ILLINOIS POLLUTION CONTROL BOARD
June 21, 1990

CITY OF BRAIDWOOD,	)	
	)	
Petitioner,	)	
	)	
v.	)	PCB 89-212
	)	(Variance)
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,	)	
	)	
Respondent.	)	

CONCURRING OPINION (by B. Forcade and J.D. Dumelle):

While we agree with the majority that the variance should be denied for all the reasons they state, we disagree on the health issues. Therefore, we concur.

The question of the health impacts of drinking water contaminated with radiological materials must be viewed in the overall perspective. The only appropriate focus is to determine how many people have been drinking water, at what level of contamination, and then attempt to project what the health impacts are likely to be. Most drinking water in Illinois contains no measurable level of radium, and it is against this bench mark that Braidwood's water should be measured.

According to the Illinois Blue Book, Braidwood was incorporated on March 4, 1873, and had a population of 3,279 during the 1900 census. The current population is around 3500 (R. 14). These numbers seem to imply that the size of the population at risk has been stable as far as demographic considerations. The record does not state specifically what number of people are served by the high radium water. But, there is evidence that water at 30.6 pCi/l is being distributed and there is no evidence to show that significant portions of the city are being supplied water that is substantially less contaminated.

There is no evidence to tell us when the radium contaminated deep wells were first placed in service so that the exposure time to the contaminated water can be calculated. Certainly the record indicates that present radiological levels were known to the Agency and Braidwood as early as 1981 (See Ex. A). Also, radiological analyses of samples taken in July, 1979, showed Gross Alpha contamination of 71.7 pCi/l (plus or minus 12.0) and Gross Beta of 64.0 pCi/l (plus or minus 10.6). Dr. Toohey is convinced that in this particular water supply, all the Gross Alpha comes from radium (R. 51), so historical levels of radium may have been more than double the present values. As a conservative calculation of health risk, we can assume present

contamination exposure levels were constant for a period of time representing the average human lifetime (say, 72 years), then modifications can be made to account for different contamination levels or for a shorter period of time that the deep wells might have been in service.

Dr. Hallenbeck provided two formulae (Respondent's Ex. #6, pp. 4-5) to calculate certain health impacts to a community. The first formula predicts the most probable estimate of excess lifetime risk of bone or head sarcoma mortality. It is the end result of the multiplication of several factors: [(2×10^{-7}) (combined radium concentration) (population at risk)]. This result would then be multiplied by years of exposure that have occurred for an estimate of the excess cancer mortality from these sarcomas. The second formula predicts the upper 99% confidence limit for such exposures. It is the same as the preceding formula except the number 3.1 replaces the number 2 in the first term. Since the number of people historically exposed seems constant and the concentration of contaminants seems relatively constant, the mathematics is straightforward. If 3500 people from Braidwood have been drinking 30.6 pCi/l combined radium water for 72 years , then the most probable formula would predict:

(2×10^{-7}) (30.6 pCi/l) (3500) (72 years) = 1.54 human deaths

If the 99% confidence level formula is used, it becomes:

(3.1×10^{-7}) (30.6 pCi/l) (3500) (72 years)= 2.39 human deaths

If the 11 year old Gross Alpha test results more accurately reflect long term radium levels (71.7 pCi/l), then the results from the above formulae would be 3.61 human deaths and 5.60 human deaths. If instead, the radium levels are as described but the deep wells have only been in service for say 36 years, then the results from the above formulae would be 0.77 human deaths and 1.20 human deaths.

In short, the estimate of the number of people already killed by certain sarcomas from drinking Braidwood's radium contaminated water could be as low as 0.77 or as high as 5.60 people from this city of 3500, depending upon the particular assumptions that are made about historical contaminant levels and well placement dates.

It is important to recognize what these numbers mean and what they do not mean. They do not mean that from 1 to 6 seventy year old people who lived all of their life in Braidwood died of head or bone sarcomas. It means that out of a group that large (3500), exposed for that long (36-72 years), at that level (30.6-71.7 pCi/l), from 1 to no more than 6 fatal sarcomas would be expected to have occurred; they could have occurred in middle

aged people or in children. In a similar manner the number of total fatalities would remain the same if the population had a significant turnover rate due to people moving, you would just have to look at a larger group of people who had been exposed for a shorter period of time.

Also, the present record does not reassure us that these are the only health impacts from drinking radium contaminated water. There is no constitutional right for a chemical to be presumed innocent until proven guilty beyond reasonable doubt. In proceedings such as this one, we believe that the correct standard to be used is whether the connection between a contaminant and an adverse health impact is more likely true than not true. No one has provided an opinion based on that standard. Both Dr. Toohey and Dr. Hallenbeck cite to leukemia studies and state that they remain unconvinced of the association, or that the association is too tentative and cannot be used in a quantitative risk assessment. This is a far cry short of a positive determination that radium does not cause leukemia. It is also short of a conclusive determination that the evidence showing radium does not cause leukemia is stronger than the evidence showing that it does.

It is a profoundly rare situation when the evidence before the Board shows estimated deaths from any cause at a level between 0.77 and 5.60 people from lifetime exposure of a population of only 3500. We felt that the instant circumstance was so unusual as to deserve additional comment.

Bill S. Forcade
Board Member

Jacob D. Dumelle, P.E.
J. D. Dumelle
Board Member

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above Concurring Opinion was filed on the 11th day of July, 1990.

Dorothy M. Gunn, Clerk
Illinois Pollution Control Board