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DOCKETED  
USNRC

August 17, 2004 (3:15PM)

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

In the Matter of

DOMINION NUCLEAR CONNECTICUT, INC.: Docket Nos. 50-336-LR,  
50-423-LR

(Millstone Nuclear Power Station,  
Units 2 and 3)

: ASLBP No. 04-824-01-LR

DECLARATION OF ERNEST J. STERNGLASS

I, Ernest J. Sternglass, do hereby declare as follows:

1. I am above the age of eighteen (18) years and I believe in the obligation of an oath.
2. I reside at 4601 Fifth Avenue in Pittsburgh, Pennsylvania, 15213.
3. I submit this declaration in support of Connecticut Coalition Against Millstone Intervention in the above referenced matter.
4. I am Professor Emeritus of Radiological Physics at the University of Pittsburgh School of Medicine and have written and published extensively in the area of low-level radiation and human health, and about the adverse effects of radioactive emissions from the Millstone Nuclear Power Station in particular.
5. I am the author of the book "Secret Fallout: Low-Level Radiation from Hiroshima to Three-Mile Island" published by McGraw-Hill in 1981, of the review article "Environmental Radiation and Human Health" published by the University of California Press in 1972, and the article "Cancer Mortality Changes Around Nuclear Facilities in Connecticut" published in "Radiation Standards and Human Health: Proceedings of a Congressional Seminar February 10, 1978, by The Environmental Policy Institute in Washington DC. The facts and statements contained in these publications are incorporated by reference herein as references 1, 2 and 3 respectively.
6. I have published a series of papers on the effects of low-level environmental radiation on human health and development produced by nuclear weapons tests and reactor releases for the last

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forty years, and have testified on this subject at hearings held by the U.S. Congress, the National Academy of Sciences, State Legislatures and U.S. Government Regulatory Agencies as an expert on this subject.

7. It is my professional opinion that the radioactive releases from the Millstone Nuclear Power Station since its startup in 1970 have caused and will continue to cause excess infant mortality, low birthweight, leukemia and cancer as well as increased rates of both chronic and infectious diseases in the towns around Millstone as well as in New London County and Connecticut as a whole.

8. According to the NRC publication "Radioactive Materials Released From Nuclear Power Plants" (NUREG /CR -2907), by 1987 Millstone had released a total of 32 Curies of radioactive Iodine and Particulates into the air which include the highly carcinogenic Strontium-90 and Iodine -131, together with 6.7 million Curies of Total Fission and Activation gases such as Xenon and Krypton, and the highest liquid releases of Mixed Fission and Activation Products of any nuclear plant in the United States, namely 581 Curies or 581 trillion picoCuries, the unit of concern in milk and drinking water.

9. In a single year, 1975, Millstone released a record high of 9.99 Curies of Iodine and Particulates into the air, more than twice as high as the 4 Curies released shortly after startup in 1971, together with 29.7 million Curies of Total Fission and Activation Gases, and 199 Curies of liquid Mixed Fission and Activation Products into Long Island Sound, also a record for all U.S. nuclear reactors.

10. Between startup of Millstone in 1970 and 1975, as shown in the 1978 Millstone report (3 ), cancer mortality rose 58% in Waterford where the reactor is located, 44% in New London 5 miles to the north-east, 27% in New Haven 30 miles to the west, 12% for the State of Connecticut as a whole, 8% in nearby Rhode Island, 7% in Massachusetts and 1% in New Hampshire, while it actually declined by 6% in the most distant New England state, Maine, following the pattern of Strontium-90 in the milk shown in the same report.

11. As shown in Table 9 of reference (3), while the Strontium-90 concentration in the milk declined for the U.S. as a whole between 1970 and 1975 from 8 picoCuries per liter to only 3 pCi/l, it rose from 9.8 in 1970 to a high of 15.8 in 1973 and 14.8 in 1974 near the Millstone Nuclear Plant, remaining at 10.7 by 1975. This is far in excess of the U.S. average of 3 pCi/l, ruling out any significant contribution to the local milk from bomb test fallout by France and China that continued until 1980.

12. As shown in Table 10 of reference (3) the calculated yearly radiation dose to bone of a child due to the excess Strontium-90 within 10-15 miles of the plant in excess of the yearly dose for the U.S. rose from 33 millirem per year in the first full year of operation to 204 mrem/yr by 1974, nearly three times the normal background level of 70 mrem/yr in Connecticut.

13. These doses due to Strontium-90 alone may be compared with the 15 mrem/yr to any organ permitted under current NRC regulations, the 2 mrem produced to bone marrow in a typical chest X-ray of a child, and the 80 mrem/yr to a developing fetus found to produce a doubling of the rate of childhood leukemia in the studies of Dr. Alice Stewart cited in Reference 7 of reference (3) for exposure in the mother's womb to X-rays in the first three months of pregnancy.

14. These considerations, later supported by the more recent studies of Strontium-90 measured in baby teeth together with effects on cancer incidence and infant mortality as reported by Mangano submitted in the present case and referred to here as reference (4) provide overwhelming evidence for the existence of a causal relationship between the abnormally high levels of Strontium-90 in the milk and the pattern of cancer changes at various distances from the Millstone plant.

15. The existence of a direct causal relationship between Strontium-90 released from nuclear reactors and an increased risk of cancer is very strongly supported by the finding described by Mangano (4) that baby teeth of children diagnosed with cancer have close to double the concentration of Strontium-90 than children born the same year and in the same area. This finding has led to a lawsuit having been filed in Florida against the Florida Power and Light company by the family of a child with a very high Strontium-90 tooth concentration seeking compensation, a suit which a federal judge ruled to be of sufficient merit to go to trial in 2005, despite efforts of the defendant to have it dismissed (5).

16. As pointed out in reference (3), this conclusion is still further supported by the fact that the types of cancer that rose most strongly in the Connecticut area near the Millstone Nuclear Plant are exactly those that have been found to be most sensitive to radiation in earlier studies by national and international standard setting organizations, namely those that increased the most by 1975, such as respiratory cancers (37%), breast cancer (12%), and pancreatic cancer (32%).

17. Likewise, further support for a causal relationship of nuclear plant releases and adverse health effects is provided by the fact cited by Mancuso et al.(5) cited in reference (1) that cancer deaths showed a much greater rise in women than in men, namely 17% for white women and only 11% for

white males. This same difference between males and females was found by Mancuso and his co-investigators for atomic workers at the Hanford Nuclear Plants exposed to low doses of both internal exposures to critical organs due to inhaled and ingested radioactive elements similar to those released by Millstone over a period of years, together with protracted external exposures from gamma rays produced by fission products accumulated on the ground, rather than to very short X-ray exposures used in diagnostic procedures.

18. A renewed rise in infant mortality in the six towns nearest Millstone took place after a sharp decline by 18% when all three units had been shut down for most of 1996-97 as described in Table 9 of the 2004 report by Mangano (4), with a smaller decline of 3.1% in 1998-99 relative to 1994-95, followed by a rise of 8.8% in 2000-01. This is very strong evidence indicating that even the much smaller releases from the two remaining PWR type of reactors continue to adversely affect the health of the newborn so that there can be no safe operation of any existing type of nuclear plant for the developing children on whom the future of our nation depends.

19. The much greater risk to human health from radioactive gases and particles that are inhaled or ingested and concentrate in certain critical organs such as the bone marrow or in hormone producing glands such as the pituitary gland targeted by the highly radioactive daughter product of Strontium-90, the element Yttrium-90 that has different chemical properties and leaves the bone to concentrate in soft tissues. This results in very high local doses to both the bone marrow and the critical hormone producing glands over long periods of time that greatly exceed the whole-body dose and result in cancer and other adverse effects on health hundreds to thousands of times greater than had been expected by a linear extrapolation to low doses of the risk from short external exposures such as received by the survivors of Hiroshima and Nagasaki or individuals exposed to medical X-rays that do not concentrate in specific organs, as described in the ECRR report (6).

20. It is important to note that exposure to low levels of Strontium-90 and other bone seeking radioactive chemicals routinely released by nuclear plants that resemble Calcium do not merely increase the risk of bone cancer or leukemia, but they weaken the immune defenses provided by the white cells of the blood that originate in the bone marrow. As a result the rate of cancer development all over the body normally held in check by white cells is increased, and the defenses against infectious diseases such as influenza, pneumonia and AIDS are lowered, increasing both total and infant mortality due to all causes combined as discussed in references (1)(2)(3) and (6).

21. Unfortunately for the protection of human health, the operators of nuclear plants such as Millstone are no longer required to measure Strontium-90 in the milk, the soil, the water and other

environmental samples, nor does the government measure bone concentrations of this element after 1982, and milk concentrations of this critical element each month in a series of cities across the nation since 1990. Thus, presently the operators of nuclear reactors only measure gamma ray emitting elements such as Cesium-137 that can be more easily and cheaply measured than Strontium-90 that emits only short range electrons that cannot penetrate the Geiger counters used for gamma rays, and which requires more costly laboratory procedures for each sample.

22. As recently brought out in the ECCR report (6), the reason why the risk of low protracted exposures due to inhaled or ingested radioactive chemicals is some 100 to 1000 times greater than the same dose due to short exposures is that for the low doses given over a long period the damage by free-radicals of oxygen dominate over direct damage to the DNA and cell membranes. This leads to a dose-response curve that rises extremely rapidly for very small doses and then flattens out at high doses, thus causing the error made by a linear extrapolation to zero dose used to establish the existing safety standards for permitted releases from nuclear plants.

23. Thus, the ECRR report states in paragraph 10 of its executive summary " that the present cancer epidemic is a consequence of exposure to global atmospheric weapons fallout in the period 1959-63 and that more recent releases of radioisotopes to the environment from the operation of the nuclear fuel cycle will result in significant increases in cancer and other types of ill health (Emphasis added).

24. Thus, in the concluding paragraph of the executive summary, it says that it is "the committee's belief that nuclear power is a costly way of producing energy when human health deficits are included in the overall assessment" and that "the environmental consequences of radioactive discharges must be assessed in relation to the total environment, including both direct and indirect effects on all living systems."(6).

25. Although the most serious airborne radioactive releases so far have occurred from the operation of Unit I which was a Boiling Water Reactor (BWR) permanently closed in 1996, studies described in references (1) and (2) have found similar increases in infant mortality, low birthweight and cancer around Pressurized Water Reactors (PWR) such as Shippingport near Pittsburgh and Indian Point near New York City. Therefore, it is to be expected that a twenty year renewal of the operating licenses for Millstone Units 1 and 2 would further increase the adverse effects on human health and their associated cost in health care, as well as the damage to wildlife, birds and fish that have been rising alarmingly in recent years.

## LIST OF REFERENCES

- 1) Ernest J. Sternglass, "Secret Fallout: Low-Level Radiation from Hiroshima to Three Mile Island" (McGraw - Hill, New York, 1981) Available on the website [www.radiation.org](http://www.radiation.org).
- 2) Ernest J. Sternglass, "Environmental Radiation and Human Health", pp.145-216, Proceedings of the Sixth Berkeley Symposium on Mathematical Statistics and Probability: Effects of Pollution on Health", Edited by M. L. Lecam, J. Neyman El. Scott, University of California Press, Berkeley and Los Angeles, 1972.
- 3) Ernest J. Sternglass, "Cancer Mortality Changes Around Nuclear Facilities in Connecticut", pp. 174-212, "Radiation Standards and Human Health: Proceedings of a Congressional Seminar", February 10, 1978 published by the Environmental Policy Institute, Washington, DC.
- 4) . Joseph J. Mangano, "Risks of Cancer And Other Diseases From The Operation Of The Millstone Nuclear Plant," August 5, 2004, Radiation and Public Health Project, New York, NY.
- 5). Finestone vs. FLP, Case Number 03-140040-CIV-COHN/LYNCHC
- 6) Philippe P. Huel et al. "Antepartum Dental Radiography and Infant Low Birth Weight", Journal of the American Medical Association, Volume 291, No.16, April 28, 2004, pp. 1987-1993.
- 7) ."Health Effects of Ionizing Radiation Exposure at Low Doses for Radiation Protection Purposes: Recommendations of the European Committee on Radiation Risk", Edited by Chris Busby with Rosalie Bertell, Inge Schmitz - Feuerhake, Molly Scott Cato and Alexei Yablokov, Published for the ECRR by Green Audit Press, Castle Cottage, Aberystwyth, SY 23iDZ, United Kingdom. (2003) Website: [www.euradcom.org](http://www.euradcom.org) 2003.

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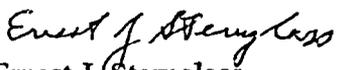
- 1) Ernest J. Sternglass, "Secret Fallout: Low-Level Radiation from Hiroshima to Three Mile Island" (McGraw - Hill, New York, 1981) Available on the website [www.radiation.org](http://www.radiation.org).
- 2) Ernest J. Sternglass, "Environmental Radiation and Human Health", pp.145-216, Proceedings of the Sixth Berkeley Symposium on Mathematical Statistics and Probability: Effects of Pollution on Health", Edited by M. L. Lecam, J. Neyman El. Scott, University of California Press, Berkeley and Los Angeles, 1972.
- 3) Ernest J. Sternglass, "Cancer Mortality Changes Around Nuclear Facilities in Connecticut", pp. 174-212, "Radiation Standards and Human Health: Proceedings of a Congressional Seminar", February 10, 1978 published by the Environmental Policy Institute, Washington, DC.
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26. This further increase of damage to human health and the environment is not only due to the short-lived radioactive elements such as Iodine-131, but also due to the long half-life of many of the radioactive chemicals routinely released by nuclear plants such as the 28 years it takes for the activity of Strontium-90 to decrease by half. Thus, it is very likely that continued operation of the Millstone Nuclear Plant will further increase the rates of cancer, low birthweight, infant mortality and chronic diseases such as hypothyroidism, diabetes, and other diseases related to immune and hormonal system damage as these elements accumulate in the underground water table from which wells draw their water, making it impossible to safely protect the public.

27. The unexpectedly great risk to the life and future health of the newborn due to very small doses of radiation to critical organs has just been further supported by a study of the incidence of premature births leading to underweight infants as reported in the April 28, 2004 issue of the Journal of the American Medical Association (7). This study revealed that the very small dose due to scattered radiation to the thyroid in the neck of the mother produced by just one or two dental X-rays during the first three months of pregnancy, approximately 40 millirem each, significantly increased the risk of premature birth and low birth weight. This in turn is known to increase infant mortality as well as producing a greater danger of mental and physical problems for infants who survive as a result of recent advances in neonatal care, but at huge emotional cost to the family and rising health care costs to society.

28. In the light of current knowledge of the unanticipated serious adverse effects on human health of extremely small doses of prolonged environmental radiation exposures to Strontium-90 and other fission products as described above, it is my professional opinion that the Millstone 2 and 3 reactors would need to end all radiation releases in order to meet public health requirements for safety, and that therefore they should not be granted license renewals to continue operations during the proposed twenty year renewal period without demonstrating that this objective can be achieved.

I hereby declare the foregoing to be true and accurate to the best of my knowledge, information and belief under penalty of perjury.

  
Ernest J. Sternglass

Dated: August 8, 2004