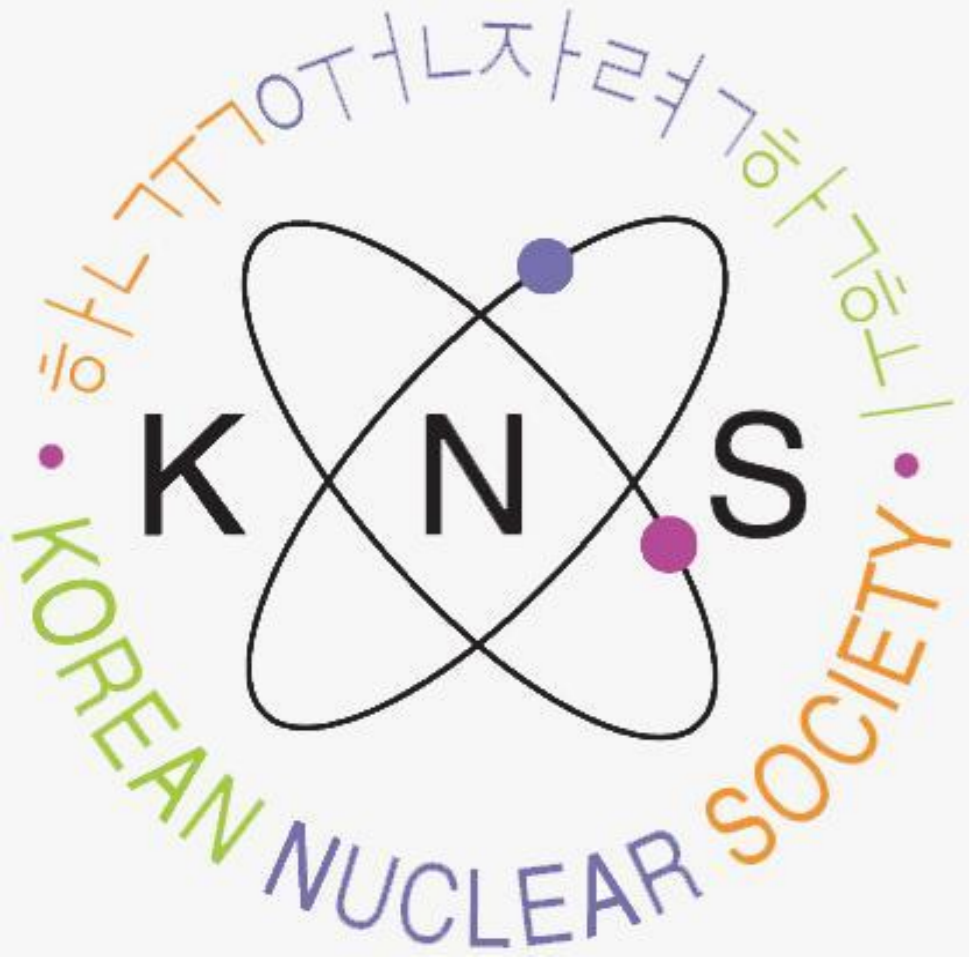


Radiological Health Effects from Uranium Deposits in Tanzania

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Introduction

- **Objective:** Using RESRAD-OFFISTE modelling software tool to estimate radiation dose and risk to the general public from uranium deposits in Tanzania
- **Location:** Uranium deposits in Bahi district
- **Target:** knowing the TEDE received & cancer risk to people living around uranium deposits
- **Method:** Applying RESRAD-OFFSITE to estimate dose and risk to exposed people in Northern zone (NZ), Central zone (CZ) and Southern zone (SN)
- **Procedures:**
 - Sampling soils from different zones
 - Calculating activity concentration of soil samples from different zones
- **Factors:** Activity concentration of Th-232, K-40 and U-238
- **Final output:** TEDE and cancer risk.

Methods

- **Soil Sampling:** Soil samples from Northern zone, Central zone and Southern zone were randomly collected
- Sample analysis was conducted at the Laboratory of Tanzania Atomic Energy Commission (TAEC).
- **Source term:** The activity concentrations of Ra-226, Th-232 and K-40 were measured using (HPGe) detector

Surveyed Area	Maximum activity concentration (Bq/kg)		
	²²⁶ Ra	²³² Th	⁴⁰ K
NZ	60.09±1.19	107.36±1.79	1,384.75±14.92
CN	42.75±0.85	47.74±0.81	874.77±9.43
SZ	69.38±1.38	132.11±2.25	706.67±7.64

Results

- **From table (1,2,3)** the TEDE received to the public over 100 years in all the three zones is below the public dose limit of 1mSv/year recommended by ICRP and TAEC.
- **From figure (1,2,3),** the Radon is major pathway to Excessive life cancer risk (ELCR) for Northern Zone (NZ) and
- Direct radiation from soil is a major pathway to Excessive life cancer risk (ELCR) for Central Zone (CZ) and Southern Zone (SZ).

Year	Total Effective Dose Equivalent (mSv/year)		
	²²⁶ Ra	²³² Th	⁴⁰ K
0	6.4E-03	3.4E-05	1.0E-03
1	6.4E-03	3.4E-05	1.0E-03
10	6.3E-03	3.4E-05	7.7E-04
20	6.1E-03	3.4E-05	5.7E-04
30	5.9E-03	3.4E-05	4.3E-04
40	5.8E-03	3.4E-05	3.2E-04
60	5.4E-03	3.4E-05	1.8E-04
80	5.1E-03	3.4E-05	9.9E-05
100	4.9E-04	3.4E-05	5.6E-05

Year	Total Effective Dose Equivalent (mSv/year)		
	²²⁶ Ra	²³² Th	⁴⁰ K
0	3.4E-04	1.5E-05	6.5E-04
1	3.4E-04	1.5E-05	6.5E-04
10	3.3E-04	1.5E-05	4.9E-04
20	3.2E-04	1.5E-05	3.6E-04
30	3.1E-04	1.5E-05	2.7E-04
40	3.0E-04	1.5E-05	2.0E-04
60	2.8E-04	1.5E-05	1.1E-04
80	2.7E-04	1.5E-05	6.3E-05
100	2.5E-04	1.5E-05	3.5E-05

Year	Total Effective Dose Equivalent (mSv/year)		
	²²⁶ Ra	²³² Th	⁴⁰ K
0	5.5E-04	4.2E-05	5.3E-04
1	5.4E-04	4.2E-05	5.1E-04
10	5.3E-04	4.2E-05	3.9E-04
20	5.2E-04	4.2E-05	2.9E-04
30	5.0E-04	4.2E-05	2.2E-04
40	4.9E-04	4.2E-05	1.6E-04
60	4.6E-04	4.2E-05	9.1E-05
80	4.4E-04	4.2E-05	5.1E-05
100	4.1E-05	4.2E-05	2.8E-05

Fig.1. Excess cancer risk for all nuclides and components pathways for Northern Zone (NZ).

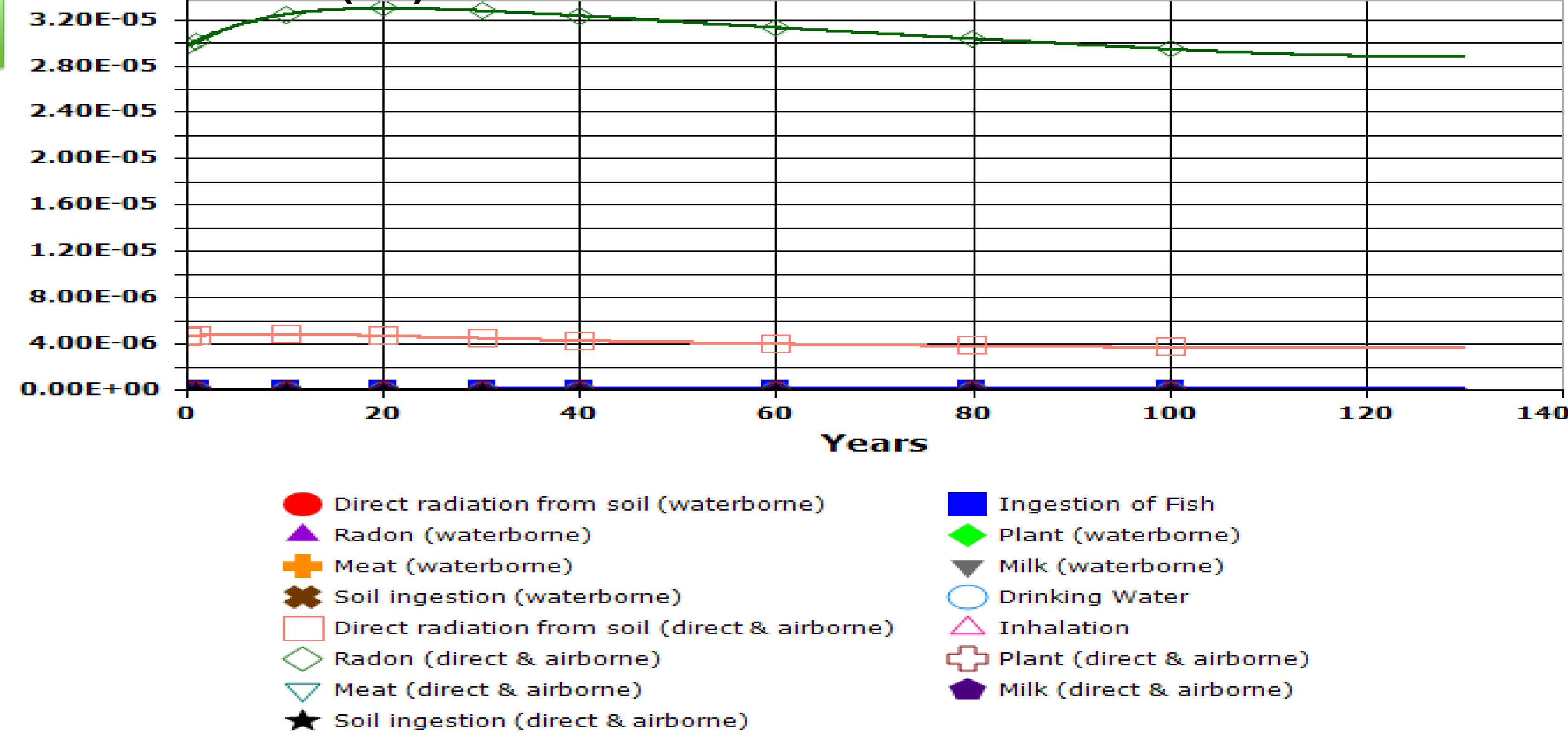


Fig. 2. Excess cancer risk for all nuclides and components pathways for Central Zone (CZ).

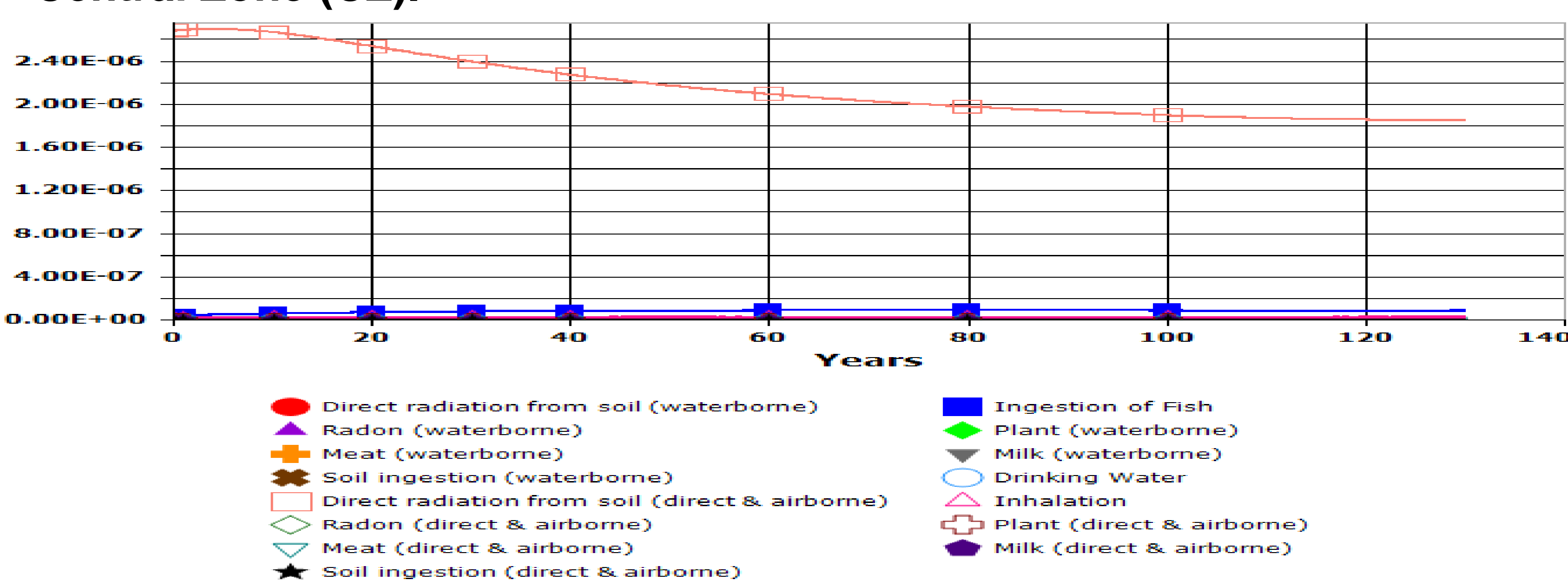
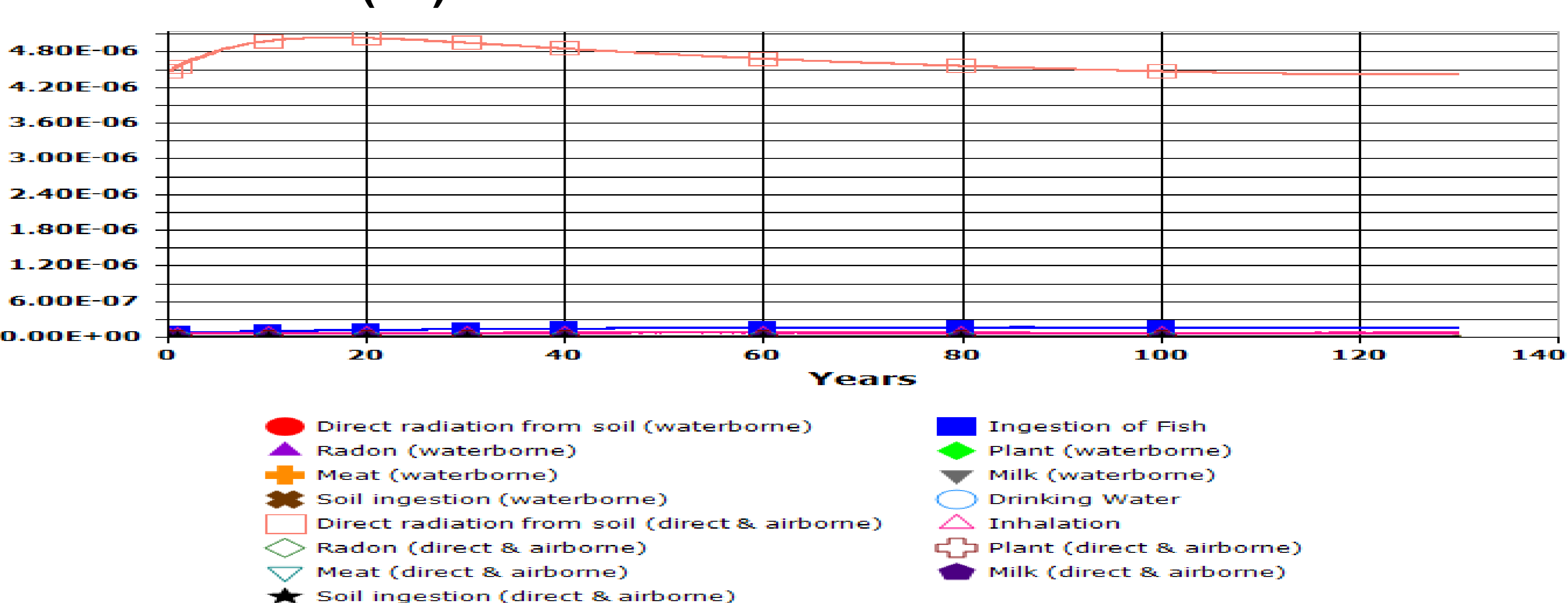


Fig. 3. Excess cancer risk for all nuclides and components pathways for Southern Zone (SZ).



Conclusions

- The TEDE received is below 1mSv/year and radon is a dominant pathway contributing to excessive life to cancer risk(ELCR) in NZ and direct radiation from the soil in CZ and SZ

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