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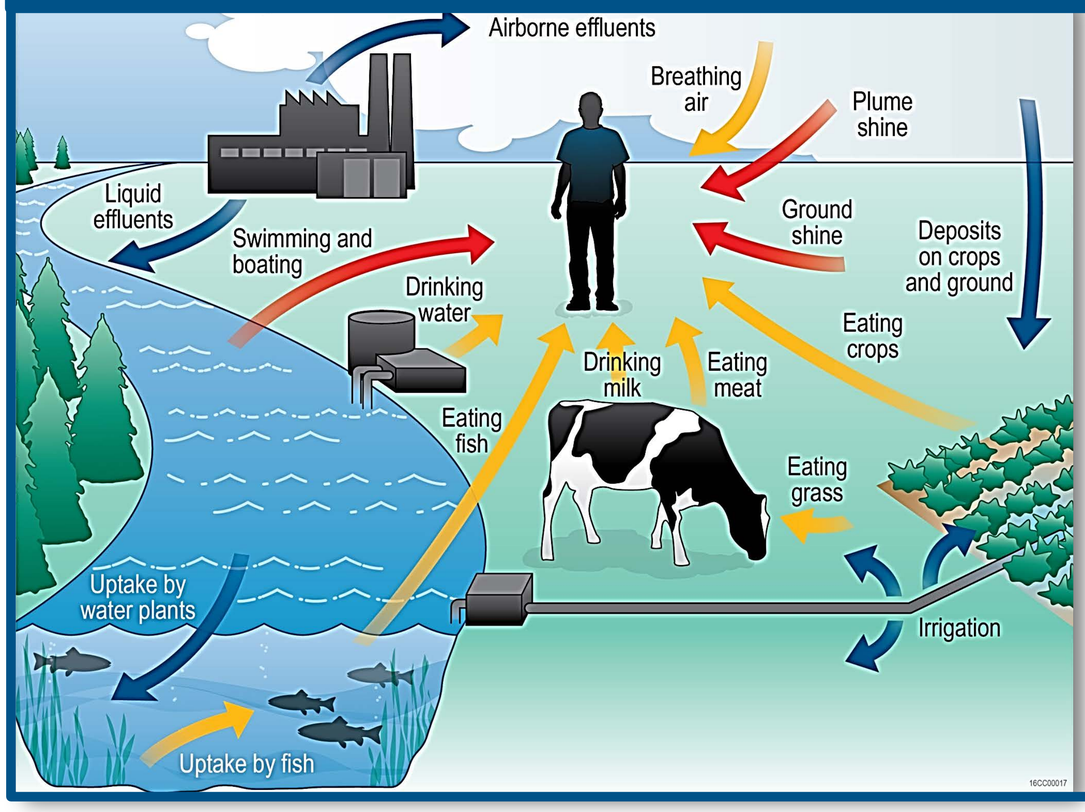
Savannah River National Laboratory™
OPERATED BY SAVANNAH RIVER NUCLEAR SOLUTIONS

Timeline of SRS Offsite Dose Calculations

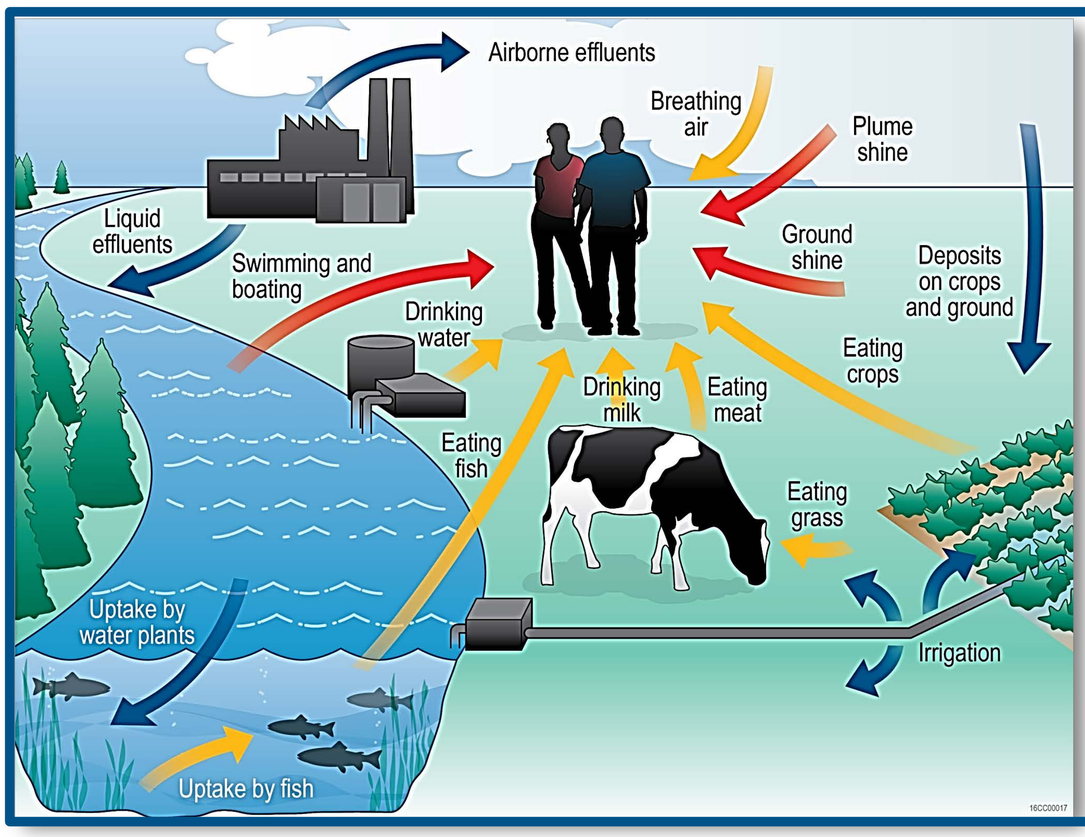
Dose Calculation Receptors



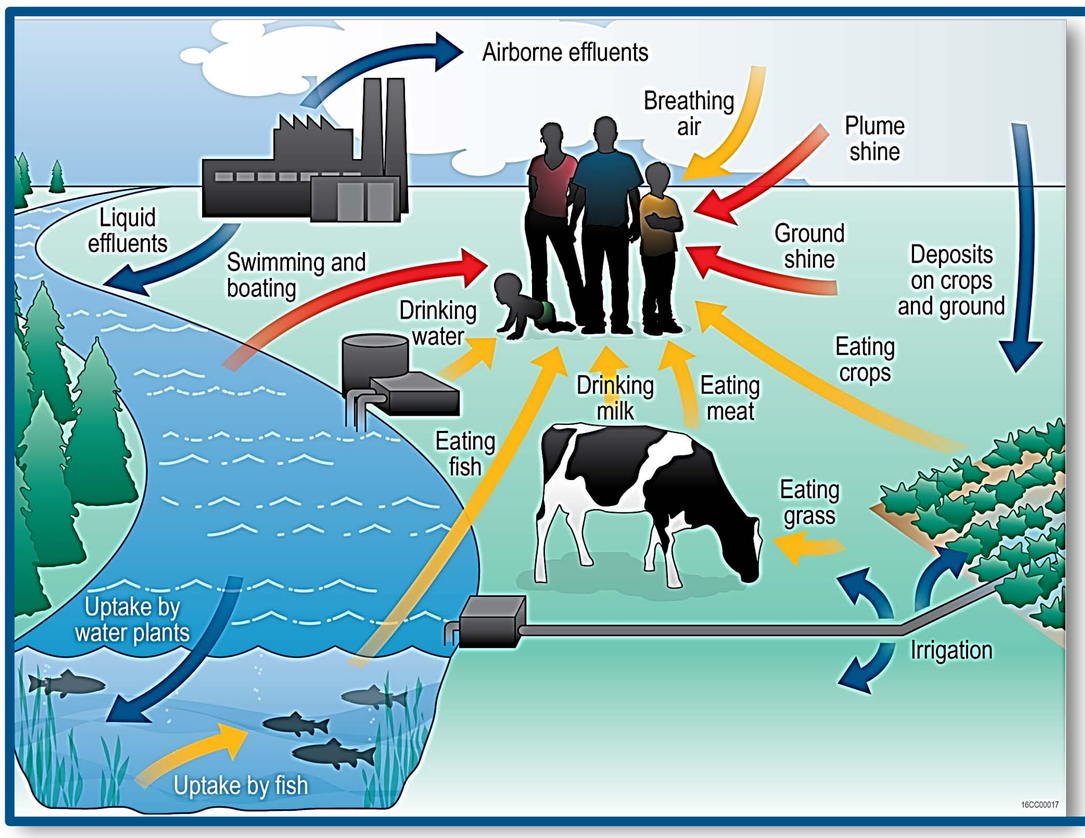
Changes to the Standards

1960 – "Standard Man" Introduced
- International Commission on Radiological Protection (ICRP) Publication #2 issued
- Based on exposures to an average Radiation Worker
  - Male 20 - 30 years old

1974 – "Reference Man" Introduced
- ICRP Publication #23 issued
- Much more detailed than ICRP-2
- Based on exposure to an average Radiation Worker
  - Male 20 - 30 years old



1989 – "Maximally Exposed Individual" Introduced
- ICRP Publication #30 issued
- Department of Energy (DOE) Order 5400.5 set Public Dose Limit of 100 mrem/year
- Based on exposures to an average Radiation Worker (added Female worker)
  - Male 20 – 30 years old
  - Female 20 – 30 years old
  - Food and water consumption and breathing rates still based on Male 20 – 30 years old



2012– "Representative Person" Introduced
- ICRP Publications #101 and #103 issued
- DOE Order 458.1 allows use of Representative Person. Replaced DOE Order 5400.5
- Based on exposures to both age and gender averaged Reference Person
- Added 6 age groups
  - New Borns
  - 1-year old
  - 5-year old
  - 10-year old
  - 15-year old
  - 17-year old and older
- Food and water consumption and breathing rates now based on both genders and all age groups

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The work of the International Commission on Radiological Protection (ICRP) helps to prevent cancer and other diseases and effects associated with exposure to ionizing radiation, and to protect the environment.

Since 1928, ICRP has developed, maintained, and elaborated the International System of Radiological Protection used world-wide as the common basis for radiological protection standards, legislation, guidelines, programs, and practice.

ICRP has published more than one hundred reports on all aspects of radiological protection. The International System of Radiological Protection has been developed by ICRP based on (i) the current understanding of the science of radiation exposures and effects and (ii) value judgements. These value judgements take into account societal expectations, ethics, and experience gained in application of the system. http://www.icrp.org/

Department of Energy (DOE) Order 5400.5 and DOE Order 458.1 establish standards and requirements for operations of the Department of Energy (DOE) and DOE contractors with respect to protection of members of the public and the environment against undue risk from radiation. DOE Order 458.1 replaced DOE Order 5400.5 in 2012. These orders specify radiation dose standards for individual members of the public and establish they are calculated based on ICRP recommendations. The dose standard to the public is 100 millirem per year to a person from routine DOE operations. SRS has continued to follow current recommendations in performing the dose calculations historically.

Under DOE Order 5400.5, SRS used the Maximum Exposed Invidual (MEI) approach to performing dose calculations. The **Maximum Exposed Individual** is a hypothetical individual who remains in an uncontrolled area and would when all potential routes of exposure from a facility's operations are considered, receive the greatest possible dose

DOE Order 458.1 allows the use of the Representative Person for performing dose calculations which are based on the latest ICRP Recommendations. The **Representative Person** is a hypothetical individual receiving a dose that is representative of the more highly exposed individuals in the population. Some of the components of the calculations are based on the ICRP Reference Person. The **Reference Person** is a hypothetical age and gender averaged individual that is a combination of human (male and female) physical and physiological characteristics arrived at by international consensus for the purpose of standardizing radiation dose calculations.

Below is a chart to show a comparison between the MEI and Representative Person:

	Maximally Exposed Individual - MEI (Prior to 2012)	Representative Person (2012)
Lives year-round at SRS boundary	Yes	Yes
Consumes milk, meat and vegetables that would only be produced from that location	Adult Male	Reference Person - Age & Gender Averaged
Consumes water and fish from the Savannah River	Adult Male	Reference Person - Age & Gender Averaged
Spends time on or near the river every day	Yes	Yes
Uses dose coefficients	Adult Male	Reference Person - Age & Gender Averaged