

**CANCER AND ENVIRONMENTAL HAZARDS IN WOBURN, MA (B):
THE SECOND STUDY**

by Wendy O'Donnell

A Long-term Evaluation of Cancer Mortality

The cancer incidence investigation had succeeded in verifying abnormally high levels of two forms of cancer and the DPH decided to begin immediately one of the studies recommended in the report's conclusions—the examination of mortality rates from childhood leukemia and kidney cancer for the decades preceding 1969-1970. This study was assigned to only one of the divisions which had participated in the first investigation, the Division of Environmental Health Assessment. The supervisor of the project was the division's director, Dr. Norman Telles.

The study was begun right after the incidence report was released. Most of the research was conducted for the DPH by a student from the Harvard School of Public Health, Dr. Richard Rowe. This second study did not face the same problem the first had, the inability to locate existing information. Since only mortality was to be examined, the data was all there in the city's death records. Additionally, the task of analysis was eased somewhat by the decision to focus specifically on the possible effects of the wells. The connection between wastes had not been linked in the incidence survey to any of the children with leukemia, and further, nothing was known about when wastes were buried or the amounts that were originally disposed on the property. The chances, then, were almost nonexistent that death rates could be meaningfully related to the wastes.

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On the other hand, while it was not known exactly how much of the water from the contaminated wells had been used for drinking, or specifically which households received water from the wells at a given time, the researchers did know when the wells were brought on-line and the periods of time in which they were active. The possibility existed, therefore, that at least the likelihood of a relationship could be established through the study.

The researchers faced some difficulties, however, with the available information. First, over time the quality of medical technology and diagnostic abilities has changed. Death records from years ago are not always dependable. The research team eventually decided to examine a period of thirty years, from 1949–1978. Prior to that they did not believe the death records were reliable. To Telles, thirty years seemed a sufficient time period at least for the study of leukemia:

...We were really looking for differences in mortality over a period of time going back some in the history of leukemia cancer mortality in Woburn. As it turned out, the data were really only good for, and available for, the past thirty years. That was all we could reasonably rely on. We did not go back any further in time and furthermore, we felt that if, in fact, the water in Wells G and H were to be the causative factor related to the increased leukemia incidence, that we should, by going back thirty years...[be able to] determine that mortality had been otherwise normal for leukemia and other cancers—the same as the rest of the state—and that the rise in mortality would only happen ten or twelve years ago. This was, in fact, not observed, but then again, the data were so limited that it was difficult to draw any definitive conclusions.

Additionally, the ability to prove a link was limited by the lack of information existing on the state of the water in the wells during their actual time of operation. The data available on the water were from the tests which found the contaminants and caused the wells to be closed and from analyses subsequent to the closings. It was unknown, though, to which, if any, of these contaminants the cancer victims might have been exposed.

Within these known limitations, according to John Cutler who edited the Telles and Rowe report, the study originally hoped to either establish or refute the possibility of a link between the wells and the elevated cancers:

We were looking to find out when the increase [in deaths] occurred. We were looking for temporal relationships and, with the knowledge that mortality data are not very good (and they probably are more inadequate the farther back you go), we hoped to see if we could link some environmental happening to the upturn in leukemia.

Both Telles and Cutler refer only to leukemia because the researchers had early on decided to narrow their focus to it. In the final report they explain:

Kidney cancer and childhood leukemia are histogenetically quite different. With the possible exception of radiation, there is no suggestion in the medical literature that agents known to be leukemigenic are also kidney carcinogens. It is therefore unlikely that a single extrinsic agent or factor would account for both the elevated mortality from the kidney cancer and the elevated incidence of childhood leukemia during the period 1969-1978. Therefore, if either disease is environmentally induced, separate factors must be sought. One of the purposes of the study was to further test whether there was an association between the use of water from wells G and H and the occurrence of leukemia.¹

At the end of the summer of 1981, Telles and Rowe completed their draft of the report titled, Cancer Mortality in Woburn: A Three Decade Study. (See Appendix A for a copy of the report's summary.) With the research completed, Rowe was no longer associated with the DPH. Telles, at the end of the summer, took a leave of absence from the department leaving the report in the hands of John Cutler. Cutler says he heavily edited the material given to him, reducing the number of pages substantially. He then circulated the report in the DPH for comments and revisions.

Neither Prove nor Refute

The final draft of the report was released in November of 1981. The body of the report was only four pages long, but even with Cutler's editing there were well over thirty pages of appendices. In addition to mortality tables, these included documents—the bulk reproduced from

the EPA—detailing the locations of various volatile organics in Woburn's groundwater, the known health effects of the organic contaminants, and the ownership and uses of the wells located in the city.

The conclusions however, were much like those from the incidence study, able neither to prove nor refute a relationship between the activity of the contaminated wells and the death rate from leukemia. The study was able to speculate that it was highly unlikely that well water could have caused renal cancer. The conclusions from the report read:

A three decade study of childhood leukemia and kidney cancer leads to the following conclusions:

1. Childhood leukemia mortality was not elevated during the period 1949-1958. Mortality began to rise in 1959-1963.
2. No unusual geographic distribution of childhood leukemia mortality occurred during the period 1949-1968.
3. These data are consistent with the possibility that, excluding a chance occurrence, the elevated incidence of leukemia and the concentration of cases in eastern Woburn during 1969-1978 must have been due to some newly introduced factor which became present and active during the late 1950s. If contaminants present in Wells G and H contributed to this increase, then leukemia should decline in the late 1980s.
4. Mortality from kidney cancer was significantly elevated in the 1970s. Assuming a latent period of 15 to 30 years for induction of kidney cancer, environmental factors introduced after about 1950 can be excluded from having any relationship to the cancer development. It is very unlikely, therefore that Wells G and H are implicated.²

Although their conclusions were phrased differently, the second research team had arrived at approximately the same findings as the first—no hard evidence on whether a link existed

between the wells and leukemia in Woburn, although they suspected it did not. They did, however, know more about the cancers than they previously had.

Some Controversy

This second study of cancer in Woburn was not as well received as the first. Its conclusion, that leukemia mortality had "begun to rise" in 1959, bothered Bruce Young. 1959 was five years before Well G began pumping and eight years before H came on-line. The conclusion was based on the following findings of actual and expected deaths:

Table 1. Childhood Leukemia Deaths ³

<u>Years</u>	<u>Observed</u>	<u>Expected</u>	<u>SMR*</u>
1949-53	1	1.3	78
1954-58	0	1.8	0
1959-63	3	2.5	120
1964-68	4	2.4	169
1969-73	1	2.0	50
1974-78	5	1.4	357
TOTAL	14	10	140

Further, in the report's discussion section the researchers said:

One of the purposes of this study was to test further whether there was an association between the use of water from Wells G and H and the occurrence of leukemia. These additional data seem to weaken this association. The number of childhood leukemia deaths began to rise in the 1959-63 period, before the wells were drilled. Given an average latent period of two to five years, childhood leukemia associated with Wells G and H should not have started to increase until 1969-73, when in fact the rate was lower than expected. The very small number of childhood leukemia deaths, 14 over 30 years, precludes any strong statistical

* SMR is the Standard Mortality Ratio which is calculated as (observed/expected) x 100.

conclusion. If some of the childhood leukemia occurring in the 1970s was related to Wells G and H, then the incidence should decline during the next few years, since Wells G and H were closed in 1979.⁴

According to Young, the 20 percent elevation in leukemia mortality should not have been judged significant because the actual numbers were too small, and the beginning of the mortality rise should have been listed as 1964-68, during which time both wells came on-line. Young explains:

...I just felt betrayed by the department in terms of interpretation of the numbers. They show in [1959-1963] that they observed three cases and they expected 2.5. So, based on that, they say that the leukemia had significantly elevated to the point where the complicity of the wells should be ruled out because the wells weren't on-line during this period...I don't have faith any longer in the statistical analyses of the department if they come up with those conclusions based on that kind of information. I've run that [statistic] by other epidemiologists, toxicologists, and statisticians...[who don't believe] you can reach that conclusion based on 2.5 and 3.

The carefully worded third conclusion, which said that the data were consistent, excluding chance, with the likelihood "the elevated incidence of leukemia and the concentration of cases in eastern Woburn during 1969-1978 must have been due to some newly introduced factor which became present and active during the late 1950s. If contaminants present in wells G and H contributed to this increase, then leukemia should decline in the late 1980s,"⁵ did not appease Bruce Young. According to Young, "that [conclusion] was a real caveat in there. They had turned their heads completely away from the wells at that point."

Young's claim seemed to be supported by the press release issued with the report. This time the department had foregone a press conference and just distributed a release to the media. The three-page release began:

Contamination of two wells that served eastern Woburn during the 1960s and 1970s probably did not cause the

area's high rate of childhood leukemia, according to a new Massachusetts Department of Public Health (DPH) study. DPH's study, based on death records dating back to 1949, indicates that Woburn's rate of childhood leukemia began to climb in the early 1960s before the two wells began to be used.⁶

That, according to the release's author, Petra Langer, was a mistake:

The press release is stronger than the actual study. If you read the study and then you read the press release, the release is stronger [on the issue of the wells]. I didn't make it up though. I got [the information] from Gerry Parker and John Cutler. I basically asked them "What does this study mean, what does it really say?" When they told me what they thought it meant, I wrote it on paper...But I think it probably was too strong; it probably should have been more general. Although I do think that people still feel you have to look at possible causes other than those two wells.

Cancer Mortality in Woburn was released on November 17, 1981, and on that same day, the Harvard School of Public Health held a press conference to announce that, in conjunction with a group founded by Bruce Young and Anne Anderson, they would be conducting a large scale investigation of public health in Woburn. The school's spokesman said the study would try to gather information from 10,000 families in the city and would specifically examine a possible relationship between ill health and toxic chemicals in Woburn.⁷

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- 1 Teites, Cancer Mortality in Woburn: A Three Decade Study, p. 3.
 - 2 Ibid, p. 4.
 - 3 Ibid, p. 6. Table 1
 - 4 Ibid, p. 3.
 - 5 Ibid, p. 4.
 - 6 Petra Langer, Press Release, Department of Public Health, Commonwealth of Massachusetts, November 17, 1981.
 - 7 "Harvard to aid Woburn toxic study," Boston Globe, November 18, 1981, p. 25.

Appendix A

Cancer Mortality in Woburn: A Three Decade Study (1949-1978)

Summary

As a follow up of a study of childhood leukemia and kidney cancer incidence during 1969-1978, mortality from these causes was tabulated for the period 1949-1978. There was an increase in childhood leukemia mortality starting in 1959-63. No concentration of childhood leukemia deaths occurred in the Walker Pond neighborhood, where the incident case cluster occurred in the 1970s. During 1948-1968, kidney cancer mortality was lower than expected but rose sharply during the 1970s. There was no geographic concentration of deaths.