

**STUDY OF RADIATION EXPOSURE FROM THE
CONNECTICUT YANKEE NUCLEAR POWER PLANT
BY
THE CONNECTICUT ACADEMY OF
SCIENCE AND ENGINEERING**

EXECUTIVE SUMMARY

STATEMENT OF INQUIRY

Citizens living in the vicinity of the Connecticut Yankee Nuclear energy plant (CYN) have increasingly expressed concerns related to the reported and possible other emissions of radiogenic elements into the atmosphere, the Connecticut River and Long Island Sound. Much of the information on which these concerns were/are based, however, contains no scientific data and has little or no statistical significance.

To assist the Nuclear Energy Advisory Council with its analysis of public safety in proximity to nuclear energy plants, the Academy was asked to study and make an initial report on cancer incidences in regions with relatively high exposure from the Connecticut Yankee plant in Haddam, using data from the Connecticut Tumor Registry.

Connecticut Yankee was selected for this study because of the fact that it has been intermittently active for several decades, and was finally closed in the fall of 1996. The relatively long and specific interval during which radiogenic emissions could have occurred may provide a reliable database of tumor incidences despite the fact that the radiation half-life of many of the elements probably released extends well beyond the closing date.

SUMMARY OF FINDINGS

A review of the scientific literature revealed no definitive studies showing increased neighborhood cancer rates associated with normally operating nuclear power plants. An estimate in 1981, updated in 1987, by Northeast Utilities (NU) indicated very low rates of emission and resulting exposure dosages well below health standards. Examination of the actual emission data, which the committee received from NU, indicated that re-analysis of the available data was not likely to result in different conclusions. Therefore, the committee agreed that a modeling analysis would be more useful in determining if more intensive measurement studies were necessary.

An atmospheric transport model was utilized to estimate the exposure doses, called Committed Effective Dose Equivalents (CEDE), of selected radionuclides in each town in Connecticut. In no town was the expected total CEDE in excess of 1 millirem (mrem) for the 28-year period. The maximum expected fatal cancers for the entire state of Connecticut was estimated to be 0.11 deaths.

In addition, the committee agreed to use the Connecticut Tumor Registry to look for any associations between tumors related to radionuclides from CYN and location of towns to the plant. Incidences of leukemia (ICD-9-CM 204-208.9), multiple myeloma (ICD-9-CM 203) and thyroid cancer (ICD-9-CM 193) as recorded by the Connecticut Tumor Registry from 1976 to 1995 were examined. Geographic Information Systems (GIS) technology was used to prepare a spatially referenced database of information from the Tumor Registry. U.S. census information for 1980 and 1990 for Connecticut's 169 towns was used to normalize the cancer incidence data. No association between cancer incidence and proximity to CYN was found through this cluster analysis.

The committee then performed an analysis that compared the calculated doses with the Connecticut Tumor Registry data.

Results of logistic regression analysis comparing disease incidence, population counts and estimated exposure levels did not identify meaningful associations among the cancers and radiation exposures in the towns. In comparisons for some tumors, a negative correlation was found.

CONCLUSIONS

The committee found that exposures to radionuclides emitted from CYN are so low as to be negligible. The committee also found no meaningful associations among the cancers studied (pediatric leukemia, adult chronic leukemia, multiple myeloma, and thyroid cancer) and proximity to CYN. Both methods thus yield the same result. Then a regression analysis of the calculated doses to the tumor incidence was conducted and no correlation was found. Based on these findings, the committee concludes that atmospheric emissions from CYN have not had a detectable influence on cancer incidences. The committee has also concluded that additional study of this topic is unlikely to produce any positive correlation.