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Use of a Weight of Evidence Approach to Determine the Likelihood of Adverse Effects on Human Health from the Presence of Uranium Facilities in Port Hope, Ontario

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ABSTRACT

The radium and uranium processing industry exists in Port Hope, Ontario, since 1932. Between 1932 and 1966, most of the waste material from these industries was deposited throughout the town. During these years, waste management practices did not prevent the spread of contamination. Several environmental and health studies have been conducted to assess the potential contamination effects in the Port Hope Community over the last 70 years. The current study used a weight of evidence approach to assess the types and levels of contaminants of concern in the environment, and the potential human exposure to these contaminants. Their toxicological and radio-toxicological properties were also assessed to determine their potential health effects. The results of these assessments were further compared to findings of earlier epidemiological studies of Port Hope residents and nuclear industry workers. The conclusions of this study indicated that: 1) Levels of exposure to radioactive and non-radioactive contaminants in Port Hope are below levels known to cause adverse health effects. 2) Epidemiological studies provide no evidence of health effects as a result of past and present activities of the Port Hope nuclear industries. 3) The environmental risk assessments and the epidemiological studies are consistent and support each other. 4) Port Hope's findings are consistent with the results of over 40 epidemiological studies conducted elsewhere on populations living around similar facilities or exposed to similar environmental contaminants.

KEYWORDS

Uranium, Radiation, Cancer, Environment

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References

[1] [1] "Canadian Environmental Protection Act (CEPA)," Canada Gazette Part III, Vol. 22, No. 3, 4 November 1999. http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=24374285-1

[2] U.S. Environmental Protection Agency, "Proposed Guidelines for Carcinogen Risk Assessment," EPA, Washington EPA/600/P-92/003C, 1996.

[3] R. G. Hetes, "Science, Risk, and Risk Assessment and Their Role (s) Supporting Environmental Risk Manage- ment," Law, Science and the Environment Forum: A Meeting of Minds Lewis and Clark Law School, 19-20 April 2007.

[4] Agency for Toxic Substances and Disease Registry (ATSDR), "The Assessment Process: An Interactive Learning Program," 2005. http://www.atsdr.cdc.gov/training/public-health-assessment-overview/html/ module2/sv18.html.

[5] U.S. EPA Science Policy Council, "Peer Review Handbook," 3rd Edition, EPA 100/B–06/002, 2006. http://www.epa.gov/peerreview/pdfs/peer_review_handbook_2006.pdf.

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[6] Canadian Nuclear Safety Commission (CNSC), "Understanding Health Studies and Risk Assessments Conducted in the Port Hope Community from the 1950s to the Present," 2009. http://www.nuclearsafety.gc.ca/eng/pdfs/Info-0781-en.pdf

[7] Ontario Ministry of the Environment (MOE), "Phytoto- xicology Technical Memorandum. A Review of Phyto- toxicology Investigations: 1974-2003 Cameco Corpora- tion—Port Hope," Report No. Phyto-S3147-2003.

[8] Ontario Ministry of the Environment (MOE), Hazardous Contaminants Branch, "Assessment of Human Health Risk of Reported Soil Levels of Metals and Radionu- clides in Port Hope," Queen's Printer for Ontario, 1991.

[9] B. L. Tracy and D. P. Meyerhof, "Health Evaluation of Uranium Emissions in Port Hope, An Assessment Submitted to the Atomic Energy Control Board," 1981.

[10] B. L. Tracy and D. P. Meyerhof, "Uranium Concentra- tions near a Canadian Uranium Refinery," Atmospheric Environment, Vol. 21, No. 1, 1987, pp. 165-172. doi:10.1016/0004-6981(87)90281-2

[11] B. L. Tracy, F. A. Prantl and J. M. Quinn, "Transfer of 226Ra, 210Pb, and Uranium from Soil to Garden Produce: Assessment of Risk," Health Physics, Vol. 44, No. 5, 1983, pp. 469-477. doi:10.1097/00004032-198305000-00001

[12] B. Ahier and B. L. Tracy, "Uranium Emissions in Port Hope, Ontario," Journal of Environmental Radioactivity, Vol. 34, No. 2, 1997, pp. 187-205. doi:10.1016/0265-931X(96)00008-2

[13] Health Canada, "Environmental radioactivity in Canada 1989-1996," Available from Environmental Radiation Hazards Division, Radiation Protection Bureau, Health Canada, 2001.

[14] SENES Consultants Limited, "Technical Report on Ave- rage and Cumulative Exposures for Residents of Port Hope, Ontario Resulting from Historic Low-Level Radio- active Wastes in the Town," Prepared for Environmental Radiation Hazards Division, Bureau of Radiation and Medical Devices, Health Protection Branch, Health Can- ada, 1995.

[15] International Commission on Radiological Protection (ICRP), "Recommendations of the International Com- mission on Radiological Protection," ICRP Publication 60, Annals of the ICRP, Vol. 21, No. 1-3, 1990, pp. 1- 201.

[16] United States National Research Council (NRC), "Health Risks from Exposure to Low Levels of Ionizing Radia- tion: BEIR VII Phase 2. Board on Radiation Effects Re- search," The Committee on the Biological Effects of Ion- izing Radiations (BEIR), The National Academies Press, Washington DC, 2006.

[17] Agency for Toxic Substances and Disease Registry (ATSDR), "Toxological Profile for Uranium," 1999. http://www.atsdr.cdc.gov/toxprofiles/tp150.pdf

[18] Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Fluorides, Hydrogen Fluoride, and Fluorine," 2003. http://www.davidborowski.com/work/ATSDR%20ToxProfiles%202007/Data/FLUORIDES.pdf

[19] Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Ammonia," 2004. http://www.atsdr.cdc.gov/ToxProfiles/tp126-p.pdf

[20] Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Arsenic," 2007. http://www.atsdr.cdc.gov/ToxProfiles/tp2-p.pdf

[21] World Health Organization (WHO), "Depleted Uranium: Sources, Exposure and Health Effects," 2001. http://www.who.int/ionizing_radiation/pub_meet/en/Depluraniumintro.pdf

[22] Health Canada, "Guidelines for Canadian Drinking Water Quality: Guideline Technical Document. Radiological Characteristics," 2007. http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/index-eng.php#tech_doc.

[23] Health Canada, "Government of Canada Radon Gui- deline," 2008. http://hc-sc.gc.ca/ewh-semt/radiation/radon/guidelines_lignes_directricie-eng.php.

[24] R. Kusiak and P. J. Howe, "Standardized Mortality Ratios in Selected Urban Areas in Ontario between 1954 and 1978," Ontario Ministry of Labour, Toronto, Ontario, 1984.