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Commissioner

May 9, 2022

The Honorable John E McCormac
Mayor of Woodbridge
Municipal Building
1 Main Street
Woodbridge, NJ 07095

Dear Mayor McCormac:

This letter health consultation (LHC) was prepared by the New Jersey Department of Health (NJDOH) under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR) to evaluate radioactive material that was detected in the Colonia High School in May of 1997. During a phone conversation with you on March 14, 2022, the NJDOH was made aware of an incident where a radioactive rock was discovered in one of the classrooms at the school during a Geiger counter demonstration. This LHC evaluates a report on the radiological data collected in May of 1997, which was provided to us on March 22, 2022.

ATSDR Evaluation Process

Identifying Exposure

People are exposed to contaminants by coming into contact with the contaminant (e.g. breathing air, skin contact, or by eating or drinking a substance containing the contaminant).

An exposure pathway is a series of steps starting with the release of a contaminant in environmental media and ending at the interface with the human body. A completed exposure pathway consists of five elements:

1) Source of contamination (radioactive rock);
2) Environmental media and transport mechanisms (air);
3) Point of exposure (school);
4) Route of exposure (external exposures); and
5) Exposed population (school students and staff)

Generally, ATSDR considers three exposure categories:

a) completed exposure pathways — all five elements of a pathway are present;
b) potential exposure pathways — one or more of the elements might not be present, but information is insufficient to eliminate or exclude the element; and

c) eliminated exposure pathways —one or more of the elements is absent.

Exposure pathways are used to evaluate specific ways in which people were, are, or will be exposed to environmental contamination in the past, present, and future. In this case, the completed exposure pathway is through radiation exposure from the radioactive material in the school classroom.

Since a completed exposure pathway was identified for the students and staff at Colonia High school, the next step is to calculate an estimated exposure dose, which is compared to a Minimal Risk Level (MRL).

An MRL is a level that is used as a screening tool that identifies exposures that could be potentially hazardous to human health.

The ATSDR chronic MRL for ionizing radiation is 100 millirem per year (mrem/y) above ambient background levels [ATSDR 1999]. The ATSDR MRL is not a regulatory level. However, for ionizing radiation, the MRL is the same value used by both the US Department of Energy (DOE) and the US Nuclear Regulatory Commission (NRC) to protect members of the public from general exposures produced by their licensees and facilities.

Public Health Implications of Completed Exposure Pathways

The evaluation of radiation exposure and doses from exposure to radioactive materials incorporates both physical and biological properties of the radioactive material. Per ATSDR Guidance [ATSDR 2016], state health assessors must rely on ATSDR health physicist subject matter experts to evaluate radiological data. The following evaluation was provided by ATSDR after NJDOH requested an evaluation of the 1997 data.

ATSDR reviewed the classroom survey performed in May of 1997. A contractor for the school surveyed the classroom where the rock was stored and determined that there was no contamination on any surface left by the rock. Since the rock was not deteriorating and no loose contamination was found, the inhalation and ingestion pathway of loose rock material was not evaluated. Dose rate measurements taken from the rock at 6 and 12 inches were 0.2 and 0.05 mrem/hr. Laboratory testing of the rock show it contained natural uranium and thorium.

To assess the health implications from external exposure to the rock, ATSDR used the following assumptions from the 1997 survey to estimate a radiation dose:

1. The distance from the rock storage location to the closest student desk was 5 feet.
2. The closest student remained stationary at their desk for 7 hours a day for 180 days a year.
3. No material between the closest student and the rock (i.e., closet door, storage box, etc.)

ATSDR used the 1997 external survey dose rate data to calculate the dose rate at 5 feet. The calculated dose rate at 5 feet is 0.002 mrem/hr using the inverse square law: 0.2 mrem/hr x $(6 \text{ inches})^2/(60 \text{ inches})^2 = 0.002$ mrem/hr.

The resulting annual dose from this dose rate for the conservative school scenario (which assumes an exposure duration of 7 hours per day for 180 days per year) is 2.52 mrem/y. This value is well below ATSDR's MRL of 100 mrem/y for ionizing radiation.

Conclusion

Based on ATSDR's evaluation, we do not expect harmful health impacts from external exposures to ionization radiation from the rock found in the classroom.

The chronic MRL is based on studies showing that natural and artificial sources of ionizing radiation ("background") give a person in the United States, on average, an effective whole-body dose of 360 mrem/y. No adverse health effects or increases in the incidences of any type of cancers have been shown to be associated with this annual dose. [ATSDR 1999; NCRP 2009].

The NJDOH and ATSDR will evaluate additional environmental data when it becomes available.

Sincerely,

Somia Aluwalia

Somia Aluwalia, Ph.D.
Research Scientist, NJDOH

cc: Dennis Green, Woodbridge Township Health Officer

References

[ATSDR 1999]. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Ionizing Radiation. Atlanta (GA):US Department of Health and Human Services; 1999.

[ATSDR 2016]. Agency for Toxic Substances and Disease Registry. ATSDR Division of Community Health Investigations (DCHI) Basic Introduction to Dose Determination from Radioactive Materials. Atlanta (GA):US Department of Health and Human Services; July 1, 2016.

[NCRP 2009]. National Council on Radiation Protection and Measurements. Ionizing radiation exposure of the population of the United States. NCRP Report No. 160. Bethesda (MD): National Council on Radiation Protection and Measurements, March 3, 2009.