

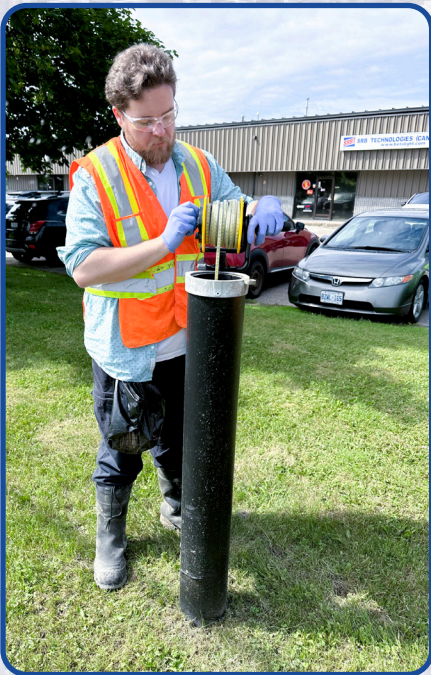


# SRBT and Groundwater

WWW.SRBT.COM



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## Groundwater



- The deposition of tritium on and around the facility from air emissions and resulting soil moisture and standing water are the sole direct contributor to tritium found in groundwater.
  - Groundwater is affected by percolation of soil moisture and standing water from the surface.
  - The tritium concentrations in groundwater are consistent with historical emission levels.
  - Groundwater samples that are greater than those expected from air dispersion were affected by water draining from roof downspouts or from snow storage areas in which water or snow would have historically developed with higher tritium levels in closer proximity to the stacks.
  - Although SRBT does not process during times of precipitation, we've developed wet weather monitoring procedures which includes the collection of precipitation and measurements of runoff from the roof downspouts, which were both approved by CNSC staff on September 25, 2008.
- Eight precipitation samplers are installed near existing air monitoring stations which are located approximately 250m from the facility. The tritium concentration in precipitation monitors are generally lower than the concentrations that are expected.
  - Tritium concentrations are measured in all facility downspouts. Samples are collected on a representative basis by SRBT for tritium concentration assessment.
  - While most of the released tritium in the air is dispersed, some of it will reach the soil through dry and wet deposition. Infiltrated precipitation water brings tritium into the groundwater below it.





## Wells

- SRBT's groundwater studies include monitoring data from 57 wells drilled at different depths in the stratigraphy, and at different distances from the facility.

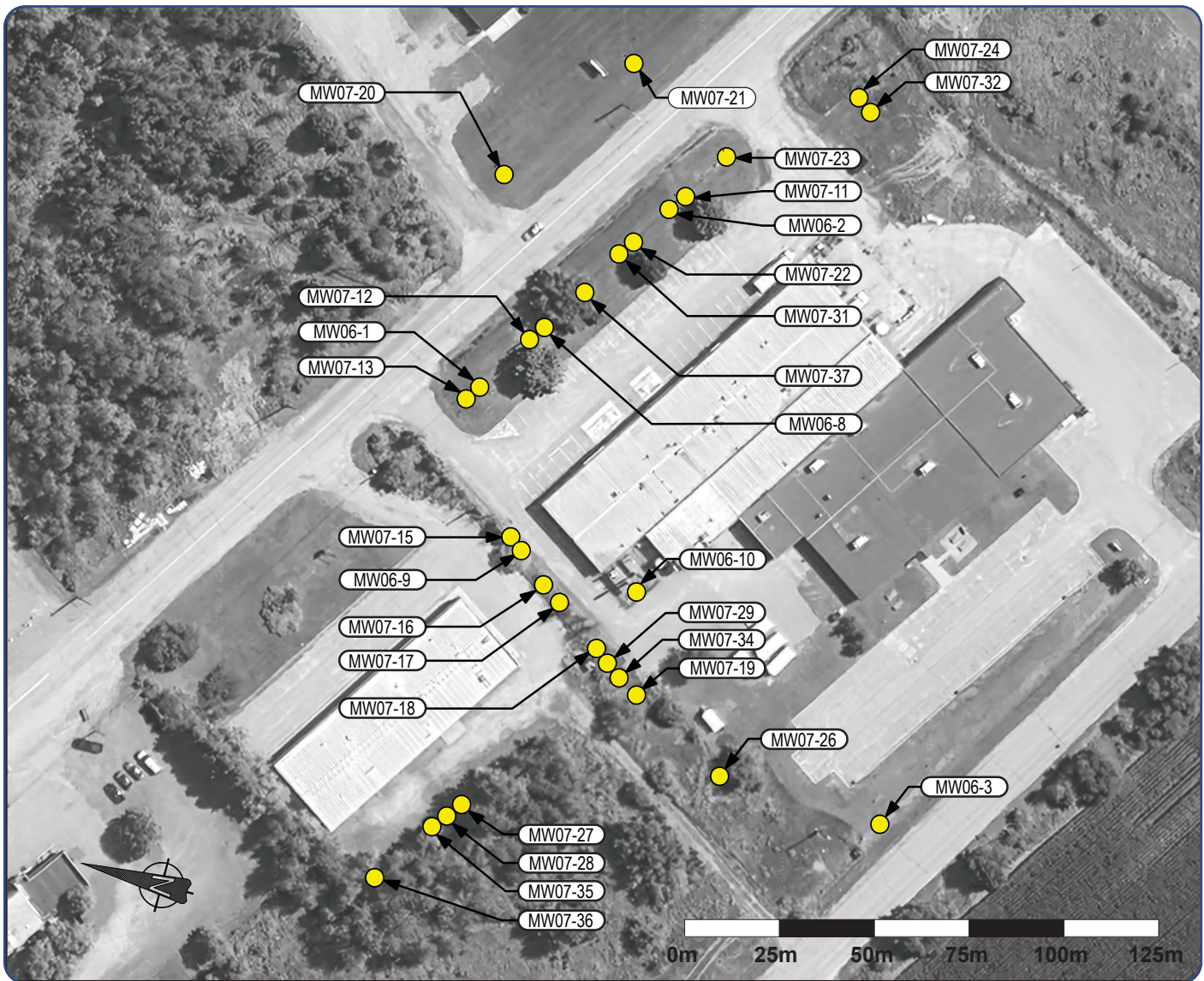
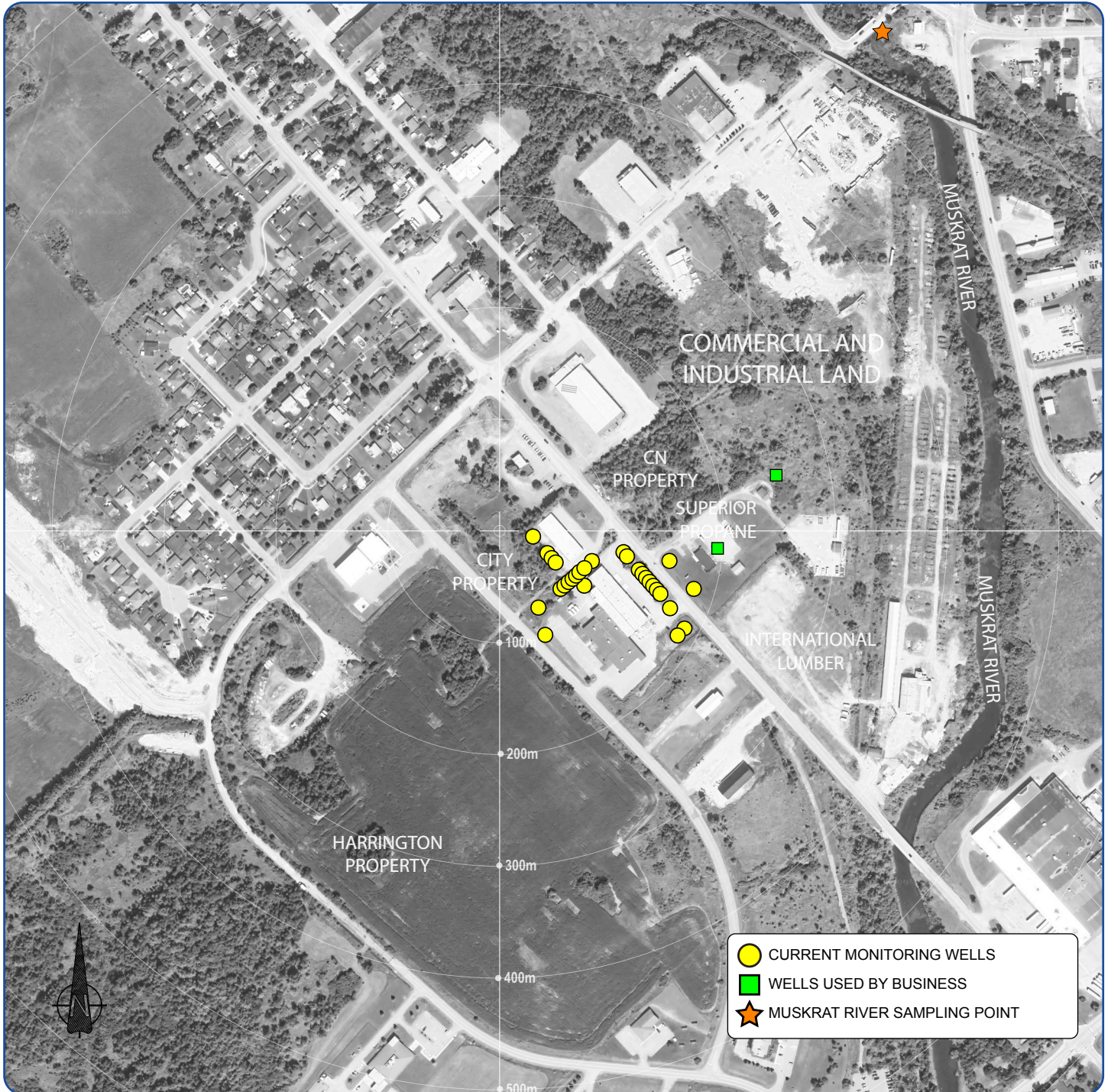


Figure 1: Current monitoring well locations



## Wells

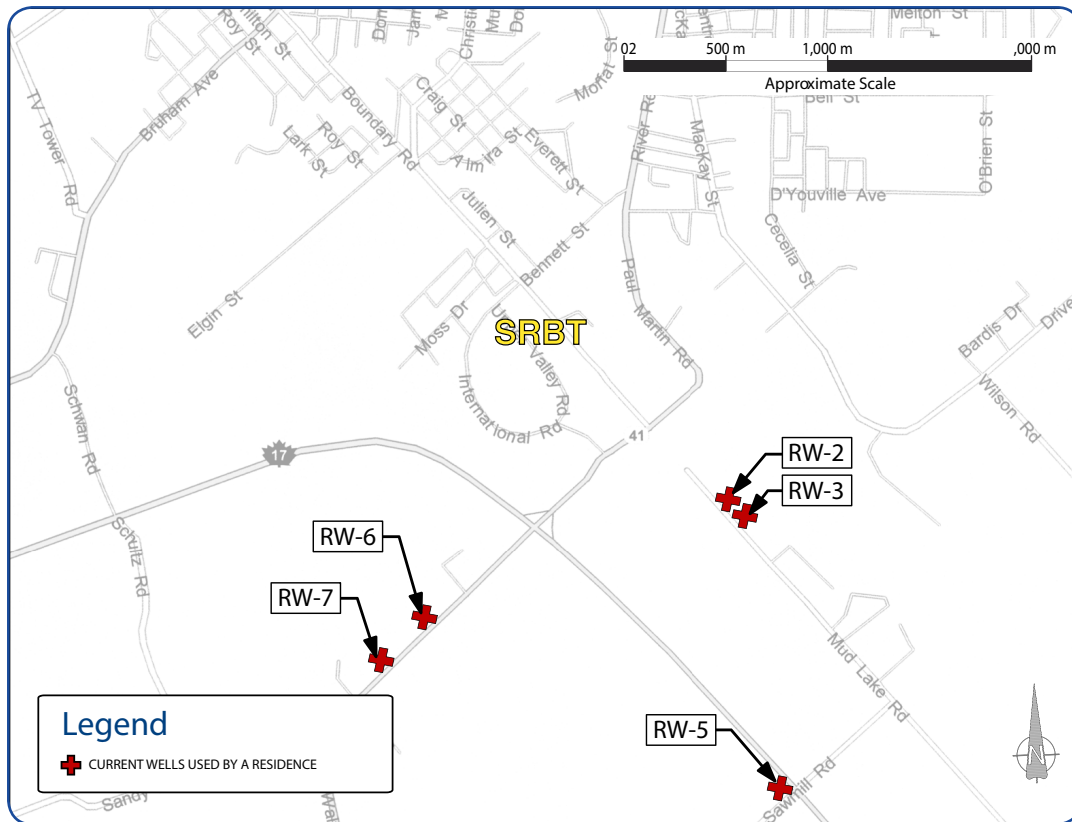
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**Figure 2:** Wells in the vicinity of SRBT



## Current Monitored Residential Wells



**Figure 3:** Location of all current monitored residential wells

- A Conceptual Model Document was prepared in support of the 2011 Annual Status Report that was provided to the Commission on June 9, 2011. The purpose of the document was to provide a clear written description and visual representation of the current and predicted groundwater conditions on and around the SRBT facility based on all groundwater data gathered to date.
- The Conceptual Model Document concluded that the continued use of the existing release limit continues to ensure the sustainable use of groundwater resources and the protection of the environment and the public. Concentrations in the future will be within those predicted by the model. The Muskrat River and drinking water supply wells are not at risk of exceeding the Ontario Drinking Water Guideline and generally soil moisture, precipitation and air concentration estimated correlate and overestimate actual values.
- The level and speed of recharge of groundwater differs drastically depending on the geology, surface topography, surface vegetation, soil characteristics, precipitation and climate. In turn the level and speed of recharge can differ from one monitoring well to another.



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- The contamination of groundwater is at a level that does not pose a risk to any member of the public. The groundwater on the land where SRBT is located is not being used as a source of drinking water.
- The highest tritium concentration in any well remains in monitoring well MW06-10 which is located in the stack area on the SRBT property. The average concentration in MW06-10 in 2023 was 26,220 Bq/L which is slightly greater than the average concentration in 2022 at 26,163 Bq/L.
- All water supply wells located in the vicinity of SRBT's facility have been identified. We have also assessed the drinking water usage for each of these wells and have been monitoring them semi-annually or at a frequency requested by the owner. The results are promptly reported to the members of the public and posted to the web site.
- The highest average concentration in a residential well used as the sole source of the drinking water was found in RW-3. Tritium concentrations in this well in 2023 averaged 39 Bq/L, which is less than 1% of the Ontario Drinking Water Standard of 7,000 Bq/L.
- Average concentrations over 2023 for other wells used for drinking water ranged from 5 Bq/L to 39 Bq/L, depending on their locations and distance in relation to the facility.
- If an individual was to use the water from a well with a concentration of 39 Bq/L as a sole source of drinking water for the entire year, their dose from consuming that water would be less than 0.001 mSv (millisieverts) for the entire year, or less than 1% of the annual public dose limit set by the Canadian Nuclear Safety Commission of 1 mSv (millisievert).
- SRBT measures the concentration of tritium in the Muskrat River downstream of the facility on a monthly basis. Tritium concentrations in receiving waters in 2023 are below the minimum detection limit.
- SRBT conducts quarterly monitoring of the wells located on site. Residential and business and wells are monitored semi-annually.

## Future Development

- The City of Pembroke Zoning By-Law 2020-05 requires all buildings within the city, including residential dwellings, to be connected to the municipal piped water services, and prohibits the installation of water supply wells within the city limits. Therefore, no new groundwater supply wells are expected to be installed in the vicinity of the SRBT facility. SRBT has agreed with the owner of the land where SRBT is located to restrict excavation or modification of the land until an assessment is performed by SRBT to ensure that the work undertaken will not result in a risk to a worker performing such work.
- Vacant lands in the vicinity of SRBT are primarily zoned as industrial. SRBT has agreed with the City of Pembroke to perform surface soil sampling at all new developments within the vicinity of the SRBT facility.



## AVERAGE WELL CONCENTRATIONS

Well ID	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023/2015
	(Bq/L)									%
MW06-1	4,338	2,753	1,946	1,334	1,045	762	651	456	424	10
MW06-2	1,965	1,467	1,166	1,160	1,031	877	736	609	489	25
MW06-3	1,218	1,029	683	469	367	244	199	166	141	12
MW06-8	906	848	780	724	679	579	550	507	475	52
MW06-9	2,731	2,476	2,224	1,952	1,774	1,527	1,366	1,127	1,044	38
MW06-10	51,635	48,189	33,520	40,208	34,592	29,513	30,153	26,163	26,220	51
MW07-11	1,521	1,344	1,099	1,122	1,053	924	858	811	759	50
MW07-12	463	469	467	468	425	422	435	416	438	94
MW07-13	13,237	10,576	8,642	6,937	5,647	4,406	3,527	2,574	2,038	15
MW07-15	1,680	1,810	1,617	1,505	1,399	1,262	1,076	1,004	990	59
MW07-16	2,188	1,879	1,649	1,433	1,240	1,003	897	685	624	29
MW07-17	780	602	335	359	338	272	296	267	237	30
MW07-18	5,491	3,690	2,739	2,192	2,000	1,494	1,102	842	649	12
MW07-19	3,222	2,500	1,926	1,889	1,468	1,198	959	665	650	20
MW07-20	775	670	571	498	438	326	296	244	222	29
MW07-21	1,121	1,009	879	778	545	393	363	351	289	26
MW07-22	1,171	1,131	1,023	974	921	783	729	639	611	52
MW07-23	2,206	1,929	1,743	1,572	1,443	1,252	1,147	1,013	908	41
MW07-24	2,314	2,206	2,022	1,928	1,839	1,644	1,511	1,340	1,226	53
MW07-26	1,941	1,491	1,190	904	697	514	421	291	238	12
MW07-27	4,869	4,292	3,589	3,136	2,683	1,994	1,696	1,439	1,131	23
MW07-28	1,446	1,311	1,063	1,017	843	705	670	520	444	31
MW07-29	3,950	3,395	2,472	2,415	2,058	1,485	1,075	760	667	17
MW07-31	756	440	186	407	352	182	325	240	255	34
MW07-32	128	155	76	70	75	59	60	42	44	34
MW07-34	3,312	2,822	2,291	1,889	1,526	1,297	1,153	908	753	23
MW07-35	3,945	3,448	3,015	2,637	2,256	1,898	1,550	1,297	1,076	27
MW07-36	2,892	2,618	2,109	2,008	1,716	1,468	1,154	1,105	1,112	38
MW07-37	1,009	989	871	830	821	763	717	677	658	65
<b>AVERAGE</b>	<b>4,294</b>	<b>3,708</b>	<b>2,824</b>	<b>2,856</b>	<b>2,458</b>	<b>2,043</b>	<b>1,920</b>	<b>1,626</b>	<b>1,545</b>	<b>35</b>

# Contacts & Information

For more information or if you are interested in participating in a plant tour, please contact:

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For further information please visit:

<http://www.srbt.com>

Or Follow our *Facebook, Instagram, X, LinkedIn, Reddit & TikTok* accounts.

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Radiation Measurements are often represented in various units which can cause confusion:

### GUIDELINE LIMIT FOR DRINKING WATER = 7,000 Bq/Litre

7,000 Bq/L = 7 Bq / millilitre  
7,000 Bq/L = 7,000,000 milliBecquerels (mBq)/Litre  
7,000 Bq/L = 7,000,000,000 microbecquerels ( $\mu$ Bq)/Litre  
7,000 Bq/L = 0.000 000 189 Ci /Litre

### PRESCRIBED LIMIT TO PUBLIC = 1 mSv

1 mSv = 0.001 sievert  
1 mSv = 1,000 microsievert ( $\mu$ Sv)  
1 mSv = 1,000,000 nanosievert (nSv)  
1 mSv = 1,000,000,000 picosievert (pSv)

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For further information on tritium and radiation hazards, please visit the third party sites listed below:

- **Canadian Nuclear Safety Commission**  
<https://www.cnsccsn.gc.ca>
- **United States Environmental Protection Agency**  
<https://www.epa.gov>
- **International Atomic Energy Agency**  
<https://www.iaea.org>
- **International Commission on Radiological Protection**  
<http://www.icrp.org>
- **Health Physics Society**  
<http://hps.org>
- **International Agency for Research on Cancer**  
<https://www.iarc.fr>

