DEPARTMENT OF HEALTH
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Chief, Rules and Directives Branch
Division of Administrative Services
Mail Stop: T6-D59a
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Sir or Madam:

This letter provides information related to the NRC staff environmental review being performed for the proposed license renewal of Peach Bottom Atomic Power Plant, Units 2 and 3 (Docket Nos. 50-277, 50-278).

Sincerely,

Joel H. Hersh, M.Ed., M.P.A.
Director
Bureau of Epidemiology

Templeton = ADM-013

E-RIDS = ADM-03
Add = D. Wheeler (DXW)

Review of the Radiation and Public Health Project's

"Comment on Environmental Issues Regarding Exelon Corporation Proposal to the U.S. Nuclear Regulatory Commission To Re-License the Peach Bottom 2 and 3 Reactors"

by

Gene Weinberg, MPH, DRPH
Pennsylvania Department of Health.

Calculation of Age-adjusted Rates

The incidence and mortality rates presented in the report are all age-adjusted. While it is not feasible to check each population (denominator) and every numerator (deaths, incidence), the methodology appears to be correct. I recalculated several rates and each matched the table.

Cancer Death Rates – All Cancers Combined

The authors use the geographic and temporal distributions of cancer deaths to describe the effects of ambient radiation levels on the population's cancer burden. The report states that cancer death rates in York and Lancaster Counties increased as a result of the start-up of the Peach Bottom Units 2 and 3. A change in the cancer death rates from 3.0 percent below the U.S. rate prior to start-up, to 2% higher than the U.S. rate after the units became operational are described.

With the exception of those cancers with a short survival (stomach, lung, liver, pancreas), death rates are inappropriate for measuring the cancer risk in a population; incidence rates should be used. Cancer mortality is determined by many factors, including; the incidence rate of the disease, severity, health care, competing causes of death, and coding rules. For cancers with long survival, death rates are useless. Thyroid cancer is the best example; survival is nearly 100 percent. For every 12 new cases that occur in Pennsylvania, there is only one death.

Cancer is a group of diseases, each with different tissues of origin, different pathology, and risk factors. Therefore, lumping all types together is meaningless. The total

cancer rate is the net effect from factors specific to the individual types. The following have caused large increases in total cancer incidence in Pennsylvania independent of any risk factors in the environment; a) Screening ; As a result of breast and prostate cancer screening,, the number of cancers increased 7,000 between 1985 and 1992, b) Personal Risk Factors; Changes in smoking patterns of women resulted in increasing incidence of lung from 2,600 cases 1985 to almost 3,900 in 1995; Better Diagnostic Methods have resulted better case-finding and in higher incidence, for example brain and colon cancers.

Differences in disease rates between populations are expected, for no other reason than random variation. The change from 2 percent lower to 3 percent higher than the U.S. rate, should be considered "no difference".

Cancer Death Rates – Site Specific

Changes in death rates for the most radiosensitive tissues (organ sites) are presented. When compared to the rates for the U.S., there is a net increase in the county death rates. Again, all the limitations of mortality data apply. The most significant risk factors are not considered. For example, a major determinant of breast cancer risk is hormonal status. Women who had their first child after age 32 have twice the risk as women who had their first child before age 20. Age at menopause also determines life-long estrogen exposures and breast cancer risk. Because women of higher social class tend to start families at an older age, this group has a greater risk of developing breast cancer. Because of the socioeconomic characteristics of a population and changing demographics, breast cancer rates might be elevated. **For 1994-1998 both the breast cancer incidence rate and mortality rate for York and Lancaster Counties were lower than the state.** For many cancers the causes are not currently known, though important risk factors have been identified. These should be addressed. Viruses likely play a role in the etiology of Hodgkin's disease other lymphomas, as well as leukemia. Occupational exposures to aromatic hydrocarbons (benzene) likely increase rates in some groups. Chronic immune stimulation by viruses and other health conditions (bronchitis, bowel disease, allergies) may contribute to the risk of multiple myeloma. There is increasing evidence that cigarette smoking contributes to leukemia risk. Consequently smoking patterns may affect cancer rates in other radiosensitive organs.

In addition to radiation, there are a number of risk factors for thyroid cancer. Both iodine deficiency and iodine excess can cause thyroid cancer. Consequently, cruciferous vegetables appear to be protective, while seafood may increase risk. There appears to be an association with breast cancer risk. Like breast cancer, the influence of estrogens and other endocrine hormones can affect risk. External, acute, childhood x-radiation is carcinogenic for long periods of time. The greater the exposure, the greater are the chances of developing thyroid cancer. Prior to 1960, there were significant iatrogenic sources; dental, treatment of skin disease, tonsillitis, and thyroid conditions. These were far greater than sources from atomic energy, and have been linked to rising incidence.

Dose-Effects

The potential effects from radiation exposure are established, but only at very high doses. **Though the authors maintain that Peach Bottom releases contributed to unusually high cancer rates, epidemiological studies and studies of biological effects of low dose radiation do not support this.** Based on risk assessments from the International Commission on Radiological Protection (ICRP), the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the Biological Effects of Ionizing (BIER) III Report of the National Academy of Sciences, the exposures could not have affected either incidence rates or mortality rates in these counties. Each of these report similar excess risks They determined that if 1,000,000 people are each exposed to 1,000 millirem (1rem each), between 110 and 120 extra cancers would occur over their lifetimes. In any normal population of 10,000 people about 30 percent (3,000) will be expected to develop cancer according to the American Cancer Society. If that same group received 1,000 millirem of radiation, 3 more cancers might develop, of which 2 may be fatal, however it would be impossible to distinguish which cancers resulted from the exposures.

Radiation exposures from nuclear power plants are extremely low. Based on 1980 data, for persons living from 1 mile to 35 miles from nuclear power plants, the total dose from all pathways is between a low of 0.00001 millirem to a high of 0.05 millirem. In contrast, the average person in the United States receives about 100 millirem per year from natural

background sources; cosmic rays, building materials, internal, ground, and dental exposures add about 90 millirem.

Discussion

The conclusions of the report, "*Environmental Issues Regarding Exelon Corporation Proposal to the U.S. Nuclear Regulatory Commission To Re-License the Peach Bottom 2 and 3 Reactors" by* the Radiation and Public Health Project can not be supported. There are several methodological problems. This is an ecological study not an analytical study. The evidence presented is built on correlating cancer rates in populations to their proximity to atomic energy facilities. This approach fails to consider actual human exposures, the doses, established dose-response curves for low levels of exposure, as well as latency; the period between exposure and disease.

Other weaknesses are; 1) the use of mortality, a measure insensitive to cancer risk, when incidence data are required, 2) aggregating different types of cancers, rather than examining individual types, 3) not considering other sources of ionizing radiation, and 4) disregarding established risk factors and their attributable risks.