

Food Issues in Environmental Impact Assessments

Health Canada



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Integration of Health and Environmental Assessment

- ⇒ Interest in the international impact assessment community exists for integration of health and environmental assessments
- ⇒ “Integrated assessment”, Martin Birley, Impact Assessment and Project Appraisal, volume 21, number 4, December 2003, pages 313-321, Beech Tree Publishing

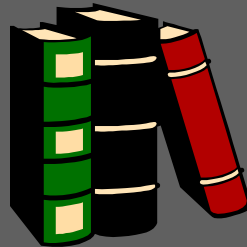
Food Issues in Environmental Impact Assessments

“Country Foods” – Foods gathered from the project area and consumed by local residents.



Canadian Handbook on Environmental Impact Assessments

Separate Chapter on Foods Issues
Risk Assessment of Contaminants in Country
Foods



Environmental Impact Assessments

- ➔ Development Projects
e.g. dams, mines, etc.
Potential of introducing
contaminants into
country foods.



- ➔ Remediation Projects
Potentially the country
foods have been
contaminated.
The source of the
contamination will be
removed.

EIAs



- ⇒ Models are typically used to estimate levels of potential contaminants in country foods
- ⇒ Propose – development of a standardized assessment procedure for food issues in EIAs
- ⇒ Objectives:
 - Better Protect Human Health
 - Facilitate the review process
 - Improve consensus on project feasibility

EIAs



- ⇒ Measure levels of contaminants in country foods under study
- ⇒ Evolve SLRA to SSRA – SSRA is a more in-depth assessment using actual data
- ⇒ Each project is unique and an experienced risk assessor is required to design the study and conduct the assessment for the project



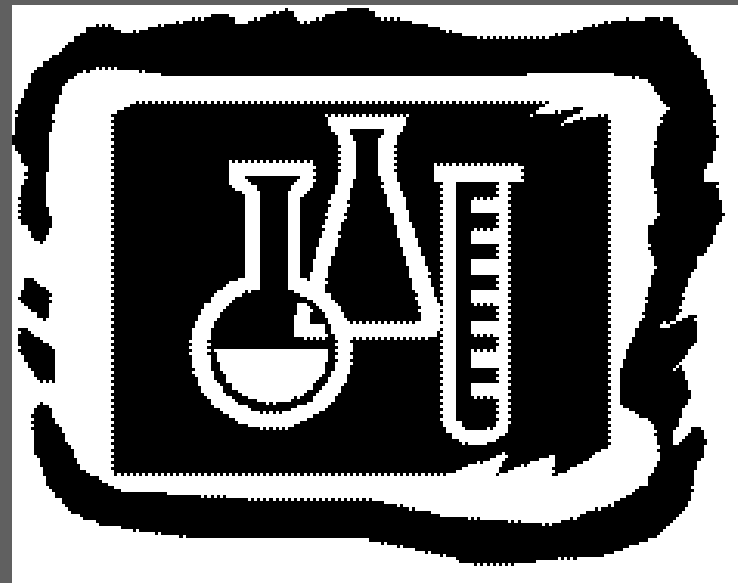
I.D. of Potential Contaminants

- ⇒ Consider a variety of factors – Project activities – e.g. construction activities, materials used, landscape changes, flooding etc.
- ⇒ Also consider naturally occurring contaminants in the project area based on information available or analysis of soil and water
- ⇒ EIA – A comprehensive list of potential contaminants is required



Examples of Contaminants

- ⇒ Metals
- ⇒ PAHs
- ⇒ POPs
- ⇒ Pesticides
- ⇒ PCBs
- ⇒ Dioxins/furans

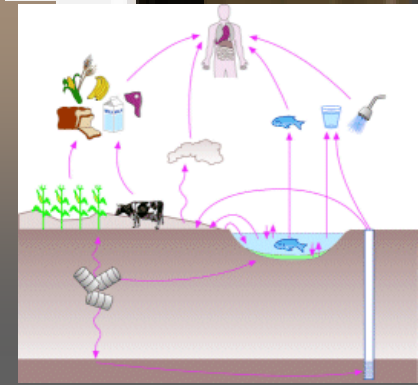


I.D. Foods

- ⇒ Foods gathered from the project area
- ⇒ Actually consumed by the local residents
- ⇒ Survey of area community
- ⇒ May include retail foods (HPFB)



Exposure Pathways



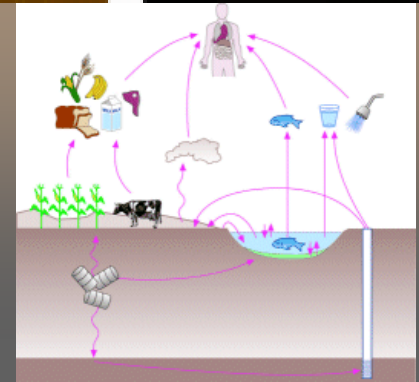
- ⇒ Route of contaminant transport from source to receptor (local residents)
- ⇒ Consider country foods consumed, potential contaminants identified and project activities
- ⇒ = Potential pathway of contaminants to country foods

Contaminants of Potential Concern (COPCs)



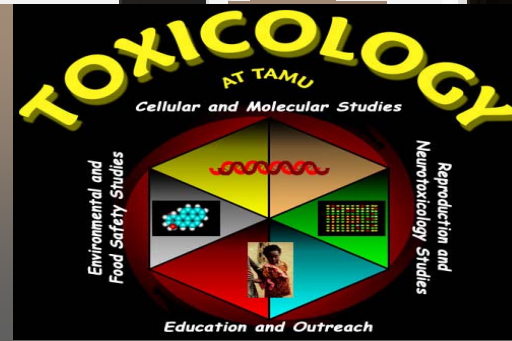
- ⇒ I.D. of COPCs based on the potential exposure pathways available for contaminants into country foods
- ⇒ Now possible to estimate the impact of the proposed project on foods before the project commences
- ⇒ Modeling can be employed at this stage of the assessment - SLRA

SLRA



- ⇒ No potential contaminants identified
- ⇒ No exposure pathways of contaminants into foods appear to exist, including after the project commences
- ⇒ No country foods harvested from the area
- ⇒ No receptors identified at any stage of the project

Toxicology



- ⇒ Toxicity Reference Values (TRVs) (TDIs, PTDIs, RfDs, ULs etc.) – from reliable sources
- ⇒ TRVs must be listed and the sources must be cited in the EIA
- ⇒ Health Canada, JECFA (FAO/WHO), Agency for Toxic Substances and Disease Registry (ATSDR), Integrated Risk Information System (IRIS), ORNL RAIS

Food Consumption Information

- ⇒ Reliable survey of local residents
- ⇒ Consumption Figures – 1972 NCS, Health Canada/Provincial Surveys, 2004 Nutrition Focus Survey (Stats Canada) – 2005
- ⇒ Eaters Only Figures in EIAs



Monitoring and Background Data

- ⇒ Background Data – Measure the contaminant levels in country foods before commencing
- ⇒ Periodic monitoring after the project is undertaken
- ⇒ Compare data sets – Impact of project
- ⇒ Determine health risk assessment and monitoring needs



Elevated Exposure



A short term elevated exposure to contaminant(s) does not necessarily represent a health risk to consumers – TRVs are based on a life-time of exposure to contaminant(s)

Monitoring of Country Foods

- ⇒ Those tissues of fish/wild game that are consumed must be analyzed for contaminant levels
- ⇒ Whole fish - PCBs are typically found in the fat (skin)
- ⇒ Filet - MeHg is typically found in filet of fish

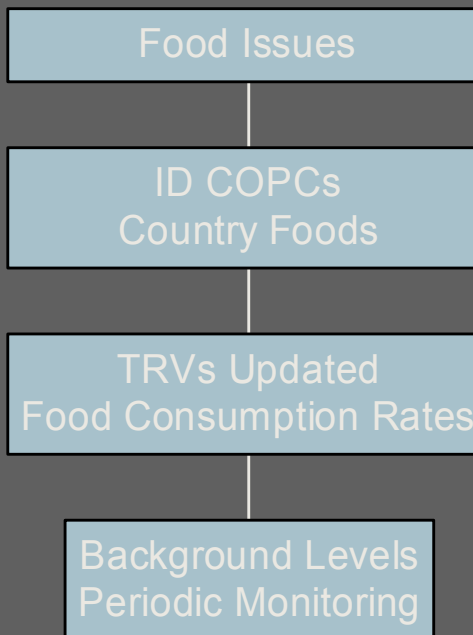


Analytical Results

- ⇒ Available methodology – lowest limits of detection achievable (~ 10 to 20 ppb range)
- ⇒ TRVs – typically expressed as $\mu\text{g/kg bw/day}$
- ⇒ A suitable (capable) laboratory is required
- ⇒ Proof of accuracy of results
- ⇒ Duplicate analysis must be provided



Environmental Impact Assessment



Risk Assessment

Hazard Assessment

Hazard Identification



Dose-Response Analysis



Low Dose Extrapolation



Exposure Assessment



Risk Characterization

Modified from HWC, 1990



Exposure Estimate

$$\text{Dose} = \frac{C_f \times IR_f}{BW}$$

Dose = Contaminant Intake

C_f = Mean level COPC Found

IR_f – Food Consumption Rate

BW = Body Weight



EIA Conclusions and Recommendations

- ⇒ Risk Assessment (EIA) – Estimate potential impact of contaminant levels in food on human health
- ⇒ Recommend mitigation such as project changes or food consumption advisories to facilitate the implementation of the project and to protect human health
- ⇒ Determine the need for periodic monitoring
- ⇒ ALARA approach – achieve exposure to contaminant(s) to levels “as low as reasonably achievable”

Standardized Assessment Procedure



Anticipated Advantages of this Health Canada Risk Assessment Protocol

- ⇒ Serve to better protect human health
- ⇒ Facilitate EIA review by stakeholders – reduce review time required and provide a means for a better consensus on project feasibility
- ⇒ This RA protocol is a useful tool in regard to the integration of health and environmental assessments

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