LIMERICK GENERATING STATION UNITS 1 & 2

ENVIRONMENTAL REPORT - OPERATING LICENSE STAGE

REVISION 8 PAGE CHANGES

The attached pages, tables, and figures are considered part of a controlled copy of the Limerick Generating Station EROL. This material should be incorporated into the EROL by following the instructions below.

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| Sector |
| --- |
| N |
| NNE |
| NE |
| ENE |
| E |
| ESE |
| SE |
| SSE |
| S |
| SSW |
| SW |
| WSW |
| W |
| WNW |
| NW |
| NNW |
| Total |

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TABLE 2.1-5

POPULATION DISTRIBUTION 0-10 MILES
2000

| DISTANCE (MILES) | | | | | | |
|---|---|---|---|---|---|---|
| 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-10 | 10-Mile Total |
| 61 | 740 | 540 | 681 | 999 | 8,905 | 11,926 |
| 141 | 263 | 335 | 460 | 194 | 3,988 | 5,381 |
| 27 | 95 | 285 | 411 | 397 | 3,810 | 5,025 |
| 32 | 91 | 353 | 470 | 230 | 2,350 | 3,526 |
| 23 | 144 | 406 | 606 | 480 | 15,327 | 16,986 |
| 73 | 167 | 426 | 371 | 419 | 18,357 | 19,813 |
| 0 | 533 | 1,501 | 5,647 | 1,578 | 4,077 | 13,336 |
| 18 | 490 | 2,110 | 5,748 | 2,384 | 40,319 | 51,069 |
| 5 | 621 | 388 | 107 | 536 | 6,434 | 8,091 |
| 0 | 732 | 461 | 500 | 355 | 3,219 | 5,267 |
| 88 | 296 | 259 | 447 | 423 | 5,078 | 6,591 |
| 67 | 326 | 753 | 632 | 1,509 | 1,782 | 5,069 |
| 65 | 79 | 1,590 | 1,593 | 2,534 | 406 | 6,267 |
| 10 | 108 | 4,630 | 15,745 | 4,726 | 11,757 | 36,976 |
| 24 | 477 | 3,415 | 8,677 | 2,033 | 1,116 | 15,742 |
| 11 | 762 | 1,255 | 1,233 | 920 | 7,035 | 11,216 |
| 645 | 5,924 | 18,707 | 43,328 | 19,717 | 133,960 | 222,281 |

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| SECTOR | 0-10 | 10-20 |
|---|---|---|
| N | 9,334 | 6,253 |
| NNE | 4,211 | 19,178 |
| NE | 3,933 | 21,396 |
| ENE | 2,759 | 38,121 |
| E | 13,294 | 52,056 |
| ESE | 15,505 | 131,917 |
| SE | 10,437 | 90,554 |
| SSE | 32,092 | 24,552 |
| S | 5,084 | 60,017 |
| SSW | 3,310 | 28,071 |
| SW | 4,142 | 4,060 |
| WSW | 3,185 | 7,472 |
| W | 4,690 | 3,644 |
| WNW | 26,001 | 123,107 |
| NW | 15,386 | 7,797 |
| NNW | 9,939 | 9,816 |
| TOTAL | 163,302 | 628,011 |

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TABLE 2.1-8

OPULATION DISTRIBUTION 10-50 MILES
(1970)

| DISTANCE (MILES) | | | |
|---|---|---|---|
| 20-30 | 30-40 | 40-50 | 50-MILE TOTAL |
| 40,245 | 42,944 | 27,908 | 126,684 |
| 188,605 | 170,433 | 35,189 | 417,616 |
| 14,868 | 22,233 | 38,547 | 100,977 |
| 38,625 | 17,188 | 28,712 | 125,405 |
| 94,689 | 164,754 | 338,592 | 663,385 |
| 724,262 | 610,275 | 73,658 | 1,555,617 |
| 1,255,972 | 566,597 | 103,147 | 2,026,707 |
| 250,377 | 25,563 | 21,282 | 353,866 |
| 29,018 | 332,241 | 18,248 | 444,608 |
| 23,849 | 36,668 | 45,361 | 137,259 |
| 34,181 | 9,976 | 14,319 | 66,678 |
| 19,717 | 62,299 | 126,433 | 219,106 |
| 15,006 | 41,717 | 70,654 | 135,711 |
| 71,310 | 18,760 | 26,015 | 265,193 |
| 16,911 | 14,553 | 61,969 | 116,616 |
| 14,500 | 5,792 | 34,883 | 74,930 |
| 2,832,135 | 2,141,993 | 1,064,917 | 6,830,358 |

| Sector |
| --- |
| N |
| NNE |
| NE |
| ENE |
| E |
| ESE |
| SE |
| SSE |
| S |
| SSW |
| SW |
| WSW |
| W |
| WNW |
| NW |
| NNW |
| Total |

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TABLE 2.1-12

POPULATION DISTRIBUTION 10-50 MILES
2000
DISTANCE (MILES)

| 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-Mile Total |
|---|---|---|---|---|---|
| 11,927 | 6,829 | 46,286 | 46,773 | 25,174 | 136,989 |
| 5,381 | 25,272 | 215,644 | 183,280 | 37,574 | 467,151 |
| 5,026 | 32,778 | 23,802 | 31,732 | 52,752 | 146,090 |
| 3,526 | 52,418 | 61,837 | 25,372 | 39,811 | 182,964 |
| 16,987 | 66,515 | 140,102 | 263,769 | 476,933 | 964,306 |
| 19,812 | 168,561 | 747,667 | 699,313 | 105,747 | 1,741,100 |
| 13,336 | 116,919 | 1,252,024 | 724,448 | 143,256 | 2,249,983 |
| 51,068 | 38,367 | 269,704 | 35,137 | 29,640 | 423,916 |
| 8,090 | 95,506 | 39,132 | 436,266 | 24,908 | 603,902 |
| 5,268 | 44,671 | 37,951 | 52,662 | 68,035 | 208,587 |
| 6,591 | 6,461 | 52,976 | 13,528 | 20,704 | 100,260 |
| 5,069 | 11,030 | 23,711 | 74,921 | 152,049 | 266,780 |
| 6,268 | 3,932 | 17,805 | 49,845 | 79,117 | 156,967 |
| 36,978 | 132,836 | 76,946 | 20,317 | 26,559 | 293,636 |
| 15,742 | 8,414 | 18,249 | 14,247 | 51,353 | 108,005 |
| 11,216 | 10,593 | 15,770 | 5,735 | 29,634 | 72,949 |
| 222,281 | 821,102 | 3,039,606 | 2,677,345 | 1,363,246 | 8,123,585 |

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that free available chlorine concentration does not exceed 0.5 mg/l. During and following chlorination, grab samples will be taken at the spray pond to monitor the chlorine concentration.

### 3.6.3 HOLDING POND EFFLUENT

A 400,000 gallon concrete-lined holding pond receives all waste-water from the Limerick Generating Station except cooling tower overflow, spray pond overflow, radwaste, sewage, and storm drainage. Holding pond inflows include low volume waste from nonradioactive floor, equipment, and sampling drains, as well as powerblock subdrainage sump pump flows and auxiliary boiler blowdown. The total holding pond inflow is expected to average 70,000 gpd, of which approximately one-half is water treatment facility waste-water from the settling basins, and approximately one-half is from miscellaneous sources. The total maximum holding pond inflow is expected to be 300,000 gpd. Two parallel 750 gpm gravity differential oil separators, located immediately upstream of the holding pond, treat all flows entering the holding pond, except for the floor dainage from the holding pond treatment enclosures, which is routed directly to the holding pond.

#### 3.6.3.1 Water Treatment Facility Wastewater from the Settling Basins

A major low volume waste source draining to the holding pond is the wastewater settling basin effluent. Raw water for the makeup water system is supplied by either the Schuylkill or the Perkiomen pumping stations. The makeup water treatment facility includes a clarification and filtration system, clarified water storage tank, ion exchange demineralization system, and demineralized water storage tank. The raw water treatment facility supplies lube water for the circulating water pump seal system, domestic water system, and demineralized water system.

Alum, polyelectrolyte, sodium hydroxide, and hypochlorite are added for clarification. Sulfuric acid and sodium hydroxide are used for regeneration of cation, anion, and mixed bed demineralizer units. Concentrated chemicals are pumped from storage tanks to system regenerant tanks, feed proportioned with dilution water, and passed through exhausted ion exchange resins. The spent regenerant chemicals are collected in a chemical waste sump, and then transferred to waste neutralizing tanks. Combined waste solutions are neutralized (pH 6.0-9.0) in two 15,000-gallon outside neutralizing tanks prior to release to the water treatment facility normal waste sump. The sulfuric acid and sodium hydroxide usages are expected to average 200 pounds per day and 150 pounds per day, respectively, for the two units. The alum usage is expected to average 50 pounds per day for the two units. The polyelectrolyte usage is expected to average 3 pounds per day for the two units.

All wastewater and floor drainage from the makeup water treatment facility is collected in a normal waste sump, and then transferred by either one or two 400 gpm sump pumps to the wastewater settling basins at a daily average rate of 9000 gpd from filter backwash, 7000 gpd from clarifier blowdown, 14,000 gpd from demineralizer regeneration, and 1000 gpd from floor, equipment, and sampling drains. Maximum wastewater flow from the water treatment facility is estimated to be 90,000 gpd.

The wastewater settling basins are arranged in parallel so that one can be cleaned while the other is still in operation. Each of the two parallel basins contains approximately 15,000 gallons, and is approximately 5 feet deep by 40 feet long by 10 feet wide, with an 8.7}foot long overflow weir. After leaving the wastewater settling basins, the chemical constituents of the wastewater from the water treatment facilities are primarily the same constituents withdrawn from the river, plus sodium sulfate that results from the neutralization reaction between sodium hydroxide and sulfuric acid. Suspended solids are reduced in the wastewater settling basin to approximately 30 mg/l in the effluent, although additional sedimentation is available at the holding pond. The dissolved solids concentration of the settling basin effluent is expected to average 1300 mg/l, resulting from demineralization of makeup water and neutralized sulfuric acid and caustic soda regenerant solutions. The wastewater settling basin effluent is routed through oil separators to the holding pond.

### 3.6.3.2 Circulating Water Pump Structure Sump Pump Effluent

Another low volume waste source draining to the holding pond is the circulating water pump structure sump pump effluent. The circulating water pump structure sumps collect circulating water pump floor drainage, chlorine feed facility drainage, acid feed facility drainage, and drainage from emergency and residual heat removal service water valve pits. The other floor, equipment, and sampling drainage that enters the sumps is expected to average 1000 gpd. From each of the two 450-gallon sumps in the circulating water pump structure, two 100 gpm sump pumps are available to transfer the water to normal waste yard piping, which drains through oil separators to the holding pond. The average and maximum daily flows from the sump pumps in the circulating water pump structure are expected to be 1,000 gpd and 10,000 gpd, respectively.

### 3.6.3.3 Auxiliary Boiler Blowdown

Three auxiliary boilers supply nonradioactive steam (45,000 pounds per hour maximum per boiler) for station heating with copper-tubed unit heaters during cold weather, and for various other services related to year-around station operation.

PREOPERATIONAL R

| Year | Sample Type | No Sta |
|---|---|---|
| 1982 | Direct Radiation | |
| (partial) | Air (Particulate & Iodine) | |
| | Surface Water | |
| | Drinking Water | |
| | Groundwater | |
| | Sediment | |
| | Fish | |
| | Vegetation | |
| | Milk | |
| | Small Game | |
| 1983 | Direct Radiation | |
| (partial) | Air (Particulate & Iodine) | |

TABLE 6.1-45 (Page 1 of 3)

ADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

| . of tions | Analysis | Frequency of Analysis |
|---|---|---|
| 48 | Gamma Dose | Monthly |
| 17 | Radioiodine (I-131) | ------- |
| | Gross Beta | Weekly |
| | Gamma Isotopic Composite | Monthly |
| 5 | Gamma Isotopic | Monthly |
| | Tritium Composite | Quarterly |
| | Gross Beta (soluble & insoluble) | Monthly |
| 5 | Gamma Isotopic | Monthly |
| | Tritium Composite | Quarterly |
| | Gross Beta (soluble & insoluble) | Monthly |
| 2 | Gamma Isotopic | Semi-annually |
| | Tritium | Semi-annually |
| 3 | Gamma Isotopic | Semi-annually |
| 3 | Gamma Isotopic | Semi-annually |
| 1 | Radioiodine | Monthly when available |
| 12 | Radioiodine (I-131) | Quarterly |
| | Gamma Isotopic | Quarterly |
| 1 | Gamma Isotopic | Annually |
| 48 | Gamma Dose | Monthly |
| 17 | Radioiodine (I-131) | ------- |
| | Gross Beta | Weekly |

TABLE 6.1-46 (Page 2 of 7)

| LOCATION DESCRIPTION | CODE | SECTOR | DISTANCE (MILES) |
|---|---|---|---|
| TLD (outer ring) | | | |
| Ringing Rock Substation | 35F1 | N | 4.2 |
| Laughing Waters GSC | 2E1 | NNE | 5.1 |
| Neiffer Rd. | 4E1 | NE | 4.6 |
| Pheasant Rd. Game Farm Site | 7E1 | ENE | 4.2 |
| Transmission Corrider, Royersford Rd. | 10E1 | E | 3.9 |
| Trappe Substation | 10F3 | ESE | 5.5 |
| Vaughn Substation | 13E1 | SE | 4.3 |
| Pikeland Substation | 16F1 | SSE | 4.9 |
| Snowden Substation | 19D1 | S | 3.6 |
| Sheeder Substation | 20F1 | SSW | 5.2 |
| Porters Mill Substation | 24D1 | SW | 3.9 |
| Transmission Corrider, Hoffecker & Keim Sts. | 25D1 | WSW | 4.0 |
| Transmission Corrider, W. Cedarville Rd. | 28D2 | W | 3.8 |
| Prince St. | 29E1 | WNW | 4.9 |
| Poplar Substation | 31D2 | NW | 3.9 |
| Yarnell Rd. | 34E1 | NNW | 4.6 |

TABLE 6.1-46 (Page 5 of 7)

| LOCATION DESCRIPTION | CODE | SECTOR | DISTANCE (MILES) |
|---|---|---|---|
| AIR PARTICULATE AND IODINE | | | |
| Sanatoga Substation | 2B1 | NNE | 1.5 |
| Pottstown Landing Field | 6C1 | ENE | 2.1 |
| Reed Rd. | 9C1 | E | 2.2 |
| Keen Rd. | 10S3 | E | 0.5 |
| LGS Information Center | 11S1 | ESE | 0.5 |
| King Rd. | 13C1 | SE | 2.9 |
| 2301 Market St., Phila. | 13H4 | SE | 28.8 |
| Longview Rd., SE Sector Site Boundary | 14S1 | SE | 0.6 |
| Spring City Substation | 15D1 | SE | 3.2 |
| Linfield Substation | 17B1 | S | 1.6 |
| Ellis Woods Rd. | 20D1 | SSW | 3.1 |
| Manor Substation | 22G1 | SW | 17.6 |
| Old Schuylkill Rd. | 26B1 | W | 1.7 |
| Yost Rd. | 29B1 | WNW | 1.8 |
| Lincoln Substation | 31D1 | NW | 3.0 |
| Met. Tower 1 | 34S2 | NNW | 0.6 |
| Pleasantview Rd. | 35B1 | NNW | 1.9 |

LGS EROL

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QUESTION E290.15

Provide a discussion on the potential environmental effects and/or hazards (excluding shocks) to biological systems from low-level electromagnetic fields generated from the transmission lines.

RESPONSE

No accepted evidence of harmful biological effects from electric or magnetic fields due to electric transmission lines has been demonstrated.

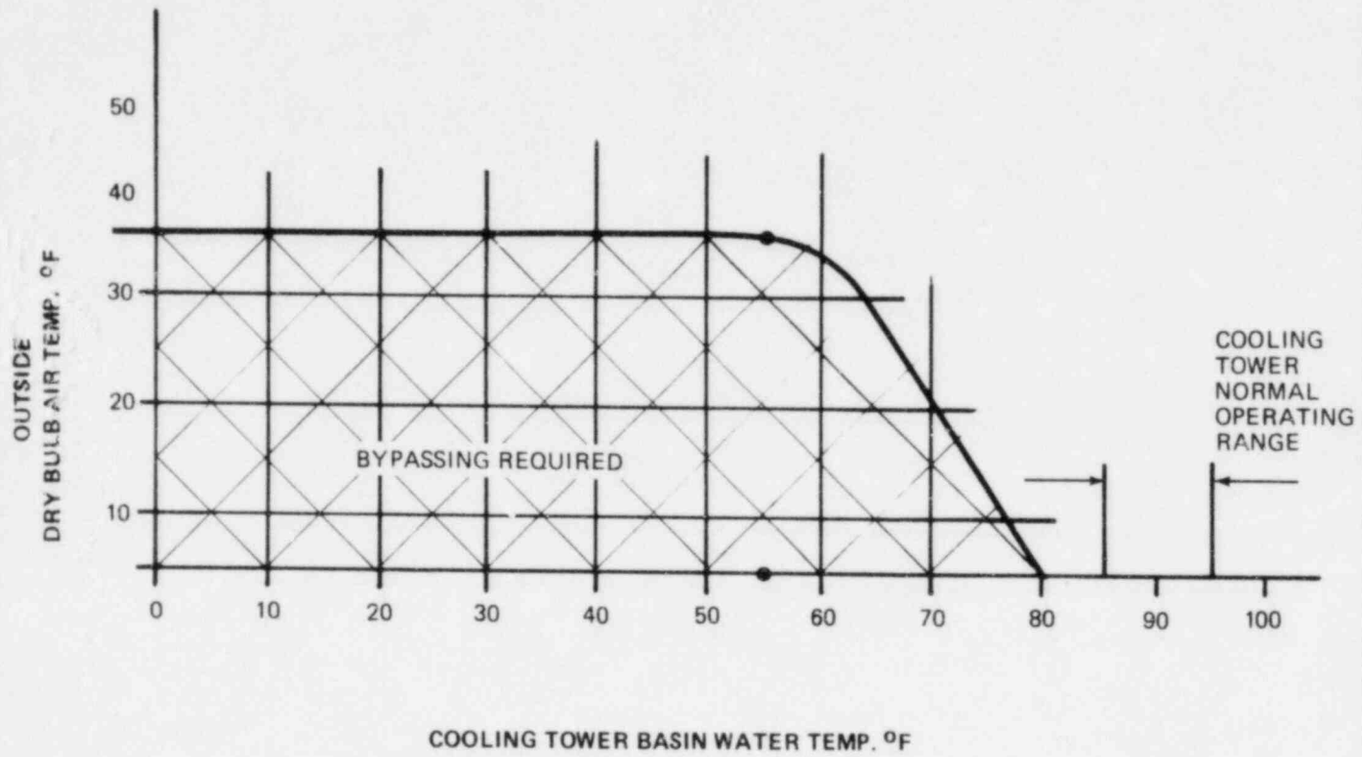
This includes over 1000 research projects as well as more than 50 years of experience with the operation of these lines.

QUESTION E291.6 (Section 3.4.2)

A statement in Section 3.4.2 mentions use of a cooling tower bypass line for the circulating water. Indicate whether the cooling towers are expected to be operated all year round. Describe those conditions and their expected frequency and duration under which the towers would be bypassed.

RESPONSE

The cooling towers are expected to operate on a year-round basis. The only time the bypass would be used would be during a winter startup after an extended shutdown, when the ambient air temperature and the basin water temperature meet the conditions shown in Figure E291.6-1. When the basin water temperature reaches the limit specified in Figure E291.6-1, bypass operation would cease and normal tower operation would resume. This type of operation is expected to occur less than 3 times a year for a period of approximately 30 hours each time.




LIMERICK GENERATING STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT

WINTER BYPASS CURVE

FIGURE E291.6-1 REV. 8, 12/82

QUESTION E291.9 (Section 3.6.2)

Indicate what limitations, including monitoring, that are to be placed on discharges from the spray pond blowdown during and following chlorination to control algae.

RESPONSE

Section 3.6.2 has been changed to indicate that monitoring of chlorine concentrations is performed during and following chlorination by taking grab samples at the spray pond. If the free available chlorine concentration of the samples should exceed 0.5 mg/l, blowdown discharge will be curtailed by stopping the makeup to the spray pond until the chlorine concentration is no longer excessive.

QUESTION E310.12 (Section 2.1.2.1)

Techniques used for estimating population within 10 miles of the station are described in Section 2.1.2.1 of the EROL. Meter counts form the basis of the estimates with factors of persons per residence used to determine total population. "A factor of 3.58 persons per residential meter in Philadelphia Electric Company territory, and a factor of 2.85 persons per residential meter for the Metropolitan Edison Company territory were used..." How were these factors obtained and why do you feel that a difference of 0.73 persons per meter exists within 10 miles of the site given electric company territory?

RESPONSE

The factor of persons per residential meter for use in Philadelphia Electric Company territory was obtained by taking the number of residential meters in the Philadelphia Electric service area Schuylkill Division, which includes the Limerick vicinity, and dividing that total into the population figures for the townships and boroughs served by the Schuylkill Division. A factor of 3.58 persons per residential meter was obtained based on data from a 1976 meter count and the 1970 census. This information was recently updated using data from a 1980 meter count and the 1980 census and a factor of 2.38 was obtained for the same area. Similarly, Metropolitan Edison calculated the factor of 2.85 persons per residential meter using 1970 census information and 2.70 persons per residential meter using 1980 census information for the townships and boroughs served by the Metropolitan Edison Central Division, which encompasses Berks County.

QUESTION E451.6 (Section 2.3)

Section 2.3.1 of the ER provides a description of air quality in the vicinity of the site. Describe station sources of criteria air pollutants as defined by the Environmental Protection Agency, including estimated emissions, and compare these emissions to the DeMinimus criteria established by the Environmental Protection Agency (EPA). If station emissions are above the DeMinimus levels, provide a quantitative assessment of the impact of station emissions on local air quality using current EPA guidelines on atmospheric dispersion modeling.

RESPONSE

The only source of criteria pollutants at Limerick are produced from the operation of the auxiliary boilers. There is a total of three boilers, any two of which may be used depending on the operating status of the power plant.

There are three identical boilers in use at Peach Bottom Atomic Power Station (PBAPS). Because the operation of these boilers is similiar to the planned operation of the Limerick boilers, the fuel consumption of the PBAPS boilers was used to produce the emission estimates. The following estimates are based on the last four years (1978-1981) average use of No. 2 fuel oil at PBAPS of $1.3 \times 10^6$ gal/yr with a sulfur limit of 0.3% by weight.

| POLLUTANT | DEMINIMUS (tons/year) | ESTIMATED EMISSION (tons/year) |
|---|---|---|
| $SO_2$ | 40 | 28.2 |
| $NO_x$ | 40 | 14.3 |
| Particulate | 25 | 1.3 |
| Ozone | 40 | 0 |
| Lead | 0.6 | 0 |
| CC | 100 | 3.3 |

The estimated emission levels are below the DeMinimus levels; therefore, no quantitative assessment of the impact of these emissions is necessary.

# Environmental Report
# Operating License Stage

# Limerick Generating Station

## Units 1 & 2

**PHILADELPHIA ELECTRIC COMPANY**

**Vol. 5**