

Report on Tritium

For the
Will County
Health, Aging, and Education Committee

Theodore J. Hogan, PhD, CIH
Theodore J. Hogan & Associates, Inc.
Lemont, IL 60439

August 14, 2006

H-44

Tritium and Community Health Concerns

The residents around the Braidwood Nuclear Generating Station were understandably angered by the reports of a series of releases of tritiated water ("tritium"). I believe some of the reasons they may have been upset include:

- Anxiety about whether their drinking water was safe
- Concerns about health, particularly health effects of a radioactive material
- Lack of knowledge about tritium
- Confusion about radiation terms such as "picocuries per liter" and "half life"
- Concerns about timeliness in reporting
- Concerns about how the information was being given to them
- Distrust about what else might be going on at the plant that may be unreported

Will County Response

Will County responded by testing drinking water wells that might have been affected by the tritium releases. The County engaged me to help them design the sampling strategy and guide their other public health efforts.

The County was able to get a commitment from Exelon to provide bottled water to potentially affected residents until the testing showed the water was safe. The County and I participated in community meetings to help answer questions about health concerns. The County also provided health information to State and Federal Agencies reviewing cancer concerns. These are just some of the actions taken by Will County to address the community health concerns.

Tritium Test Results

Fortunately, only one well had tritium higher than typical amounts. This one well near the Kankakee River had a level of around 1600 picocuries per liter of water. This level is below the current Environmental Protection Agency Maximum Contaminant Level of 20,000 picocuries per liter. This home is apparently still being supplied with bottled water.

All of the other approximately 300 tested wells had low levels near the detection limit of around 200 picocuries per liter. All these other wells were below the California Maximum Contaminant Goal Level of 400 picocuries per liter. Similar test results were obtained by both the Nuclear Regulatory Commission (NRC) and Exelon.

Independent testing by the NRC and Exelon reportedly showed that no other Braidwood Nuclear-related radioactive materials were detected in water samples.

Current Status and Recommendations

The test results do not indicate a current tritium health issue. However, this only addresses a few of the community's concerns. For example, there is still a perceived "cancer cluster" associated with residences near the river and the blowdown line.

The County needs to participate in the legislative process to ensure that Exelon and State and Federal Regulatory agencies help minimize future health concerns for residents near

the Braidwood Nuclear Generating Station. Effective communication channels between Exelon and Will County should be developed and maintained, including with the Health Department.

The County should focus on what it can best accomplish. For example, the County should ensure Exelon provides timely and effective public communication to County residents. The County should also support others who are addressing issues that are best handled on a State or National level. For example, establishing Tritium water contamination levels is a role best left to other Agencies.

Answering Questions About Radiation Exposures Near Nuclear Power Plants

A respected resource on radiation risks is the National Academies of Sciences. Their most recent document on the topic is "Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2 (2006)", National Academies of Sciences, <http://www.nap.edu/catalog/11340.html>.

A free public summary is available at http://newton.nap.edu/execsumm_pdf/11340. The summary also contains an explanation on radiation terminology.

The National Academies of Sciences document specifically addresses the health effects of living near nuclear power plants as well as other environmental exposures, which concludes that the radiation exposure is very low under normal operating conditions.

The County should rely on the National Academies of Sciences report rather than developing a separate analysis of the risk of living around nuclear power plants.

Addressing Ongoing Cancer Concerns

A group of local residents raised a concern about an apparent "cancer cluster" in a neighborhood near the river and the blowdown line. The County should support the Agency for Toxic Substances and Disease Registry (ATSDR) review of this community-reported concern. The ATSDR is best equipped to address this issue. One resource on cancer clusters is the National Cancer Institute, Cluster Fact Sheet: <http://www.nci.nih.gov/cancertopics/factsheet/Risk/clusters>.

The National Academies of Sciences report addressed in detail the issue of epidemiology studies around nuclear power plants. The National Academies of Sciences report recommends that such studies not be conducted because they are unlikely to yield useful information. The County should still continue cancer surveillance using standard epidemiologic methods already employed by the Health Department.

Preventing Future Releases

The initial tritium release from the blowdown line was apparently unknown by Exelon. The County cannot accept Exelon having unknown or unintended releases.

The potential for radioactive material releases may increase as a nuclear plant ages. For example, some nuclear power plants (but reportedly not Braidwood Nuclear), have had small leaks from their fuel storage pools.

Both Exelon and the NRC need to conduct a thorough systems review to identify and evaluate potential “unintended” exposure pathways. The County should be able to review this analysis.

Exelon still needs to deal with tritium disposal. Presently Exelon has been recycling stored tritiated water back into the plant. Eventually, Exelon may require some other alternative disposal. Exelon should be required to provide to the public a health risk assessment and dose calculations for alternate tritium disposal methods (such as evaporation), and ensure effective risk communication for the public on these disposal methods.

Exelon installed a series of monitoring wells around the Braidwood Nuclear plant. The apparent goal of these monitoring wells is to detect groundwater contamination before it reaches off property. This is a positive step taken by Exelon. The County should be provided access to the well test results so that it can properly prepare to protect health before these materials go offsite.

Ensuring Effective Risk Communication

There will continue to be concerns about radiation around the Braidwood Nuclear Generating Station. Exelon needs to continue to educate the public on potential nuclear power plants health risks, including normal operation and emergency releases.

Exelon’s approach to risk communication apparently aggravated the tritium issue and may have lingering effects. Exelon needs to change the way it talks to the public about tritium and radiation exposures.

The principles of risk communication are well established. The Agency for Toxic Substances and Disease Registry has an online resource on this topic:
<http://www.atsdr.cdc.gov/HEC/primer.html>):

One aspect of Exelon’s approach to risk communication was to compare the involuntary risk of drinking water with Braidwood Nuclear-related tritium contamination to the voluntary risk of eating food with naturally occurring radiation. While the dose may be the same, the risk is perceived very differently.

The ATSDR document identifies “Factors Influencing Risk Perception” (Source, Fischhoff et al. 1981, summarized in <http://www.atsdr.cdc.gov/HEC/primer.html>):

- People's perceptions of the magnitude of risk are influenced by factors other than numerical data.
- Risks perceived to be voluntary are more accepted than risks perceived to be imposed.

- Risks perceived to be under an individual's control are more accepted than risks perceived to be controlled by others.
- Risks perceived to have clear benefits are more accepted than risks perceived to have little or no benefit.
- Risks perceived to be fairly distributed are more accepted than risks perceived to be unfairly distributed.
- Risks perceived to be natural are more accepted than risks perceived to be manmade.
- Risks perceived to be statistical are more accepted than risks perceived to be catastrophic.
- Risks perceived to be generated by a trusted source are more accepted than risks perceived to be generated by an untrusted source.
- Risks perceived to be familiar are more accepted than risks perceived to be exotic.
- Risks perceived to affect adults are more accepted than risks perceived to affect children.

The County should ensure that Exelon engages in effective risk communication which adequately addresses the community concerns.

Other Water Quality Issues

Will County also tested each of the drinking water wells for coliform bacteria (an indicator of sewage contamination) and nitrates (a pollutant that can come from fertilizers and other sources). Wells with higher levels of these materials posed an immediate health concern for the residents. High nitrate levels can cause health problems for infants.

A few of the wells in the Godley area had coliform and high nitrate levels above drinking water guidelines. The Will County Health Department communicated the results and provided guidance to the affected homes.

Will County also tested drinking water well in Godley for Volatile Organic Compounds (which would show the presence of gasoline or similar types of materials). Nothing of significance was found.

The County also tested Godley wells for Arsenic, a metal that can be associated with strip mining areas. Arsenic is associated with a number of diseases, including some skin conditions. No significant amounts of arsenic were found.

Summary

The tritium issue has been traumatic for the community around Braidwood Nuclear Generating Station, even though ultimately the health risks have been small. However, a positive outcome is that the community activism of local residents will help protect the people of Will County and others around the Nation from inadvertent releases of radioactive materials from nuclear power plants.