



Santé
Canada

Health
Canada

EMRAS II

Working Group 1

Reference Methodologies for “Controlling Discharges” of Routine Releases

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Outline

- Talk about what WG1 is doing
- Show preliminary results
- Conclude

Environmental Modelling for Radiation Safety II (EMRAS II)

- International Atomic Energy Agency (IAEA) program
- General Aim:
 - To improve the capabilities in the field of environmental radiation dose assessment by:
 - Acquisition of improved data for model testing
 - Model comparison
 - Reaching consensus on modelling philosophies, approaches, parameter values,
 - Development of improved methods and exchange of information.
- Continues the work of previous international exercises including BIOMOVs, BIOMOVs II, VAMP, BIOMASS, EMRAS I.

Major Theme 1:

Reference Approaches
for human dose assessment

Working Group 1

Controlling Discharges of Routine Releases

- Lead: Dr. Trevor Stocki
- Participant Countries
 - Canada (3)
 - Argentina (2)
 - Belarus (1)
 - Brazil (2)
 - Czech Republic (1)
 - France (2)
 - Netherlands (1)
 - Poland (1)
 - Slovak Republic (1)
 - Sweden (2)
 - Ukraine (1)
 - United Kingdom (2)
- Models
 - IMPACT/ CSA N288.1
 - PC CREAM 98
 - PC CREAM 08
 - CROM
 - IRAT (Initial Radiological Assessment Tool)
 - POSEIDON
 - DOSAMED
 - Symbiose



Collaboration:

T.J. Stocki (Canada)

L. Bergman (Canada)

G. Latouche (Canada)

D.M. Telleria (IAEA)

G. Proehl (IAEA)

V. Amado (Argentina)

A. Curti (Argentina)

I. Bonchuk (Ukraine)

P. Boyer (France)

C. Murlon (France)

P. Chyly (Slovak Republic)

R. Heling (Netherlands)

V. Kliaus (Belarus)

P. Krajewski (Poland)

D.C. Lauria (Brazil)

L. Newsome (United Kingdom)

J. Smith (United Kingdom)

L. Sagi (Hungary)

Scenario A

- Based on data from Sizewell, UK
 - Includes information about the site, as well as habits information for near by residents
- Additional parameters selected from a variety of sources
 - Parameter values chosen from IAEA technical documents, ICRP documents, CSA documents, or recommended by the participants in a previous Working Group 1 meeting
- By providing an extensive list of parameters, each participant should be modelling the identical scenario. This allows us to directly compare the models.

Scenario A

- Includes an atmospheric release of Co-60, Cs-137, I-131, and Kr-85 at a rate of 1 TBq/a
- Includes a marine release of Co-60, Cs-137, and Sr-90 at a rate of 1 TBq/a
- Includes a cattle/sheep farm at a distance of 1 km from the source
- Includes a fishing location at 300 m distance from the source
- Includes a population living at 300 m distance from the source who ingest local beef, sheep, milk, fish, crustaceans, and molluscs

Sizewell Nuclear Power Facility

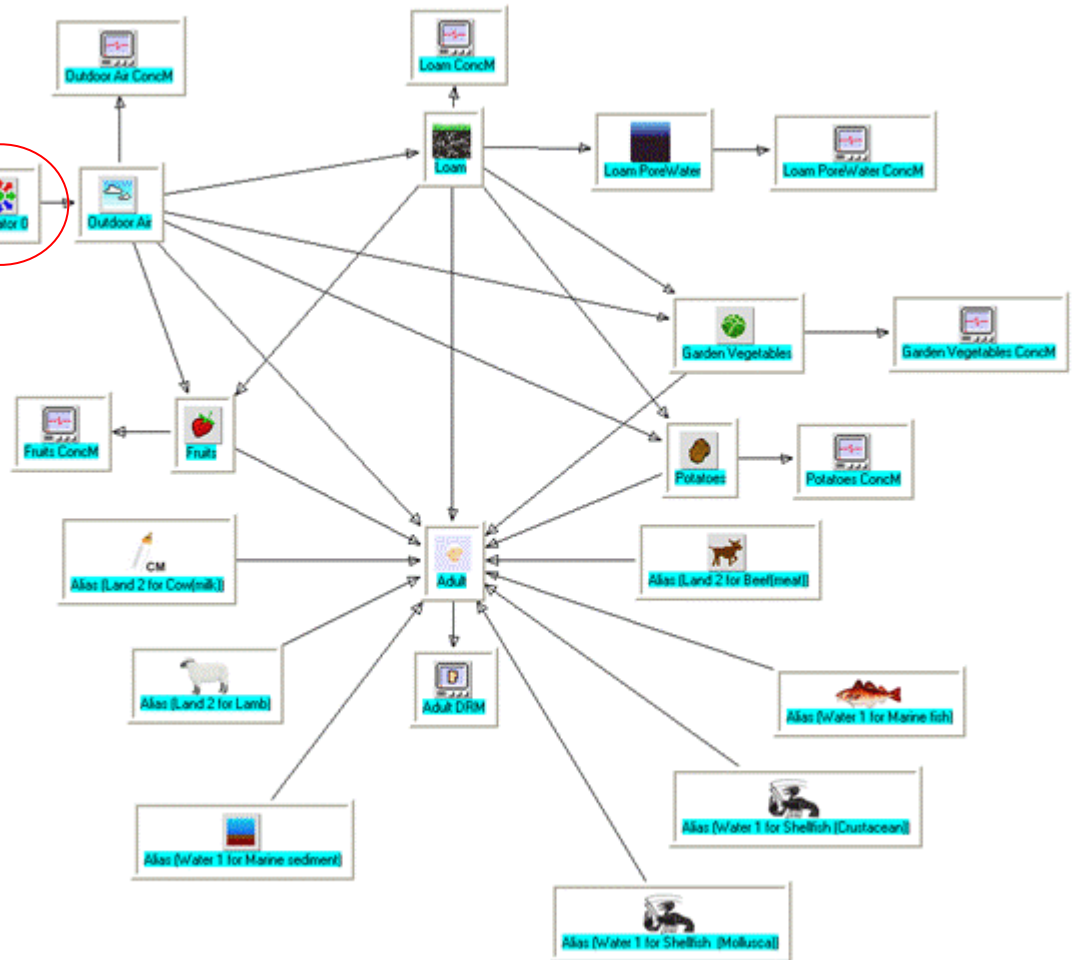


Canadian Models

- Canadian Standard Association (CSA) Document N288.1
 - Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities (2008)
 - Used in this exercise as guidance material
- Integrated Model for the Probabilistic Assessment of Contaminant Transport (IMPACT)
 - Ecometrix
 - Based on the guidance of N288.1
 - Used by nuclear industry professionals in Canada to model the effects of routine releases
 - Used in this exercise to model the scenario

Critical Group Dose Modelling by Lauren Bergman

Land Polygon: Land 1
Edit Source Air plume Air Soil Underground water Plant Animal Human Monitor Alias Transmogrify Rename

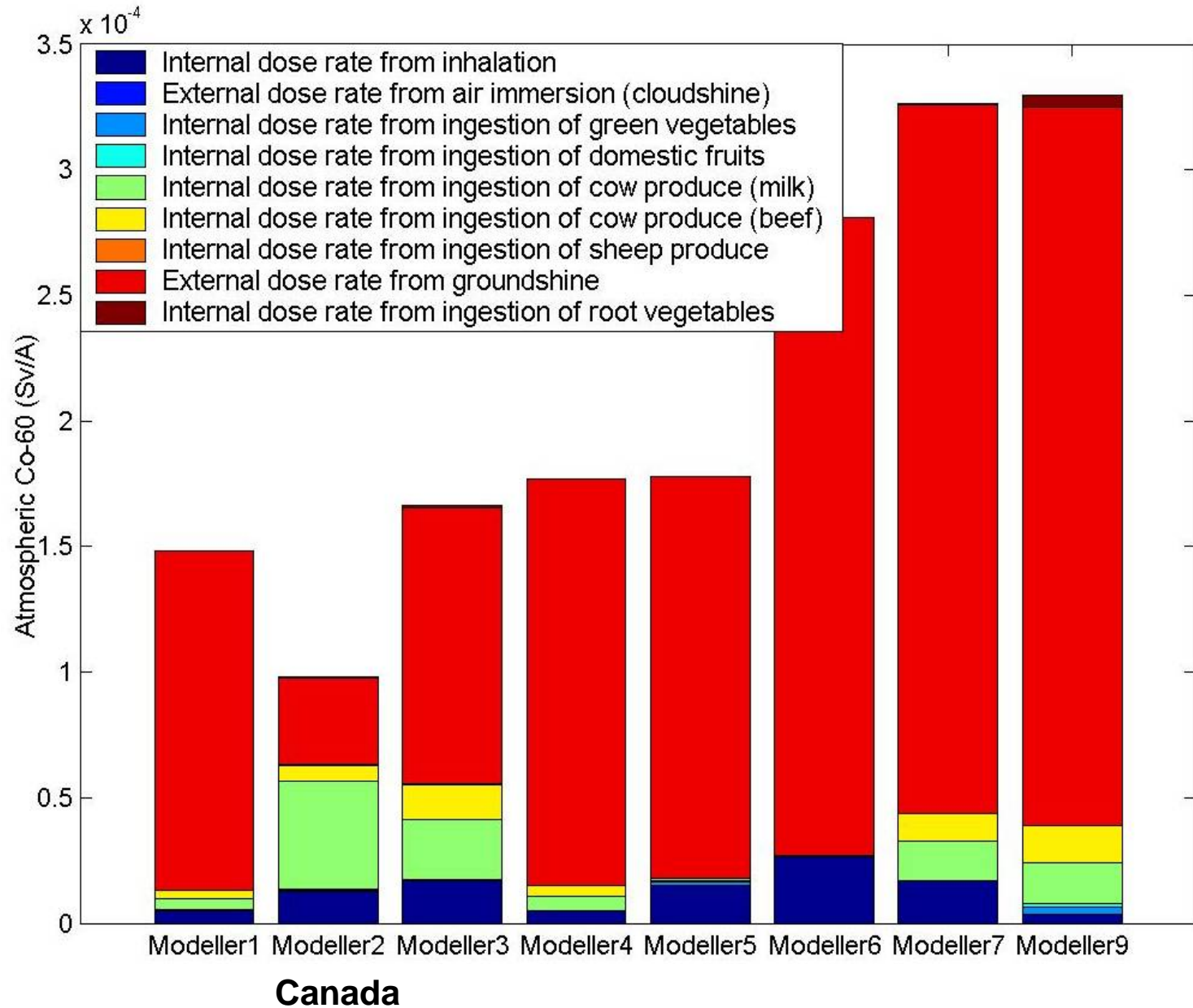


Dictated atmospheric concentration

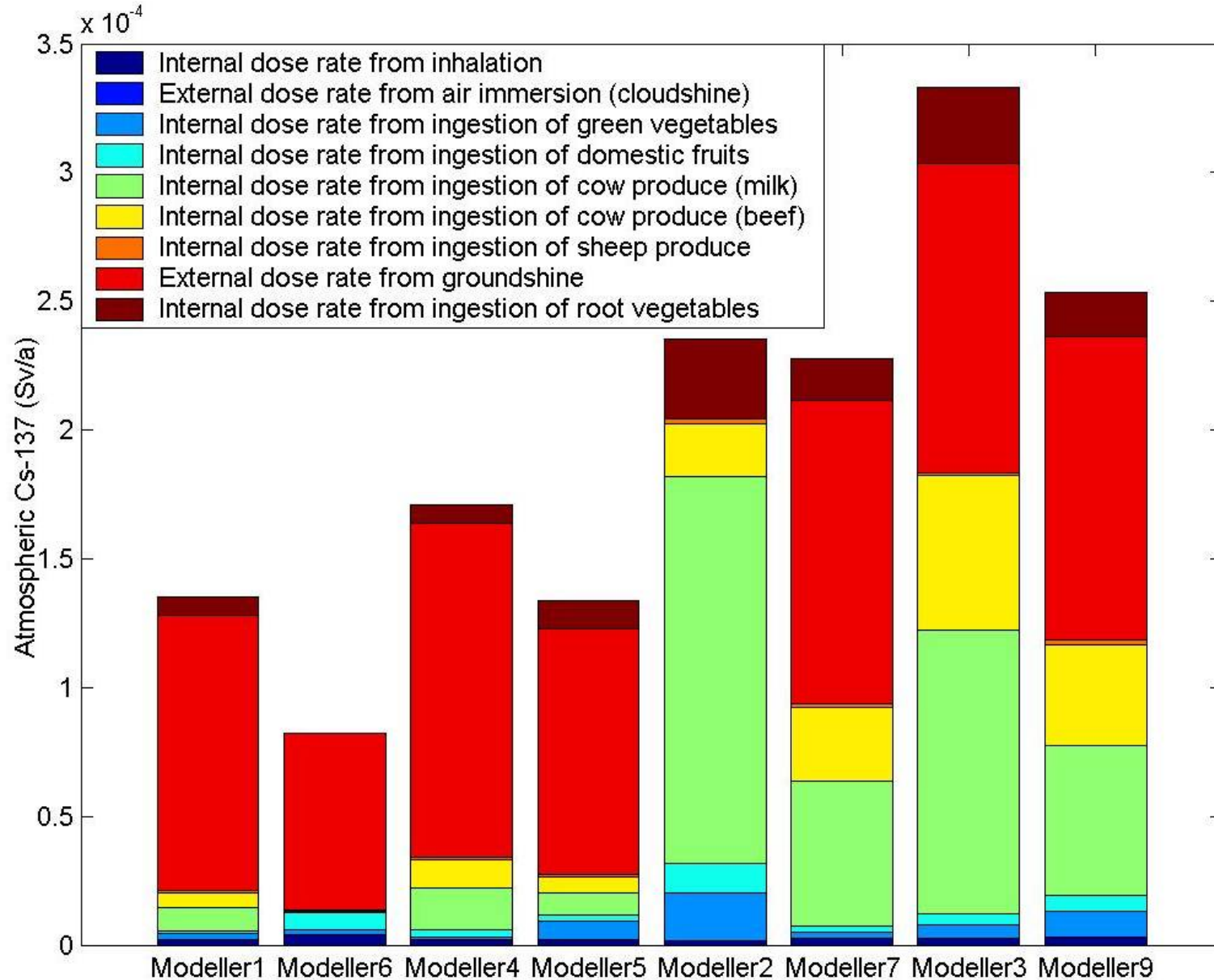
Calculated using
SRS-19:
 $0.0593 \text{ Bq}\cdot\text{m}^{-3}$

Residential site and local
garden farming site

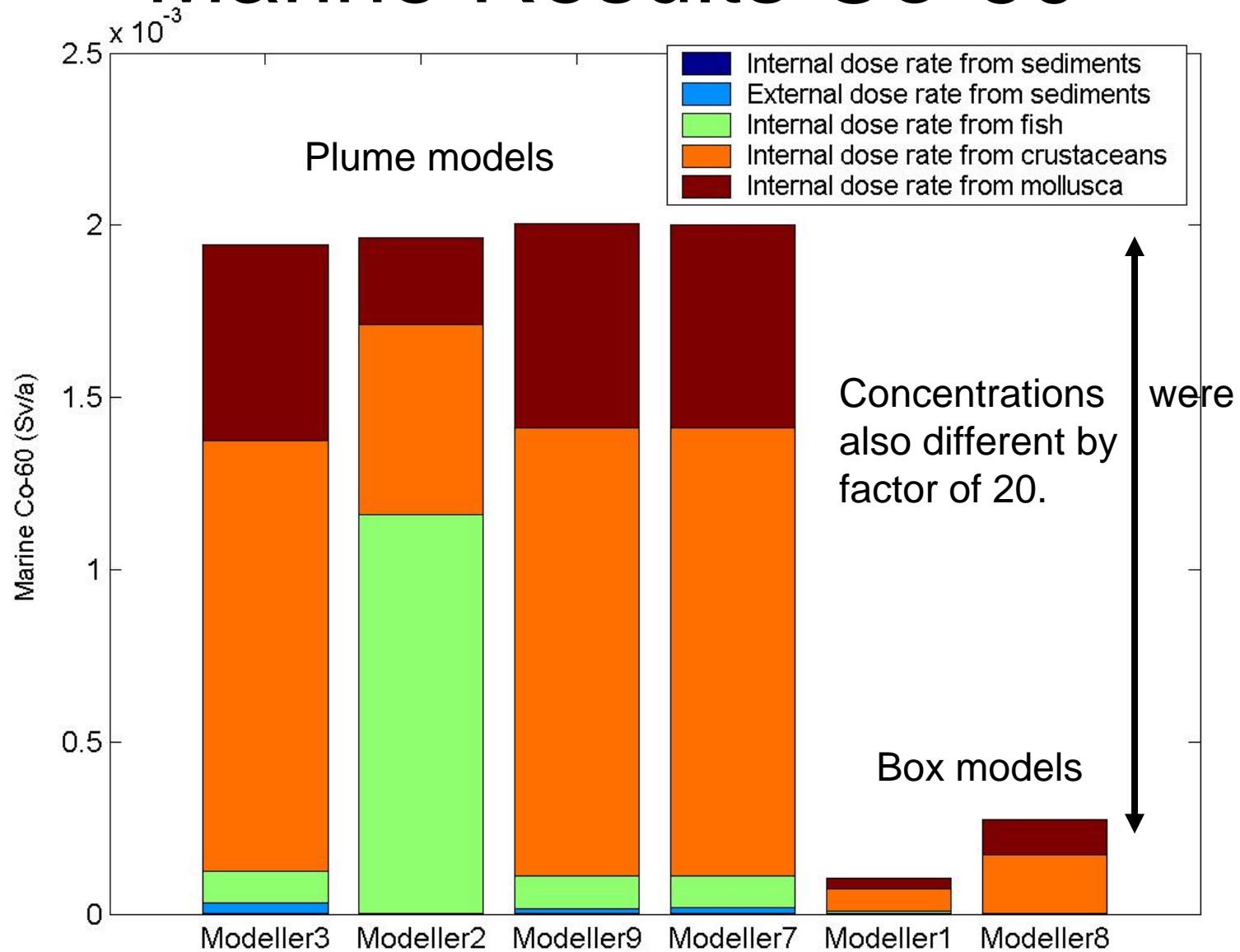
Atmospheric Results Co-60



Atmospheric Results Cs-137



Marine Results Co-60



Scenario B



- Original plan: Have participants model Scenario A, but allow them to choose their own critical group
- Decided this is not easily quantifiable.
- Asked participants to provide a description of their methodology used to choose a critical group, and how this factors into their modelling
- Will be incorporated into the final report

Scenario C

- River scenario, based on Chalk River
- No atmospheric component considered, only aquatic release
- Scenario template discussed at recent meeting in Vienna, and has been updated
- Results are due before the summer 2011 meeting



Conclusions

- The preliminary results for the atmospheric transport had difference of about a factor of 4.
- This is reasonable, it is due to our heavy parameterization.
- Results from the Marine release were interesting in the sense that the plume models in this scenario were more conservative.
- Will be working on scenario C.

Next Working Group 1 meeting

- International Conference on Radioecology and Environmental Radioactivity
 - Hamilton, Ontario
 - June 19th – 24th, 2011
- Working group 1 meeting will follow the conference at McMaster University

Website:

<http://www.icrer.org/>



EMRAS II Wrap-up

- EMRAS II Program to be completed by December 2011
- Wrap-up meeting to take place January 2012
 - Produce a final report for Working Group 1
- A new EMRAS program will begin once this program has been completed
 - IAEA looking for suggestions of issues for the next program
 - Contact: Claire Halsall at C.Halsall@IAEA.org

Extra slides

WG2: Modelling of NORM & Legacy Sites

- Objective: testing models' suitability for demonstrating compliance with IAEA safety requirements as input to IAEA regulatory programmes.
- Scope: remediation of legacy sites
- Models: RESRAD, ASAM, ERICA, Ecolego...
- Are the models appropriate?
- Which model is the best for solving problems at a given legacy site?
- Group leader: Astrid Liland, NRPA, Norway.
(Astrid.Liland@nrpa.no)
- Canadian: S. Chouhan (???)

WG3: Reference Models for Waste Disposal.

- Aims: develop reference modelling approaches & reference case for biosphere in the future on basis of BIOMASS approach.
- Include environmental change in biosphere modelling
 - Climate, society, land use.
- Id impact of climate factors on processes that may have a major influence on dose to man.

- Group leader Tobias Lindborg, SKB, Sweden
- Canadians: S. Chouhan, S. Sheppard
T. Yankovich (????)





Major Theme 2:

Reference Approaches
for biota dose assessment



WG4: Biota Modelling

- Objective: to improve Member State's capabilities for protection of environment by comparing and validating models for biota assessment
- Considering ICRP C5 output(s) & transfer handbook.
- One of the scenarios they have considered is a U mine in Canada (Beaverlodge).
- They chose Beaverlodge because of the data available.
- Group Leader: Nick Beresford, CEH, UK.
- Canadians: S. Mihok(CNSC)



WG5: Wildlife Transfer Coefficient Handbook.

- Objective: Provide IAEA Member States with data for use in the radiological assessment of wildlife as a consequence of routine discharges. Accidental releases also considered.
- Will be published as TRS
- On-line database populated with ERICA dB.
- On-going 'living' database after TRS.

<http://www.wildlifetransferdatabase.org/>

- Group leader: Brenda Howard, CEH, UK.
- Canadians: S. Mihok(CNSC), T. Yankovich(SRC)
- C. Seymour, Helmendra Mulye(CNSC)



WG 6: Biota Dose Effects Modelling

- Objective: Dose-Effect modelling to assist Risk Assessments.
- Sub groups:
 - Update Dose-Effect database (A. Real)
 - Dose-Response relationships (J. G-L IRSN)
 - Incorporate Population models (T. Sazykina, Russia)
 - Alternative Approaches (T. Sazykina, Russia)
 - Multiple Stressors (H Vandenhove, Belgium)
 - Canadian Benthic Data (S. Mihok, Canada)
- Group leader: Tom Hinton, IRSN, France
- Canadians: C. Seymour(MacMaster)





Major Theme 3:

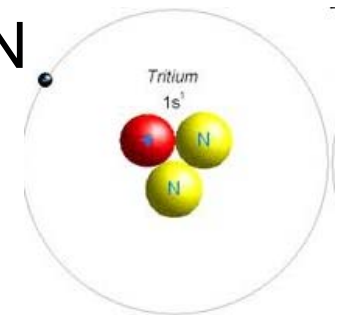
Emergency Situations



WG 7: Tritium Accidents



- Objectives: to develop a standard dynamic model for ^3H dose assessment for acute releases to atm and water.
- Justifications:
 - Accident preparedness
 - Uncertainties in existing models are high
 - OBT models need improvements
- Leader: Dan Galeriu, Institute of Physics & Nuclear Eng., Romania.
- Canadians: V. Korolevych (AECL), S. Mihok (CNEL), T. Yankovich (SRC)



WG8: Environmental Sensitivity

- Explore the concept of environmental sensitivity in rural and semi-natural environments in the framework of assessments after an emergency situation.
- Formulate the concept of environmental sensitivity.
- Model various environments Alpine, Arctic, Temperate.

- Group Leader: Bliss Tracy, Canada
- Canadians: B. Tracy, S. Barabash (Ecometrix),
S. Chouhan (AECL), L. Bergman (HC).



WG9: Urban Areas (Emergencies)

- 3 modelling exercises id'ed:
 - Atm dispersion, short-range
 - Atm dispersion, longer-range
 - Countermeasures
- Dispersion from an explosion Czech data set.
- Compare model predictions with measurements
- Group leader: Kathy Thiessen, SENES, USA
- Canadians: S. Chohan(AECL)

