

Tritium Releases and Dose Consequences in Canada in 2006

Objective

To present an overview of the tritium releases in 2006 and resulting doses to members of the public and nuclear energy workers from CANDU nuclear reactors, research reactors, nuclear waste management facilities, tritium processing facilities, research facilities and chemical laboratories.

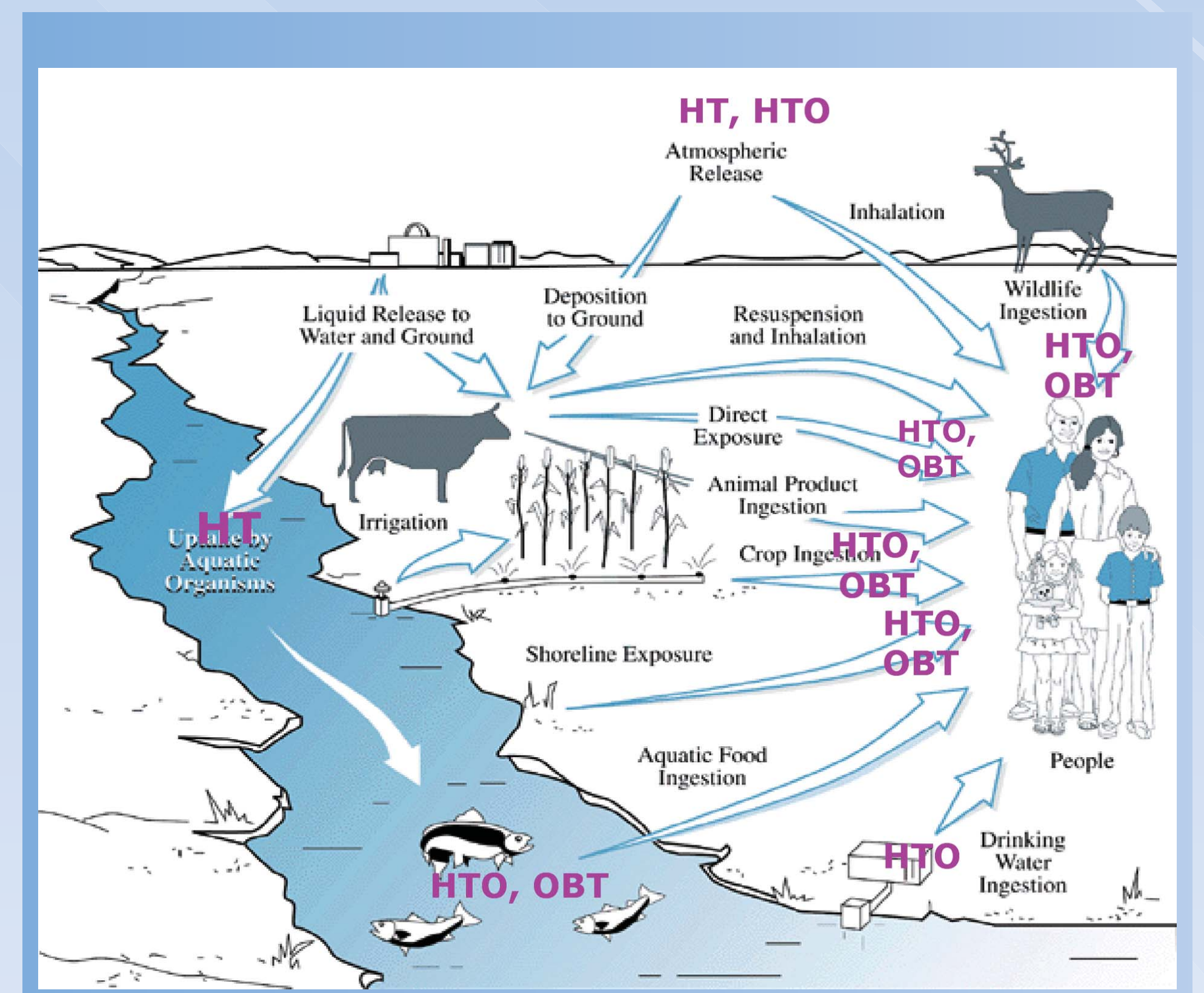
Main Findings

- In 2006, all the tritium releases—both gaseous (see Figure 1) and liquid (see Figure 3)—from each facility were only a small fraction of Derived Release Limits (DRLs). These limits restrict the amount of tritium that can be released from a licensed nuclear facility, and represent a dose of 1 mSv/year.

Figure 1. Tritium emissions to air in 2006 compared with Derived Release Limits

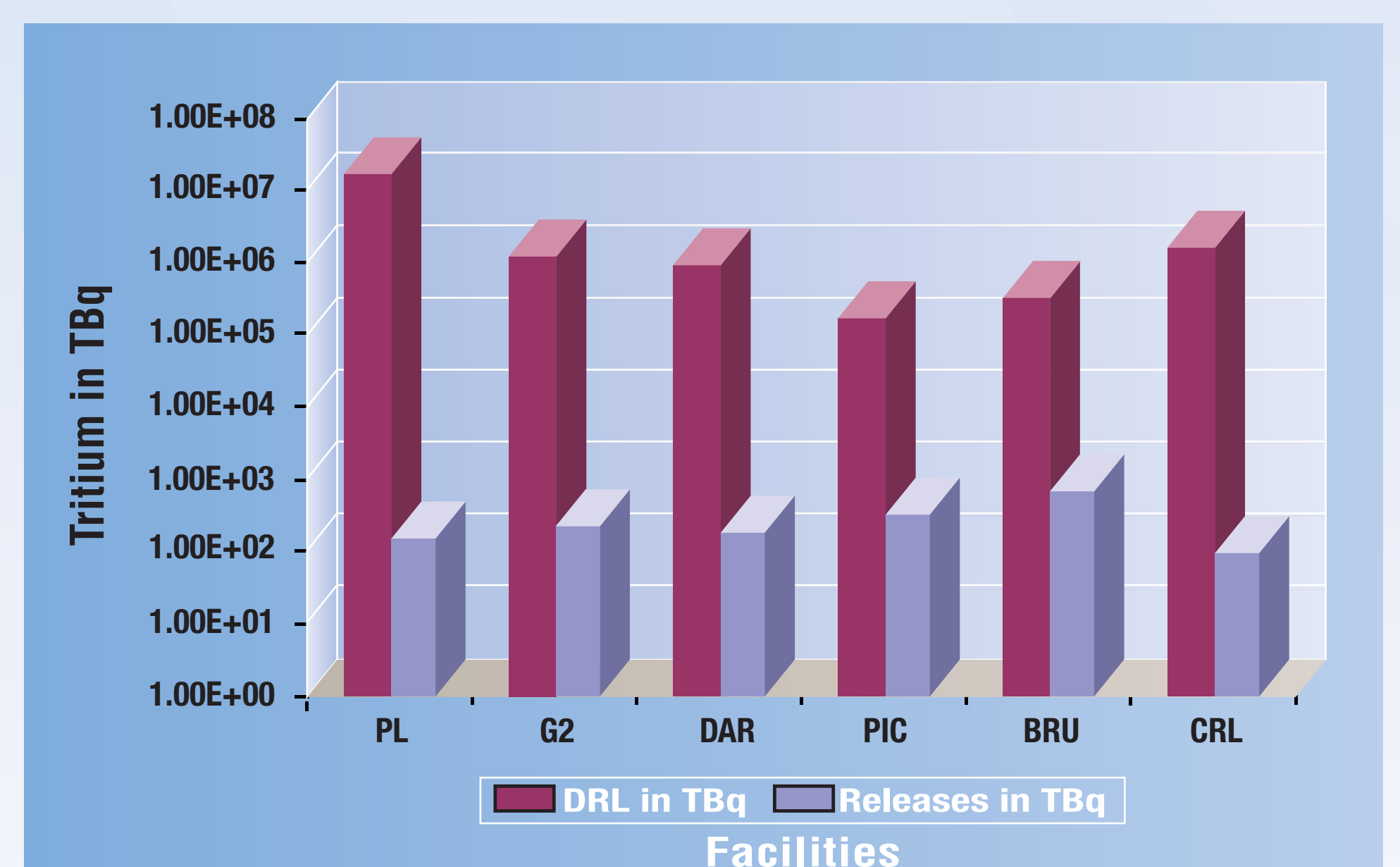


Figure 2. A typical environmental pathway diagram



- Tritium intakes through local water and food (milk, vegetables and meat) (see Figure 2) would result in a dose that is a small fraction of the CNSC annual public dose limit of 1 millisievert (mSv).

Figure 3. Tritium liquid emissions in 2006 compared with Derived Release Limits

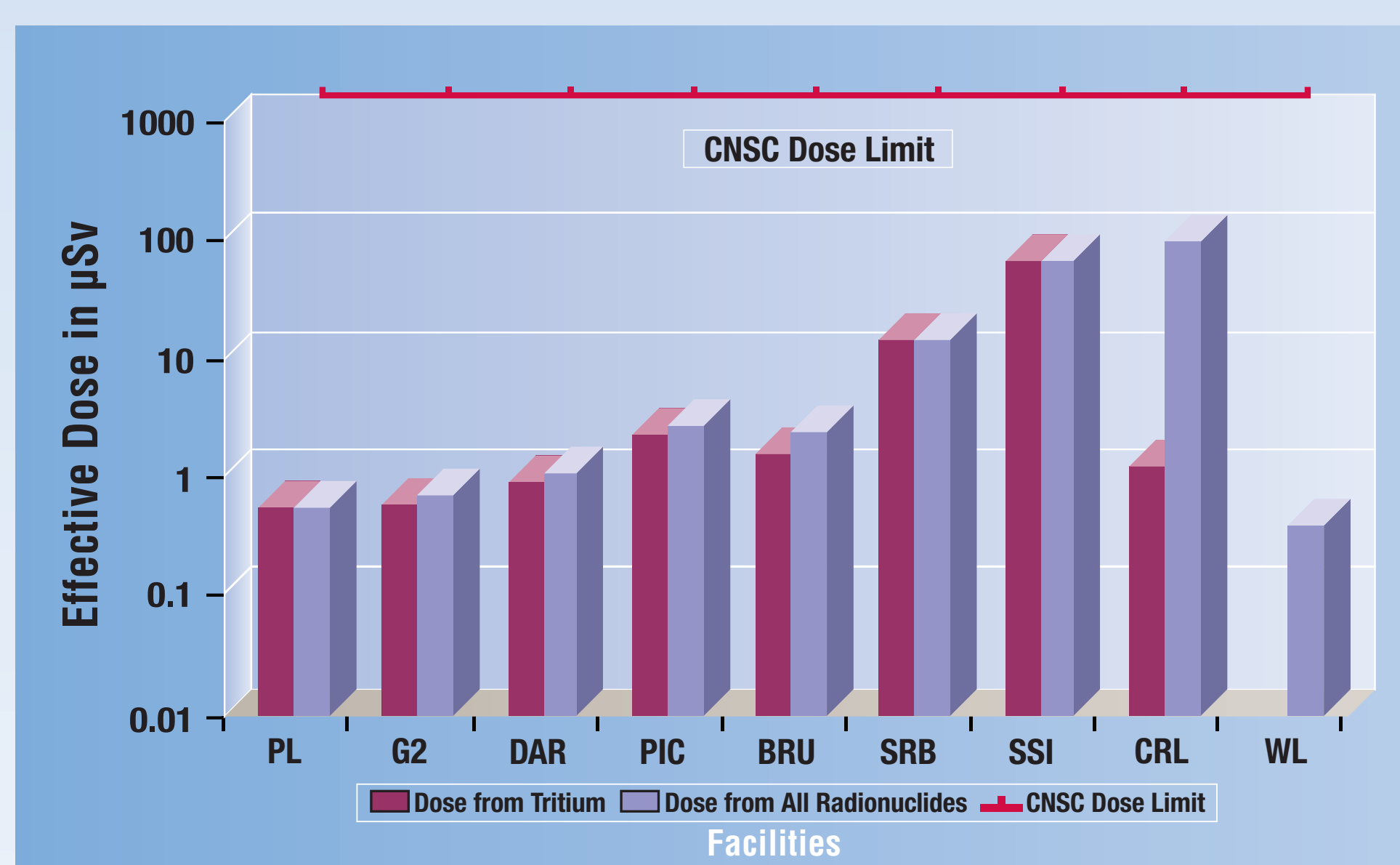


Tritium Releases and Dose Consequences in Canada in 2006 *(continued)*

Main Findings

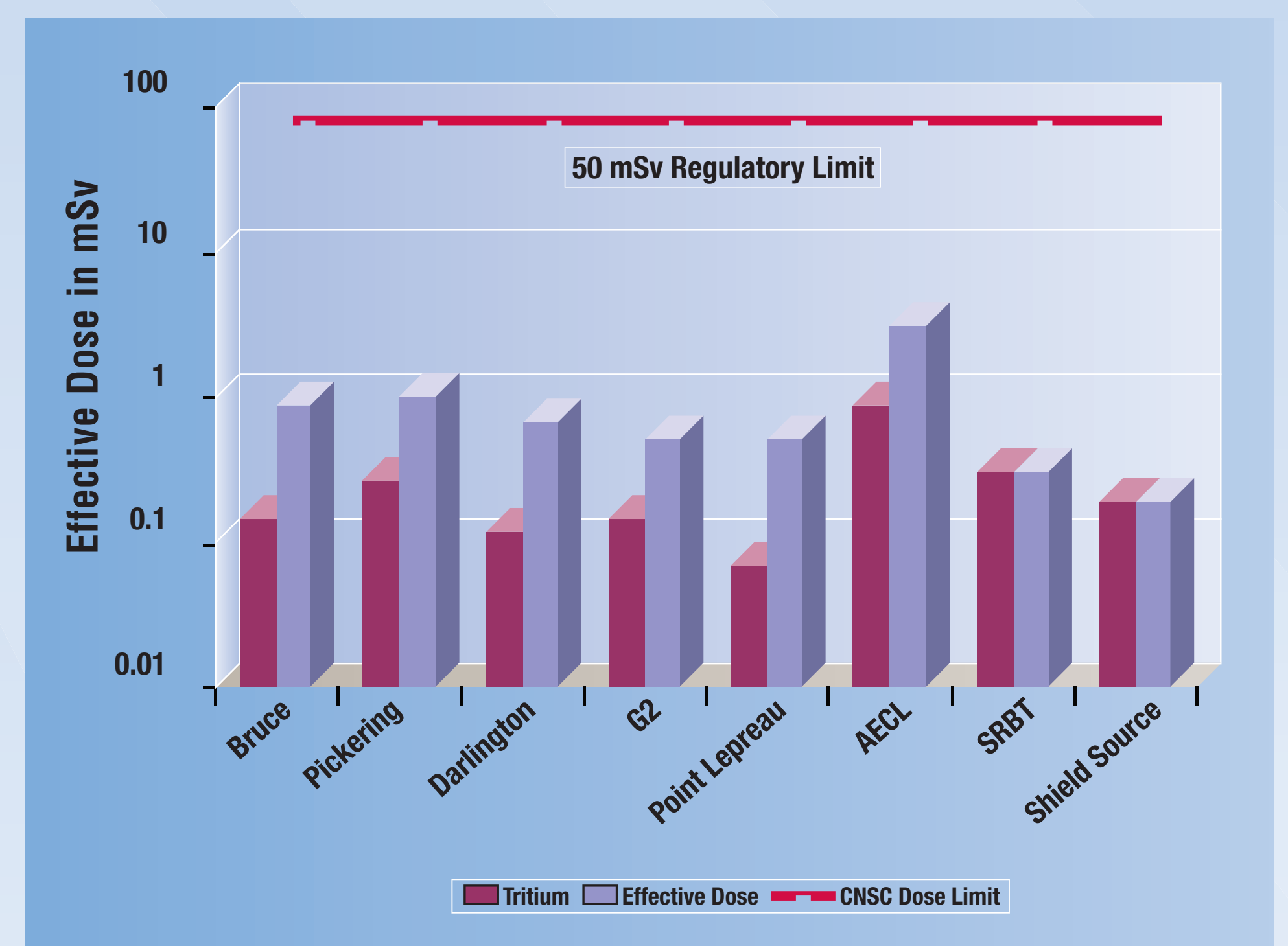
- Tritium concentrations in air near nuclear facilities varied from 0.38 Bq/m³ to 35.66 Bq/m³. The corresponding tritium doses for people living near nuclear generating stations were very low (0.00045 mSv/year to 0.00236 mSv/year). Tritium doses to members of the public around processing facilities were also very low (0.00001 mSv/year to 0.0145 mSv/year) (see Figure 4).
- Tritium doses received by nuclear workers in 2006 were far lower than the CNSC regulatory dose limit of 50 mSv/year (see Figure 5). Occupational doses from tritium exposures ranged from 0.07 mSv/year to 0.26 mSv for workers in nuclear generating stations, and from 0.30 mSv/year to 0.90 mSv for workers in processing and research facilities.
- Concentrations of tritium in municipal drinking water sources around nuclear facilities varied from 7 Bq/L to 18 Bq/L. These values are below both the current Canadian drinking water guideline of 7,000 Bq/L and the Ontario Drinking Water Advisory Council's proposed limit of 20 Bq/L. Levels in private wells ranged to a maximum of 1,875 Bq/L, which is below the current guideline of 7,000 Bq/L.

Figure 4. Tritium doses to members of the public in 2006 compared to dose limit



- This study reported elevated tritium concentrations in groundwater at some nuclear facilities. The tritium plumes do not contribute to radiation doses to workers or the public. Additionally, because the groundwater near these plumes is not used for drinking water or other purposes, the plumes do not pose health risks to workers or the public.

Figure 5. Average tritium doses and total effective doses to workers with regulatory limits



Conclusions

- Data on tritium releases and dose calculations for 2006 indicate that tritium releases from nuclear facilities were at levels representing a small fraction of regulatory limits (see Figure 1 and 3).
- Doses to workers (see Figure 5) or the public (see Figure 4) living near nuclear facilities were at levels of only a fraction of CNSC dose limits.
- Concentrations of tritium in drinking water sources around nuclear facilities were all below the Canadian drinking water quality guideline of 7,000 Bq/L.
- Tritium in groundwater at nuclear facilities does not contribute to radiation doses to workers or the public.