LIMERICK GENERATING STATION UNITS 1 & 2

ENVIRONMENTAL REPORT - OPERATING LICENSE STAGE

REVISION 19 PAGE CHANGES

The attached pages 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.

After the revised pages have been inserted, place the page that follows these instructions in the front of Volume 1.

REMOVE		INSERT
	VOLUME 2	
Pages 3.2-1 & -2		Pages 3.2-1 & -2

THIS EROL SET HAS BEEN UPDATED TO INCLUDE REVISIONS THROUGH 19 DATED 7/84.

3.2 REACTOR AND STEAM-ELECTRIC SYSTEM

The Philadelphia Electric Company has employed Bechtel Power Corporation and Bechtel Construction, Inc. to serve as the architect-engineer and construction contractors of the two-unit Limerick Generating Station. Each unit employs a light water-moderated boiling-water reactor (BWR) and a turbine-generator, both supplied by the General Electric Company. Each nuclear unit is designed for an operating life of 40 years. Cooling water for the tube side of the condensers is supplied from the circulating water system that rejects heat through natural draft hyperbolic cooling towers. Figure 3.2-1 shows a simplified schematic of the reactor and steam-electric system.

Each nuclear steam supply system (NSSS) consists of a BWR/4 reactor, reactor coolant system, auxiliary systems (including systems to ensure the ability to shut down the reactor safely under adverse conditions), and appropriate instrumentation. The reactor system has a core-rated power level of 3293 megawatts thermal (MWt). Each reactor is expected to be capable of a stretch output of 3435 MWt. Stretch power output is the maximum capacity of the equipment (design) and is always a few percent greater than the nominal rated capacity. The analysis of the possible offsite radiological consequences of postulated design basis accidents, to demonstrate acceptability of the station site in accordance with 10 CFR 100, has been performed assuming a core power level of 3440 MWt.

Reactivity and thermal power are controlled during normal operation by the control rod drive system and the recirculating water flow control system. The primary reactor control elements are the control rods. The control rods are used primarily for power distribution shaping and for shim control of long-term reactivity changes that occur as a result of fuel irradiation. The boron in the control rod captures neutrons, thus limiting the nuclear chain reaction. Each control rod is surrounded by four fuel assemblies. There are a total of 185 control rods in the core. The recirculation flow control system regulates the steam volume within the core to follow rapid load changes. The volume of steam within the core controls the amount of neutron moderation and the rate of the nuclear chain reaction. The recirculation flow control system is used to vary the reactor power level by 35% or less.

Each initial core consists of 764 fuel assemblies, with each assembly containing 62 fuel rods and two water rods in a square 8x8 array with 100 mil channels. The fuel is in the form of high-density uranium dioxide compacted and sintered into cylindrical pellets. These pellets are 0.41 inch long and 0.41 inch in diameter. The initial core contains approximately 139,000 kg of naturally and artificially enriched uranium. The average enrichment of the core is 1.906% U-235. Each initial

core fuel rod consists of a 150-inch stack of fuel pellets inside a 160-inch-long Zircaloy-2 tube which is backfilled with helium and sealed at each end by welding with Zircaloy end plugs. Certain fuel rods contain pellets consisting of a blend of uranium dioxide and gadolinium, which is a burnable poison. The Zircaloy-2 clad fuel rods will confine fission fragments and their decay products, thereby keeping the concentration of radioactivity in the NSSS at low levels.

Each of the turbine-generator units consists of the turbine, generator, exciter, controls, and required subsystems. The turbine is an 1800-rpm, tandem-compound, six-flow machine, having one dual-flow high pressure element and three dual-flow low pressure elements with 38-inch last-stage blades. Exhaust steam from the high pressure element will pass through six parallel moisture separators before entering the three low pressure elements. A portion of the steam from each element is extracted for feedwater heating. The drains from each feedwater heater are cascaded successively to the next lower pressure and finally discharged into the condensers.

The generator is a direct-driven, three-phase, 60-Hz, 1800-rpm, 22,000-V, hydrogen inner-cooled, synchronous generator rated at 1265 megavoltamperes (MVA) at 0.90 power factor and 75 psig hydrogen pressure. The turbine-generator has a rated output of 1092 MWe gross at throttle conditions of 965 psia and 1191.5 Btu/lbm, and condenser backpressures of 2.81/3.56/4.67 inches of mercury absolute. The turbine-generator has a gross electrical rating of 1138 MWe with valves wide open. Inplant electrical consumption, including transformer losses and cooling tower makeup pump requirements, is estimated at 46 MWe for a net electrical plant output of 1092 MWe per unit with valves wide open.

Heat rate is the reactor core thermal heat output required to generate 1 kilowatter hour (kWh). The heat rate of Limerick Generating Station at design reactor output (3435 MWt) and net electrical power generated is 10,298 Btu/kWh. Figures 3.2-2 through 3.2-4 show the relationship of expected variations of condenser backpressure for various circulating water temperatures at design circulating water flow (450,000 gpm).