

APPENDIX A

Survey Questionnaires and Responses

I. Sewage Biosolids Stakeholders In Ontario

IA. Survey Cover Letter

October 14, 1999

Sewage Biosolids Stakeholder

Dear Sir or Madam:

Re: **WEAO Sewage Biosolids Study**

Assessing the Fate and Significance of Selected Metals, Trace Organics and Pathogens in Sewage Biosolids Applied to Agricultural Land through Literature Review and Consultation with Stakeholder Groups

The study is supported by Environment Canada, the Ontario Ministries of the Environment (MOE) and Agriculture, Food and Rural Affairs (OMAFRA), and the municipalities of Toronto, Windsor, Hamilton-Wentworth, Waterloo, Ottawa-Carleton, Halton, Niagara, Durham and Peterborough.

Background

It is estimated that more than 300,000 dry-tonnes of sewage biosolids are generated annually by the 260 plus primary and secondary sewage treatment plants (STPs) in Ontario. Approximately 34% of these biosolids are utilized as fertilizer/soil supplements on agricultural land this practice will increase in the future, especially when the Toronto Main STP completes its program of 100% beneficial reuse of biosolids in 2001.

Reuse of sewage biosolids on agricultural land has been practiced for more than 30 years in North America and many European countries without notable human health or environmental problems. Nonetheless, some scientists, farm communities and other sectors of the general public have expressed concerns about this practice. For example, they question whether; (1) present sewage biosolids application guidelines and practices in Ontario are adequate to protect the environment and human and animal health and (2) minute concentrations of organic contaminants such as PAHs, PCBs, dioxins, furans and other endocrine disruptor compounds (EDCs) represent significant risks?

The WEAO concluded that a literature review and stakeholder consultation study on the fate and significance of metals, trace organics and pathogens in biosolids applied to agricultural land is a necessary first step to respond to these concerns. It is anticipated that results of this study will enable regulators to assess whether; (1) the current guidelines for biosolids utilization in Ontario are adequate or (2) further study is required to revise them.

Stakeholder Consultation

Following up on my recent telephone/email contact, I am attaching the WEAO Study questionnaire. As we discussed, its purpose is to solicit information from stakeholder (i.e., affected communities) groups about your knowledge of sewage biosolids recycling to agricultural land and to provide opportunity for you to express concerns and satisfactions with this practice. Please use as many additional pages as you require to complete the questionnaire.

Information is being solicited from a wide range of stakeholders including; non-government organizations, farming associations, regulatory agencies, and expert and industry groups. The detailed survey findings will be discussed and verified at a stakeholders meeting and included in the WEAO study report.

The questionnaire is being forwarded to you as a representative of your stakeholder group - please forward it to other members who want to receive it. Also, you are invited to represent your group at the stakeholders meeting December 1, 1999 at the MOE Laboratory in Etobicoke (details to follow).

To maintain the WEAO study schedule, I request that completed questionnaires be returned to me by November 5, 1999. This will allow time for information to be compiled and prepared for presentation to the stakeholder meeting.

Please consolidate the responses from your stakeholder group into a single document but, if this is not possible, please forward all completed questionnaires to:

Dr. M.D. Webber
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Recycling to agricultural land is an important sewage biosolids management practice in Ontario but its continued success depends upon stakeholder acceptance. The WEAO anticipates that actions arising from this study will enhance this acceptance. Thank you for contributing to our study.

IB. Survey Questionnaire

Assessing the Fate and Significance of Selected Metals, Trace Organics and Pathogens in Sewage Biosolids Applied to Agricultural Land through Literature Review and Consultation with Stakeholder Groups

WEAO Study Questionnaire - Stakeholders

- 1) Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.
- 2) Name of stakeholder group represented.
- 3) Approximate membership (if applicable) of stakeholder group.
- 4) Major aims/objectives of stakeholder group.
- 5) Reason(s) for stakeholder group's interest in sewage biosolids management.
- 6) Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious. Please:
 - Indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Ontario Biosolids Utilization Guidelines;
 - Indicate other contaminants or groups of contaminants that you feel are not adequately regulated by the Guidelines and represent serious concerns for agriculture and the environment;
 - Provide reasons for your choices;
 - Rank your concerns in order of priority; and
 - Provide reference to any documentation you have that supports your choices.
 - The references should include: author(s); year of publication; title of article; and name, volume and page numbers of publication. Examples follow:

Webber, M.D. and A. Shames, 1987. Heavy metal concentrations in Halton Region soils: An assessment for future municipal sludge utilization. *Can. J. Soil Sci.* 67: 893-903.

Webber, M.D. and J.A. Bedford, 1996. Organic and Metal Contaminants in Canadian Municipal Sludges and a Sludge Compost: Supplemental Report. WTI Report No. 1996-RES-3, May 1996, Burlington. 26 pp & Appendices.

Bradley, J.W., S. Kyosi, P. Matthews, K. Sato and M. Webber, 1992. Worldwide sludge management practices. In *Municipal Sewage Sludge Management: Processing, Utilization and Disposal*, Water Quality Management Library - Volume 4, eds., C. Lue-Hing, D.R. Zenz and R. Kuchenrither, Technomic Publ. Co. pp 537-657.
- 7) Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc). Please elaborate.

- 8) What information/action do you feel is required to respond to your concerns.
- 9) Land utilization of sewage biosolids in Ontario is conducted according to Ministry of Environment, Agriculture and Health guidelines and is regulated and monitored by the Ministry of Environment. Are you aware of other land utilization programs that you think offer better or safer practices? Please provide details and any documentation.
- 10) Is sewage biosolids utilization on agricultural land a desirable practice and what is its long-term future in Ontario? Please elaborate.
- 11) Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (3) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rate these options in order of preference and explain your rating.
- 12) Please indicate any other concerns (i.e., not mentioned above) about present land utilization of sewage biosolids practices in Ontario.
- 13) Do you have any comments or recommendations about the WEAO study?

IC. Survey Responses From Stakeholders

APPENDIX A

I. SURVEY RESPONSES FROM BIOSOLIDS STAKEHOLDERS

I(a). Linda Toy – Canadian Food Inspection Agency

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

Linda Toy, Toxicologist

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Canadian Food Inspection Agency
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2. *Name of stakeholder group represented.*

Fertilizer Section, Canadian Food Inspection Agency

3. *Approximate membership (if applicable) of stakeholder group.*

Not applicable.

4. *Major aims/objectives of stakeholder group.*

The mission of the Canadian Food Inspection Agency is to ensure that Canadians have a safe, high quality food supply. The CFIA's animal and plant health programs achieve this by regulating food products and providing food inspection and quarantine services. The fertilizer section regulates fertilizers and supplements. We conduct pre-market evaluation and registration of products to ensure that they are safe to human health and the environment, effective, and properly labelled.

5. *Reason(s) for stakeholder group's interest in sewage biosolids management.*

The Fertilizer section is interested in the agricultural use of sewage biosolids as fertilizers, soil supplements, or soil amendments. The reason for this is that we regulate these products by administering the *Fertilizers Act and Regulations*. According to these legislations, fertilizers and supplements must be safe for human health and the environment, effective, and properly labelled. In the case where sewage biosolids or other waste materials are to be sold in Canada as fertilizers or supplements, we would want to make sure that these products meet the requirements of the *Fertilizers Act and Regulations*.

6. *Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious. Please:*

- 6(i) *Indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Ontario Biosolids Utilization Guidelines.*

I feel that metals are adequately regulated by the Ontario Biosolids Utilization Guidelines. The provincial guidelines for maximum permissible metal addition to uncontaminated soil are similar to metal standards (maximum acceptable cumulative metal addition to soil) for fertilizers and supplements developed by the Fertilizer Section.

Please note that for the remainder of this question, I will answer question 6 parts ii and iii, then 7 and 8 for the first contaminant which I feel is not adequately regulated by the guidelines and then question 6 parts ii and iii, then 7 and 8 again for the second group of contaminants.

- 6(ii) *Indicate other contaminants or groups of contaminants that you feel are not adequately regulated by the Guidelines and represent serious concerns for agriculture and the environment and provide reasons for your choices*

- 6(iii) *Provide reasons for your choices*

The contaminants that I feel are not adequately regulated by the Guidelines are:

- (1) pathogens, and
- (2) organic contaminants

- (1) Pathogens

The Guidelines indicate that waste materials “must contain acceptably low concentrations of organisms pathogenic to humans or animals“. However, there is no indication of what an acceptable level is. Proponents are not currently required to submit analyses for pathogenic organisms. It would appear that the only protective measure currently in place is that there is a waiting period between the application of the biosolids/waste material and harvesting or grazing. While this will minimize exposure to pathogens to some extent, I do not feel that this measure is sufficient to protect humans, animals, and wildlife from exposure to dangerous pathogens. Proponents should be required to test their biosolids/waste material for pathogens or at least for indicators of the potential presence of pathogens. In addition, the MOE and OMAFRA should develop guidelines or numerical limits that indicate what constitutes an acceptable level of pathogens. In the Fertilizer Section, we use *Salmonella* spp. and *E. coli* as indicators of the potential presence of pathogens in products. Our guidelines for fertilizers and supplements are no detectable *Salmonella* and *E. coli* < 1000 MPN/g dry weight.

7. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc). Please elaborate.*

My concern regarding pathogenic organisms applies to any land that people would be using or would be in contact with. This would include agricultural land, parks, golf courses, backyards, etc. I do not feel that the guidelines or numerical limits for pathogens or indicators of potential pathogens should be lower for land where there is

limited public access (e.g. agricultural land) than for land with high public exposure (e.g., parks). If sewage biosolids were to be applied to lands where there is no public access or strictly controlled public access, then the acceptable level of pathogens could be higher.

8. *What information/action do you feel is required to respond to your concerns?*

Guidelines should be developed for pathogenic organisms or at least for indicators of the potential presence of pathogens. Proponents should be required to test their biosolids/waste material for the organisms indicated in the guidelines. In the event that the level of one or more of these organisms exceeds the guideline, the proponent should not receive approval for application to agricultural land or other land where there is public access.

(2) Organic contaminants

At present, the Guidelines do not provide any regulation for organic contaminants. According to the Guidelines, with over 25 years of experience in land spreading, there is no evidence to suggest that there are any organic contaminants in sewage biosolids that would pose a risk to humans. Has this been investigated in sufficient depth to be able to conclude that organic contaminants in sewage sludge are not a concern?

The U.S. EPA has taken a more cautious approach by compiling a list of contaminants in sewage sludge that, if disposed of improperly, could cause adverse effects on human health or the environment. This list included many pesticides, PCBs, dioxins and furans, PAHs, industrial organic chemicals, etc. These substances were then evaluated to determine whether they would be present in sewage sludge in sufficient concentrations to pose a risk to human health or the environment. Numerical limits were established for those contaminants that could be present in concentrations that could adversely affect human health or the environment (U.S. EPA 40 CFR Part 503).

The Guidelines do not require that proponents submit analyses for any organic contaminants. Therefore, it is possible that biosolids or waste material containing high concentrations of organic contaminants could be applied to agricultural land, resulting in sufficiently high levels of contaminants in the soil/crops to cause harmful effects on human health or the environment. I feel that there is a need for stricter regulations that would limit the concentrations of organic contaminants that are allowed in sewage biosolids and waste materials that are to be applied to agricultural land.

9. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc). Please elaborate.*

If sewage biosolids or waste material containing high concentrations of organic contaminants is applied to land, there is the potential for adverse effects on human health and the environment whether that land has limited public access (e.g. farmland) or high public access (e.g., parks). Whether only a few people or a lot of people are exposed is not the issue - what matters is that people will be in contact with the waste material. Acceptable levels of organic contaminants would likely depend on what the biosolids/waste is proposed to be used for. The nature of the proposed land use of the material will determine the potential route(s) by which people could be exposed to

contaminants in the material. For example, in the case of biosolids that are to be applied to farmland, one would be concerned with the dermal, inhalation, and, in the case where food crops are being grown, oral routes of exposure. If biosolids are to be applied to a golf course, one would likely be concerned with only dermal and inhalation exposure. (This is assuming that the contaminant doesn't leach into groundwater).

10. *What information/action do you feel is required to respond to your concerns?*

The first step would be to determine which contaminants need to be regulated. An approach similar to that of the EPA could be taken, whereby a list of contaminants that should be examined further is compiled by a group of experts. This list should include substances that, if present in biosolids/waste material that is applied to land where there is public access, could pose a potential risk to human health or to the environment. Substances such as PAHs, PCBs, dioxins, furans, pesticides, and endocrine disruptors should appear on the list. These contaminants would then be assessed to determine whether they are likely to be present in sufficient concentrations to cause harm to human health or the environment. The substances that are selected from that assessment would then be targeted for the development of guidelines or numerical limits.

The guideline development process should take into account the physical and chemical properties and environmental fate of each substance as well as its toxicity. It is likely that there would be different guidelines depending on whether the guideline is intended to protect human health or the environment. In the case where a waste material containing an organic contaminant is being considered for a land use where there will be both human exposure and possible entry into the environment, the lowest guideline is the one that should be used. In the event that the level of one or more contaminants exceeds the guideline, the proponent should not receive approval for application to agricultural land or other land where there is public access.

A task group or committee should periodically review the list of contaminants for which guidelines are developed in order to identify new contaminants that should be considered or ones that should be re-considered on the basis of new information.

6(iv) Rank your concerns in order of priority.

I feel that pathogens and organic contaminants are both very important. I would give priority to pathogens because they can be very dangerous to human health within a short period of time following exposure.

11. *Land utilization of sewage biosolids in Ontario is conducted according to Ministry of Environment, Agriculture and Health guidelines and is regulated and monitored by the Ministry of Environment. Are you aware of other land utilization programs that you think offer better or safer practices? Please provide details and any documentation.*

No, I am not aware of any other land utilization programs for biosolids.

12. *Is sewage biosolids utilization on agricultural land a desirable practice and what is its long-term future in Ontario? Please elaborate.*

The utilization of sewage biosolids on agricultural lands is a desirable practice provided that:

- the quality of the biosolids is carefully monitored and found to be in compliance with established standards intended to protect human health and the environment the biosolids are demonstrated to actually benefit crops
- Sewage biosolids can contribute valuable nutrients to the soil, and their application to agricultural land as a management option has some advantages over landfilling or incineration. Public perception of this practice may, however, be negative. Information should therefore be made available to the public (e.g., on the web) on the benefits of this practice, as well as its potential risks, and what the government is doing to minimize those risks.
- Long-term future - The recycling of sewage sludge/ biosolids as agricultural materials has grown and become more widespread in the last 25 years. In the future, it will continue to increase, as larger volumes of waste material are produced and landfill space becomes more and more limited. The Toronto Main STP's goal of 100% beneficial reuse of biosolids by 2001 gives a good indication of the increase we can expect to see in this practice. As larger volumes of waste material are re-used, an increase in public concern over safety and environmental protection is foreseeable; therefore, it is important to establish and enforce standards for contaminants that will be protective of human health and the environment.

13. *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rate these options in order of preference and explain your rating.*

Each of the above options for disposal of sewage biosolids has advantages and disadvantages. My ranking would depend on the priorities of the sludge disposal program. For example, which of the following are we concerned with primarily: human health? protecting the environment? a cost-effective way to dispose of sludge? recovering nutrients from the sludge?

I have ranked the above options based on the assumption that we are concerned primarily with protecting human health and the environment. My preferred options, from the most desirable (1) to the least desirable (5) are as follows:

Ranking	Option	Advantages	Disadvantages
1	utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land)	minimal exposure of humans to biosolids ? low possibility of adverse effects on human health resulting from direct exposure to contaminants relatively cheap	contaminants may enter into the environment and cause adverse effects*
2	utilization on agricultural land	nutrient content of the sludge is being recovered for a beneficial use relatively cheap	Possible exposure of humans to contaminants through direct contact or ingestion of crops grown on sludge-amended soils. This could lead to adverse effects on human health. contaminants may enter into the environment and cause adverse effects*
3	landfilling	limited or no public contact; therefore, low potential for direct exposure of humans to contaminants relatively cheap	Contaminants could leach into the environment and may cause adverse effects This is a temporary solution because there is limited space available in landfills
4	incineration	reduces the volume of sludge destroys organic contaminants	very expensive releases contaminants into the air - eg. metals, dioxins & furans contributes to global warming
5	utilization on lands with high public access (e.g., backyards, golf courses, parks)	relatively cheap	high potential for human exposure to contaminants and possible adverse effects on human health. contaminants may enter into the environment and cause adverse effects*

*In the event that contaminants found in biosolids do enter into the environment, there is the potential not only for adverse effects on the environment (e.g., in terrestrial and aquatic biota) but also for adverse effects on human health because contaminants may get into ground water and surface waters.

For each of the above options, I considered the advantages and disadvantages, particularly those that involved a possible risk to human health or the environment or a benefit to human health or the environment. The final rating reflects my overall evaluation of each option.

14. *Please indicate any other concerns (i.e., not mentioned above) about present land utilization of sewage biosolids practices in Ontario.*

The concentrations of organic contaminants in sewage biosolids are described as being “minute”. What is meant by this (what levels are we talking about?). What is the basis or supporting documentation for this?

I did not have time to read the entire Guidelines document through. From my quick review of it, I have the following comments:

Regarding the information requirements for proponents, they should be required to identify contaminants that may occur in the material.

Where sewage biosolids are applied to soils where food crops are being grown, the crops should not contain pathogens or residues of contaminants at levels that are likely to cause adverse effects on human health or the environment. There does not appear to be anything in the Guidelines to address this, for example there is no requirement for analysis of crops grown on sludge-amended soils.

15. *Do you have any comments or recommendations about the WEAO study?*

I would like to receive the WEAO study report. The stakeholders who participated in this questionnaire should be given the opportunity to comment on it. What is the next step in the evaluation of whether the current Guidelines are adequate? Please keep me informed of the progress of this study.

I(b). Harold Rudy - Ontario Soil and Crop Improvement Association

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

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2. *Name of stakeholder group represented.*

Ontario Soil and Crop Improvement Association

3. *Approximate membership (if applicable) of stakeholder group.*

7,000 members

4. *Major aims/objectives of stakeholder group.*

Communicate Responsible, Economic Management of Soil, Water, (Air) and Crops.

5. *Reason(s) for stakeholder group's interest in sewage biosolids management.*

- Some members use bio-solids while others are opposed to its use. Our members have proposed the establishment of a Central Registry to record analysis and locations to ensure integrity of records.
- Locations of applications, analysis properly conducted and potential liability to the farmer if improper application occurs

6. *Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious. Please:*

- *Indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Ontario Biosolids Utilization Guidelines;*
- heavy metals
- *Indicate other contaminants or groups of contaminants that you feel are not adequately regulated by the Guidelines and represent serious concerns for agriculture and the environment;*
- hormones
- pathogens
- bacteria
- organics
- *Provide reasons for your choices;*

- Little research has been done; concern over endocrine disrupters; food safety becoming a higher priority with trace-back mechanisms being established;
 - Unclear what potential risks and liability pathogens, bacteria and organics may impose
 - Rank your concerns in order of priority; and
 - Hormones, pathogens, bacteria, organics
 - Provide reference to any documentation you have that supports your choices.
 - No references provided.
7. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc). Please elaborate.*
- Concerns are the same but level of processing and quality control should be stricter where public exposure is greatest
 - Inconsistency in application procedures results in lack of confidence in the applicators and value of the product in some municipalities
8. *What information/action do you feel is required to respond to your concerns.*
- Scientific studies to quantify concerns; permanent registry funded by fees/registrations and managed by Ontario Soil and Crop Improvement Association.
9. *Land utilization of sewage biosolids in Ontario is conducted according to Ministry of Environment, Agriculture and Health guidelines and is regulated and monitored by the Ministry of Environment. Are you aware of other land utilization programs that you think offer better or safer practices? Please provide details and any documentation.*
- Better or safer practices depend on the knowledge, commitment, training and credibility of applicators.
10. *Is sewage biosolids utilization on agricultural land a desirable practice and what is its long-term future in Ontario? Please elaborate.*
- There is great value for nutrients and organic matter to be provided to farmers at little cost, resulting in increased yields and higher profit potential. It is a renewable resource, which also reduces the cost to urban centres for disposal. There is a great future to expand its use if all safeguards and security is in place.
11. *Assuming the following biosolids management options - (1) **(5th rating)** incineration, (2) **(4th rating)** landfilling, (3) **(1st rating)** utilization on agricultural land, (4) **(2nd rating)** utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) **(3rd Rating)** utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rate these options in order of preference and explain your rating.*

- The goal is to provide the assurances and security to ensure society benefits from the greatest value, considering the most ecological and economic use and that a credible infrastructure will be put in place that provides security.
12. *Please indicate any other concerns (i.e., not mentioned above) about present land utilization of sewage biosolids practices in Ontario.*
- Haulers and Contractors who specialize in “Waste” transportation create suspicion if one fleet of trucks haul toxic waste and another hauls biosolids for agricultural land. All measures must be in place to ensure a squeaky-clean image and reputation.
 - The organic communities specifically do not allow the use of biosolids if they wish to apply for certification of their crops and any application may void that certification for life. Each group may deal with the issue in a slightly different way but the application of biosolids may affect the “value” or limit options for that land for future use.
 - Concern is being expressed that the use and consumption of bioengineered crops could eventually be traced back in the biosolids to land application and result in a “permanent” introduced “ of unnatural” life forms.
 - Monitoring and inspection by regulatory agencies is inadequate.
 - Long term integrity of sewage treatment plants is in question since they are leased out to private corporations on short term contracts with no long term maintenance program. Will the STP be up to standard when the contract is over as at the start? Will this lead to decreased confidence by the public and farmers over the long term.
13. *Do you have any comments or recommendations about the WEAO study?*
- There is a strong contingent that opposes use of biosolids because they have no confidence in the security and inspection procedures. On the other hand, there are farmers who have used biosolids for years and have recognized the full value and have confidence in the regulatory process and there has not been any identified problems.
 - Society receives a tremendous bargain for the privilege of agricultural land application. Society needs to invest in the security and liability issues to establish increased confidence for wider adoption.

**I(c). David Armitage, Betty Semeniuk and Gordon Garlough -
Ontario Federation of Agriculture**

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

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2. *Name of stakeholder group represented.*

Ontario Federation of Agriculture

3. *Approximate membership (if applicable) of stakeholder group.*

44,000 farm family members, 30 farm organization members

4. *Major aims/objectives of stakeholder group.*

OFA's mission is to improve the economic and social well-being of farmers in cooperation with county, commodity and rural farm groups

5. *Reason(s) for stakeholder group=s interest in sewage biosolids management.*

A number of OFA members are users of sewage biosolids and very satisfied with the product. Other OFA members would not consider using the product because of the risk of long-term soil contamination. Also, there is concern that with more metro Toronto sewage sludge destined for agricultural land there will be aggressive recruiting of farm operators willing to accept the product. The OFA wants assurance that these potential new users of biosolids are well aware of the advantages and disadvantages of its use.

6. *Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious.*

- *Please indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Ontario Biosolids Utilization Guidelines;*

Considerable work seems to have been done with respect to testing for heavy metals ("Analytical Results, Findings and Recommendations of the 1995 OMAFRA Sewage Biosolid Field Survey", December 1995, OMAFRA)

- *Indicate other contaminants or groups of contaminants that you feel are not adequately regulated by the Guidelines and represent serious concerns for agriculture and the environment;*

Concern today seems to be with pathogens, including medications for human and pet health; and endocrine modulating substances. Testing procedures appear to have focussed on heavy metals. Are there reliable tests for pathogens and hormones. This is particularly important given the move to identity preservation which will ultimately allow for tracing food borne illness back to the food producer and their input suppliers.

- *Rank your concerns in order of priority;*

Pathogens, Endocrine Modulating Substances, Heavy Metals

7. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc). Please elaborate.*

Direct public exposure to agricultural land may be limited but given that the land is producing food for human consumption it would be unwise to relax any regulations. Ideally, biosolids will provide nutrient and organic matter with no human health risks.

8. *What information/action do you feel is required to respond to your concerns.*

Tests need to be developed and used that will provide societal assurance that there are no health risks associated with the application of biosolids.

9. *Land utilization of sewage biosolids in Ontario is conducted according to Ministry of Environment, Agriculture and Health guidelines and is regulated and monitored by the Ministry of Environment. Are you aware of other land utilization programs that you think offer better or safer practices? Please provide details and any documentation.*

A biosolids program operated out of Oregon State University appears to be held in high regard.

10. *Is sewage biosolids utilization on agricultural land a desirable practice and what is its long-term future in Ontario? Please elaborate.*

It is a desirable practice providing that the biosolids product is free of pathogens and endocrine modulating substances, and has acceptable levels of heavy metals. Of equal importance is the responsible storage, handling and application of the biosolids material. The benefits associated with an excellent product can be lost if the storage, handling and application is done in a haphazard fashion.

The long-term impact will be a function of how successful the STPs and haulers are at managing the product and its application.

11. *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rate these options in order of preference and explain your rating.*

1. utilize on agricultural land; 2. Utilize on land with limited access; 3. Utilize on land with high public access; 4. Incinerate; landfill

12. *Please indicate any other concerns (i.e., not mentioned above) about present land utilization of sewage biosolids practices in Ontario.*

Most complaints received by OFA on the issue of biosolids relate to application and storage. There needs to be more rigorous enforcement of the guidelines, with penalties for those who ignore the guidelines.

Concern has also been raised with respect to the move to self-regulation. This could become a serious issue in instances where an applicator hauls product (e.g. hazardous waste) other than biosolids that could result in cross contamination. The OFA suggests that only companies dealing exclusively with biosolids should have the opportunity to self regulate.

13. *Do you have any comments or recommendations about the WEAO study?*

The OFA believes that if farmers are providing a service by accepting sewage biosolids that they should be provided with indemnification should the standards governing agricultural land be adjusted to so that land which has received biosolids has restrictions attached to it.

The OFA would like to have several people in attendance at the Stakeholder Meeting scheduled for December 1, 1999.

I(d). P.D. Mason - Grand River Conservation Authority

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

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2. *Name of stakeholder group represented.*

Grand River Conservation Authority

3. *Approximate membership (if applicable) of stakeholder group.*

Not Applicable

4. *Major Aims and Objectives of Stakeholder Group*

The Grand River Conservation Authority (GRCA) is a partnership of all municipalities in the Grand River watershed. The goal is to promote and undertake wise resource management on a watershed basis across municipal boundaries.

Canada's conservation movement started in the valley of the Grand. This occurred because a group of major urban municipalities depended on the river system for their mutual economic viability.

Formed in 1934 to address problems of flooding, pollution and water supply, the Grand River Conservation Commission was a partnership of watershed municipalities, banding together to solve a common problem. The Commission was a pioneer, the first of its kind in Canada. It served as the model for passing of the Conservation Authorities Act in 1946, which enabled municipalities across Ontario to take advantage of this powerful form of environmental alliance.

Today's Grand River Conservation Authority can point to 60 years of accomplishment in the valley. Flooding, while never to be completely overcome, has been reduced in frequency and severity. The river no longer shrinks to a trickle in the dry months of summer. Expanded fisheries and broader recreational use of the river and its surrounding lands are a legacy of past success.

Our future still relies on the river. The economic growth of our municipalities remains inextricably linked to a healthy river system - both directly for water supply and sewage discharge - as well as indirectly in the standard of living we expect from the region in which we live. In the face of expanding population, industrial, agricultural and

environmental demands, it is essential that the municipal partnership build upon, rather than forfeit, the significant gains that have been made.

The watershed is one of the largest inland river systems in southern Ontario, having a total area of 6,980 square kilometres and is 298 kilometres in length. It consists of the main Grand River and four major tributaries: the Speed, Eramosa, Nith and Conestogo Rivers. It has a population of 693,000 in 54 municipalities and 10 regions and counties.

The Grand River Conservation Authority is the mechanism by which municipalities in the watershed work together, deal with cross-boundary issues, and influence each other's activities for mutual benefit. Through the GRCA, one or more municipalities have the ability to jointly undertake work in another municipality for the benefit of all.

GRCA's core business is watershed management. A most important part of GRCA's 1994 Strategic Plan is to focus on cross-boundary issues. Major issues in the watershed include:

- keeping the watershed healthy while accommodating growth and developing a viable tourism industry;
- water quality management;
- water supply and water allocation;
- reducing flood and erosion damages;
- protecting natural areas and biodiversity.

Additional programs that have been requested by municipal residents are environmental education programs to promote environmental awareness and recreation programs to provide a wide variety of outdoor recreational opportunities on GRCA owned lands.

5. Reason(s) for stakeholder group's interest in sewage biosolids management.

- The deregulation of biosolids process through implementation of SAR's
- There may not be the enforcement and monitoring that is necessary to insure proper application of biosolids (We are aware of an instance where the field was not planted following application of biosolids)
- We will have to wait until there is a problem before anyone insures that application was done properly
- A concern that there may be a concentration of applications within a specific area of the watershed, (high hazard areas) specifically the Upper Grand area (How do we ensure that this does not happen?)
- A concern of receiving biosolids from Toronto and the receiving municipality does not have any say over application within its own municipality
- Is new science and technology adding elements to biosolids that have not been measured, tested, or risk determined?
- Can other municipalities do what is being done in Halton Region?
- Are there any studies to verify the benefits to crops?
- Are there any studies showing the uptake of metals by crops?
- Have there been any studies regarding contamination of ground water?

6. *Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious.*

- Nutrients are adequately regulated by guidelines
- Contaminants of concern include, toxic substances such as persistent organic pollutants, metals such as arsenic, cadmium, lead, chromium, copper, mercury, molybdenum, nickel, zinc, selenium, PCB's, dioxins, viruses, parasites, endocrine disrupting substances, other "drugs" and pathogens
- Supporting documentation from presentation by Dr. P. Voroney, Land Resource Science, University of Guelph to Soil and Water Conservation Society meeting February 25, 1999.
- We have a concern for the testing of "new parameters" in sewage effluent (i.e. drugs passing through human body)

7. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc)? Please elaborate.*

- Our concern applies to the affect the application may have on health of the environment, i.e. is there an impact to ground water, surrounding surface water, is there uptake in plants (and is this harmful to human/animal consumption).
- If it is not safe to put in your own back yard (golf course) why should we be considering putting it where your food is grown.

8. *What information/action do you feel is required to respond to your concerns?*

- More assurance that process is being adequately monitored
- A study to determine if biosolids application to agricultural lands impacts ground water
- Determine what new elements are present in biosolids and what impact they may have on human and animal health
- Assurances that there are no detrimental affects to the environment from the application of biosolids
- Monitor and limit total application to any site so that no metal can theoretically rise above provincial maximum content level.

9. *Land utilization of sewage biosolids in Ontario is conducted according to Ministry of Environment, Agriculture and Health guidelines and is regulated and monitored by the Ministry of Environment. Are you aware of other land utilization programs that you think offer better or safer practices? Please provide details and any documentation.*

- The Regional Municipality of Halton has a system in place that addresses our concerns regarding monitoring

10. *Is sewage biosolids utilization on agricultural land a desirable practice and what is its long-term future in Ontario? Please elaborate.*

- Yes.
- When issues we have outlined above are addressed, we feel the use of biosolids on agricultural lands is a beneficial practice both to the agricultural community and the generator.

11. *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rate these options in order of preference and explain your rating.*

- Utilization on other lands with limited public access, utilization on lands with high public access, utilization on agricultural lands, landfilling.
- Incineration would only be acceptable if items listed in question 8 are adequately addressed.

12. *Please indicate any other concerns (i.e., not mentioned above) about present land utilization of sewage biosolids practices in Ontario.*

- We wish to emphasize the inability of the current system to regulate many applications within a concentrated area.

13. *Do you have any comments or recommendations about the WEAO study?*

- It is a welcome study and we are pleased that it is being undertaken since we feel the Terms of Reference will address many of our concerns.
- We feel it is timely and the project time line (if adhered to) will provide answers in a relatively short time.
- We have a concern that given the timing of the study that proper agricultural representation may not take place (fall farming operations)
- There should be representation from a farmer that does not make use of biosolids application
- Phase Three of the study involves field tests which will be beneficial, however we do not believe that “comparing accumulation of selected organics and pathogens in lands which have received several applications Vs lands that have never received any will provide conclusive evidence about the effects of long term applications”. It is our view that contaminant content of the sludge must be recorded along with the rate of application and number of applications. After multiple applications the land can be analyzed.
- We commend the foresight and concerns of those municipalities and agencies that contributed towards this study.

I(e). Maureen Reilly – Greenpeace

- 1) *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

Maureen Reilly
RR#3 Kirkfield
Ont K0M 2B0
Phone: 705-438-1456
Fax: 905-852-3044

- 2) *Name of stakeholder group represented.*

Greenpeace

- 3) *Approximate membership (if applicable) of stakeholder group.*

- 4) *Major aims/objectives of stakeholder group.*

- 5) *Reason(s) for stakeholder group's interest in sewage biosolids management.*

Greenpeace has an interest in toxics, food chain contamination, habitat, and environmental protection

- 6) *Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious. Please:*

- *Indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Ontario Biosolids Utilization Guidelines;*

The Biosolids Utilization Guidelines does not require adequately stringent testing and enforcement to provide reassurance on any contaminant.

- there is no requirement to test for heavy metals or other contaminants in the actual load of sludge that is delivered to the farmfield. There is also no clear definition in the Guidelines of how the calculation of heavy metals is derived. In one place it states it is the 12-month rolling average of results from the wastewater treatment facility, in another place it is the previous 4 months of tests. Nowhere does it define or limit the heavy metals that actually arrive at the farm.
- There are very few parameters tested.
- There are few real consequences for violations of spreading limits.
- The abatement officers are often not full MOE employees. Instead they are hired on a contract and have no union protection from the companies that they are paid to regulate.
- In particular, mercury levels in sludge are too high, as is cadmium.
- Sludge should be required to meet the compost guidelines.

- *Indicate other contaminants or groups of contaminants that you feel are not adequately regulated by the Guidelines and represent serious concerns for agriculture and the environment;*
 - *Provide reasons for your choices;*
- Dioxins are inadequately regulated along with all other organics, since no testing is required. Dioxins, DDT, PCBs are all a great concern both in the environment, in animals and in human beings.
 - There is also concern that dioxins and other organic toxins may be washed into groundwater or surface water due to high concentrations of nonyl phenol and other surfactants.
 - Nonyl phenol and other surfactants and endocrine disruptors are not tested for in sludge.
 - Brominated flame retardants have been identified in food in Sweden and have become part of the reason why land application of sewage sludge has been suspended in that country. These chemicals need to be reviewed in Ontario sludge and in the food available at the marketplace.
- *Rank your concerns in order of priority; and*

It is not possible to put these issues in order of priority, since they must all be addressed.

- *Provide reference to any documentation you have that supports your choices.*

No references were provided.

- 7) *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc). Please elaborate.*

There are few differences related to sewage sludge applications on low and high exposure lands. Since farmland and forestry lands are still wildlife habitat and have groundwater safety issues, the build up of heavy metals and dioxins are problematic in both cases. Similarly, mercury emissions from sludged lands are uniformly an issue.

It is wrong to consider that the current use of a property will remain in the same usage. Parks become residential lands become vegetable gardens and it is shortsighted to assume that the current use will not change in the future. Where pathogens are concerned, clearly playgrounds and daycare centres and hospital and school grounds will all afford high higher human exposures, but farm families and agricultural workers are exposed on a 24-hour a day, 7 day a week basis. Off site impacts of sludge application can also be significant from odour, bioaerosol, and groundwater perspective.

8) *What information/action do you feel is required to respond to your concerns.*

- Market basket analysis of heavy metals and organic contaminant in meat, milk, cheese, butter, root and green vegetables and fruit. Where do we now stand on the presence of contaminants on the dinner table?
- Dioxin, PCB, and other organic contaminant levels must be tested routinely in wastewater sludges.
- Sludge should be held back from application until the tests have been returned indicating that there are no contaminant spikes.
- All testing labs providing data must be accredited to Guideline 25.
- Review impact of sludges on grazing animals (heavy metals, organic contaminants, pathogens)
- Waiting periods for harvesting and grazing must be enforceable in the C of A
- More abatement and enforcement is required, with strong fines for violations
- Public must become educated so as to be able to identify unacceptable practices
- Poor spreading practices should be contained by 'point system', such as three violations and the C of A is awarded to another hauler.
- More consideration should be given to wildlife considerations: earth worm, insect life, and microbial growth in the soil. Soil imbalance.
- Health effects may include mold and fungal endotoxin exposures and trigger impacts in sensitive individuals.
- Need further pathogen studies, antibiotic impacts, and presence of parasites.

9) *Land utilization of sewage biosolids in Ontario is conducted according to Ministry of Environment, Agriculture and Health guidelines and is regulated and monitored by the Ministry of Environment. Are you aware of other land utilization programs that you think offer better or safer practices? Please provide details and any documentation.*

- Please provide me with the Agriculture Guidelines governing land utilization and the Health guidelines governing land application. I have been unable to identify these guidelines.
- These regulations and their enforcement are inadequate. MOE refuses to investigate health complaints, MOH's are very poorly informed about the programs, OMAFRA has no authority in the management of the programs.
- The Swedish Farm Association has called a suspension of land application of sewage sludge. Given the high concentration of organic contaminants in food, this is prudent.

10) *Is sewage biosolids utilization on agricultural land a desirable practice and what is its long-term future in Ontario? Please elaborate.*

- Land application on agricultural land is an undesirable practice because of the accumulation of heavy metals, pathogens, and organic contaminants in the food chain. It also poses problems for wildlife. It is not a sustainable practice. It is not adequately regulated.
- Municipalities have poor control of sewers. City of Toronto has proposed an excellent sewer use by-law, but has not yet passed it. The cart is before the horse. Clean up sludge before initiated extensive land application programs.
- Stop using Waste Water Treatment Plants to process hazardous waste, nuclear waste water, landfill leachate etc. These contaminants should not be introduced onto farmland.
- Investigate the environmental impact of polymers and other agents.

11) *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rate these options in order of preference and explain your rating.*

- This exercise does not include adequate strategies for the future of sludge management.
- There should be trial projects to create communities that are not sewered, using composting toilets and greenhouses to manage household waste and grey water. Apartment buildings could also be designed with source separation of such wastes.
- We should enact strict sewer use by-laws to clean up sludge and set targets until the sludge meets the current Compost Guidelines (no net degradation).
- Sludges should not be used on food chain crops.
- Pelletized sludges pose a new set of problems as they may evade all regulation if they are not sold, but given away.
- Consumers should be informed as to whether gardening materials, fertilizer, or other soils contain sewage sludge. Labelling should be required.
- Pastureland sludge application should cease immediately.
- In the short term: landfill.
- Investigate pros and cons of high temperature incineration.

12) Please indicate any other concerns (i.e., not mentioned above) about present land utilization of sewage biosolids practices in Ontario.

- Pelletization is a problem because of the regulatory grey zone. Will the use of pellets of sewage sludge lead to heavy metal loadings on agricultural land and vegetable gardens?

13) Do you have any comments or recommendations about the WEAO study?

- What motivated this study? Who is paying for it? What percentage of sludge is currently land applied, incinerated, or land filled.

I(f). AI Smith – Ontario Association of Sewage Industry Services (OASIS)

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

AI Smith
714 Caton Rd. RR#3
Bath, Ontario KOH 1G0

asmith@kos.net
(613) 386-3184
(613) 386-5552

2. *Name of stakeholder group represented.*

Ontario Association of Sewage Industry Services (OASIS)

3. *Approximate membership (if applicable) of stakeholder group.*

Not applicable.

4. *Major aims/objectives of stakeholder group.*

Provide a membership forum for persons engaged in the sewage handling industry to promote their interests regarding safety, business operations, the environment, regulatory issues, and the welfare of the public at large.

5. *Reason(s) for stakeholder group's interest in sewage biosolids management.*

OASIS is interested because biosolids management is not only the business of our members, biosolids management is critical to the welfare of society of which we are a part.

6. *Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious. Please:*

We feel that biosolids management guidelines with respect to nutrients and those constituents which are currently monitored are adequate and in some cases, overly conservative. Better use could be made of both the farm land utilized and the biosolids applied should more latitude be allowed in the guidelines with respect to application rates. This would also alleviate some farm operator frustrations as well. With respect to one site, biosolids application is only a part time supplement in that it is not practical to make applications each year in sufficient quantities.

Our group does have concerns with the lack of information regarding the effects on waste water of such things as high use medication constituents such as estrogens. The effects of household bacterial killing soaps and similar products as they affect the waste water streams, to both municipal treatment plants as well as the private septic system, are also of concern.

These types of 'contaminants' are largely outside the expertise of our group but do typify the kind of concern we hear expressed by members of the public at large.

7. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc). Please elaborate.*

No! Those of us in OASIS that actually apply biosolids to farm lands have few concerns other than adhering to the guidelines and satisfying the farm operator.

OASIS feels that most operators would have a problem with applications in areas where public contact could be an issue. Because of the unwieldy approvals and record keeping procedures and the poor public perception of biosolids, it would be hard to justify utilization in contentious areas. Most operators would find it economically unfeasible to handle the public harassment. Dry biosolids in limited quantities might be utilized by other parties.

8. *What information/action do you feel is required to respond to your concerns.*
9. *Land utilization of sewage biosolids in Ontario is conducted according to Ministry of Environment, Agriculture and Health guidelines and is regulated and monitored by the Ministry of Environment. Are you aware of other land utilization programs that you think offer better or safer practices? Please provide details and any documentation.*

(8 & 9) Assuming research does not determine that our current practices are destroying the environment, biosolids application is a desirable practice and its long term future should be for improved application techniques and refined regulations and guidelines.

The real future may be that farm utilization ceases to be an option. The potentially fatal problem lies with the government's method of handling the public's concerns. The current practice is to allow the public to challenge every application of the rules. What the public should be allowed to do is to challenge the rules themselves but not their application. The current system is costing both the government and the industry many millions of dollars every year by continuously reviewing procedures which have already been reviewed to death. The public gets frustrated and more agitated because it has no mechanism to actually change the rule, procedure, guideline, and takes the only course open to it which is to challenge the application - the CoA (certificate of approval) which allows the storage, transportation, etc.

At some point in time, activists will eventually exercise sufficient control of the process to prevent reasonable decisions by the various levels of government and industry. A farm community, sensitive to and influenced by the growing urban sense of values may back away from the program dooming it to collapse.

10. *Is sewage biosolids utilization on agricultural land a desirable practice and what is its long-term future in Ontario? Please elaborate.*

In the liquid and semi dried state, OASIS feels that land application is the only reasonable option at this time. Utilization on other lands (4), is acceptable but not preferable. In a composted or processed state, other applications may be appropriate.

I(g). John Bacher – Preservation of Agricultural Lands Society (PALS)

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire*

John Bacher (Ph.D)
134 Church St.
St. Catharines, Ontario L2R 3E4
phone/fax (905) 884-4834

2. *Name of stakeholder group represented.*

Preservation of Agricultural Lands Society (PALS)

3. *Approximate membership (if applicable) of stakeholder group.*

Five Hundred members

4. *Major aims/objectives of stakeholder group.*

To protect agricultural lands in southern Ontario from urban sprawl

5. *Reason(s) for stakeholder group's interest in sewage biosolids management.*

To protect agricultural lands from contamination from sewage biosolids

6. *Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious. Please.....*

From discussion with experts and other environmental NGOs in this field, there appears to be inadequate testing for a wide range of potential contaminants with the exception of heavy metals. Of particular concern are incidents regarding contamination on the Pacific coast and Lake Superior, where the chemical agent responsible for the problem has not been identified, likely because the problem has been caused by yet unidentified synergistic effects.

7. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc). Please elaborate.*

My concerns are related to agricultural land and potential for runoff into ground and surface waters.

8. *What information/action do you feel is required to respond to your concerns.*

I would like to know more about past problems arising from the application of sewage and paper mill waste on agricultural land.

9. *Land utilization of sewage biosolids in Ontario is conducted according to Ministry of Environment, Agriculture and Health guidelines and is regulated and monitored by the Ministry of Environment. Are you aware of other land utilization programs that you think offer better or safer practices? Please provide details and any documentation.*

No.

10. *Is sewage biosolids utilization on agricultural land a desirable practice and what is its long-term future in Ontario? Please elaborate.*

I do not believe that disposing of sewage biosolids onto agricultural land to be a desirable practice. As long as sewage biosolids exist, it would be better to treat them as a hazardous waste as we now treat municipal garbage in a well regulated landfill. With such an approach any leachate from the site could be collected by underground pipes and sent to a sewage treatment plant, or another appropriate treatment facility.

While for the next decade sewage sludge should be treated in a fashion similar to municipal garbage, in the long term the (the following two lines of the fax were illegible – Mel Webber) such chronic sources of contamination such as the tendency to pour paints down toilets and sinks.

11. *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rate these options in order of preference and explain your rating.*

Rated in order of priority:

1. Landfilling.

For reasons stated earlier landfilling is my preferred option. With landfilling biosolids could be better monitored and managed, and potential contaminants could be better kept out of the water cycle.

2. Utilization on other lands with limited public access

This situation could be similar to a landfill situation, since a leachate collection system could be installed since the size of the area would likely be manageable, being fenced.

3. Utilization of agricultural lands

This situation is certainly to be avoided. It is preferable however, to the lower listed situations since record keeping could ensure that a potentially contaminated site could be cleaned up in the future by removing fill. It is less desirable than above alternatives since a piped leachate collection system would almost certainly be too expensive to be feasible.

4. Utilization of lands with high access

This is a low alternative because in such a situation there would be assumption that sewage sludge is contaminate free which could be disproven at a later date when more is understood about synergistic effects of chemical interactions.

5. Incineration

This is the lowest alternative, since incineration of sewage sludge has a long demonstrated effect of emitting pollutants such as dioxins.

12. Please indicate any other concerns (i.e., not mentioned above) about present land utilization of sewage biosolids practices in Ontario.

No additional concerns.

I(h). Joe Furgal – Regional Municipality of Niagara

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

J. Furgal
Regional Municipality of Niagara
P0 Box 1042 Thorold, Ont. L2V 4T7
Fax: 685-5205; Tel: 685-1571 ext 3208
email jfurgal@enviro Niagara.com

2. *Name of stakeholder group represented.*

Regional Municipality of Niagara Public Works, Operator of Municipal Pollution Control and Water Treatment Plants

3. *Approximate membership (if applicable) of stakeholder group.*

Service population 350,000

4. *Major aims/objectives of stakeholder group.*

Disposal of Biosolids in an environmentally acceptable economical manner.

5. *Reason(s) for stakeholder group's interest in sewage biosolids management.*

ABOVE and gain public acceptance of the operations of biosolids producing and handling facilities and product disposal.

6. *Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious. Please:*

Metals are adequately regulated.

Nutrient values are not reflected in the limitation by allowing Bio solids application only once every 5 years. If you are going to limit application on technical grounds, don't limit them also by saying -apply only once every 5 years-.

7. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc). Please elaborate.*

Our present program deals with liquid (Not Dewatered) Biosolids. As long as we can find sufficient agricultural land within 50 Km of the plants this is so far the most economical method of disposal It is a "beneficial" use as the Biosolids reduce the amount of commercial fertilizer that is needed for the crop production. We are not interested in

seeking disposal sites in more public, sensitive areas because this will turn the consensus as to the acceptability of the product and could jeopardise our agricultural disposal program.

If the product were turned into a "FERTILIZER PRODUCT" then we would support its use in keeping with other Commercial Fertilizer practices.

8. *What information/action do you feel is required to respond to your concerns.*

A study into presently produced commercial fertilizer from the Municipal Pollution Control Plant Biosolids and their acceptability and quality would be beneficial.

9. *Land utilization of sewage biosolids in Ontario is conducted according to Ministry of Environment, Agriculture and Health guidelines and is regulated and monitored by the Ministry of Environment. Are you aware of other land utilization programs that you think offer better or safer practices? Please provide details and any documentation.*

See 2 above.

10. *Is sewage biosolids utilization on agricultural land a desirable practice and what is its long-term future in Ontario? Please elaborate.*

There are some groups of agricultural product producers in the Wine Industry who are against the use of Biosolids. What are their scientific reasons for this opposition?

11. *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rate these options in order of preference and explain your rating*

1. Liquid agricultural disposal
2. Dewatered agricultural disposal
3. Other land area (non-public)
4. In a FERTILIZER FORM on all lands
5. Landfilling
6. Incineration

12. *Please indicate any other concerns (i.e., not mentioned above) about present land utilization of sewage biosolids practices in Ontario.*

No response.

13. *Do you have any comments or recommendations about the WEAO study?*

The survey may be made more attune to generators, (as you will see I answered on behalf of the generators).

I(i). Klaus Stolch – Azurix North America

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

Klaus Stolch
Director of Operations
Azurix North America
100 King Street West, 21 floor
Hamilton, Ontario L8P 1A2

2. *Name of stakeholder group represented*

Responses from the operations contractor for the the Region of Hamilton-Wentworth.

3. *Approximate membership (if applicable) of stakeholder group.*

As the operating contractor, Azurix North America charged with the responsibility to manage the liquid and solid wastewater processes for the Region of Hamilton Wentworth such that the bio-solids program meets all current legislative and operational procedures, guidelines, etc., utilizing the processing infrastructure provided by the Region.

4. *Major aims/objectives of stakeholder group.*

Azurix main objective is to implement the required strategies in the least costly means possible.

5. *Reason(s) for stakeholder group's interest in sewage biosolids management.*

Azurix's interest in sewage bio-solids management is that the company implements the strategies as established by the Province, and as such wishes to "keep current" with future changes, etc. the current accepted policies and procedures.

6. *Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious. Please.....*

Azurix believes the current contaminants currently regulated by the Provincial guidelines are adequate and do not require any enhancement or changes thereto.

I(j). Elizabeth Christie - Sierra Legal Defence Fund

Hi Mr. Webber:

(cc to Mark Winfield, Canadian Institute for Environmental Law and Policy, and Teresa McClenaghan, Canadian Environmental Law Association)

The mandate of the Sierra Legal Defence Fund focuses on providing legal services - primarily in the context of litigation - to environmental groups and individuals raising significant environmental issues. Because of our mandate, only in unique circumstances do we provide comments on policy or legis1ation.

Although I am most interested in the issue of land application of sewage sludge, it would be inappropriate for me, in the circumstances of this matter, to respond to your questionnaire.

That said, it is my view that it is essential that the government of Ontario obtain sufficient input from environmental organizations including environmental law organizations. I was most disappointed to learn that you have consulted only 5 environmental organizations and only 1 environmental law firm (Sierra Legal).

In any event, I have forwarded your questionnaire to both Mark Winfield of the Canadian Institute for Environmental Law and Policy and Teresa McClenaghan of the Canadian Environmental Law Association. I assume that you will provide them with sufficient time to determine the appropriate course of action for their organization and/or forward the questionnaire on to other interested groups.

Thank you for contacting me with regards this issue, and I hope you are able to provide the government with a well rounded and well informed response.

Elizabeth Christie, Counsel
Sierra Legal Defence Fund

I(k). Julia Langer – World Wildlife Fund (WWF)

WWF does not have a specific program or position re: sludge quality and use. We support, in principle, the use of sewage sludge for its nutrient value, as long as this does not introduce toxins into the natural environment and foodchains.

Current guidelines on sludge quality are not adequately protective -- they allow metal build-up and don't account for the many organic contaminants found in sludge.

WWF has been promoting pollution prevention planning in municipal by-laws (e.g. City of Toronto). Preventing discharge of industrial contaminants to sewers will make for better sludge and better water quality.

Since it is not possible to say (as your introduction suggests) that there are no human health or environmental problems associated with the use of sewage sludge, a proactive and preventative approach is in order.

Thank you for the invitation to the workshop, but we cannot attend.

Julia Langer
Director, Wildlife Toxicology Program
World Wildlife Fund Canada

I(I). Les Evans – University of Guelph

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*
 - Dr. Les Evans, Department of Land Resource Science, University of Guelph
2. *Name of stakeholder group represented.*
 - Land Resource Science, University of Guelph
3. *Approximate membership (if applicable) of stakeholder group.*
 - Not applicable
4. *Major Aims and Objectives of Stakeholder Group*
 - Scientific research.
5. *Reason(s) for stakeholder group's interest in sewage biosolids management.*
 - Ensuring that scientifically sound and acceptable criteria are used in the formulation of the Guidelines for Sewage Biosolids Management in Ontario.
6. *Sewage biosolids contain nutrients and organic matter that are beneficial for agricultural land and contaminants that may be deleterious.*
 - Guidelines for nitrogen seems to be adequately covered but the availability of phosphorus from sewage sludges has not been adequately studied. A recent M.Sc. thesis by a student of Dr. Voroney would suggest that the availability of P in sewage sludge amended soils has been grossly over-estimated. The current guidelines suggest that 40% of the P in sewage sludge is plant available.
 - The guidelines for the maximum contents of toxic elements is based primarily on an estimation of the background levels in Ontario soils. The database used in formulating the guidelines was not representative of agricultural soils in Ontario. It is also unclear as to the source used for the soil Se content used in the current guidelines. The guidelines for toxic elements were not formulated using current acceptable protocols for assessing the risks to the environment or human health.
 - Since the Guidelines were introduced, other toxic elements have been recognized as elements of concern from both environmental and health interests. These elements include beryllium, thallium, and silver. These elements are not currently regulated in Ontario sewage sludges or other biosolids.
 - The effects of changing soil management practices on the long term fate and mobility of toxic elements has not been thoroughly investigated. For example, additions of chloride ions from wastes from the food industry to sludge amended soils can increase the mobility of metals, such as Hg and Cd.

- a) Evans, L.J., Spiers, G.A. and Zhao, G. 1995. Chemical aspects of heavy metal solubility with reference to sewage sludge amended soil. Intern. J. Environ. Anal. Chem. 59: 291-302.
- b) Lumsdon, D.G., L.J. Evans and K.A. Bolton. 1995. The influence of pH and chloride on the retention of zinc, lead, cadmium and mercury by soil. J. Soil Contam. 4: 137-150.
- Lastly the effects of toxic elements on the soil microbial population has not been adequately studied. This can lead to the time-bomb effect as outlined by McBride (1996).
 - a) McBride, M.B. 1995. Toxic metal accumulation from agricultural use of sludge: are USEPA regulations protective?
- The current Guidelines state that sewage sludges and other biosolids cannot be added to agricultural land with pH values below 6. However there are no guidelines for soils which are alkaline. Many toxic elements, such as chromium, vanadium and cadmium become mobile at pH values above 7.5
 - a) Evans, L.J. 1998. Toxic Elements in Biosolid Amended Soils. Annual Report to OMAFRA. University of Guelph/OMAFRA Research Program. pp25.
- 7. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc)? Please elaborate.*
 - The greatest concern with the application of sewage sludge and other biosolids onto agricultural land is the risks associated with toxic elements entering the human food chain and to a lesser extent contamination of both surface and groundwaters. This risk is much less for lands which are not used for food production
- 8. *What information/action do you feel is required to respond to your concerns?*
 - The current Guidelines are in need of review in light of the considerable increase in our knowledge and understanding of both the chemistry and biology of toxic elements and the assessment of environmental and health risks posed by these elements.
- 9. *Land utilization of sewage biosolids in Ontario is conducted according to Ministry of Environment, Agriculture and Health guidelines and is regulated and monitored by the Ministry of Environment. Are you aware of other land utilization programs that you think offer better or safer practices? Please provide details and any documentation.*
 - Both Europe and the United States are currently reviewing their respective Guidelines for the application of sewage sludge and other biosolids onto agricultural land. Their guidelines should be compared with the Ontario guidelines to see if there are complimentary or different guidelines for particular elements.

10. *Is sewage biosolids utilization on agricultural land a desirable practice and what is its long-term future in Ontario? Please elaborate.*

- Sewage and biosolid application onto agricultural land needs much more research to assess the benefits and risks associated with their application.

11. *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rate these options in order of preference and explain your rating.*

- Sewage sludge should only be applied to land which is not being used for food production, such as forestry, reclaimed land, etc.

I(m). Edward Topp - Agriculture and Agri-Food Canada

Dear Mel,

Upon reflection I won't respond to your survey directly as I'm not a "stakeholder" as I understand you to mean it. However, scientists at AAFC (Agriculture and Agri-Food Canada) Research Centres in Ontario have an ongoing interest in the agricultural use of biosolids (livestock and municipal) that you should be aware of and I think is relevant to the study you are undertaking. We are broadly interested in three aspects of the use of biosolids: environmental significance and mitigation of contaminant problems; agronomic benefits of biosolid use; and control of soil-borne crop diseases by application of biosolids. Specifically;

1. We are in the fourth year of a study assessing the impacts of lime-stabilized municipal biosolids on field crop yield and quality (heavy metal content), and soil physical chemical and biological properties. This material is being marketed as an alternative to agricultural liming agents. Our as-yet unpublished results suggest that when used at rates appropriate for soil pH control this material is benign.
2. We have been characterizing the soil persistence of so-called endocrine disrupting chemicals (EDCs) found in municipal biosolids. We have found that the EDC 4-nonylphenol is readily biodegradable in agricultural soils. This work will be published shortly in the new year in Environmental Toxicology and Chemistry. We also are also currently characterizing the fate of other potential EDCs in soils including estrogenic hormones. The content in biosolids and probable soil fate of bioactive organic chemicals is an element that should be addressed in your study. This should include xenoestrogenic and other potential EDCs and pharmaceutical chemicals.
3. We are in the early stages of a significant program characterizing the persistence of enteric bacteria and antibiotic-resistance determining genes in soils arid crop surfaces receiving livestock manures. Results from these studies will be relevant to municipal biosolids since it can be expected that the environmental behaviour of enteric bacteria and associated genes should be independent of the host source. More broadly I note that your study will assess persistence and fate of pathogenic viruses, bacteria and parasites. I would include the persistence of genes encoding bacterial pathogenicity determinants and antibiotic-resistance in your analysis. These are frequently on mobile genetic determinants and you should consider movement and dissemination as well.
4. We have some activity assessing the long-term impact of heavy metals in municipal biosolids on soil biology. This has been largely confined to an examination of bacterial populations, activities, and heavy metal resistance in soils obtained from the Elora plots treated with sewage sludges by Tom Bates and colleagues 20-odd years ago. There is a voluminous and often contradictory body of literature on the

relationship between heavy metal dose and impacts on soil microorganisms. There are good recent reviews by Steve McGrath from Rothamsted and Murray McBride from Cornell.

5. We have been characterizing the ability of livestock biosolids to suppress soil-borne bacteria and fungi which are pathogenic to crops. Changes in soil microbial populations following the addition of municipal biosolids are to my knowledge unknown, likewise have significant beneficial effects and merit characterization.

These elements of biosolids use should be evaluated in the context of current and proposed new recommended management practices.

Yours sincerely,

Edward Topp, Ph.D.

Research Scientist and Team Leader, Field Crops, Soil and Environmental Quality
Agriculture and Agri-Food Canada

II. Sewage Biosolids Experts Outside Ontario

IIA. Survey Cover Letter

October 22, 1999

Sewage Biosolids Experts Outside Ontario

Dear Sir or Madam:

Re: Water Environment Association of Ontario (WEAO) Sewage Biosolids Study

Assessing the Fate and Significance of Selected Metals, Trace Organics and Pathogens in Sewage Biosolids Applied to Agricultural Land through Literature Review and Consultation with Stakeholder Groups

The WEAO study is supported by Environment Canada, the Ontario Ministries of the Environment (MOE) and Agriculture, Food and Rural Affairs (OMAFRA), and the municipalities of Toronto, Windsor, Hamilton-Wentworth, Waterloo, Ottawa-Carleton, Halton, Niagara, Durham and Peterborough.

As part of the study, we are contacting experts outside Ontario to obtain information on other biosolids use programs and to ensure that we have the most comprehensive understanding of current science regarding the fate and significance of contaminants in biosolids applied to agricultural land. We also want to avoid duplicating studies which may have been recently completed or are underway in other jurisdictions.

Background

It is estimated that more than 300,000 dry-tonnes of sewage biosolids are generated annually by the 260 plus primary and secondary sewage treatment plants (STPs) in Ontario. Approximately 34% of these biosolids are utilized as fertilizer/soil supplements on agricultural land this practice will increase in the future, especially when the Toronto Main STP completes its program of 100% beneficial reuse of biosolids in 2001.

Reuse of sewage biosolids on agricultural land has been practiced for more than 30 years in North America and many European countries without notable human health or environmental problems. Nonetheless, some scientists, farm communities and other sectors of the general public have expressed concerns about this practice. For example, they question whether; (1) present sewage biosolids application guidelines and practices in Ontario are adequate to protect the environment and human and animal health and (2) minute concentrations of organic contaminants such as PAHs, PCBs, dioxins, furans and other endocrine disruptor compounds (EDCs) represent significant risks?

The WEAO concluded that a literature review and stakeholder consultation study on the fate and significance of metals, trace organics and pathogens in biosolids applied to agricultural land is a necessary first step to respond to these concerns. It is anticipated that results of this study will enable regulators to assess whether; (1) the current guidelines for biosolids utilization in Ontario are adequate or (2) further study is required to revise them.

Expert Consultation

Following up on my recent telephone/email contact, I am attaching a study questionnaire for you to complete.

Information is also being solicited from a wide range of stakeholders in Ontario including; non-government organizations, farming associations, regulatory agencies, and expert and industry groups. Your expert input will be used to expand our understanding of the issues.

To maintain the WEAO study schedule, I request that completed questionnaires be returned to me by November 12, 1999. This will allow time for information to be compiled and prepared for presentation to an upcoming stakeholders meeting.

Please forward completed questionnaires by email (preferably), or by fax to:

Dr. M.D. Webber
Environmental Consultant
590 Barons Court
Burlington, ON
L7R 4E4

email: mdwebberenvironmental@home.com
fax: 905-632-5109
tel: 905-632-7954

Recycling to agricultural land is an important sewage biosolids management practice in Ontario but its continued success depends upon stakeholder acceptance. The WEAO anticipates that actions arising from this study will enhance this acceptance.

We will share the results of our study with you. The schedule indicates completion in early summer 2000. Thank you for contributing to our study.

IIB. Survey Questionnaire

Assessing the Fate and Significance of Selected Metals, Trace Organics and Pathogens in Sewage Biosolids Applied to Agricultural Land through Literature Review and Consultation with Stakeholder Groups

WEAO Study Questionnaire – Experts Outside Ontario

1. Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.
2. A great deal of study has been directed toward determining the fate and significance of heavy metals, pathogens and organic contaminants in sewage biosolids used as fertilizer on agricultural land. In general, results from these studies have indicated no environmental or health problems arising from this practice. Indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction.
3. Indicate specific contaminants or groups of contaminants that you feel are **NOT** adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction, and require further study.
 - Provide reasons for your choices;
 - Rank your concerns in order of priority;
 - Provide reference to any documentation you have that supports your choices. (The references should include: author(s); year of publication; title of article; and name, volume and page numbers of publication);
 - What information/action do you feel is required to respond to your concerns?;
 - Are you planning studies to address the concerns?
4. Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc)? Please elaborate.
5. Have stakeholders (i.e., affected communities) in your jurisdiction been surveyed for comment on the adequacy of your regulations? If so, please provide information about the responses.
6. Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (3) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rank these options in order of preference and explain your ranking.

7. Part of the WEAO project is a review of related literature. We are particularly interested in any recent or proposed work in your jurisdiction related to pathogens and trace organics. Please provide details of this work.
8. Are concerns in your jurisdiction different for US EPA Class A and Class B biosolids?
9. What is your opinion of the long-term future for biosolids utilization on agricultural land in your jurisdiction? What are the major potential barriers to long-term success?
10. Are you familiar with the Ontario Biosolids Utilization Guidelines? If so, please indicate how the regulations in your jurisdiction may be more or less effective than the Ontario Guidelines.
11. You are invited to offer other comments or recommendations, not presented above, on the fate and significance of contaminants in sewage biosolids applied to agricultural land.

IIC. Survey Responses From Experts Outside Ontario

APPENDIX A

II. SURVEY RESPONSES FROM BIOSOLIDS EXPERTS OUTSIDE ONTARIO

II(a). Jack Bryden - BC Ministry of Environment, Lands and Parks

- 1) *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

Jack Bryden M.Sc. P.Ag.
Senior Pollution Prevention Officer
BC Ministry of Environment, Lands and Parks
Pollution Prevention Section
PO Box 9342 Stn Prov Govt
Victoria BC V8W 9M1

- 2) *A great deal of study has been directed toward determining the fate and significance of heavy metals, pathogens and organic contaminants in sewage biosolids used as fertilizer on agricultural land. In general, results from these studies have indicated no environmental or health problems arising from this practice. Indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction.*

- Arsenic
- Cadmium
- Chromium
- Cobalt
- Copper
- Lead
- Mercury
- Molybdenum
- Nickel
- Selenium
- Zinc

Provide reasons for your choices;

- Ongoing BC research

- 3) *Indicate specific contaminants or groups of contaminants that you feel are **NOT** adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction, and require further study.*

May be adequately regulated

- Dioxins and Furans

Provide reasons for your choices:

- Ongoing BC research

May not be adequately regulated

- a) *p*-cresol
- b) phenol
- c) phenanthrene
- d) naphthalene
- e) heavy extractable petroleum hydrocarbons

Provide reasons for your choices:

- Ongoing BC research
- f) Pathogen sampling for retail products
- g) Nitrates

Provide reasons for your choices:

- Out-of- date requirements in present guidelines
- h) Endocrine disrupters

Provide reasons for your choices:

- Ongoing national research

Rank your concerns in order of priority:

- a) Pathogen sampling for retail products
- b) Nitrates
- c) *p*-cresol
- d) phenol
- e) phenanthrene
- f) naphthalene
- g) heavy extractable petroleum hydrocarbons
- h) Dioxins and Furans
- i) Endocrine disrupters

Provide reference to any documentation you have that supports your choices. (The references should include: author(s); year of publication; title of article; and name, volume and page numbers of publication);

- Contaminated Sites Regulation: BC Reg 375/96
- Healy, Norm & Bright, Doug; Royal Roads University Applied Research; September 1999 (DRAFT); Validation of Risk-based Contaminant Management Strategies for the beneficial Recycling of Wastewater Treatment Plant Biosolids
- Sylvis Environmental, November 1999 (DRAFT) Mercury and Dioxin and Furans in Southwest British Columbia Biosolids
- Northwest Biosolids Management Association; November 1999 (DRAFT) Managing

Nitrogen from Biosolids

- 4) *What information/action do you feel is required to respond to your concerns?;*
- Complete present studies and follow up with research recommendations
 - Information is still required about how, where and when to sample for pathogens for different forms of retail grade biosolids
- 5) *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc)? Please elaborate.*
- Concerns are less for mine reclamation projects.
- 6) *Have stakeholders (i.e., affected communities) in your jurisdiction been surveyed for comment on the adequacy of your regulations? If so, please provide information about the responses.*
- Some survey work has recently been carried out in the lower mainland. (will fax this survey to you)
 - BC Environment, Lands and Parks is working with stakeholders (e.g. Ministry of Health) to ensure that biosolids will be used beneficially.
- 7) *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rank these options in order of preference and explain your ranking.*
- a) Utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land):
Mine reclamation projects using biosolids have been highly successful in BC
 - b) Utilization on lands with high public access (e.g., backyards, golf courses, parks):
The high quality that these types of projects demand have encouraged municipalities in BC to pasteurize their biosolids and to implement source control programs. Also composting reduces available nitrogen potentially reducing nitrate impacts on groundwater
 - c) Utilization on agricultural land:
There is already a glut of organic matter in the lower mainland. Some biosolids are being used sparingly to rebuild organic matter on over grazed rangelands in the drier interior of the province
 - d) Landfilling:
Only if used to produce final cover
 - e) Incineration:
Least popular option in BC
- 8) *Part of the WEAO project is a review of related literature. We are particularly interested in any recent or proposed work in your jurisdiction related to pathogens and trace organics. Please provide details of this work.*
- See question 3 above

- 9) *Are concerns in your jurisdiction different for US EPA Class A and Class B biosolids?*
- BC draft regulation would allow for both retail and managed biosolids (similar approach to EPA) Product quality standards are stricter in BC for both pathogens and metals.
- 10) *What is your opinion of the long-term future for biosolids utilization on agricultural land in your jurisdiction? What are the major potential barriers to long-term success?*
- See question 6 above. Many farmers have access to other sources of organic matter in BC. Some Municipalities such as the Capital Regional District have focused on farmland applications because of farmers' land application expertise.
- 11) *Are you familiar with the Ontario Biosolids Utilization Guidelines? If so, please indicate how the regulations in your jurisdiction may be more or less effective than the Ontario Guidelines.*
- I look forward to reviewing Ontario's guidelines
- 12) *You are invited to offer other comments or recommendations, not presented above, on the fate and significance of contaminants in sewage biosolids applied to agricultural land.*

II(b). Robert Bastian - U.S. Environmental Protection Agency

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

Robert Bastian
U.S. Environmental Protection Agency
Office of Wastewater Management (4204)
401 M Street, SW
Washington, D.C. 20460
Tele: 202-260-7378
Fax: 202-260-1827 or -0116
e-mail: "bastian.robert@epa.gov"

2. *A great deal of study has been directed toward determining the fate and significance of heavy metals, pathogens and organic contaminants in sewage biosolids used as fertilizer on agricultural land. In general, results from these studies have indicated no environmental or health problems arising from this practice. Indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction.*

The current U.S. requirements dealing with land application of biosolids (located at 40 CFR Part 503 in the U.S. Code of Federal Regulations) issued by EPA in February 1993 were based upon the results of many years of extensive research and monitoring activities, as well as a comprehensive, multi-pathway risk assessment. These efforts, which included extensive evaluations of potential environmental and human health effects, thoroughly evaluated both heavy metals and many toxic organic compounds, as well as pathogens, that have been detected in biosolids. Land application limits were established in the rule when it was first promulgated for 10 heavy metals (As, Cr, Cd, Co, Hg, Mo, Ni, Pb, Se & Zn), although the values for Cr were subsequently deleted in response to a court suite over the fact that they were based upon the 99th percentile of current biosolids quality (based upon the results of a national survey of current biosolids quality which was conducted to determine the pollutant concentrations in biosolids for 412 analytes) rather than on the risk assessment which calculated much higher values. The development of these limits started by evaluating a group of ~200 "toxic" pollutants that had been detected in biosolids; this initial list was reduced to 50 by four panels of experts that met to recommend both pollutants and pathways to be further evaluated for land application, surface disposal, incineration, and ocean dumping practices. Profile assessments and hazard indices were developed for the 50 pollutants using conservative assumptions based upon pollutant toxicity; concentrations in soil, water, air, food, and/or biosolids; worst-case data, and extreme exposure for most exposed individuals (MEIs). If hazard indices were ≥ 1 , the pollutant was considered for detailed risk assessment and regulation.

The risk assessment used in development of the proposed rule (proposed in February 1989) used the MEI approach, conservative models and assumptions, and worst-case available data. The public review period on the proposed rule generated 5,500 pages of comments. Formal peer review and comments by expert advisors resulted in modifications to the original risk assessment methodology: changed from MEI to the use

of Highly Exposed Individuals (HEI); revised, more realistic models were used; and field data were used when available.

The final rule, as issued in February 1993, that resulted from the risk assessment effort, established numerical land application pollutant limits for only 10 metals. EPA determined that it would not establish numerical pollutant limits for any pollutants meeting one of the following criteria; 1) the pollutant is banned or restricted by the Agency or is no longer manufactured or used in manufacturing a product; 2) the pollutant is not present in biosolids at significant frequencies or detection based on data gathered from the national survey; 3) the Agency's risk assessment for the pollutant showed no reasonably anticipated adverse effects on public health or the environment at the 99th percentile concentration found in biosolids from the national survey.

While a preliminary, general risk assessment was conducted regarding pathogens, the specific pathogen and vector attraction reduction requirements established by the final rule were actually "technology-based" and focused in most cases on the level of pathogen die-off and volatile solids destruction demonstrated to be achieved by specific stabilization practices operated in a specified manner.

Since the final rule was issued in February 1993, the Agency has evaluated a list of 31 additional candidate pollutants using the same risk assessment process; this list was narrowed to Dioxins/Furans/Co-Planar PCB's after the initial risk assessment effort and a proposal addressing this group of chemicals due to be proposed by December 15, 1999.

Also since the final rule was issued, the Water Science & Technology Board of the National Research Council/National Academy of Sciences has conducted a review (focused on the production of food crops with reclaimed water and/or biosolids) of the current state of the practice, public health concerns, existing guidelines and regulations, and implementation issues and concluded in their 1996 report ("*Use of Reclaimed Water and Sludge in Food Crop Production*") that "the use of these materials in the production of crops for human consumption, when practiced in accordance with existing federal guidelines and regulations, presents negligible risk to the consumer, to crop production, and to the environment."

3. *Indicate specific contaminants or groups of contaminants that you feel are NOT adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction, and require further study.*

- Provide reasons for your choices;
- Rank your concerns in order of priority;
- Provide reference to any documentation you have that supports your choices. (The references should include: author(s); year of publication; title of article; and name, volume and page numbers of publication);
- What information/action do you feel is required to respond to your concerns?;
- Are you planning studies to address the concerns?

1) -- Unanswerable questions continue to be raised about the possible synergistic effects of the many organic compounds that may be present at low levels in biosolids. The establishment of a residual toxicity bioassay test (or battery of tests) similar to the WET

testing of effluents would go a long way towards addressing such concerns. WERF currently has a contract effort underway (“Assessment of Bioassay Procedures for Biosolids”) to identify an appropriate battery of toxicity bioassay tests to screen for residual chemical contamination of biosolids and to conduct a detailed assessment of an array of biosolids products with varying characteristics and contaminants. This effort may well lead to a means of helping to respond to the issues that are frequently raised regarding all of those “other” pollutants that may be present in biosolids in small (or large) amounts that we haven’t set criteria for or that may create synergistic effects.

2) -- Completion of a full-scale formal risk assessment of pathogens would also help reassure the effectiveness of the current pathogen reduction requirements associated with our Class A & B requirements. (Class A biosolids are treated by processes that reduce pathogenic bacteria, enteric virus, and viable helminth ova to below detectable levels and can be used without any special restrictions associated with pathogens; Class B biosolids are treated by processes that reduce pathogens to levels achieved by conventional anaerobic digestion, cannot be sold or given to the public, and have specific waiting periods before certain crops can be harvested, domestic animals grazed, or public allowed general access to the application site). Better analytical procedures for pathogen recovery from the biosolids matrix would also help with the assessment of pathogen presence in biosolids products and reduction capabilities of various biosolids processes. Round-robin evaluation of several revised pathogen testing methods are currently underway. WERF also has several projects underway addressing methods for conducting a full-scale pathogen risk assessment associated with land application practices.

3) – Concerns continue to be expressed over the potential for ecological impacts associated with land application of biosolids. At the time the risk-assessment was conducted that supported the development of the Part 503, methods for conducting formal ecological risk assessments were only in the formative stages. Since that time, EPA has issued its final “Guidelines for Ecological Risk Assessment” (EPA/630/R-95/002F; April 1998). An initial effort to conduct a limited ecological risk assessment by EPA/ORD that did not include any effort to obtain field validation data and was undertaken before the guidelines were finalized has resulted in a draft document with results that are not consistent with available field observations. Further efforts to better evaluate the ecological impacts of land application practices and validate the results with field observations and field data need to be undertaken.

4. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc)? Please elaborate.*

Available data and past experience with biosolids uses suggests to me that, as concluded by the National Academy of Sciences study on food crop production, when practiced in accordance with existing federal guidelines and regulations, land application presents negligible risk to the user, general public, crops, wildlife or the environment. My concerns noted above regarding potential residual toxicity of “other” pollutants or synergistic effects of pollutants and the need for further evaluation of ecological impacts relate more to the application of biosolids products to land with limited public access where the biosolids may be applied at agronomic rates that can vary greatly between agricultural and reclamation uses. The need for more formal pathogen risk assessment efforts applies more to the application of Class B materials and the need for improved

pathogen detection methods relates more to land application of Class A products to land with high public exposure since the unrestricted use of such products assumes the absence of viable pathogens above background levels in the soil.

5. *Have stakeholders (i.e., affected communities) in your jurisdiction been surveyed for comment on the adequacy of your regulations? If so, please provide information about the responses.*

A broad range of stakeholders were actively involved in commenting on the proposed EPA regulations; their input resulted in the use of less conservative, more realistic assumptions and field project data where possible in preference to lab data or simulated modeling results in the establishment of the final rule's requirements. Since the final rule was issued several groups and individual scientists have raised concerns over some of the assumptions used in developing the final rule which were less conservative than those used in developing the proposed rule (arguing that being more conservative is always better) and identifying specific pollutants that were not directly addressed by the risk assessment (e.g., trimethylamines and some chemicals with hormone disrupting properties). A growing number of agriculture-related groups and public interest groups have been raising concerns that they have with various biosolids use practices (e.g., the use of Class B biosolids and waiting period management practices). They generally relate to land application of treated biosolids as being land disposal of "human waste" or "hazardous waste"—a practice that they find to be clearly unacceptable. This general opposition has spurred a growing number of "negative" news coverage events (e.g., a 3-part CNN-Moneyline series, several short Time articles, a USA-Today editorial, etc. generally based upon one-sided interviews with opponent groups or individuals who express concerns). At least in part, this may be the result of an increased use and visibility of land application practices over the past 10-20 years (over 50% of the biosolids in the U.S. are currently land applied in one form or another, which is up from 25-35% in the early 1980's).

6. *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rank these options in order of preference and explain your ranking.*

My personal ranking of the options you listed are as follows:

(1) utilization on other lands with limited public access ... (especially use in reclaiming disturbed and contaminated sites) since these practices generally results in the greatest benefits being derived from the organic matter and nutrients in the biosolids; this might also include use as a daily or final landfill cover where the treated biosolids product is used to replace native topsoil that would otherwise be used for this purpose;

(2) utilization on agricultural land ... (especially marginally productive fields) as a replacement for commercial inorganic fertilizers and to improve soil properties, while returning the nutrients and organic matter to farmland where much of the nutrients and organic matter were lost as a part of food crop production;

(3) utilization on lands with high public access ... to replace inorganic fertilizers and recycle the product close to its source, thus avoiding the cost and energy consumption involved with longer distance transportation;

(4) incineration ... with energy recovery to obtain some value from the destroyed organic matter;

(5) landfilling ... also with energy recovery, due to the loss of valuable land associated with landfill disposal that can be better used for other purposes

7. *Part of the WEAO project is a review of related literature. We are particularly interested in any recent or proposed work in your jurisdiction related to pathogens and trace organics. Please provide details of this work.*

Recent or proposed work ... The EPA support documents associated with the Part 503 rule and risk assessment provides a good summary of the related literature as of that time. There is ongoing research being conducted by Dr. James Ryan at the ORD/Cincinnati, OH, lab on the basic metal binding properties associated with the biosolids matrix and some ongoing work by other scientists at the ORD/Cincinnati, OH, lab in cooperation with Dr. James Smith relative to pathogens in biosolids. You also need to check the WERF and WEF web sites for more recent/proposed work and recent WEF and WERF publications.

8. *What is your opinion of the long-term future for biosolids utilization on agricultural land in your jurisdiction? What are the major potential barriers to long-term success?*

I anticipate that biosolids utilization on agricultural land will continue to grow in use and acceptance as long as the basic information that has been developed is made readily available in an easily understandable format to all interested parties, along with current information on biosolids quality and compliance/enforcement information for individual facilities, Environmental Management Systems (EMS's) are developed and put in place to help assure that nuisance problems as well as regulatory issues are addressed at the local project level, and any new issues raised by interested parties are thoroughly addressed.

9. *Are you familiar with the Ontario Biosolids Utilization Guidelines? If so, please indicate how the regulations in your jurisdiction may be more or less effective than the Ontario Guidelines.*

Yes. The requirements imposed on land application practices in the U.S. are addressed on a national basis by the EPA Part 503 rule. In addition to these general requirements, individual states often impose additional specific requirements. In general, the Ontario guidelines are more restrictive than the Part 503 requirements. Prior to the development of the risk-based Part 503 rule, EPA's guidelines (and most state requirements) were also more restrictive. It was as a direct result of the comprehensive, multi-pathway risk assessment, which attempted to use the best and most appropriate available scientific data, that the requirements now imposed in the U.S. are less restrictive than those in the Ontario guidelines.

10. *You are invited to offer other comments or recommendations, not presented above, on the fate and significance of contaminants in sewage biosolids applied to agricultural land.*

Biosolids have been successfully utilized for many years in the U.S., with some projects being in operation for well over 50 years. An extensive R&D program was supported with funding provided by several Federal agencies, state and local authorities throughout the 1970's and 1980's, involving hundreds of millions of dollars that supported research activities in every state. These R&D efforts included extensive field-scale project evaluations of both the positive and potential negative impacts associated with land application of biosolids products (including soil, plant, animal and human impacts), and often involved excessive application rates in an effort to simulate what might happen as a result of misapplication or to project long-term use impacts. They included efforts to document human health impacts associated with land application practices (as well as detailed studies of the health impacts of sewage treatment plant workers and neighbors of sewage treatment plants). The bulk of this work was conducted on biosolids that were produced before the implementation of the effective industrial pretreatment and source control programs that are in place today. The results of this extensive research investment was used to support the comprehensive risk assessment that was conducted that lead to the requirements contained in the Part 503 rule. As noted above, the available data and past experience with biosolids uses suggests to me that, as was concluded by the National Academy of Sciences study on food crop production, when practiced in accordance with existing federal guidelines and regulations, land application presents negligible risk to the user, general public, crops, wildlife or the environment. Still, we will strive to address areas of limited information and continue to improve our knowledge based relative to our understanding of the fate and effect of pollutants that may be present in biosolids and the potential impacts (both positive and negative) of land application practices.

II(c). Jim Smith - USEPA Pathogen Equivalency Committee

1. *Name, address, tele /fax numbers and email address of person(s) completing the questionnaire*

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National Risk Management Research Committee
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2. *A great deal of study has been directed toward determining the fate and significance of heavy metals, pathogens and organic contaminants in sewage biosolids used as fertilizer on agricultural land. In general, results from these studies have indicated no environmental or health problems arising from this practice. Indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction.*

40 CFR Part 257 et al. Standards for the Use or Disposal of Sewage Sludge; Final Rules, (US) Federal Register, February 19, 1993, in my mind adequately controls the chemical and microbiological contaminants in sewage sludge. This includes the control of arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, pathogenic bacteria, viruses, and parasites.

3. *Indicate specific contaminants or groups of contaminants that you feel are NOT adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction, and require further study.*
 - *Provide reasons for your choices;*
 - *Rank your concerns in order of priority;*
 - *Provide reference to any documentation you have that supports your choices. (The references should include: author(s); year of publication; title of article; and name, volume and page numbers of publication);*
 - *What information/action do you feel is required to respond to your concerns?;*
 - *Are you planning studies to address the concerns?*

I do not at this time feel that there are any specific contaminants or groups of contaminants that are not adequately regulated by the standards listed in Number 2.

4. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc)? Please elaborate.*

See answer to Number 3 above.

5. *Have stakeholders (i.e., affected communities) in your jurisdiction been surveyed for comment on the adequacy of your regulations? If so, please provide information about the responses.*

There has been no survey by the US federal government.

6. *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rank these options in order of preference and explain your ranking.*

Land Application
Utilization on other lands with limited public access
Utilization on agricultural land
Utilization on lands with high public access
Landfilling
Incineration

I have made the above ranking because it is the policy of the USEPA to vigorously encourage the recycling of the beneficial materials in biosolids (nutrients and soil building materials) back to the land. Since presently about 90 + % of biosolids is treated with Class B procedures, I prefer to limit public access. These concerns would not exist with Class A material. The public in the US and the EPA do not actively encourage or desire incineration. Landfilling in situations where the landfill is operated as a reactor and the methane gas captured and utilized is favored after land application.

7. *Part of the WEAO project is a review of related literature. We are particularly interested in any recent or proposed work in your jurisdiction related to pathogens and trace organics. Please provide details of this work.*

Presently little research work is being done by the USEPA. Most research work currently done in the US is by the Water Environment Research Foundation with funding assistance from the USEPA. Some ongoing efforts are looking at thermophilic anaerobic digestion, simple class A methods including lagoon storage, methods of measuring stability, and performing a risk assessment for microbiological contamination.

Recently the USEPA revised its guidance document for control of pathogen and vector attraction reduction. This is Environmental Regulations and Technology: Control of Pathogens and Vector Attraction in Sewage Sludge, EPA/625/R-92/013 - 1999 Edition.

8. *Are concerns in your jurisdiction different for US EPA Class A and Class B biosolids?*

We see less opposition to the application of Class A biosolids than we do to the application of Class B biosolids. This is likely because it is recognized that Class B

material may still contain pathogenic microorganisms. However, I must repeat > 90 % of the systems in the US applying biosolids are applying Class B material and opposition is small.

9. *What is your opinion of the long-term future for biosolids utilization on agricultural land in your jurisdiction? What are the major potential barriers to long-term success?*

The regulations in effect in the US are good, and the future of biosolids utilization on agricultural land is good provided there adequate oversight for how the program is implemented. Oversight is essential to insure that the regulations are followed.

10. *Are you familiar with the Ontario Biosolids Utilization Guidelines? If so, please indicate how the regulations in your jurisdiction may be more or less effective than the Ontario Guidelines.*

I am not immediately familiar with the Ontario Biosolids utilization Guidelines.

11. *You are invited to offer other comments or recommendations, not presented above, on the fate and significance of contaminants in sewage biosolids applied to agricultural land.*

Think I have said all that is necessary.

II(d). Robert Dowdy – USDA-Agric. Research Service

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

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2. *A great deal of study has been directed toward determining the fate and significance of heavy metals, pathogens and organic contaminants in sewage biosolids used as fertilizer on agricultural land. In general, results from these studies have indicated no environmental or health problems arising from this practice. Indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction.*

Class A biosolids are adequately regulated (per 503 reg's.), as are metals in Class B biosolids. I cannot speak for regulations on pathogens and organics in Class B biosolids.

3. *Indicate specific contaminants or groups of contaminants that you feel are NOT adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction, and require further study.*
 - *Provide reasons for your choices;*
 - *Rank your concerns in order of priority;*
 - *Provide reference to any documentation you have that supports your choices. (The references should include: author(s); year of publication; title of article; and name, volume and page numbers of publication);*
 - *What information/action do you feel is required to respond to your concerns?;*
 - *Are you planning studies to address the concerns?*

I disagree with the implication of the question. Just because an item requires further study should NOT necessarily imply a need for regulation.

Biosolids flowing from the end of the treatment pipeline should be monitored on a regular, periodic basis, depending upon many factors including flow volume. If any non-regulated constituent shows a documentable increase over a given time interval, the said constituent should be placed on the "watch" list and undergo a risk assessment. If assessment identifies an unacceptable risk, then further study is required and possible regulation warranted.

4. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc)? Please elaborate.*

As a matter of principal, I believe that all biosolids meeting Class B or better standards should be beneficially land applied, AND that areas of high public exposure (e.g. backyards, residential gardens, picnic and campground areas of parks, etc) should be avoided. There is enough land areas for beneficial use, without application on high public exposure areas.

5. *Have stakeholders (i.e., affected communities) in your jurisdiction been surveyed for comment on the adequacy of your regulations? If so, please provide information about the responses.*

Not to my knowledge.

6. *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rank these options in order of preference and explain your ranking.*

From highest to lowest preference ranking.

- a. Utilization on agricultural land — conservation of plant nutrients, carbon; reduce public cost.
- b. Utilization on other lands with limited access — for same reasons as given in “a” above.
- c. Land filling — a waste of carbon and plant nutrients.
- d. Incineration — a waste of carbon and plant nutrients; contributes to global CO₂ load; an unnecessary extra public cost.
- e. High public access lands — pure negative public perceptions.

7. *Part of the WEAO project is a review of related literature. We are particularly interested in any recent or proposed work in your jurisdiction related to pathogens and trace organics. Please provide details of this work.*

No current or proposed research in these areas.

8. *Are concerns in your jurisdiction different for US EPA Class A and Class B biosolids?*

Fundamentally no, but some lip-service to a difference.

9. *What is your opinion of the long-term future for biosolids utilization on agricultural land in your jurisdiction? What are the major potential barriers to long-term success?*

Engineers who are in control and like to have big facilities to manage and don't want to get beyond the gate. This philosophy is reinforced by the NIMBYs and neighbors of treatment facilities who have a #1 priority of odor reduction.

10. *Are you familiar with the Ontario Biosolids Utilization Guidelines? If so, please indicate how the regulations in your jurisdiction may be more or less effective than the Ontario Guidelines.*

No.

11. *You are invited to offer other comments or recommendations, not presented above, on the fate and significance of contaminants in sewage biosolids applied to agricultural land.*

My view is pretty well spelled out above.

II(e). Peter Matthews – Consultant

1. *Name, address, tele/fax numbers and email address of person(s) completing the questionnaire.*

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2. *A great deal of study has been directed toward determining the fate and significance of heavy metals, pathogens and organic contaminants in sewage biosolids used as fertilizer on agricultural land. In general, results from these studies have indicated no environmental or health problems arising from this practice. Indicate specific contaminants or groups of contaminants that you feel are adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction.*
3. *Indicate specific contaminants or groups of contaminants that you feel are NOT adequately regulated by the Biosolids Utilization Guidelines in your jurisdiction, and require further study.*
 - *Provide reasons for your choices;*
 - *Rank your concerns in order of priority;*
 - *Provide reference to any documentation you have that supports your choices. (The references should include: author(s); year of publication; title of article; and name, volume and page numbers of publication);*
 - *What information/action do you feel is required to respond to your concerns?;*
 - *Are you planning studies to address the concerns?*

(2 & 3) I think that the evidence indicates that we have enough limits . However there are other views in Europe regarding dioxins etc , pcbs, flame retardents etc

4. *Are your concerns the same for sewage biosolids application to land with limited public access (e.g., agricultural land) as to land with high public exposure (e.g., backyards, golf courses, parks, etc)? Please elaborate.*

Biosolids can be applied to land safely , but if the quality is such that a maximum soil value will be attained(albeit over along and safe period of time) the operation must be supported by extensive soil monitoring.This is difficult to do in gardens. Equally , if the product will have to be treated , but for most treatment processes there will still be a need for some sort of associated good practice in use to act as an infection barrier .

The use of products in non-agricultural situations present more difficulties in these controls which in essence should probably be of sufficient quality that there can be infinite use.as far as soil quality is concerned and completely hygienised as far as

product quality is concerned. This will probably push up costs unreasonably for gardens and small horticultural properties are concerned for many biosolids and even then will only represent a small part of large scale operations. So why bother if you have access to agricultural land ?

5. *Have stakeholders (i.e., affected communities) in your jurisdiction been surveyed for comment on the adequacy of your regulations? If so, please provide information about the responses.*

Our government consults on draft regulations and takes responses into account. You need to speak to the DETR about this and I can find out the right name, if you like. It runs advisory committees with a wide range of interests. Water companies consult local parish councils when they start new local operations.

6. *Assuming the following biosolids management options - (1) incineration, (2) landfilling, (3) utilization on agricultural land, (4) utilization on other lands with limited public access (e.g., forest, nurseries, reclaimed land), and (5) utilization on lands with high public access (e.g., backyards, golf courses, parks) - please rank these options in order of preference and explain your ranking.*

Depends on where you live but for Eastern England in general the order is 3, 4, 5 about same as 2 which is becoming more expensive, regulated and unpopular, and last 1 but it may well come up the rankings if things change. The future will probably be 3+4 with 1 but what about other outlets like bricks and oil etc; the former certainly seems practical and Anglian Water is already into this and it will grow.

7. *Part of the WEAO project is a review of related literature. We are particularly interested in any recent or proposed work in your jurisdiction related to pathogens and trace organics. Please provide details of this work.*

Speak to WRc (Water Research Centre, UK)

8. *Are concerns in your jurisdiction different for US EPA Class A and Class B biosolids?*

Food retail issues

9. *What is your opinion of the long-term future for biosolids utilization on agricultural land in your jurisdiction? What are the major potential barriers to long-term success?*

Food retail issues

10. *Are you familiar with the Ontario Biosolids Utilization Guidelines? If so, please indicate how the regulations in your jurisdiction may be more or less effective than the Ontario Guidelines.*

Not too sure

11. *You are invited to offer other comments or recommendations, not presented above, on the fate and significance of contaminants in sewage biosolids applied to agricultural land.*

(Copies of two publications were included and are available from Mel Webber)

II(f). Bob Davis – WRC (Water Research Centre), UK

Mel,

In your review I thought it might be of interest to touch on the difference of approach- N. America V. Canada.

In the UK since BSE (“Mad Cow Disease”) the credibility of the scientist and risk assessment has lost ground. Pathogen worries have lead to perception problems with the public, and safety worries with the powerful supermarkets who specify how farmers are to grow the produce they buy. So the UK standards are now ‘the safe sludge matrix’ which I’ll fax to you. These are ‘market lead’ standards - the market has overtaken the regulator and the 2 papers attached give some background.

The EC has now issued a draft of the proposed revision to 86/278/EEC which I’ll fax to you. We do not know if the values are set in concrete or likely to alter after negotiation. The standards are driven by ‘precautionary principle’ to the extent that they will divert sludge away from recycling to land- presumably not what was intended. UK water companies are going into energy recovery.

Hopefully the Ontario guidelines demonstrate the right balance - a sound science risk assessment approach to standard setting with added precautionary principle (unlike the US EPA) to ensure safety, and retain a positive perception of biosolids recycling and keep public confidence in the outlet.

All the best,

Bob.

(Promised information was provided and is available from Mel Webber)