



Biosolids Pellet Review Study

Human Health and Ecological Risk Assessment

Prepared for Toronto Public Health

Cecile Willert, P.Eng.
Jacques Whitford Limited

May 11, 2005



TPH Study Team

Lead Authors

- Cecile Willert, P.Eng.
Jacques Whitford
- Chris Ollson, Ph.D. Jacques
Whitford
- Erik Apedaile, P.Ag.
Apedaile Environmental
Management

Contributing Team Members

- Angela Li-Muller, Ph.D.,
Toronto Public Health
- Beverly Hale, Ph.D.
University of Guelph
- Michael Goss, Ph.D.
University of Guelph
- Donald Cole, M.D., M.Sc.,
University of Toronto
- Karen Clark , LLB, M.A.,
Toronto Public Health



Contributing Authors

- Rena Chung, M.E.S. (Jacques Whitford)
- Ian Collins, B.A.Sc. (Jacques Whitford)
- Susan Springthorpe, M.Sc. (U of Ottawa)
- Siobhan Sutherland, M.A. (Jacques Whitford)
- Malcolm Stephenson, Ph.D. (Jacques Whitford)
- Syed Sattar, Ph.D. (U of Ottawa)

External Peer Reviewers

- Sanya Petrovic, M.Sc. (Health Canada)
- Tim Sly, Ph.D. (Ryerson U)
- Ellen Harrison, M.S. (Cornell U)
- Rebecca Efroymson, Ph.D. (Oak Ridge National Laboratory)

Public Advisory Committee Members



Outline

- The Issues
- Biosolids Pellets
- Study Objectives
- Approach
- Study Conclusions



Issues

- Biosolids are a product
 - disposal versus acceptable uses
- Biosolids are rich in some nutrients and a potentially beneficial resource
- Biosolids contain natural and man-made chemicals and biological entities which may pose hazards

Biosolids Pellets



Ashbridges Bay
Treatment Plant

Digested Sewage
Sludge

Biosolids Cake
(Dewatered, Thickening
Agents Added)

Pelletization (Heating
and Drying)



Study Objectives

- Improve knowledge and understanding about biosolids pellets and related issues;
- Provide information to assist in developing appropriate management practices for pellet use in the City of Toronto; and,
- Provide practical and scientifically defensible information to address concerns related to pellets.



Approach: Entities Evaluated

Quantitative Evaluation

- Arsenic
- Cadmium
- Chromium III
- Cobalt
- Copper
- Lead
- Mercury
- Molybdenum
- Nickel
- Selenium
- Zinc
- PCBs
- Dioxins and Furans

Qualitative Evaluation

- Biological Agents
 - bacteria, viruses, parasites, helminths, prions
- Odour
- Polybrominated Diphenyl Ethers
- Phthalates
- Alkylphenol Ethoxylates
- Endocrine Disruptors
- Linear Alkylbenzene Sulphonates (LAS)
- Pharmaceuticals
- Radionuclides



Approach: Receptors Evaluated

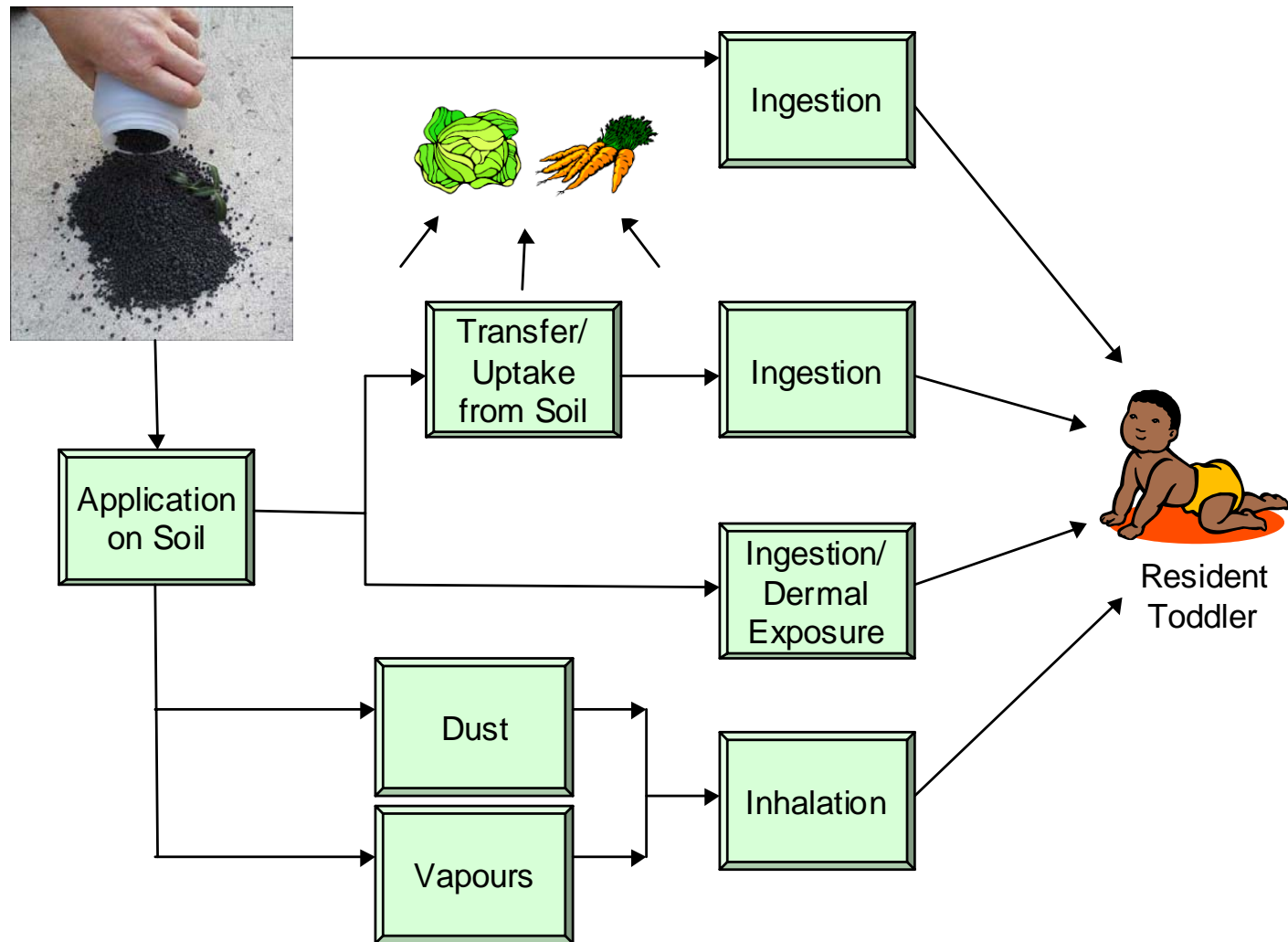
Human

- City Workers
 - parks & landfill
- Residents
 - child & adult
- Recreational
 - child & adult

Ecological

- Plants
- Birds
- Mammals
- Pets as individuals

Approach: Exposure Pathways (Toddler)





Conclusions: Human Health

- Non-carcinogenic human health risks below MOE “acceptable” benchmark
- All chemicals, uses and scenarios below MOE & Health Canada cancer risk benchmarks
 - when background included, home use scenario for arsenic exceeds MOE but meets Health Canada benchmark
 - Arsenic levels in biosolids decreasing



Conclusions: Biologics

- Process equivalent to US EPA Class A biosolids and pellets likely of similar quality
- Data suggest minimum process time of 60 to 90 minutes at 80°C effectively destroys most pathogens
- Some biological entities may not be deactivated during pelletization
- Confirmatory testing is limited
- Potential risks of prion-related diseases in Toronto are low.
- Bulk discharges of untreated blood products may expose the sewage treatment system to biological entities



Conclusions: Ecological

- No elevated risks for use in landfill top dressing
- Qualitative assessment of plants or soil organisms
 - no risk expected for most chemicals evaluated
 - copper levels slightly above conservative screening values after long-term application on lawns
- Evaluation of birds and mammals
 - Most exposure concentrations below acceptable benchmarks
 - Chromium exposure estimated to robins above benchmark
 - No effects to robins expected
- Estimated hazards at potential effects threshold for
 - exposure of dogs or cats to arsenic
 - exposure of cats to dioxins and furans
 - No effects to pets expected



Conclusions: Quality Issues

- Dry bulk storage is important in preventing pathogen regrowth, smoldering, odour and dust generation
- Proper and consistent function of the pelletizer is important
- Confirmatory testing is important



Report available on Toronto Public
Health web site:

<http://www.toronto.ca/health/>