as given in FSAR Table 2.3-41 with the following exceptions:

Vegetable Garden	Residents
N - 2,391 m	NNE - 2,396 m
NE - 3,852 m	NW - 1,335 m
ENE - 1,562 m	NNW - 1,285 m
NW - 1,367 m	
NNW - 1,366 m	

These exceptions are due to the different downwind distances at which D/Q values due to process vent gaseous emissions and cooling tower drift maximize. This is caused by differences in plume rise and particle sizes between the process vent gaseous emissions and cooling tower drift emissions.

TABLE E451.5-2

GRAZING SEASON AVERAGE D/Q VALUES (x 10^{-9} M^{-2}) FOR THE BVPS-1 COOLING TOWER DRIFT

	Individual Receptors*						Population Distances (meters)									
Downwind Sector	Site Boundary	Veg. Garden	Milk Cow	Milk Goat	Meat Animal	Residence	805	2,412	4.023	5,633	7,242	12,070	24,140	40,230	56,330	72,420
N	-	1.06	-	.440	0.549	1.09	1.45	1.03	.528	0.257	0.149	<.126	<.126	<.126	<.126	<.126
NNE	0.190	1.53	-	.490	1.50	1.55	1.18	1.53	0.943	0.540	0.355	<.328	<.328	<.328	<.328	<.328
NE	-	1.85	.495	.489	0.495	1.28	1.51	2.97	1.75	0.992	0.537	<.489	<.489	<.489	<.489	<.489
ENE	-	4.71	-	.529	-	4.71	2.56	3.29	1.76	1.54	0.476	<.386	<.386	<.386	<.386	<.386
E	0.443	4.94	.628	2.04	2.04	4.94	3.63	4.07	2.17	1.08	0.612	<.494	<.494	<.494	<.494	<.494
ESE	1.30	3.20	-	1.89	3.20	3.25	1.94	2.28	1.23	0.626	0.348	<.292	<.292	<.292	<.292	<.292
SE	1.24	1.95	.327	.327	1.09	1.95	1.24	1.54	0.846	0.382	0.228	<.188	<.188	<.188	<.188	<.188
SSE	1.48	1.40	.442	.171	1.38	1.51	1.33	1.12	0.636	0.384	0.190	<.171	<.171	<.171	<.171	<.171
S	2.16	1.21	1.10	-	1.74	1.78	1.71	1.78	0.856	0.507	0.329	<.264	<.264	<.264	<.264	<.264
SSW	1.44	0.835	.478	.206	0.835	1.22	1.38	0.860	0.371	0.265	0.135	<.129	<.129	<.129	<.129	<.129
SW	1.73	1.27	-	.922	1.19	1.27	.986	1.27	0.594	0.264	0.136	<.129	<.129	<.129	<.129	<.129
WSW	1.58	1.53	.464	-	1.40	1.53	1.85	1.53	0.772	0.395	0.193	<.178	<.178	<.178	<.178	<.178
W	2.24	1.23	.653	-	1.04	1.23	2.90	2.42	1.11	0.494	0.234	<.216	<.216	<.216	<.216	<.216
WNW	1.34	0.628	.421	.110	0.628	0.628	1.88	1.22	0.516	0.304	0.121	<.110	<.110	<.110	<.110	<.110
NW	-	1.98	-	.148	0.570	1.98	1.21	1.29	0.654	0.283	0.161	<.149	<.149	<.149	<.149	<.149
NNW	-	0.328	-	.034	.167	0.373	.291	0.273	0.157	0.081	0.034	<.034	<.034	<.034	<.034	<.034

NOTE:

*Distances from the BVPS-1 cooling tower to these receptors are the same as given in FSAR Table 2.3-41 with the following exceptions:

Vegetable Garden	Residents
N - 2,391 m	NNE - 2,396 m
NE - 3,852 m	NW - 1,335 m
ENE - 1,562 m	NNW - 1,285 m
NW - 1,367 m	
NNW - 1,366 m	

These exceptions are due to the different downwind distances at which D/Q values due to process vent gaseous emissions and cooling tower drift maximize. This is caused by differences in plume rise and particle sizes between the process vent gaseous emissions and cooling tower drift emissions.

NRC LETTER DATED
MARCH 2, 1984

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NRC QUESTIONS AND RESPONSES INDEX

BEAVER VALLEY POWER STATION - UNIT 2
ENVIRONMENTAL REPORT - OPERATING LICENSE STAGE
DOCKET NO. 50-412
MARCH 2, 1984

NRC Question	ER-OLS Section	Keywords
ENVIRONMENTAL ENGINEERING BRANCH (EEB)		
E290.5	-	Site map containing locations of loudspeakers inpacting Rt. 168 trailer park
E290.6	-	Supplementary noise calculation reports
E290.7	-	Scaled plan view sketch of transformer and firewall locations
E290.8	-	Summary of specific transformer information
E290.9	-	Documentation of Unit 1 noise complaints

NRC Letter: March 2, 1984

Question E290.5

Provide a map of the site containing the locations of the loudspeakers that would impact the trailer park on Rt. 168 (home of George White) during plant operation. Provide coordinates (including elevation) of the loudspeakers and their major axis of directivity.

Response:

Table E290.5-1 lists data including plant coordinates, elevations, and directions of aim for external loudspeakers that will be used during operation of BVPS-2. The locations of the loudspeakers are shown on Figure E290.7-1.

TABLE E290.5-1

EXTERNAL SPEAKER DATA

Spkr No.	Plant Coordinates	Elev	Watts	Direction of Aim	Location
S217	N3612 E8005	740'-3"	29	South	Turbine Bldg.
S258	N3830 E7875	745'-3"	29	West	Auxiliary Bldg.
S343	N3974 E8167	777'-7"	29	North	Reactor Bldg.
S363	N3978 E8028	745'-3"	29	North	Decontamination Building
S408	N3258 E8370	809'-4"	29	East-Southeast	Inside Cooling Tower
S409	N3339 E8642	809'-4"	29	South-Southwest	Inside Cooling Tower
S410	N3042 E8730	809'-4"	29	West-Northwest	Inside Cooling Tower
S411	N2961 E8458	809'-4"	29	North-Northeast	Inside Cooling Tower

NRC Letter: March 2, 1984

Question E290.6

Provide any supplementary (to ER) reports (if available) describing the details of noise calculations (tonal and broadband) done for the site. Provide any supporting documentation on the ambient noise surveys including octave band noise spectra measured during the daytime and nighttime at sites 1-7. Include also the octave band spectra data taken for several sites in September 1983.

Response:

The predicted operational noise levels from BVPS-2 shown in ER Table 5.6-1 were obtained using the octave band noise levels of each of the major noise sources adjusted for the attenuation effects due to hemispherical divergence and atmospheric absorption. However, only the A-weighted levels are presented in Table 5.6-1. The octave band noise levels of the major noise sources were either obtained from the equipment manufacturer's noise data or were calculated using standard noise calculation methods. Section 5.6.1 identifies the major noise sources and describes the noise calculation procedure.

Tables E290.6-1 and -2 show the ambient residual octave band noise levels obtained at several measurement locations during the 1977 ambient noise survey, and during the September 1983 environmental site visit, respectively. Refer to ER Figure 2.7-1 for the locations of the measurement sites.

TABLE E290.6-1

REPRESENTATIVE DAY/NIGHT RESIDUAL OCTAVE BAND SOUND PRESSURE LEVELS*
1977 AMBIENT NOISE SURVEY

Measurement Location		Octave Band Center Frequency (Hz) 63	125	250	500	1,000	2,000	4,000	8,000	dBA
1	Day	75	74	61	59	58	54	44	35	64
	Night	Constant Day/Night levels due to Bruce Mansfield plant operation								64
2	Day	61	61	49	49	49	45	42	28	52
	Night	50	52	48	37	30	27	13	13	44
3	Day	64	63	60	57	61	53	41	23	61
	Night	Constant Day/Night levels due to Bruce Mansfield plant coal unloading								61
4	Day	55	52	48	43	41	39	34	23	50
	Night	51	49	42	38	39	34	28	21	44
5	Day	62	65	58	47	47	44	40	24	54
	Night	62	59	53	49	49	43	26	18	52
6	Day	62	64	57	51	48	40	32	25	55
	Night	57	57	50	44	42	32	13	13	48
7	Day Night	No data obtained at this location.								

NOTE:

*Sound pressure level reference 0.0002 microbars.

TABLE E290.6-2

REPRESENTATIVE DAY/NIGHT RESIDUAL OCTAVE BAND SOUND PRESSURE LEVELS*
1983 AMBIENT NOISE SURVEY

Measurement Location		Octave Band Center Frequency (Hz) 63	125	250	500	1,000	2,000	4,000	8,000	dBA
1	Day	No data obtained at this location								
	Night									
2	Day	58	52	45	47	51	46	41	49	54
	Night	50	45	42	45	50	46	43	33	54
3	Day	60	58	51	46	43	38	31	18	50
	Night	60	63	56	47	44	43	37	23	53
4	Day	49	46	40	32	31	31	34	37	41
	Night	48	47	42	39	37	40	35	23	46
5	Day	No Data - too much local activity								
	Night	52	53	49	46	38	33	29	17	46
6	Day	53	52	48	43	40	33	30	34	45
	Night	52	55	49	43	40	48	40	27	51
7	Day	No data obtained at this location								
	Night									

NOTE:

*Sound pressure level reference 0.0002 microbars.

NRC Letter: March 2, 1984

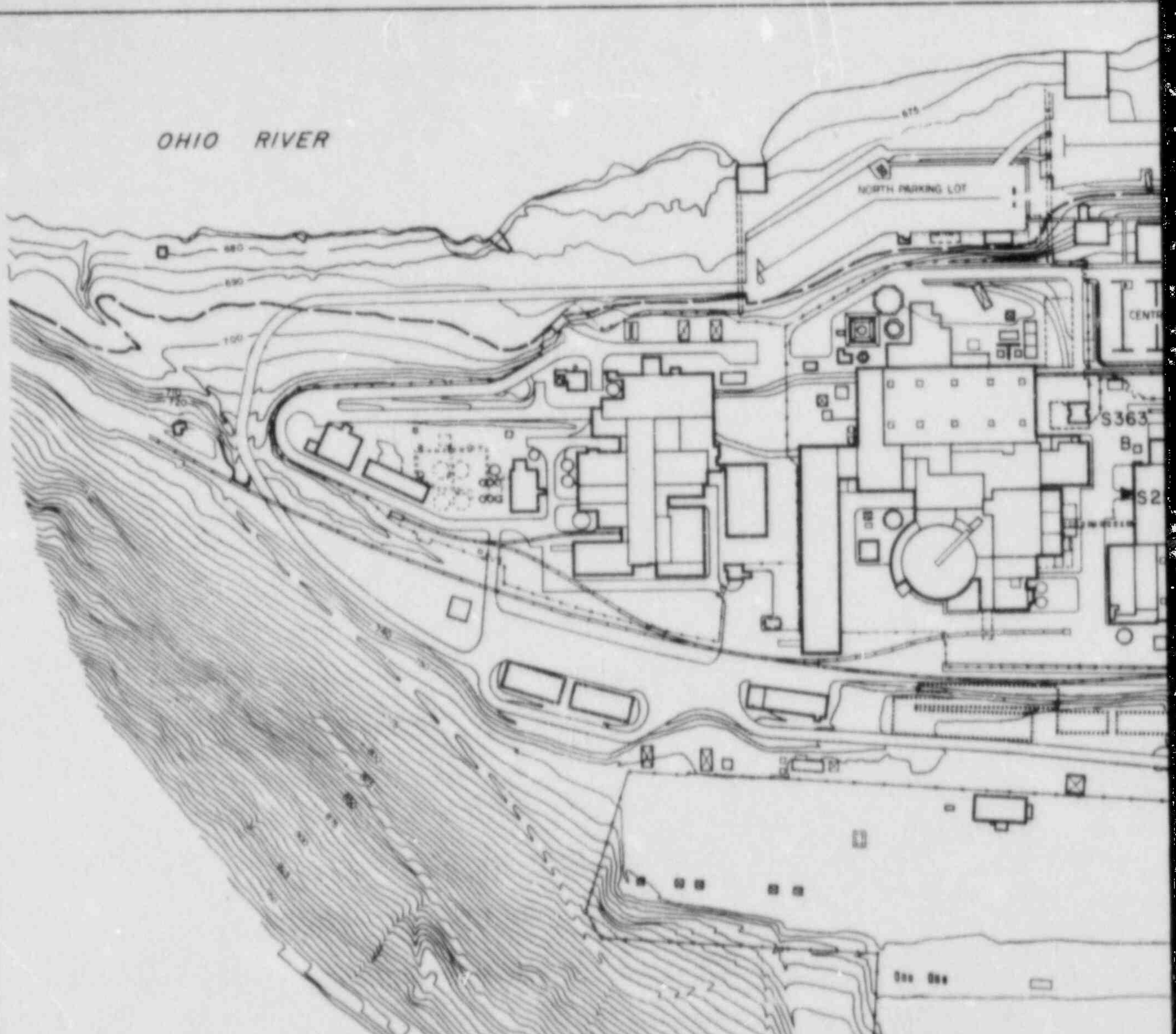
Question E290.7

Provide a scaled plan view sketch of the location of the transformers (main and auxiliary) and their firewalls. Mark on the drawing the distances between transformers and firewalls. Note also the height of the firewalls and height of the transformers. Construction layout drawings for the region around the main and auxiliary transformers are an acceptable alternative to the sketches since the detailed drawings should provide the same information.

Response:

Figure E290.7-1 contains a detailed plot plan of BVPS-2 with the locations of the main transformer, the unit station service transformers, and the system station service transformers clearly identified. The figure also shows the locations of the auxiliary boiler building and an adjacent building housing offices and work shops which have recently been added to the BVPS-2 construction plan. The combined barrier effects of the added auxiliary boiler building and the BVPS-2 cooling tower will provide additional reduction of the main transformer noise levels. In addition, the operation of the BVPS-2 cooling tower will also provide substantial masking of transformer noise. Figure E290.7-1 also shows the locations of the auxiliary boiler building and the BVPS-2 cooling tower relative to the location of the nearest resident at the intersection of Route 68 and Ferry Hill Road.

Figures E290.7-2, -3 and -4 show the detailed arrangements of the transformer areas, including the locations of the firewalls. The heights and locations of the firewalls can be obtained from these drawings.



LEGEND

S408 ▼ LOUDSPEAKER LOCATIONS AND NUMBERS (8) (REFER TO TABLE E290.5-1)

A MAIN TRANSFORMER AREA (CONTAINS THE TWO UNIT STATION SERVICE TRANSFORMERS)

B SYSTEM STATION SERVICE TRANSFORMERS (2)

C SOUTH OFFICE BUILDING

D BVPS- 2 COOLING TOWER

E AMBIENT NOISE MEASUREMENT LOCATION (LOCATION 2)

F RESIDENCE

Also Available On
Aperture Card

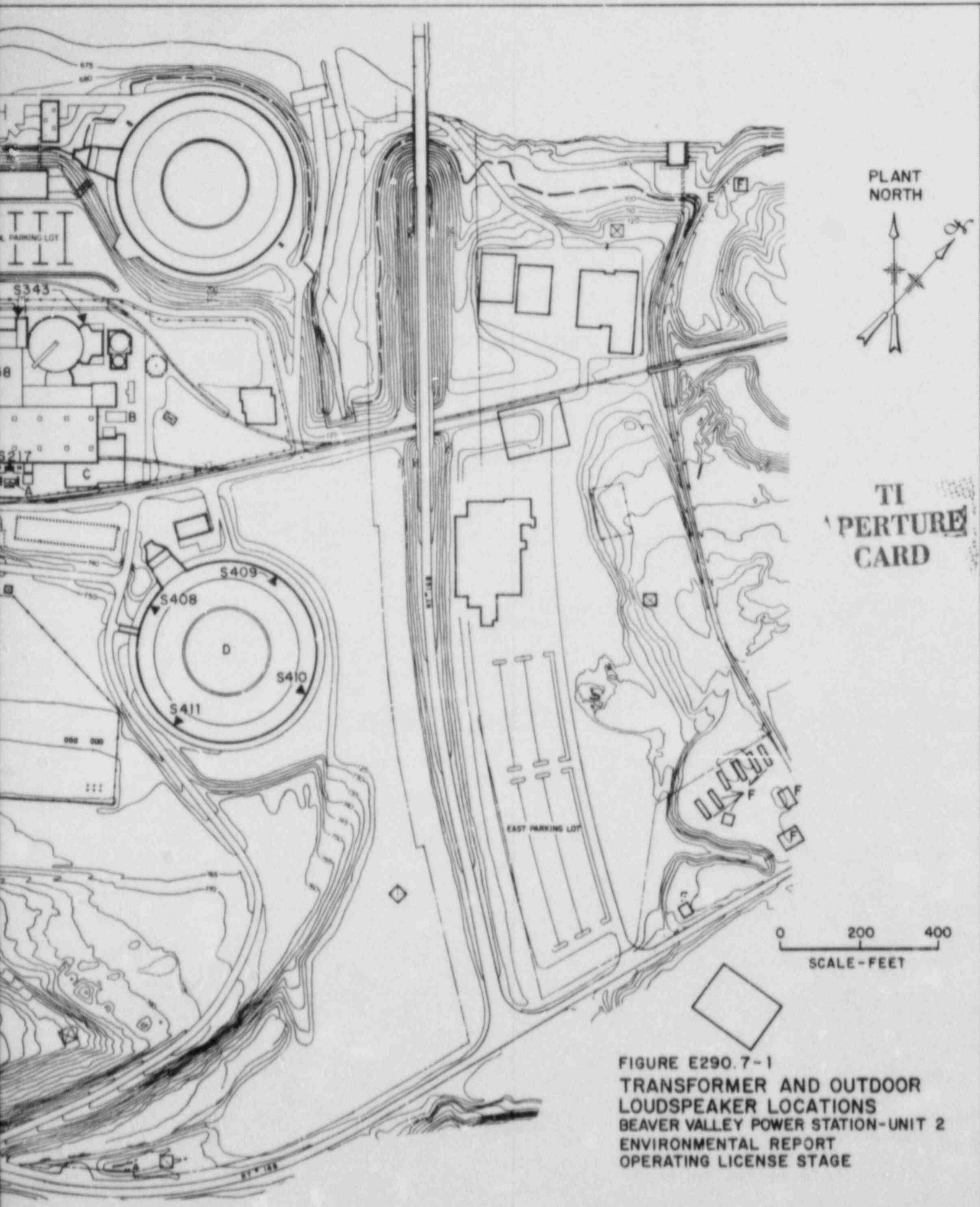
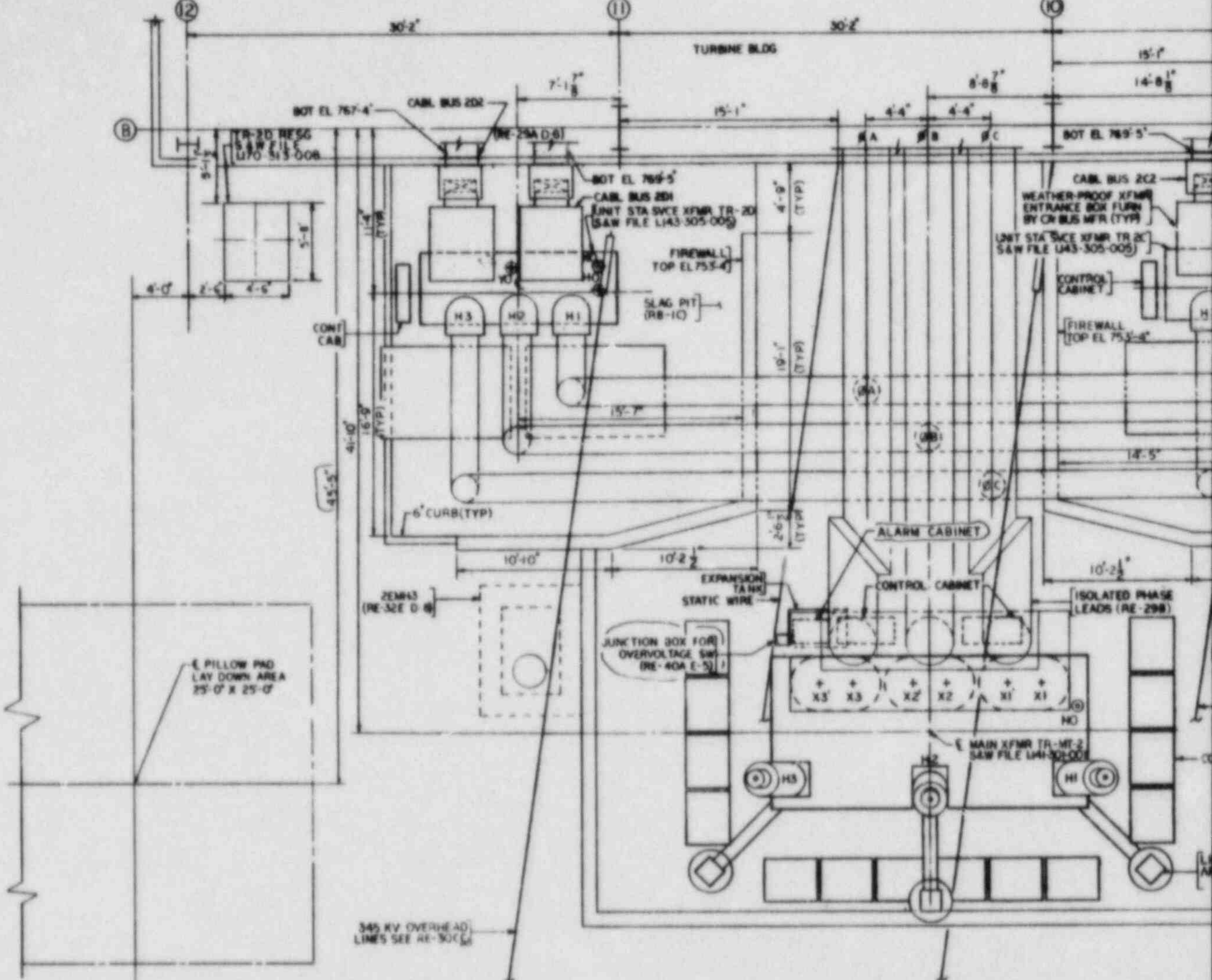


FIGURE E290.7-1
TRANSFORMER AND OUTDOOR LOUDSPEAKER LOCATIONS
BEAVER VALLEY POWER STATION-UNIT 2
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE



PLAN

SCALE: 1/4"=1'-0"

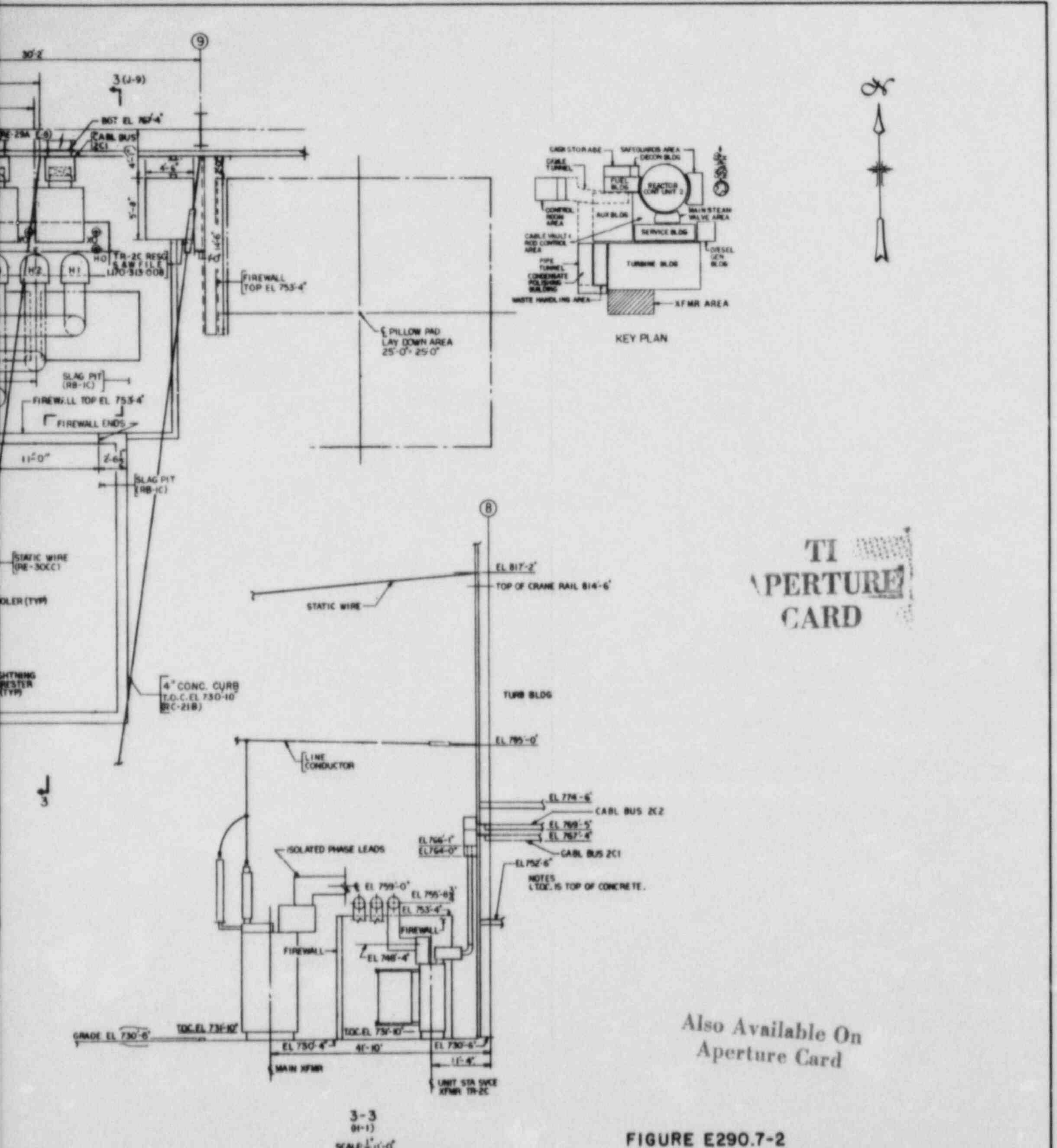
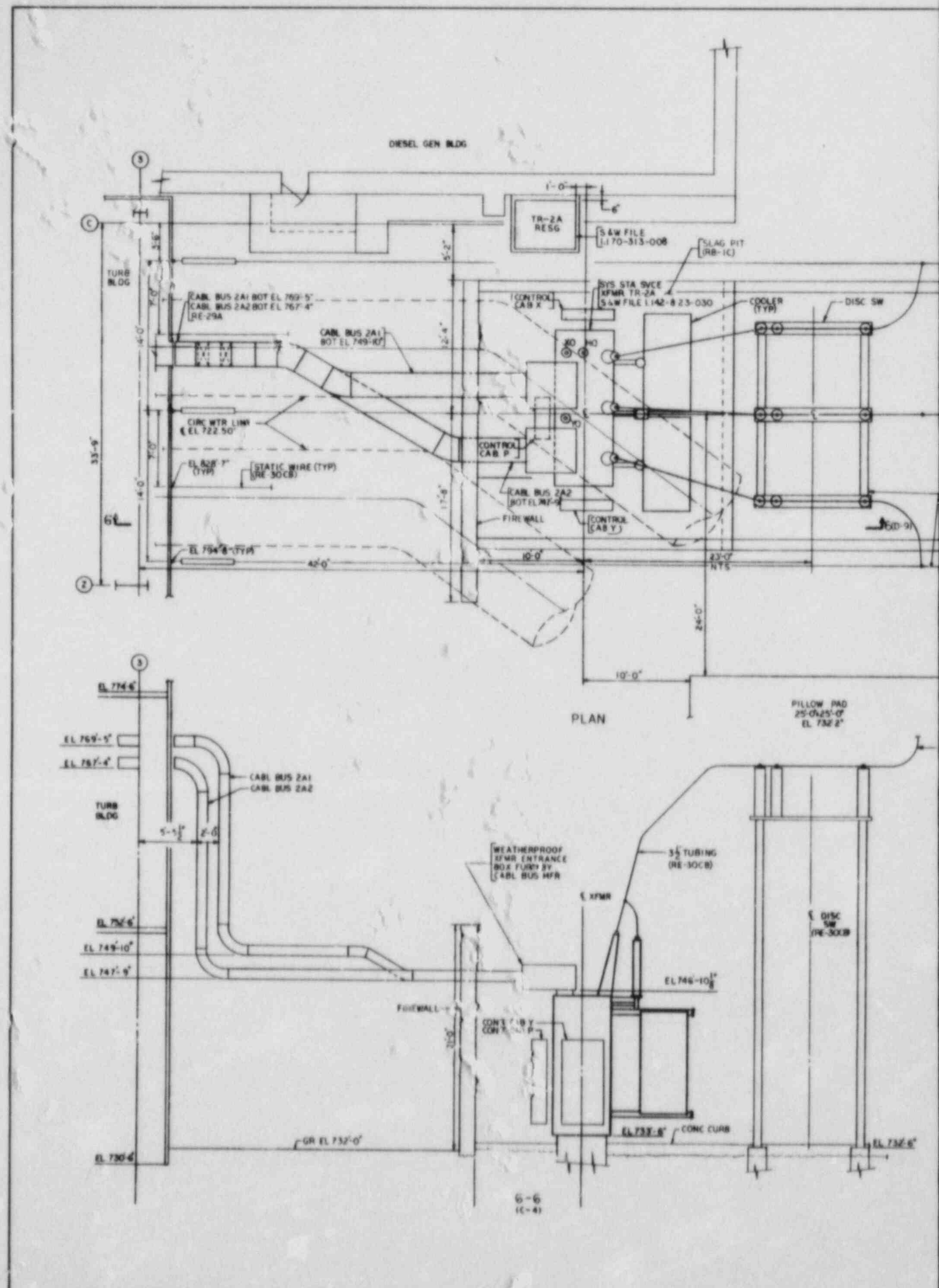
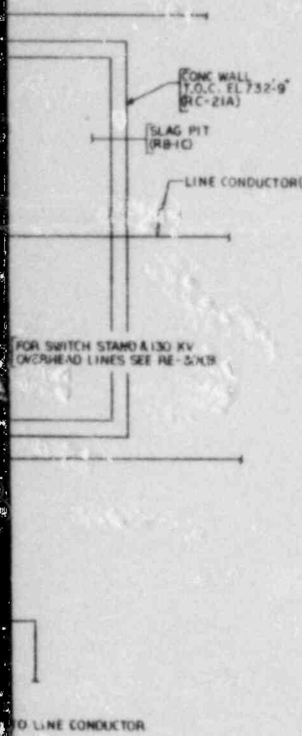
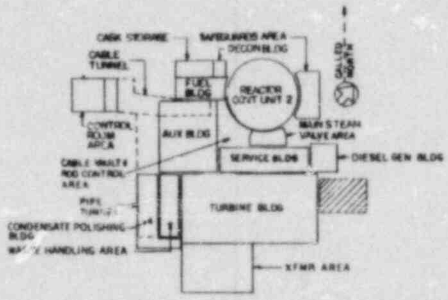


FIGURE E290.7-2
STATION SERVICE TRANSFORMERS
BEAVER VALLEY POWER STATION-UNIT 2
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE

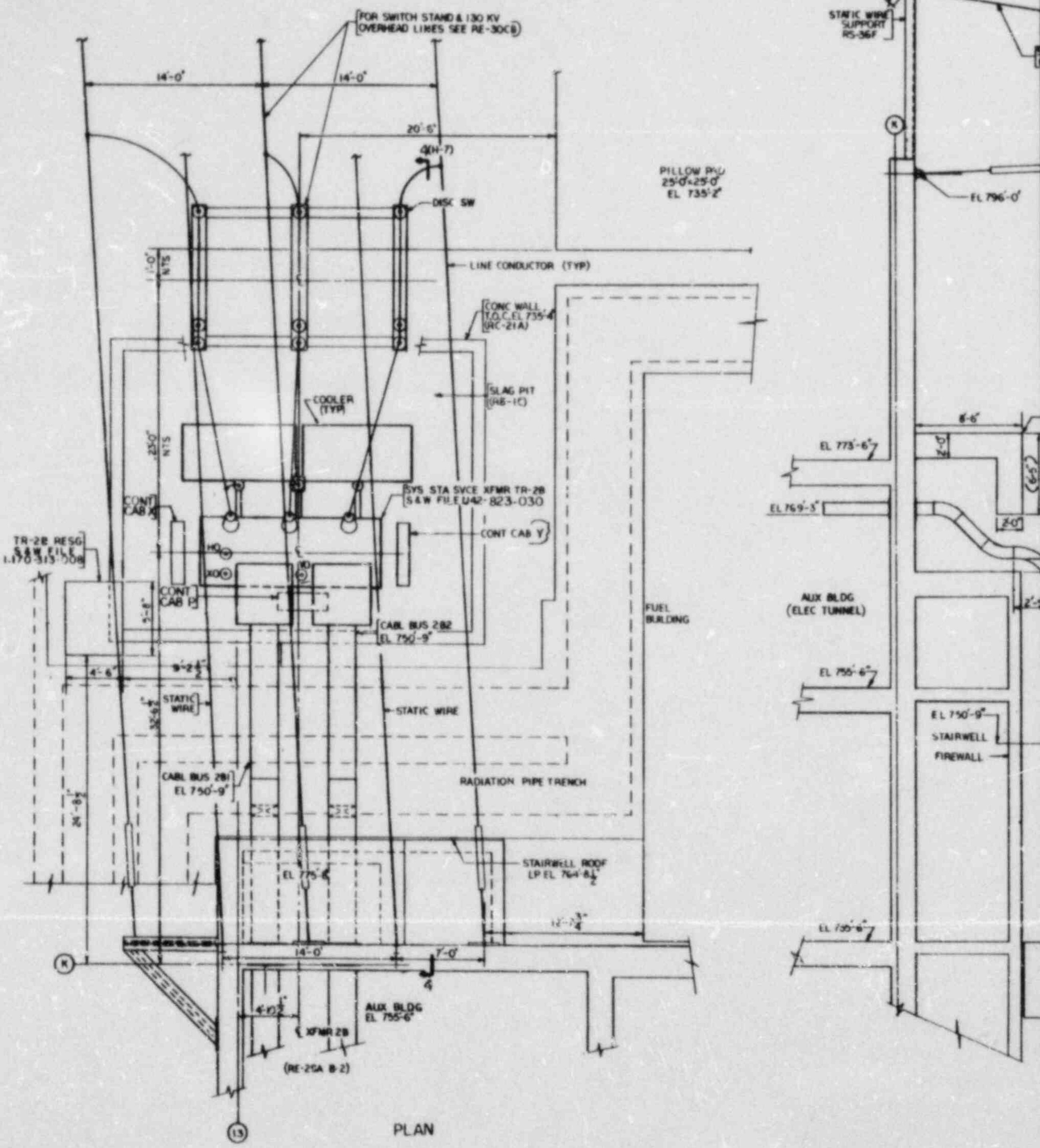

DIESEL GEN BLDG
TR-2A RESG
S&W FILE 1-170-313-008
SLAG PIT (RB-1C)
SYS STA SVCE XFMR TR-2A S&W FILE 1-142-823-030
COOLER (TYP)
DISC SW
TURB BLDG
CABL BUS 2A1 BOT EL 769'-5"
CABL BUS 2A2 BOT EL 767'-4"
RE-29A
CONTROL CAB X
CABL BUS 2A1 BOT EL 749'-10"
CIRC WTR LINE ℄ EL 722.50'
CONTROL CAB P
EL 828'-7" (TYP)
STATIC WIRE (TYP) (RE-30CB)
CABL BUS 2A2
FIREWALL
CONTROL CAB Y
EL 794'-8" (TYP)
42'-0"
10'-0"
33'-9"
14'-0"
7'-0"
5'-2"
24'-0"
PLAN
PILLOW PAD 25'-0"x25'-0" EL 732'-2"
EL 774'-6"
EL 769'-5"
EL 767'-4"
CABL BUS 2A1
CABL BUS 2A2
TURB BLDG
3½ TUBING (RE-30CB)
WEATHERPROOF XFMR ENTRANCE BOX FURN BY CABL BUS MFR
℄ XFMR
℄ DISC SW (RE-30CB)
EL 752'-6"
EL 749'-10"
EL 747'-9"
EL 746'-10⅛"
FIREWALL
CONT CAB Y
CONT CAB P
GR EL 732'-0"
EL 733'-6"
CONC CURB
EL 732'-6"
EL 730'-6"
6-6 (C-4)





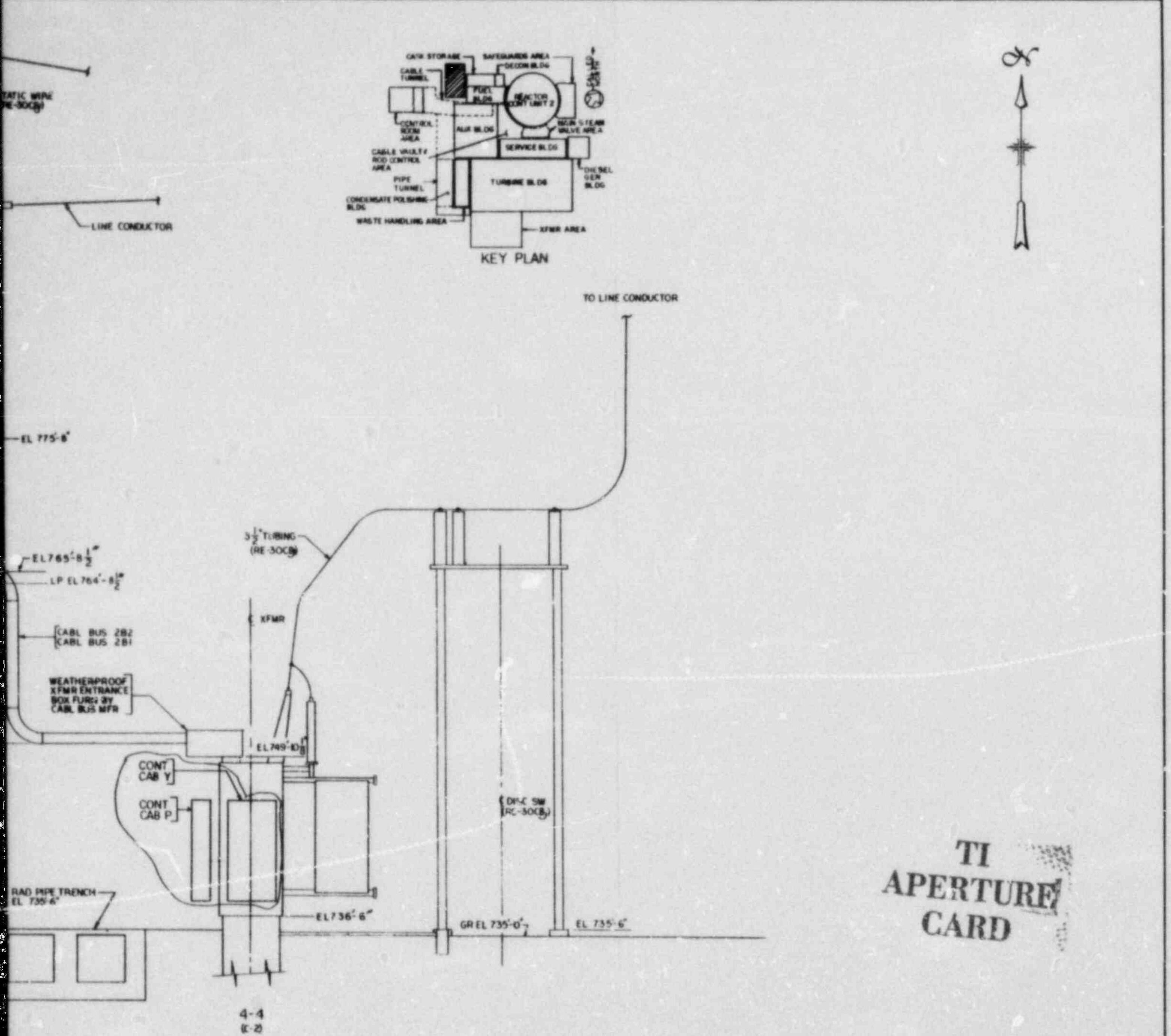
KEY PLAN

FIGURE E290.7-3
SYSTEM STATION SERVICE TRANSFORMER 2A
BEAVER VALLEY POWER STATION-UNIT 2
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE



FOR SWITCH STAND & 130 KV OVERHEAD LINES SEE RE-30C6
14'-0"
14'-0"
20'-6"
DISC SW
PILLOW PAD 25'-0"x25'-0" EL 735'-2"
LINE CONDUCTOR (TYP)
CONC WALL T.O.C. EL 735'-4" (RC-21A)
SLAG PIT (RB-1C)
COOLER (TYP)
SYS STA SVCE XFMR TR-2B S&W FILE U42-823-030
CONT CAB X
CONT CAB Y
CONT CAB P
TR-2B RESG S&W FILE
CABL BUS 2B2 EL 750'-9"
STATIC WIRE
FUEL BUILDING
RADIATION PIPE TRENCH
CABL BUS 2B1 EL 750'-9"
EL 775'-6"
STAIRWELL ROOF LP EL 764'-8½"
14'-0"
7'-0"
AUX BLDG EL 755'-6"
XFMR 2B
(RE-25A B-2)
EL 810'-6"
STATIC WIRE SUPPORT RS-36F
EL 796'-0"
EL 773'-6"
EL 769'-3"
8'-6"
AUX BLDG (ELEC TUNNEL)
EL 755'-6"
EL 750'-9"
STAIRWELL
FIREWALL
EL 755'-6"

PLAN



TI APERTURE CARD

Also Available On Aperture Card

FIGURE E290.7-4
SYSTEM STATION SERVICE TRANSFORMER 2B
BEAVER VALLEY POWER STATION-UNIT 2
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE

AMENDMENT 6 MAY 1984

8406010315-07

NRC Letter: March 2, 1984

Question E290.8

For all the transformers:

a. Indicate the names of the manufacturers, the equivalent two-winding ratings, the NEMA ratings, and the breakdown insulation levels (BIL).

b. Indicate the type of cooling system.

c. Indicate whether there is a three-phase transformer system, and, if so, whether each phase is in a separate tank.

d. Provide the core tone sound power levels if available from the manufacturer. If not known, provide the sound power level octave band spectra used in your noise analyses.

Response:

Table E290.8-1 contains a summary of specific transformer information. Each transformer system is a three-phase system located in a single tank. The main transformer octave band sound power levels used in the noise analysis presented in ER Section 5.6.1 are shown in Table E290.8-2. Only the main transformer was considered in the analysis since the NEMA sound level ratings of the other transformers were significantly lower and did not contribute to the overall operational noise levels at the station. No additional analysis was performed to evaluate the transformer tone levels.

TABLE E290.8-1

TECHNICAL SPECIFICATION OF BVPS-2 TRANSFORMERS

	Main Transformer	Unit Station Service Transformer	System Station Service Transformer
Quantity	1	2	2
Manufacturer	Westinghouse Electric Corp.	McGraw-Edison Power Systems Div.	McGraw-Edison Power Systems Div.
Rating	945,000 kVA 3 phase, 60 Hz, at 55°C	32,000 kVA 3 phase, 60 Hz, at 55°C	32,000 kVA 3 phase, 60 Hz, at 55°C
Equivalent 2-Winding Rating	HV Winding 345 kV LV Winding 21.5 kV	HV Winding 19.2/25.6/32 MVA LV Winding 9.6/12.8/16 MVA	HV Winding 19.2/25.6/32 MVA LV Winding 9.6/12.8/16 MVA
NEMA Rating	91 dB	71/73/74 dB	73/75/76 dB
BIL Base Insulation Level	HV Winding 1,050 kV LV Winding 150 kV	HV Winding 150 kV LV Winding 75 kV	HV Winding 550 kV LV Winding 75 kV
Type of Cooling System*	FOA	OA/FOA/FOA	OA/FOA/FOA
Transformer Dimensions (from drawings)	L = 22 ft W = 10 ft-4 in H = 9 ft-4 in	L = 19 ft-4 in W = 6 ft-4 in H = 6 ft-1 in	L = 14 ft-2 in W = 5 ft-4 in H = 12 ft-9 in

NOTE:

*OA - Oil emersed, self cooled.
FOA - Oil emersed, forced oil cooled.

TABLE E290.8-2

MAIN TRANSFORMER SOUND POWER LEVEL*

	Octave Band Center Frequency (Hz)								
	63	125	250	500	1K	2K	4K	8K	dBA
Main Transformer NEMA Rating	91	91	91	91	91	91	91	91	-
Octave Band Correction	+3	+5	0	0	-6	-11	-16	-23	-
Main Transformer Close-in Sound Pressure Level (SPL)	94	96	91	91	85	80	75	68	-
10 log S (S = the total surface area of the four side walls of the transformer = 57.4 m^2)	18	18	18	18	18	18	18	18	-
Main Transformer Sound Power Level** PWL = SPL + 10 log S	112	114	109	109	103	98	93	86	108

NOTES:

*PWL relative to 10^{-12} Watts.

**From Edison Electric Institute 1978. Electric Power Plant Environmental Noise Guide, p. 4-17.

NRC Letter: March 2, 1984

Question E290.9

Provide documentation on any noise complaints received during the operation of Unit 1 and any action taken.

Response:

There has been only one noise complaint received during the operation of BVPS-1. This complaint was received in September 1983. Action was taken (volume lowered and speakers redirected) with a significant reduction in speaker sound levels off site.

A followup phone call was held with the complaintant on October 6, 1983. He was satisfied with the results of the corrective action.