

EDO Principal Correspondence Control

FROM: DUE: 03/05/01 EDO CONTROL: G20010058
DOC DT: 01/31/01
FINAL REPLY:

Mary Lampert
Duxbury Nuclear Advisory Committee

TO:
Chairman Meserve

FOR SIGNATURE OF : ** GRN ** CRC NO: 01-0096
Collins, NRR

DESC: Methodology Radiological Environmental Monitoring
Program Reports, Pilgrim Station - Location of
Control Stations

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Date Printed: Feb 07, 2001 14:03

PAPER NUMBER: LTR-01-0096 **LOGGING DATE:** 02/07/2001
ACTION OFFICE: EDO

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SUBJECT: METHODOLOGY RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
REPORTS, PILGRIM STATION--LOCATION OF CONTROL STATIONS

ACTION: Direct Reply
DISTRIBUTION: CHAIRMAN, COMRS

LETTER DATE: 01/31/2001
ACKNOWLEDGED: No
SPECIAL HANDLING:

NOTES: SECY TO ACK
FILE LOCATION: ADAMS

DATE DUE: 03/05/2001 **DATE SIGNED:**

EDO --G20010058

January 31, 2001

Chairman Richard Meserve
US Nuclear Regulatory Commission
Washington DC 20555-0001

**RE: Methodology Radiological Environmental Monitoring Program Reports,
Pilgrim Station – Location of Control Stations**

Dear Mr. Chairman:

We appreciate that the NRC has in place a radiological monitoring program and that its ultimate purpose is to assure that the public's health and safety is not compromised. However the location of some of the sampling stations negates that assurance. We hope that you will look into this situation, get back to us with your assessment and rectify the problem - where and how appropriate.

Problem:

Some of the environmental control stations for the radiological monitoring program of the Pilgrim Nuclear Power Plant are located within the Emergency Planning Zone – in the towns of Kingston, Duxbury and Marshfield. We understand that this is the case at other nuclear power plants, too.

In order to assure public confidence in the accuracy and reliability of the reports, it seems to us that control locations should be sited well outside emergency planning zone towns, "so as to be [clearly] outside the influence of Pilgrim Station." Past studies investigating both potential health effects from exposure to radiation from the Pilgrim Nuclear Power Plant and meteorological conditions in this area speak to the fact that the control locations referenced are located in communities considered to be within the potential influence of Pilgrim Station.¹

Background:

Definitions – indicator and control stations:

Sampling locations have been established by considering meteorology, population distribution, hydrology, and land use characteristics of the Plymouth area. The sampling locations are divided into two classes, indicator and control. Indicator locations are those which are expected to show effects from PNPS operations, if they exist. These locations were primarily selected on the basis of where the highest predicted environmental concentrations would occur. While the indicator locations are typically within a few kilometers of the plant, the control stations are generally located so as to be outside the influence of Pilgrim Station. They provide a basis to evaluate fluctuations at indicator locations relative to the natural background radiation and natural radioactivity and fallout from prior nuclear weapons tests. *Pilgrim Nuclear Power Station, Radiological Monitoring Program, Report No. 32, January 1 through December 31, 1999, Entergy - 2.2 Environmental Monitoring Locations, page 23.*

¹ Clapp RW, Cobb S, Chan CK, Walker B Leukemia near Massachusetts Nuclear Power Plant, letter. Lancet 1987; 2:1324-5.
Morris MS, Knorr RS, Southeastern Massachusetts Health Study 1978-1986, Massachusetts Department of Public Health, 1990.
Morris MS, Knorr RS, Adult Leukemia and Proximity-Based Surrogates for Exposure to Pilgrim Plant's Nuclear Emissions, Archives of Environmental Health July/August 1996 [Vol. 51] No. 4]]
Spengler JD, Keeler GJ. Feasibility of Exposure Assessment for the Pilgrim Nuclear Power Plant. Cambridge MA: Spengler Environmental Consultants, 1988 Final report to the Massachusetts Department of Public Health.

Locations of control stations- Pilgrim NPS:

Terrestrial and Aquatic Sampling Locations, Figure 2.2-5, page 64 - *Pilgrim Nuclear Power Station, Radiological Monitoring Program, Report No. 32, January 1 through December 31, 1999*, Entergy

Description	Distance/Location
Surface Water	
Powder Point Control	13 km NNW
Irish Moss	
Brant Rock Control	18 km NNW
Shellfish	
Duxbury Bay Control	13 km NNW
Powder Point Control	13 km NNW
Green Harbor Control	16 km NNW
Lobster	
Duxbury Bay Control	11 km NNW
Fishes	
Jones River Control	13 km WNW
Sediment	
Duxbury Bay Control	14 km NNW
Green Harbor Control	18 km NNW

Example of the Problem

The excerpts from a state study on health effects associated with exposure to radiation from the Pilgrim Nuclear Power Station are illustrative. Massachusetts Department of Public Health hypothesized that those who lived close to Pilgrim NPS, within the EPZ towns, had a high potential for exposure. It is equally reasonable to hypothesize that plants, aquatic and terrestrial samples close to Pilgrim, within the EPZ towns, have a high potential for exposure, too. They should not be control stations.

Excerpts: *Southeastern Massachusetts Health Study 1978-1986* - Martha Morris, Robert Knorr - Epidemiology Unit, Bureau of Environmental Assessment, Massachusetts Department of Health.

- The major findings of the study were: Individuals with the highest potential for exposure to Pilgrim emissions (i.e., those who lived and/or worked the longest and closest to the plant [note, lived where some terrestrial and aquatic sampling stations are now located]) had almost four times the risk of leukemia as compared with those having the lowest potential for exposure (i.e., those who lived or worked the least amount of time and farthest from the plant. Page iii
- The observation of significant excesses of leukemia in specific towns including Plymouth and communities to its north led investigators to hypothesize a mechanism by which northern regions might be exposed to higher-than-expected levels of radiation [note, this is where some terrestrial and aquatic sampling stations are now located]. Page 25
- The relative risk estimates displayed in table 38 indicate that the leukemia risk associated with ever having lived within twenty miles of the Atlantic Ocean between 1972 and the "diagnosis year" was slightly greater than that associated with never having lived this close. Proximity within twenty miles, however, seems to have made little difference (i.e., the relative risk calculated for residence within one mile was actually slightly less than that determined for residence between one and twenty miles [this has obvious implications for comparing data from PNPS's indicator and control stations]. Page 61

Table 38 Results of matched case-control analyses: estimated relative risk of leukemia by distance between the Atlantic coastline and the closest residence to it occupied between 1972 and the "diagnosis year"

Distance (miles)	Cases	Controls	O.R.(odds ratio) (CI)
20+	28	59	1,00
1.25-19.75	42	78	1.46 (0.77, 2.90)
<1	35	71	1.32(0.68, 2.54)
Total	105	208	

- The principal finding of the data analyses here was a statistically significant dose-response relationship between leukemia incidence and twenty-two southeastern Massachusetts towns and an exposure score based on (1) the distance of people's residences and work sites from the Pilgrim I nuclear plant in Plymouth, (2) the duration of residence and work at each site, and (3) the frequency with which each site was downwind from Pilgrim I. Page 62
- Orientation toward the source is another factor, which can be important but is often ignored. If winds direct contaminants from the source in different directions with unequal frequency, then it is inappropriate to consider all residents of the ring to be equally exposed [again, this has obvious and important implications for the placement of indicator and control stations and the need to factor in wind direction when interpreting sampling results] - Page 63

It is reasonable to conclude that the present location of control stations inevitably will result in a misinterpretation of radiological impact. For example:

REMP Report for 1998 2.17 #31
Sediment Radioactivity Analyses

Plutonium 239/240 was detected in four of the indicator station samples, as well as in the control station samples.

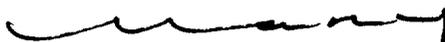
Plutonium 239/240 levels in the indicator samples ranged from 2.2 to 7.9 Pi/kg. The concentration of PU 239/240 in the single sample collected in the control locations **beyond the influence of Pilgrim Station** was 12.4 Pi/kg. **The fact that the results from the indicator locations are lower than those from the control stations indicates that the source of this activity is not Pilgrim Station.** The levels detected are also comparable to concentrations observed in the past few years and are indicative of plutonium deposited in the environment from nuclear weapons testing. Emphasis added, Page 33

To the contrary, we believe that the control sample stations are located in areas that have a high potential for exposure to Pilgrim emissions.

Conclusion

It is important to move control stations outside Emergency Planning Zone communities and factor in meteorological conditions in interpreting results. This change will enhance the accuracy and reliability of environmental impact tests. It will help protect public health safety and boost the public's confidence in the NRC.

We thank you in advance for your attention to this important public health and safety issue and look forward to your reply.


Mary Lampert, on behalf of the committee
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