Summary of Consultation Comments

Soil Amendment: Code of Practice Intentions Paper

(Formerly titled: Soil Enhancement Using Wastes Code of Practice)

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Table of Contents

Section A: Background to the Consultation Process and Responses Received

Introduction and Background to the Consultation Process

This report provides a thematic summary of comments received as part of the consultation process for a "code of practice" (minister's regulation) to authorize the land application of wastes used as soil amendments under provisions of the *Environmental Management Act* (EMA) and the *Waste Discharge Regulation* (WDR). The EMA and WDR were brought into force in July 2004. Under the legislation, introductions of waste from identified "prescribed" industries, trades, businesses, operations and activities require authorization (e.g., permit or approval) from the ministry. The WDR also contains provisions for establishing codes of practice issued by the minister as a form of authorization for specified industries, trades, businesses, operations and activities. A code of practice is a legally binding and enforceable set of rules that must be followed – the environmental protection measures and other actions that are expected of the industry by the ministry.

An "intentions paper" and response form were posted for public review and comment on the ministry's website (www.env.gov.bc.ca/epdiv/ema_codes_of_practice/index) through November and December 2005. The intentions paper provided a summary of the ministry's mandate and objectives, background information and potential concerns arising from the use of industrial wastes as soil amendments, the proposed contents of the code of practice, and the avenues for providing comment as the code is developed and implemented by the ministry. The response form set out discussion issues and questions in relation to the ministry's intentions.

This document has been prepared for the Ministry of Environment by C. Rankin & Associates, contracted by the ministry to independently receive, compile and review comment on the proposed soil enhancement using wastes code of practice. The summary does not reflect the ministry's position on any issue. It provides a synopsis of the responses that are being reviewed by the Ministry in the development of the code of practice – without specific attribution, except to the extent required to provide context for the comments. The summary follows the headings and questions contained in the ministry intentions paper and response form – with synoptic and detailed sections, as well as general, process related and supplementary comments from respondents. Section B is a bullet point synopsis of the key concerns or recommendations raised by respondents. Section C of the document outlines general concerns and comments regarding the consultation process. Section D provides a more detailed compilation of comments for each response form question. The final section of the report, Appendix 1, lists acronyms and abbreviations commonly used in submissions and this summary document.

All detailed comments have not been included in this document – but have been compiled as part of the comprehensive documentation of responses being reviewed by the ministry. Several respondents also submitted supplementary articles (journal and newspaper) and information from internet sources. All comments and references submitted though this process, through independent submissions and through direct consultations with stakeholders, will be reviewed and carefully considered by the ministry in the development of proposed code of practice.

Description of Responses Received

Over 150 responses were received (by e-mail, fax and attached file) by mid-January 2006 and have been reviewed for this thematic summary of comments. About half of the respondents were "individuals" who did not identify themselves as part of an organization, agency or company. Over twenty submissions were made on behalf of, or by individuals who identified themselves as members of, environmental or community organizations. A similar number of responses from "industry" organizations or companies included submissions from pulp & paper companies, farms and organic growers associations. Responses were also received from federal, provincial and local government agencies, and First Nations and First Nations organizations.

Section B: Synopsis of Comments, Concerns or Recommended Actions

This section contains a point form synopsis of the comments, concerns or recommended actions raised by respondents. It includes general concerns and comments regarding the consultation process, as well as comments received on each of the questions in the response form that accompanied the soil enhancement using wastes intentions paper. A more detailed compilation of comments from respondents, from which these synoptic points are derived, is provided in sections C and D of this document.

General concerns

- A large number of the responses received expressed concern regarding the proposed code of practice and the potential to intentionally spread materials containing "toxic wastes" on agricultural lands or introduce contaminants to the environment through direct application or leachate in surface or groundwater.

Comments regarding the consultation process

- Many respondents expressed concern regarding the limited notice and "short time period" for public response to the intentions paper.
- Responses from First Nations commented on the notice and information about the proposed code of practice – that it did not in their view constitute sufficient "consultation" for individual First Nations to consider the proposed code of practice.

Comments regarding response form questions

Question 1.1: Are there any materials that, in your view, should be added to, or removed from, the list? Why?

- Remove materials with a potential to harm human health or the environment (fly ash, primary and secondary pulp and paper residues, lime mud and water plant residuals) as they are inappropriate for use as soil amendment materials.
- Remove wood waste as it has a low risk of containing contamination.
- Consider water treatment residuals in a distinct category (with clarification regarding status under the Organic Matter Recycling Regulation).
- Require materials to be composted prior to consideration for application.

Question 1.2: Do you have any additional comments regarding the materials that the proposed code lists as potentially appropriate for consideration as soil amendments, and the regulation of their application to land under the proposed code of practice?

- Provide explicit criteria for materials that may be considered under the code (to supplement or replace the list of materials), with a key criteria being benefit to the proposed receiving soil.
- Proponents should be required to provide a complete analysis of the contents of the materials and consistency of content over time (accurate characterization) prior to consideration of any application to soils.
- Refine definitions of materials (fly ash, primary or secondary pulp or paper mill wastewater treatment residuals, lime mud, water treatment residuals, wood) to explicitly exclude or include identified high or lower risk materials.

- Make a clear distinction between municipal biosolids and industrially generated wastes and how the code or the Organic Matter Recycling Regulation will apply to each.
- Exclude uncontaminated wood waste, or specific uses of wood waste (i.e., encapsulated sub-surface application) from requirements of the code.

Question 2.1: Do you feel that these prohibitions are appropriate and support the ministry's objectives in protecting human health and the environment? Do you have any comments or suggestions about these prohibitions?

- Ensure that any application of industrial waste used as a soil amendment does not harm human health or the environment. How will the ministry ensure adequate monitoring and enforcement of the proposed code?
- Provide clear direction regarding the prevention and monitoring of leachate from industrial residuals into groundwater and/or streams.
- Clarify the rationale and appropriateness of any restriction to application on residential or urban parkland.
- Provide standards for fabricated soil consistent with Organic Matter Recycling Regulation – of particular use in reclamation situations, as well as for horticulture and landscaping.

Question 3.1: Do you feel that the proposed list of substances that would be used for establishing whether a substance would be considered as a soil enhancement is appropriate and complete? Do you have any suggested changes to this list of substances?

- Identify additional substances of concern with respect to human health and the environment for use in establishing limits (e.g., boron, sodium, chlorinated organic compounds, volatile organic compounds (VOCs), dioxins, furans, salts, total hydrocarbons, fecal coliforms, endocrine disruptors, methyl-mercury, PCBs and Simazine).
- Require comprehensive testing of potentially high risk materials (i.e., residues from pulp mill operations) prior to identifying a limited set of specific substances with prescribed limits and monitoring requirements.
- Consider other factors (beyond substances) that may be appropriate for use in establishing limits (e.g., pH, salinity, sulphate).
- Review substances required for testing under the Contaminated Sites and Organic Matter Recycling Regulations for adequacy in protecting human health and the environment, and consistency between existing regulations and the proposed code.

Question 3.2: Do you feel that that the proposed limiting values for these listed substances (following standards set by the Canadian Food Inspection Agency and used in the Organic Matter Recycling Regulation) are appropriate? Do you have any suggestions for improving the setting and/or use of these limiting values?

- Follow Canadian Council of Ministers of the Environment (CCME) standards for unrestricted or agricultural use (rather than CCME compost or fertilizer standards) when setting limiting values for substances that may be contained in soil amendment materials.

- Include provisions for government and public access to analysis and monitoring information in the code.
- Consider establishing different classes of soil amendment material (as in the Organic Matter Recycling Regulation), with requirements linked to nature and environmental risk of the materials involved.
- Clarify requirements for identifying reference sites for background soil trace element testing and protocols for situations where one or more background trace elements may exceed Contaminated Site Regulation standards.
- Review the required experience, role and powers of a "qualified professional" under the code to ensure that provisions are specific and appropriate to achieve ministry objectives and intentions.
- Review monitoring requirements and adjust requirements if appropriate (e.g., reduce frequency monitoring if reliable monitoring shows materials involved to be consistent and within required limits), and consider requiring marked "check plots" for comparative purposes over time.

Question 4.1: Do you feel that a land application plan – prepared by a qualified professional is an appropriate and practical means for describing and addressing the technical and administrative requirements for the application of a soil enhancement? Do you have any suggestions or comments regarding the information that should be included in a land application plan?

- Strengthen provisions in the code and provide staff resources for implementation to ensure government staff monitoring and enforcement of code provisions.
- Clarify the specific expertise and tasks required of a "qualified professional" (e.g., agronomy to assess soil amendment requirements, toxicology to consider contaminant loading), individually or collectively, to prepare a land application plan.
- Add more specific additional required provisions for a land application plan, including notification of adjacent land owners, local and other government agencies and the public, specific soil testing requirements, and history of previous applications on the site(s).
- Consider varying requirements for a land application plan, or delineate common "generic" provisions for land application plans, based on risk to human health or the environment of the material(s) and site(s) involved.
- Require a record of application of soil enhancements using waste be attached to the land title or record, and conveyed to potential purchasers and subsequent owners.
- Specify the scope and lifespan of a land application plan in the code.

Question 4.2: Do you have any comments or suggestions regarding the requirements for storage facilities and storage sites for soil amendments?

- Clarify storage facility requirements with the aim of minimizing field storage and limiting the length of time that material may be stored at a site other than where it is generated. Include requirements for storage facility planning in land application plans.
- Strengthen provisions to protect ground and surface water through runoff and/or leachate from storage facilities. A proponent should be required to identify and address wind and odour control issues associated with storage of materials.

- Clarify the means by which provisions for and use of storage facilities will be monitored by the ministry.
- Establish storage requirements based on volume of material involved and risk to human health and the environment.

Question 4.3: Do you have any other comments or suggestions regarding the proposed general technical and administrative requirements for the code of practice?

- Clarify the criteria and "triggers" that would be used for requiring a land application plan under the code (e.g., risk to human health and the environment, type of material, volume of material, characteristics of application area, ground and surface water conditions and features, adjacent land use).
- Clarify and strengthen provisions for long term monitoring and the capacity of the ministry to monitor, assess and enforce provisions of the code. The ministry should be able to say with certainty that it is doing no harm by allowing the use of industrial wastes as soil amendment materials under terms of the code.

Question 5.1: Do you have any comments or suggestions regarding the proposed requirements for notification under the code of practice?

- Strengthen requirements for notification of the public (through local newspaper advertisements and posting on accessible websites) and adjacent land owners (by direct contact and posting of signs) prior to intended application of soil amendments.
- Include explicit requirements for consultation with First Nations and appropriate accommodation of First Nations rights and obligations.
- Consider increasing the volume threshold for notification requirements to 15 or 100 m^3 of material.
- Review the criteria used for establishing a classification system, and associated notification and posting requirements, in order to appropriately address risk and potential exposure associated with application of industrial wastes.
- Review provisions for notification of Medical Health Officers and the Agricultural Land Commission with each of the agencies to ensure that they are sufficient for review and appropriate response. Add "Local Government" (i.e., relevant municipal and regional bodies) to the government agencies that must be notified of intended application of soil amendments. Consider increasing window for response to 45 (from 30) days.

Question 5.2: Do you have any comments or suggestions regarding the proposed application requirements – minimum distances from potable and other water sources and public roads, and with respect to the groundwater table – under the code of practice?

- Ensure that the code contains sufficient provisions to prevent contamination of surface water and groundwater – due the high environmental and economic cost that can be incurred if the supplies are contaminated.
- Review proposed setback requirements for sufficiency, consistency and inclusion of all areas of concern (e.g., dwellings, organic farms).
- Review intent and content of provisions for public roads and right of ways with the Ministry of Transportation (MoT) to address environmental and human health protection objectives in relation to MoT interests and needs for stable road beds.

- Review provisions for application of soil amendments in relation to the groundwater table are practical and effective in meeting surface and groundwater protection objectives.

Question 5.3: Do you have any comments or suggestions regarding the proposed record-keeping requirements under the code of practice?

- Lengthen the period that records are required to be kept, and include provisions for public access to application records.
- Require preparation of an independent annual management report on the application of soil amendment materials associated with each generator of the materials.
- Provide additional direction or provisions for monitoring and enforcement of the code (e.g., check plot requirements, guidelines for monitoring parameters and procedures).

Question 6.1: Are there any aspects of applying particular industrial wastes to land that could significantly affect human health or the environment that are not, in your view, sufficiently addressed in the proposed code? What are they? What suggestions do you have for the ministry to improve the manner in which these concerns are addressed?

- Do not permit the use of soil amendments on agricultural lands or on any lands that are publicly accessible.
- Encourage or require processing and sales of soil enhancements made using industrial wastes "by the bag" rather than through broad scale application.
- Use the same classification for soil enhancements from industrial wastes as for OMRR class A and class B residuals.

Section C: General Concerns and Comments Regarding the Consultation Process

General concerns

Many respondents addressed comments directly to the Minister of Environment or the Premier, rather than following the intentions paper outlining the proposed soil enhancement using wastes code of practice and questions in the response form prepared by the ministry. These comments have been compiled and forwarded to ministry staff, and included in this summary as "supplementary comments" following the "additional comments" section (question 6 of the response form).

The vast majority of such comments received voiced general concern regarding the proposed code of practice and the potential to intentionally spread materials containing "toxic wastes" on agricultural lands or introduce contaminants to the environment through direct application or leachate in surface or groundwater.

Comments regarding the consultation process

A significant number of respondents commenting on the proposed code of practice expressed concern regarding the limited notice and "short time period" for public response to the intentions paper (initially 30 days from posting on the ministry's website, later extended for an additional 15 days, with subsequent responses collected and collated for ministry staff review). Comments regarding the consultation process included: "I am alarmed at the intent of this proposal and am very disappointed that the public has not been given enough time to study and respond to it"; "the general public should have been made aware of this, not just those who have the interest and just might happen to see [the web posting]… disappointed that a procedure that could have serious consequences in the future has been handled in this way"; and "this regulation has been quietly and quickly fast tracked by government and it does nothing more than allow industry a cheap method of disposal of its toxic industrial waste by spreading it on farm and forest."

One local government respondent commented that: "the Regional District is also concerned with the limited amount of time and opportunity to respond to the code of practice initiatives…the Regional District respectfully requests the Ministry to ensure that all stakeholders are provided an adequate opportunity to participate in any changes that may affect their business."

Two responses from First Nations were received that commented on the consultation process for the proposed code of practice. One stated: "this is not 'consultation' of any form in regards to First Nations usage of these lands and therefore is a breach of legal requirement on the part of the BC Government." The second acknowledged receipt of a referral package directed to Indian Bands and Tribal Councils and asserted that: "The forestry resources, which the Province seeks to allocate in this referral fall within our traditional territory. At stake in this referral is aboriginal title and aboriginal right to harvest timber for cultural, community and livelihood purposes…the referral will interfere with aboriginal title…The Courts have said that consultation is about accommodation and these components of aboriginal title suggest that accommodation must encompass priority access by our Nation to resources, co-management to reflect decision making of our Nation as to how the land is to be used, and compensation of revenue sharing…In the context of this referral, we will endeavour to reach a workable interim compromise, which is part of a longer term solution. We are prepared to mandate negotiations to achieve this purpose, and we ask the Province to do the same… In addition to aboriginal title, this referral may interfere with site specific concerns. Unfortunately, a site specific response to this application requires resources, both financial and technical to investigate and respond to the referral… In the absence of specific funding, we are not in a position to address in this letter any interest other than aboriginal title."

Section D: Comments on Discussion Issues

This section contains a detailed summary of responses to questions posed in the response form. See section B of this document for a shorter point form "synopsis" of comments. This summary reflects the range of comments received, as well as excerpts of individual submissions with specific advice or recommendations. Direct excerpts from submissions are included in quotation marks (" ") and square brackets ([ ]) indicate inferred or contextual terms. The complete set of responses and submissions received through the consultation process has also been compiled and passed to the ministry for detailed review and consideration.

Discussion Issue 1: Materials defined as "soil amendments" under the code of practice

The Ministry is proposing that the code of practice apply to the following materials applied to land – fly ash, primary or secondary pulp or paper mill treatment residuals, lime mud, water treatment plant residuals, and wood waste.

Question 1.1: Are there any materials that, in your view, should be added to, or removed from, the list? Why?

Respondents provided a range of suggestions regarding the proposed list of materials to which the code would apply. Several respondents stated that they had "no [suggested] additions or deletions to the list" while many others commented that "fly ash, primary and secondary pulp and paper residues, lime mud, [and] water plant residuals should be removed." Concerns about the materials suggested for removal from the list involved the potential for them to contain compounds that may be deleterious or toxic to human health and/or the environment. Respondents raised specific concerns about materials that may contain lead, arsenic, cadmium, mercury, thallium, alkylphenols, chlorates (salts), chlorinated acetic acids, acetones, hydrocarbons, chlorobenzenes and other organic chemicals.

Several respondents suggested that it was inappropriate to include wood waste in the list of materials to be included in the code of practice. For example, "the material typically has a very low risk of containing any substantial contamination"; "log yard waste if screened to 6mm size produces fine clean topsoil useable in the landscaping industry"; and "only ground wood waste should be applied as mulch (not mill ends, etc.) and unscreened log yard debris – screened log yard debris could be fitted under 'composted materials' in the OMRR [Organic Matter Recycling Regulation]…wood waste should be covered under a strict rule for maximum amount… wood waste is typically a clean material which would not require soil sampling and monitoring as long as the amount applied is reasonable."

Respondents provided differing comments concerning waste water treatment residuals (or sludge). One, for example, suggested adding the material to the list, as "many waste water treatment facilities generate waste biosolids which are as or more suitable for land application than those from pulp mills." Others advocated removing such materials, as they "can contain many harmful compounds, metals, chloramines" or considering waste water under a separate classification or under OMRR.

Several respondents commented that the code should require that materials be composted prior to being used as a soil amendment. One noted that "a local contractor completed a successful trial producing 'class A' compost by blending biosolids with screened log yard waste and clay."

Additional specific comments or suggestions included: "focus on results and standards without consideration to the source"; "have a standard process to evaluate [materials] for placement on the list – perhaps a set of criteria they need to meet (such as the metals limit in Table 1 of the intentions paper) would be

sufficient"; "a generator of material could self-qualify that material based on it meeting certain criteria – notification of the ministry prior to use of a self-qualified material [could] provide a safeguard against inappropriate materials;" and "it is not clear what criteria were met by the materials that have been proposed as soil amendments – the terms used to describe the proposed materials seem overly broad… and may be open to the interpretation of the producer."

Question 1.2: Do you have any additional comments regarding the materials that the proposed code lists as potentially appropriate for consideration as soil amendments, and the regulation of their application to land under the proposed code of practice?

Many respondents used this section to expand on comments that they provided in response to question 1.2 (materials that should be added or removed from the list to be considered under the proposed code).

Several respondents suggested that the ministry provide criteria for considering potentially appropriate material under the code and recommended that benefit to the proposed receiving soil be one of the criteria. For example, "the key criteria… must be how will the addition of this material produce a measurable benefit to the soil that receives it?"; and "the type and quantity of material should clearly be demonstrated to be necessary to provide a beneficial purpose in upgrading the quality of the receiving environment."

Some respondents recommended comprehensive characterization of any material prior to consideration as a soil amendment, for example: "the proponent should submit a total analysis of the contents of the materials and demonstrate the variability of the quality of the material over time and across the material – the contents must be free of deleterious substances and provide 'balanced' additions of nutrients and not be a source of imbalance of the healthy soil, and non toxic to the soil biota;" and "it would be prudent to require some waste characterization… one possible criterion is screening of CSR Schedule 4 compounds to identify specific constituents that could be a concern in a waster-amended soil product." Many respondents commented that materials containing "any" trace of heavy metals (e.g., lead, mercury, arsenic, cadmium) or other "proven toxics" should not be considered appropriate for use as a soil amendment.

Several respondents commented generally on materials generated from **pulp and paper mill** operations, for example: "I have serious concerns about pulp and paper mill residuals which [can] contain even trace amounts of dioxins and furans, the most poisonous substances known to man"; and "the extensive chemical processing involved in converting wood fibre to pulp means that residues such as sludge and fly-ash are potentially contaminated with a number of chemicals, some of which (including organochlorines generated in bleached Kraft processing) are known to persist in the environment and are toxic, carcinogenic, or affect reproduction in a range of animals (including humans)."

Specific concerns or comments regarding **fly ash** included: "Consider referring to a generic 'ash' (Why is there a restriction to power boilers using primarily wood as fuel?) – coal fired power generation also creates a similar ash, as would industrial cogen facilities burning natural gas, wood and pulp sludge"; "fly ash should only be accepted from industrial power boilers using wood as fuel EXCLUSIVELY, and the fuel wood should not include any logs from salt water or any wood treated with preservatives"; "Could the ash contain residuals from other waste burned in/on the site? – concern over metals and other source contaminants"; "monitoring of fly ash for dioxins and furans is essential to minimize these proucts from polluting air, water and soil;" and "possible water-repellency of fly ash leads to increased runoff and loss of phosphorus to water bodies, therefore eutrophication becomes a concern."

Specific concerns or comments regarding **lime mud** included: "if this material is 'mud' [this implies that] it contains clay like properties or clay residues that would have the risk of a negative (non soil enhancement) character"; and "the definition should be expanded to include other lime based residuals that include wash fines from the cement and aggregate industry,ground shells from the food processing industry (e.g., sea shell food shells)."

Specific concerns or comments regarding **water treatment residuals** included: "these materials usually contain all manner of heavy metals, pharmaceutical drug residues, and hormone-mimicking substances"; and "we suggest modifying the definition ('primary or secondary pulp or paper mill wastewater residuals') to exclude the linkage to wastewater, thus expanding the definition of suitable materials – it could be said that de-inking plant sludge is a residual generated in the paper recycling process, and not linked to effluent treatment."

Specific concerns or comments regarding **wood waste** included: "wood waste is very open in terms of wording (Is this only pre-consumer wood waste from the pulping or milling process that does not contain materials such as antisapstain or wood preservatives?) – there should be no post consumer wood waste in this definition unless it is free of all paints, preservatives, stains etc."; "log yard waste can be significant in volume – we have been… developing a process to sort the material into various products – these can be returned to the logyard (rock & gravel), used as an energy source (wood waste for hog fuel), and potentially the fines (soil and fine wood particles) [used] for a component of a top soil mix – the testing outlined [in the proposed code of practice] is overly onerous if dealing with testing every 1,000 Tonnes or 5 m^3 of material – the application approval process and tracking requirements are also very onerous for low risk material;" and "many types of wood waste (sawdust, bark and similar materials) are currently being used as feedstock in the fabrication of other products – for example fabricated growing media or commercially prepared 'top soil' – would the use of wood waste as a feedstock in the production of these materials or the use of sawdust in a horseback riding arena require a LAP?"

A specific concern was raised by a respondent from the Ministry of Transportation regarding the ministry's use of hogfuel (hogwood) and fly ash for lightweight fill materials. "These two materials are particularly useful [for road bed construction] in the Lower Mainland where water tables are very high and soft soils are common. The definition of 'soil enhancement' could conceivable be applied to a roadway foundation and the Intentions Paper clearly identifies these two products as 'soil enhancements'… we [Ministry of Transportation] believe that the code of practice for soil amendments is intended to apply to sidespread surface applications over pre-existing soils, not for encapsulated, sub-surface applications that are essentially buried beneath other materials. This needs to be clearly defined in the Background Information. If the Code of Practice for Soil Enhancement does not apply to structural applications, then that needs to be part of the definition."

Other comments or suggestions received included: "consider including a category for fruit and vegetable food processing wastes – for example fruit pulp waste from 'off farm' processing operations"; "in many instances the application of residuals under the code will occur concurrent with bio-solids application under the OMRR – reciprocity should be identified in both the OMRR and the code"; "how will the co-application of different residuals be considered under the code?"; "clearly state that this code of practice covers only industrial wastes and that municipal biosolids and soil products made with municipal biosolids are exempt from this code;" and "sodium absorption ration (SAR) for materials treated with sodium compounds such as NaOCI or NaOH."

Discussion Issue 2: Prohibitions to protect human health and the environment

The proposed code of practice would parallel and reinforce provisions in the Organic Matter Recycling Regulation (OMRR) of the *Environmental Management Act* (EMA), including prohibiting application of any soil amendment that would: i) result in leachate entering a well or stream; ii) introduce unacceptable levels of contaminants into the terrestrial food web; iii) exceed the agronomic application rate; or iv) result in any of the identified substances exceeding soil standards set out under the Contaminated Sites Regulation of EMA.

Question 2.1: Do you feel that these prohibitions are appropriate and support the ministry's objectives in protecting human health and the environment? Do you have any comments or suggestions about these prohibitions?

A limited number of respondents answered the question: "Do you feel that these prohibitions are appropriate and that they support the ministry's objectives in protecting human health and the environment?" Of those who did, about half indicated "yes" and half "no."

Several respondents commented that any application of industrial wastes under provisions of the proposed code could result in harm to human health and the environment, and hence would not be appropriate.

A number of respondents commented on the regulatory difficulties inherent in prohibiting "contamination of the terrestrial food web" and suggesting additional potential provisions for the code, for example: "a demonstration that these materials can be used safely… and the contaminants of concern are not taken up into plants to any greater degree than on untreated soils of similar composition"; and establishing a "chain of custody" for the soil amendment to monitor any removal (of the amendment) from the application site.

Many respondents expressed concern that the ministry would not have sufficient capacity to properly oversee application of material and to ensure that regulations are followed. Sample comments on this topic included: "the Ministry does not have the resources to ensure they are enforced – only a blanket ban is enforceable and adequate"; "if the prohibitions are followed by enforcement, there will be some teeth to the system"; and "any prohibitions to protect human health and the environment would be ineffectual with this Ministry of Environment's lack of: political will, resources, monitoring (industry monitors themselves and reports to government), and enforcement." In contrast to these comments, one respondent recommended that the ministry further focus on "those soil amendments which carry some of the high risks of violating the prohibitions" as "the blanket approach to all potential risks is overly onerous."

Comments offered by several respondents expressed concern about the difficulty of determining or monitoring the leaching of deleterious substances subsequent to application. One respondent commented, for example, that "it is impractical to specify that no leachate may enter a well or stream – by definition, any materials in contact with precipitation that result in dissolution of material will generate leachate – it is not a question of whether leachate will be generated (since most materials generate leachate) but the strength of that leachate." Another pointed to the difficulty in proving the cause and effect of "harmful" impacts that may result from leaching of substances into a stream. One respondent suggested that the code use the definition of stream under the Riparian Areas Regulation. Another suggested that "a more practical and enforceable prohibition [w]ould be to specify that the water quality in a domestic, livestock watering or irrigation well should not exceed provincial water quality standards, unless a risk assessment indicates that the risk to human health and the environment is acceptably low."

Several respondents commented on the proposal that soil enhancements from industrial wastes not be applied to residential or urban parkland. Some queried "the basis" for the restriction, pointing out the potential for conflicting requirements between OMRR and the proposed code (as "bio-solids and managed organic matter can be applied to residential and urban parkland under the OMRR – provided the generic and matrix soil limits are adhered to"). One respondent suggested "removing the restriction on residential and urban parkland and using the existing generic and matrix standards." Others supported the restriction, or provided additional recommendations, for example, "encouraging application of amendments to non-food crops such as horticulture or forested areas."

One respondent felt that "there is a lack of support for the use of residuals in the fabrication of growing media and soil amendments… the code should include, much like OMRR does, a set of standards for fabricated soil." The respondent commented that "in many reclamation situations there is no soil, and residuals (like sawdust and lime mud [mixed with] biosolids or pulp sludge) are mixed to form a soil-like mat-

erial. The draft code is unclear in establishing this significant opportunity… there should be standards for the resulting products – be they fabricated soil or soil amendments composed of ash, pulp sludge and wood waste."

Discussion Issue 3: Contaminant limits in soil amendments

The proposed code of practice would use limiting values for concentrations of listed substances for soil amendments. The proposed listed substances are arsenic, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium and zinc – with limiting values in accordance with standards for metals in fertilizers and supplements established by the Canadian Food Inspection Agency.

Question 3.1: Do you feel that the proposed list of substances that would be used for establishing whether a substance would be considered as a soil enhancement is appropriate and complete? Do you have any suggested changes to this list of substances?

About twice as many respondents answered "no" over "yes" in answer to the question: "Do you feel that the proposed list of substances that would be used for establishing whether a substance would be considered as a soil enhancement is appropriate and complete?"

Several respondents felt that the limiting values for potentially harmful substances within industrial wastes that may be applied as soil amendments should be "zero." Others would recommend considering material that contains acceptable levels of copper, selenium and zinc – but none of the other limits proposed in the intentions paper. A number of respondents also suggested that residues from pulp mill operations be subject to comprehensive testing (i.e., for a broad range of substances) rather than the "limited" list that was described in the intentions paper.

Many respondents suggested additions to the list of substances. Common suggestions included: boron, sodium, chlorinated organic compounds, volatile organic compounds (VOCs), dioxins, furans, salts, total hydrocarbons, fecal coliforms, endocrine disruptors, methyl-mercury, PCBs and Simazine. Some respondents suggested comprehensive testing of specific proposed industrial wastes as a first step in determining which substances should be considered for establishing limits.

One respondent suggested additional "factors for lime sludge and fly ash such as pH, salinity, alkalinity, sulphate and the like," as well as "stringent standards for dioxins." The respondent also suggested that aside from dioxins that may be generated in facilities that burn salt laden wood bark for energy recovery, many compounds are not currently found in pulp mill sludge (e.g., chlorinated hydrocarbons, PAH and other aromatics, endocrine disruptors) as mills have "switched to surfactants other than nonylphenols" and, hence do not require testing.

Several respondents suggested that it would be appropriate to require testing for all substances listed in the Contaminated Sites Regulation (i.e., Schedule 4 of the regulation). A number of respondents also pointed out that the Organic Matter Recycling Regulation does not specify a dioxin and furan limit for municipal biosolids and compost.

Other comments included a concern that the proposed "test frequency is quite high (every 1000T) particularly if metals are always low", a suggestion that "leachable compounds (e.g., tannin, lignin) from the proposed soil amendments should have limits determined" and a recommendation to "be certain that the employed consultant [qualified professional] has a BSc in Agriculture with a soil science major."

Question 3.2: Do you feel that that the proposed limiting values for these listed substances (following standards set by the Canadian Food Inspection Agency and used in the Organic Matter Recycling Regulation) are appropriate? Do you have any suggestions for improving the setting and/or use of these limiting values?

About twice as many respondents answered "no" over "yes" in answer to the question: "Do you feel that the proposed limiting values for these listed substances (following standards set by the Canadian Food Inspection Agency and used in the Organic Matter Recycling Regulation) are appropriate?"

A considerable number of respondents suggested that the limiting values set forth in the Canadian Council of Ministers of the Environment (CCME) standards for unrestricted or agricultural use are more appropriate for materials addressed by the code than the CCME compost or fertilizer standards. Some respondents also commented that proposed Canadian Food Inspection Agency limiting values (for metals in fertilizers and supplements) are not appropriate – and that the standard for residential soil should be used instead. Specific concerns voiced by respondents included: "[the proposed limits] for mercury are three times greater than the CCME maximum levels for restricted use"; and "there appears to be no consideration to the soil pH but there should be… the value proposed for Chromium is 1060, compared to the matrix value of 300 for toxicity to soil invertebrates and plants, or to 60 for soil when groundwater is used for livestock watering… Selenium at 14 is much greater than the matrix value of 3 for urban park and even greater than 10 for industrial."

Several respondents highlighted the importance of ensuring that initial analysis and monitoring information is available to government and the public. One respondent, for example, stated that "contaminant limits in industrial wastes are irrelevant without government analysis, monitoring and enforcement – government will not be able to limit the values for concentrations of the listed substances, because of the pulp and paper industries Non-Disclosure and Proprietary Knowledge arrangements which legally exclude anyone from government or public from knowing, or telling anyone else, what chemicals come in our out of their operations."

Several respondents provided comments or suggestions related to the relationship between the Organic Matter Recycling Regulation and the proposed code, and to establishing separate classes of soil amendment materials in the code. One respondent suggested that as: "the organic soil amendments and lime materials targeted by the code must be added in large quantities to be workable (~60 tonnes/ha and more), [the code should] follow the OMRR and have a class A and a class B material, where the class A includes notification [and] material testing to show compliance to the standards [while] class B materials would need the full work-up of sampling and monitoring… the class A should have an absolute maximum of materials per ha applied annually, with a limit for 5 years to prevent applications to over-stretch agronomic rates, and should include the requirement for mixing with mineral soil."

With respect to background soil trace element concentration, one respondent recommended "having a means to address sites where the background soil trace element concentration is greater than the generic or matrix limit [as] is required in OMRR." Several respondents posed questions or raised issues about the proposed provisions in this area, for example: "What background concentrations are [being] referred to?... Can a proponent find his/her own background site for reference? We know from OMRR that Contaminated Site Regulation protocols cannot necessarily be used to provide a release under another regulation. Will this be different with this regulation? This needs to be clarified or the mechanism may not work at all." One respondent recommended that "identified substances (trace elements, dioxins and furans) should be specified in a Schedule, and limited to these constituents… many industrial residuals will not meet the class 2 amendment status in the draft code (most BC ash), but will meet the OMRR class B requirements."

In another reference to the Organic Matter Recycling Regulation, one respondent commented that: "[OMRR] is designed to address concerns regarding sewage sludge, not industrial waste such as from pulp mills – therefore [the ministry] recommending that this regulation be used to ensure the safety of our communities from the toxins in pulp sludge is unsupportable."

Several respondents commented on the role of a "qualified professional" outlined in the intentions paper. One respondent suggested that: "the regulation should enable the qualified professional, based on knowledge and professional experience to assess the residual and/or environmental matrix for additional constituents… the schedule [of named substances and limits] should be a minimum, with additional parameters [possible or required] at the discretion of the qualified professional." Another respondent recommended that: "the regulation should either specify that the producer/generator have their own qualified professional sign off on the quality/classification determination or have the qualified professional preparing the land application plan ensure quality/classification [to ensure a chain of accountability]." One respondent pointed to the subjectivity involved with "interpretation of an 'agronomic rate' or a 'typical farm practice'… one cannot depend on the qualified professional alone to set this limit – he/she does not have the power to enforce anyway."

One respondent recommended that "a permanent check plot (with no application) [should be required for every application site] for comparison with soils [that] receive applications." Another commented that "the requirement to monitor every 1000 tonnes of material is excessive – [this amount] can be produced weekly at some mills, making this requirement too onerous – given the consistency of materials, a preferable alternative is quarterly analysis, especially if historical data can demonstrate this consistency."

Additional comments included: "the suggested limiting values are acceptable if the materials are only to be land applied and incorporated into existing soils – there should be no intention of sole use of the materials as 'soil media' nor should there be any intention that the materials could be used to create 'soil media' or compost"; "try doing some research to see what the materials you are trying to regulate [should be]…do the research independently of industry"; and "the chemical mix in the waste materials may be very complex, and the proposed testing processes appear inadequate to determine just what toxic constituents may be present."

Discussion Issue 4: General technical and administrative requirements

Before the first application of a soil amendment to land, or the transfer of a soil amendment to another person, the producer of the material would be required to establish the classification of the material as a soil amendment – by collecting representative samples and analyzing them for all the substances listed in the code. Before a soil amendment is applied to land, or transferred to another person for application, the person responsible for the material would, if requested by a director, be required to submit a land application plan prepared by a qualified professional. The proposed code would also require a person who stores a soil amendment (or soil amendment-derived material) to meet specific requirements for storage equivalent to those set out for "managed organic matter" in the *Organic Material Recycling Regulation* (OMRR).

Question 4.1: Do you feel that a land application plan – prepared by a qualified professional is an appropriate and practical means for describing and addressing the technical and administrative requirements for the application of a soil enhancement? Do you have any suggestions or comments regarding the information that should be included in a land application plan?

About twice as many respondents answered "no" over "yes" in answer to the question: "Do you feel that a land application plan – prepared by a qualified professional is an appropriate and practical means for describing and addressing the technical and administrative requirements for the application of a soil enhancement?"

As with other questions in the response form, some respondents voice their lack of support for the proposed code of practice, for example: "no land should be used, period", and "don't even bother to start on this useless process since British Columbians value their health over your big plans."

Several respondents recommended a strong or more explicit role for government staff in preparing or reviewing a land application plan, or in monitoring and enforcement to ensure compliance with plans. One respondent suggested that: "the code of practice should provide some prescriptive guidance for land application – the plan could then be filled out by a qualified ministry staff." Another recommended that "land application plans prepared by qualified professionals should be reviewed and monitored on an ongoing basis by government agency representatives to ensure compliance." Several respondents expressed a desire for "stringent" or "strong" monitoring and enforcement by ministry staff, suggesting that "the ministry does not have the resources to do adequate checks on work done by consultants [who prepare land application plans]."

A number of respondents provided additional comments regarding the training or role of qualified professionals in preparing land application plans. One suggested that such individuals "must be trained in all aspects of environmental effects… otherwise a team needs to assess risks and benefits." Another commented that while "a professional agrologist has the expertise to prepare the main components of the land application plan from an agricultural perspective, [he or she] may not have the expertise to assess the contaminant loading aspects of the land application specific to the wastes." One respondent felt that "terms such as 'qualified professional'… and 'appropriate professional association' are too vague… it is not clear who, how or when the 'appropriateness' of different kinds of professionals is declared, or what triggers (or doesn't trigger) tasks such as a land application plan."

Respondents provided a number of suggestions for provisions that should be included in a land application plan, including: notification of adjacent landowners, local government (i.e., regional district) and the public of intended soil amendment applications; "[an assessment of] risk to soil, health and larger ecosystem, benefit for agriculture, other amendments/treatments that must accompany the application"; soil testing ("for pH, regulated chemicals, cation exchange and microbial activity") before and after application; "dates and quantities of [previous] applications of such substances to the land"; soil salinity, sulphur and salt levels; electroconductivity, macronutrients and micronutrients of receiving soil; odour control; and depth to groundwater and elevation of the water table over seasons.

Some respondents suggested creation of "generic plans to cover a number of geographically similar applications." Suggestions were also made that requirements for a land application plan be linked to the nature of the material and the application site involved, for example: "coliform and vector control should only be required if there is a source of septic waste"; "for low risk, low volume applications costs [of requiring and using a qualified professional] quickly outweigh the benefits"; "only on large volumes and large land parcels with high risk materials"; and "need to have a class A and a class B, each with own land application plan – the land application plan for class B needs also to look at soil salinity, sulphur and salt levels."

One respondent recommended that the code specify the lifespan of a land application plan and requested clarification regarding the term and scope of a plan – "Is it an annual plan, or does it cover a single application, or multiple applications to the same land within one year or multiple applications over multiple years?" The respondent also noted that: "the land application plan model has been successful under OMRR and is appropriate for the residuals identified under the code."

Several respondents recommended that documentation of application of soil amendments should be required to be provided at the time of sale to any potential purchaser of the land.

Question 4.2: Do you have any comments or suggestions regarding the requirements for storage facilities and storage sites for soil amendments?

Several respondents commented that "storage of these materials should only take place at the site where they are generated" and that there should not be a need to store them at the land application site. One respondent suggested that any temporary storage at on agricultural lands should be "in the spirit of the Agricultural Waste Control Regulation (with respect to time, climate and not causing pollution)."

Some respondents suggested including any storage plan in the land application plan, for example, "residual storage should be linked to use, and that a storage plan be required [as part of] the land application plan." Several respondents requested clarification regarding any distinction between "short and long term storage" and which circumstances would require a storage plan. Respondents also expressed concern that provisions limiting the length of time that a material may be stored would be difficult to monitor and enforce. One respondent suggested that the maximum time period for storage be set at 2 years. Another noted that there may be "specific reasons or seasonal issues" for extending the length of time that a material is stored, hence the code should include "provision to have justifiable extensions to the storage if requested."

Several respondents suggested increasing the setback distance of any storage facility from 15m to 30m from a well, lake, river or stream – consistent with land application requirements. Respondents also provided several suggestions to prevent or limit runoff from storage sites and subsequent leachate in groundwater, including: setting a maximum volume of stored material; "either setting a performance based standard or requiring a cover for the material"; and requiring "an impervious (cement) lining and a roof." Respondents also suggested that prevention of dissemination of material in storage by wind, and odour control, are also issues that should be considered when storing materials.

One respondent noted that they "do not support the storage of soil amendments on private lands, given the potential for non-compliance and the subsequent potential for environmental contamination." Another commented that "our government ministries must be the only arbiter of safety of such sites – it must not be offered to a private firm – public servants are more likely to be honest, guardians of the public trust."

A number of respondents expressed concern that the development requirements outlined in the intentions paper are overly onerous for low volume/low risk operations (e.g., involving log sort yards) and small operators "as there is little margin in handling [and] marketing these materials." Instead producers would "turn back to inexpensive landfill" alternatives.

Question 4.3: Do you have any other comments or suggestions regarding the proposed general technical and administrative requirements for the code of practice?

Respondents provided a wide range of comments or questions related to soil testing, monitoring, requirements for land application plans, consideration of material that may contain animal waste and provisions for handling "soil amendment derived material" in response to this question.

One respondent commented that: "the requirement for a land application plan for 'each site and each occurrence' will place unnecessary burden on producers of small but continuous streams of the material," recommending instead "that for continuous [waste] streams, a plan with annual reviews and proper sampling and monitoring would work better, especially for producers of smaller quantities [of materials]." Other respondents felt that the code should support use of "low risk materials" such as log yard wastes as soil amendment material and encourage diversion of such materials from other waste streams (burning or landfill) through such measures as training courses and testing, application, approval and record keeping measures that are not "overly onerous" in relation to the risk that the materials pose to human health and the environment.

A number of respondents requested "more specific guidance [in the code] concerning when a land application plan would be required." Some respondents suggested criteria such as waste type (e.g., pulp and paper sludge), extent land application area, and specific features (e.g., proximity to groundwater wells) as potential "triggers" for requiring a land application plan.

Several respondents expressed concern about potential long term impacts from the application of materials under the proposed code. Respondents reiterated the importance of "monitoring and enforcement to ensure compliance" and continued monitoring for impact on adjacent or downstream surface or groundwater bodies. One respondent specified that there should be "no application on or near organic farm lands, or lands designated to allow organic agriculture." Another suggested that the code "should delineate between residuals with or without animal waste introduction (human or otherwise) [and] if the residual does [contain such waste], refer to the numerical standards for class A and class B fecal coliform in the OMRR, and the pathogen based land application restrictions on use... as with OMRR, the residual quality should be linked to fecal coliform, or some other indicator, if the residuals contain sewage."

Discussion Issue 5: Management of soil amendments – notification, application and record-keeping

The proposed code of practice includes requirements for:

- Notifying appropriate parties regarding a proposed application of a soil amendment to land (the director under the *Environmental Management Act*, the applicable medical health officer and the Provincial Agricultural Land Commission if involving agricultural land);
- Identifying the location of any application in relation to potable water sources and domestic water uses, major and minor public roads, and groundwater conditions; and
- Keeping and posting analysis reports, the land application plan and post-application sampling reports.

Question 5.1: Do you have any comments or suggestions regarding the proposed requirements for notification under the code of practice?

Many respondents suggested that notification provisions in the proposed code be strengthened. Respondents also recommended who and how such notification could or should take place, for example: "adjacent landowners and the public"; "neighbours"; "adjacent landowners within at least a two kilometre radius of the application area"; "Agricultural Land Commission, MoE and Health Officers"; "farm lands and lands in the Agricultural Land Reserve, or residents with gardens and consumers of produce"; "local government;" and "the public." Suggested means for notification included: "a legal notice in newspapers… a press conference for each case…all details posted on well-publicized websites"; and "posting of the property, notices in the newspaper and correspondence to all land owners within 1 mile."

One First Nation respondent noted that "nowhere in this section of the document is found reference to consultation with the First Nation in whose Traditional Territory it falls." The respondent commented that: "posting 'specified information relevant to the proposed application on the Internet' does not constitute consultation with First Nations" and noted that their First Nation would require "at least 45 days notice to respond to this kind of referral."

Some respondents suggested that 5 m^3 is "a low threshold for notification" and commented that "notification for applying topsoil of low risk and small volumes seems very time consuming and expensive." Alternative recommendations included: "100 m^3"; "15 m^3 (one dump truck)"; and "also … allow[ing] sufficient material to be applied to test pilots (to test the application of the material in combination with other materials."

A number of respondents suggested a classification system for materials, with requirements or restrictions for notification, publishing, posting and application based the classification, derived from "pathogens" (e.g., fecal coliforms) or "risk and exposure." One respondent felt that: "the current [proposed] code of practice does not have any incentive built in for improving the situation and that "[a classification system] will force facilities to change their practices as economic considerations (expensive monitoring programs) are the driver to better management and the quality enhancement of the materials." Several respondents questioned the appropriateness of following the classification in the Organic Matter Recycling Regulation (OMRR) based on fecal coliform, and not trace element, concentrations – stating for example that, "there is no increased pathogen related human health risk following the application of non-pathogenic residuals." One respondent continued with examples and a question: "why would signage be required on the application of a 'class 2' lime mud to agricultural land or primary clarifier solids to a poplar plantation as vegetation controlling mulch[?]" Another commented that "there is confusion on the posting requirement" in the draft code and that it "needs to be clear what posting is required, when it is required and how long it is required."

Several respondents commented on requirements for notifying the Medical Health Officer and Agricultural Land Office in the proposed code. Some respondents felt that the requirements "are adequate and appropriate" while others "question[ed] the method of notification and the ability of the public or the Ministry of Health to respond [within 30 days of receipt of notification]." One respondent recommended that "Local Government must also be included in the notification process and be able to provide comments in the same manner and to the same extent as the Medical Health Officer (MHO)… [and that] the Agricultural Land Commission should have the same authority as the MHO."

Question 5.2: Do you have any comments or suggestions regarding the proposed application requirements – minimum distances from potable and other water sources and public roads, and with respect to the groundwater table – under the code of practice?

Several respondents commented on the importance of surface water and groundwater and the difficulties inherent in post hoc remediation of contamination. Advice to the ministry included: "make all requirements extremely conservative"; and "[do] not use… industrial waste containing toxic substances for so-called soil enhancement or amendment."

In contrast, several respondents felt that "the set backs are appropriate and consistent with other regulations" while others recommended "drop[ping] the application requirements if, with minimal testing, the material is safe."

Specific comments regarding setback distance included: "a 50 m minimal distance upgradient of a potable water source (the 20 m and 10 m minimum distances to roads doesn't make sense)"; and "[adopt] Washington State guidelines, much better setbacks – marine water and freshwater 200 ft, seasonal streams 100 ft, dwellings, subdivisions, schools, playgrounds 100-300 ft, property lines 30 ft, drinking water wells and springs 200-1500 ft and irrigation wells not utilized for domestic purposes 100 ft." Additional suggestions included: identifying setback distances from dwellings; adding reference to "irrigation ditches" as well as "irrigation wells"; and ensure protection of organic farms and natural ecosystems."

One respondent suggested that "the Ministry of Transportation should be in control of allowing or not allowing application within highway rights of way or highway properties." The respondent also noted the "great concern" that the Ministry of Transportation has regarding potential of the proposed code to restrict use of hog fuel and fly ash in road construction for specific situations, commenting that "MoT believes that encapsulating the materials and then covering them with clean structural fill (sands and gravels) provides adequate protection for the environment."

Several respondents commented on the difficulties involved in monitoring application of amendments in relation to the height of the water table due to seasonal fluctuations and variations in topography and soils. One respondent commented that "at no time should the water table be above the 1 m mark." Another "suggest[ed] that the material not be applied during the rainy season (October 1 to March 31) in the Lower Mainland and Vancouver Island regions due to runoff and leaching risk, and contamination of surface and groundwater."

Question 5.3: Do you have any comments or suggestions regarding the proposed record-keeping requirements under the code of practice?

Many respondents suggested that the proposed period for record keeping (of three years following application) was too short for assessment of any potential longer term impacts associated with the application. Suggestions for the ministry with respect to record keeping included: posting records on the internet; having the records kept by a "third party or the government"; and requiring notation of any application included on the land title of the property.

Several respondents commented on the importance of, and the need for, auditing and enforcement, recommending, for example, "quality assurance spot-checks" by the ministry.

Additional suggestions made by respondents included: establishing and maintaining "check plots clearly marked with painted fence posts" at each application site; including in the records the contact information of any producers of food from the application site; and requiring preparation of an independent annual "management report" for the application of all materials (regardless of classification), with copies "provided to the residual generator and the land owner, and available to the [ministry] director on request."

Discussion Issue 6: Protection of human health and the environment

Question 6.1: Are there any aspects of applying particular industrial wastes to land that could significantly affect human health or the environment that are not, in your view, sufficiently addressed in the proposed code? What are they? What suggestions do you have for the ministry to improve the manner in which these concerns are addressed?

Respondents provided a range of comments and suggestions to this set of questions, many of which were identified by other respondents through previous sections of the response form. The following list includes examples of comments:

- "Soil amendments should not be used on agricultural lands or on any lands which will be publicly accessible";
- "This proposed code of practice does NOT protect human or environmental health, but rather tries to manage risk so that once again the public bears the burden of exposure to additional amounts of harmful substances while the industries which produce these substances have government help in disposing of their waste at public expense";
- "Contaminated, toxic, industrial wastes ('soil enhancers') should be sent to a properly lined hazardous waste ('special' waste) landfill on the polluting industries private land, away from any waterways, with leachate collection piped back into their facilities… the industrial wastes landspread sites on farm and forestland must allow applications to be public knowledge, so the public can protect themselves accordingly, and neighbors of the site can legally protect themselves from losses incurred due to devaluation of their property";
- "None of these materials should be introduced to the environment";

- "There have been over applications of carbonaceaous (woody or pulpy) waste materials that have rendered sites unusable for agriculture – there have also been issues with salt and sodium concentrations in some of these wastes which have not been dealt with prior to application";
- "If this stuff is so damned good and desirable, then bag it and sell it. If you have to ask how much risk we'll take to human health before we get screaming about it, then we know you're up to no good";
- "We are concerned that the characteristics of the soil that the amendments are being added to are not being taken into consideration. There should be concurrent soil testing such that maximum total (soil + amendment) concentrations are kept below the human health and environment thresholds";
- "Why is farm animal waste not included in this Code, particularly as it has high fecal content?";
- "Assessment by qualified individuals is not outlined clearly. How is the assessment conducted?";
- "A key to understanding the possible negative effects is adequate waste characterization and land application planning by qualified professionals";
- "We are unsure as to the reasons for the class 1 and class 2 amendment classification system. Trace element limits with class A and class B requirements with the OMRR were implemented to drive source management initiatives to reduce trace elements… In the use of residuals in a land application program the ability to apply to a site will be based upon the trace element concentrations in the residuals, and those in the soil. Elevated trace element concentrations in the residuals will reduce the site life, or eliminate the materials from being used. We suggest using the same classification as the OMRR for class A and B residuals";
- "Industrial wastes landspread sites on farm and forestland must allow applications to be public knowledge, so the public can protect themselves accordingly, and neighbors of the site can legally protect themselves from losses incurred due to devaluation of their property" and
- "Waste materials that by themselves, or in combination with other materials, have the ability to create obnoxious odours off site… control of the volume of material and the moisture levels of such materials is of prime importance in controlling possible odours;"

Question 6.2: Do you have any other comments or suggestions for the ministry?

Additional comments included:

- "I do commend the ministry for looking at the possible reuses of industrial waste. Substances such as fly ash have been successfully used in concrete products. However, we must be diligent in ensuring the safety of these products to the environment and to human and animal health";
- "Although the Qualified Professional (QP) system works, it could be abused by operators who have views different from those of the QP (and the Ministry), and the interpretation of what "agronomic use" and "typical farm practice" is. It would be nice when the Ministry could hire the QP (or part of QPs time) to monitor the land application on the Crown's behalf";
- "Do some testing";
- "There should be an opportunity to do basic testing and once the material is found to be of acceptable quality for the intended purposes, then forego the additional testing, application approval, and detailed record keeping requirements. This testing may be required periodically (annually [or] quarterly) to ensure the material is continuing to meet the standards";
- "In our case sodium and boron are key concerns. I would recommend extensive testing at first or

when there are significant process changes, in order to define the material. The plan could then address routine test requirements with the metals testing at a minimum… Odour control is a big concern with some materials and should be addressed in the plan";

- "An affirmative finding of safety should be made for each and every one of these waste streams prior to land application, and based on a site-by-site determination (pH, cation exchange, soil type, etc.). This includes that the chemicals of concern do not migrate to groundwater, are not taken up into crops to a greater degree than on untreated soils of like-type, do not runoff into waterways and do not become airborne particulates. These are the requirements for land disposal in the United States";
- "It would be useful for the… Code of Practice to have a section on manufactured soil and say that any industrial waste or byproduct that met the specs for land application could be used in soil manufacture. It does have a section saying that flowerpots made from wastes are acceptable, but not topsoil… further, if a soil is manufactured using an industrial waste or byproduct listed in this code, the soil product will have lower levels of the contaminants of concern – as such these soils should be [permitted] to be used without restrictions such as setbacks and application plans";
- "There is no allowance in the proposed Code for any industrial wastes or byproducts that meet the class A [OMRR] limits for bio-solids. There should be a section in the code [that drops the] requirement for a land application plan for industrial wastes or byproducts that met the class A limits for bio-solids";
- "Industrial waste should be treated as hazardous waste";
- "Pulp mill residuals composted products should be included in schedule 12 of OMRR"; and
- "Review other jurisdictions that have rejected this practice (Netherlands in 1950s). Design regulations more as an addition for soil requirements than as a waste disposal opportunity. Applications must apply all requirements for a productive soil, not just some of it! In summary, this is not a good practice. But if allowed, it must be ecologically sound and economically beneficial to farming in terms of increased productivity."

Further comments and separate submissions

Many respondents provided further comments or recommendations either accompanying their response form, or in separate submissions to the Minister of Environment or Premier. While many of the comments were also raised by respondents answering individual questions in the response from, these additional comments are summarized in the following section.

Many respondents commented that they were "opposed" to the proposed soil enhancement using wastes code of practice out of concern regarding the potential for contamination of soils from industrial byproducts (i.e., "wastes"). Common and sample comments in this respect included: "providing industry with cheaper and ever more dangerous ways to dispose of their toxic waste is the worst possible course of action – we should be seeking to eliminate the causes of pollution rather than trying to manage it after it has been created"; "please do what is right, not what is convenient"; "please stop this process"; "please don't allow contaminants in pulp mill sludge to be dumped on farm land and watersheds – industrial waster should be shipped to Alberta and burnt"; "we need to see proposals that begin to reduce the level of herbicides, pesticides and soil amendments that currently pollute the soil and groundwater… the provincial government's intention paper is heading in the opposite direction of responsible environmental legislation"; "disposing of pulp mill sludge by spreading it into the environment is only marginally better than our current practice of incinerating it in a power burner as hog fuel"; "find some other place to put toxic waste"; "I am writing to express my outrage about [this] British Columbia Government proposal to allow mixing of toxic wastes with fertilizer and allowing the application of it to our farmland… this is a criminal plan and we the citizens of British Columbia will not allow our government to implement it"; "the deadline of Dec. 15 2005 for public comment is unconscionable – the whole idea is unconscionable – when is government going to get responsible and find better answers to real problems"; "we submit that this proposal for a code of practice allowing use of hazardous material as soil enhancement is shortsighted, dangerous and should proceed with no further without detailed analysis and examination to ensure the protection of health and the environment"; "what a crazy idea"; "I am concerned that the proposed plan for disposal of industrial wastes on farm and forest lands is dangerous and that the proposed code of practice is inadequate"; "there are some very important environmental issues, impacts and repercussions in this piece of legislation which require public knowledge and feedback…let's get it out into the public and academic forums rather than having it snuck into legislation"; "I look forward to an honest and open public consultation where BC citizens can speak to ministry and industry experts about this issue – let the people decide whether they want contaminated wastes renamed 'soil enhancement' and then spread on their farm and forestry land;" and "I want to totally object to everything about this topic and consultation – I am not interested in participating in the regulation of spreading industrial waste on land – I want to prevent and forbid this practice, and I am appalled that our government wants to allow it and regulate it, no matter how low the heavy metals and other contaminants are." Several respondents quoted an assessment of the proposed code of practice prepared by a Non-Government Organization: " this regulation gives industry cheap disposal of its (often toxic) industrial waste by spreading it on farm and forest – the main problems with this regulation are: lack of knowledge of what really is in the industrial waste which is proposed for spreading on farmland; lack of testing; lack of public notification and lack of public recourse; [and] what few safeguards and standards exist are insufficient, unenforceable and after-the-fact."

Comments in support of the general direction of the proposed intentions paper were fewer in number. The following excerpt includes common points raised by several respondents: "the Policy Intentions Paper on this proposed code has generated a good deal of public/ENGO backlash that does not accurately reflect the degree of technical review and consideration that has gone into the development of this code of practice. Use of approved industrial wastes such as primary clarifier sludge, lime mud, wood ash, and wood wastes such as log yard debris is a common practice in many other North American jurisdictions as well as Europe… [companies involved in] BC pulp & paper industry are looking for environmentally sound ways of dealing with non-hazardous process wastes and minimizing the volume of materials that are cur-

rently going to our industrial landfill… [We] recognize the need for strict standards and analytical procedures for characterizing waste materials prior to consideration for use as soil amendments. We feel that such technical standards need to be, and are incorporated in the proposed code. In addition, it is our understanding that the proposed code would also require any waste applications to land to be done under the direct supervision of a professional agronomist and only after notification of the local public. The code would incorporate strict requirements for testing and reporting…[We are] concerned that the public backlash may be more about the overall code 'development process' and unfounded perceptions about the characteristics of typical pulp mill residues that may be applicable for land application. Public pressure could negate years of technical review and science that has gone into developing the technical aspects of the proposed code… the BC pulp & paper industry [is] facing unprecedented economic challenges. [We] strongly support your ministry in developing this code and providing the industry with viable alternatives to costly landfilling of residual materials that can benefit and enhance agricultural lands."

A limited number of respondents suggested that the proposed code of practice was not warranted and amounts to "over regulation." For example, one respondent commented that "this would be a total waste of time and money because it is already regulated! We wanted to spread ash from [our] Energy plant on our land, a practice commonly used and acknowledged in Europe and had to deal with exactly all the red tape described in this code of practice. The existing regulations are more than enough, making it nearly unfeasible to enhance your soil following proven practices!"

Several respondents commented that the intentions paper outlined a process that "is not one which 'enhances soil' but will be 'soil pollution'…" Comments on this theme included: "any toxic waste, or waste which is of unknown potential toxicity, which cannot be neutralized, which is cumulative and harmful to life and health, environmental and human, is simply an investment in 'other people's problems'"; "I disagree with this dilution theory that, if we spread toxic materials over a larger area, it won't hurt a thing;" and "this concept of low level application of dangerous or potentially noxious contaminants is known under the 'tongue in cheek' phrase, 'dilution is the solution to pollution', and if you are familiar with the concept of bio-accumulation, you will realize that this is no solution at all – I strenuously object to the wide scale application of ANY known hazardous material at ANY concentration, legal or otherwise… eventually, these contaminants WILL find their way back into the food chain as has been demonstrated many times all over the world – confine contaminants to source and eliminate them there – surely we do not need to debate the details of what is by now, a well established fact."

Many respondents expressed particular concern about the use of industrial waste (or residual) materials on agricultural lands. Sample comments include: "I think that the proposed regulations are much too permissive of dangerous substances and substances of unknown or uncertain toxicity being spread upon our farmland"; "I strongly object to your government's proposal to allow industry to get rid of their toxic wastes by spreading them on farm and forest land"; "your decision to allow sludge from various sources to be placed on farmland, which then is used to produce our food is hard to believe"; "please do not run the risk of allowing pollutants to contaminate more areas of productive land and deprive us of the opportunity to grow some measure of our own food needs"; "the soils that our foods are grown in are not a good place to put industrial waste at any time, in any amount"; and "we are aware that this practice is already being used, and that it is common for contaminated soils from industrial sites to be spread out on agricultural lands in order to reduce the ppm of whatever toxin is being 'treated' to acceptable levels… we do not find this practice acceptable as it stands – to continue…and rename it ENHANCEMENT is a really bad idea – the soils that our foods are grown in are not a good place to put industrial waste at any time, in any amount." Some respondents asked questions or made specific recommendations regarding the type of land on which it may be appropriate to apply industrial residuals, for example: "why would it be ok to apply the wastes to food lands but not to residential and park lands?"; and "application [of such soil enhancements] must be kept away a sufficient distance from organic farm operations – the effects on organic farm status needs to be investigated." Several respondents raised specific concerns about potential

impacts of soil enhancement using industrial wastes on organic farming, either through ground or surface water leaching or standards for composted materials. For example, "soil amendments that contain trace amounts of contaminants will affect many 'O.I.' farms, resulting in declassification of many organic farms."

Several respondents expressed concern about the application of industrial wastes on Crown land, for example: "Crown land belongs to the public – as members of the public we cannot see how the potential value of this proposal can justify the risks to human and environmental health; and "if this is such a safe code of practice, and I do not believe it is, then I ask for two amendments to these set of rules: 1) the land to which soil amendment is stored or applied, be held in private hands: fee-simple (I have lost faith in the Ministry to protect public lands) and 2) the State of Title to the land, under the Land Title Act, be amended to show the soil amendment site along with its legal survey and all soil analyses, never to be removed from record."

Many of the general comments received were concerned explicitly about potential contamination from "pulp and paper mill wastes." For example: "You must not allow the spreading of pulp mill sludge, green liquor, lime dregs and fly ash on to BC forest or farmland – no one knows all of the contaminants in pulp mill sludge – we do know that it contains a variety of heavy metals and chlorinated and non-chlorinated benzenes and phenolics (PAH) and that the amount appears to vary from sample to sample – nor does anyone know what the actual environmental impacts of landspreading sludge are;" and "BC pulp mills are among the province's most polluting industries, generating huge amounts of toxic waste, discharging it into rivers and ocean, and emitting it into the air we breathe – secondary treatment systems installed in the 1990s have improved the effluent discharge but have concentrated toxins in the sludge – likewise, pollution control equipment for controlling air emissions has concentrated toxins in the ash."

As well as providing specific comment in response forms, a number of respondents also submitted comments regarding proposed standards for material considered suitable for use as a soil enhancement. Several respondents commented that: "NONE of the proposed standards for metals [in the intentions paper] meet existing CCME [Canadian Council of Ministers of the Environment] standards for unrestricted or agricultural use, and in the case of mercury the [proposed] BC reg[ulation] even exceeds by three times the CCME maximum acceptable level for unrestricted use." One respondent provided additional commentary on this topic: "Whatever is 'Most' of the numbers that are consistent with standards for fertilizers. Does consistent mean 'in the same order of magnitude' How variable are these substances? It is the incidences of exceedance [sic] of the standards and accumulative effects that lead to contamination. The cost of ICP is generally low, and it makes little difference how many of the metals are determined. The cost of monitoring P, S, N and organic components is prohibitive. Whereas in fertilizer production a reasonably limited set of 'additional contaminants' is to be monitored, for the wastes under this practice, a great variety of such contaminants can occur. Agriculture cannot afford to monitor for such compounds in the amendment or as accumulated in the soil." One respondent commented that: "[While] I fully support the concept of recycling the waste materials from various sources. The capture of the useful components of such waste for the benefit of other land-uses is excellent. However, the waste-producer must extract the desired components from the waste and find ways to dispose of the remaining materials. The agricultural industry cannot take on the burden of addressing the deleterious materials… this practice merely transfers the cost of sustainably dealing with waste from the producing industry to agriculture."

Some respondents provided specific suggestions regarding provisions for soil analysis and long term monitoring prior to and following application of any soil enhancement, for example: "there need[s] to be a bit more attention to characterizing the soil P and K availability before adding materials that contain these elements"; "applications must consider the periodic, as well as the total loading on each soil – dilution to specified standards does not solve the issue of total loading – I see no loading limits… the cumulative risks of repeated applications needs to be considered for any application"; "the frequency, quality

and response to results of monitoring must be fixed in regulation… acid drainage, saline drainage and evaporation, and nitrogenous leachate must be prevented";

One respondent expressed concern that the proposed code of practice would place an undue restriction on the use of wood waste materials, providing an example where [the regional district] "has utilized wood chips as an alternative cover material [for municipal landfills] for a number of years – processed wood chips have been used when freezing conditions prevent access to cover soils – log yard wastes (rock and fibre) are being used on a consistent basis and are very beneficial both to the forest industry as a low cost disposal opportunity and to local government as a good alternative cover source."

Several respondents commented on the relationship between the proposed code and the Organic Matter Recycling Regulation (OMRR). For example: "We [regional district] appreciate the effort to make the requirements under this COP consistent with OMRR…[however] it is important to municipalities that this Code of Practice does not unintentionally restrict our ability to use biosolids and soil and compost products made with biosolids in a sustainable manner"; and "OMRR only defines material quality on metals and pathogen terms – it does not deal with Dioxins and furans or other organic contaminants – also, OMRR does not clearly define what is meant by agronomic application rate – it leaves that determination up to the qualified professional." Several respondents also referred to a ministry audit of Vancouver Island biosolids (municipal sewage) operations undertaken in 2003-2004. For example: "a ministry audit… found that none of the sites met all significant requirements of the Organic Matter Recycling Regulation – we cannot see the logic in adding industrial waste onto a code of practice that is not working for the sewage sludge it was intended to regulate."

A number of respondents commented on the potential benefit that can be derived from application of "industrial residues" to specific sites. For example, one respondent described his experience with a pulp and paper company involved in the application of residuals at a gravel mine: "I have seen the benefit that controlled application of these materials can have…residuals from the treatment of municipal effluents can be applied to soils under an existing regulation [and they] have higher concentration of contaminants such as heavy metals, oils and endocrine disrupting substances – there is no scientific reason why pulp and paper mill residuals should not also be applied to enhance soils under controlled conditions." Another respondent noted that: "the ability to use these residuals (in our case, wood waste, hog fuel, boiler ash, and primary/secondary bio-solids) as a beneficial soil amendment to the surrounding area devastated by the Mountain Pine Beetle is an excellent way to return the nutrients to the existing timber supply area, and minimize the amount of material that is landfilled. We have also had some tremendous preliminary results showing that a one meter thick layer of pulp mill sludge can be an alternative impermeable landfill capping material instead of clay or geosynthetic membrane, which are very expensive options for large landfills."

A number of respondents also expressed concern about the ministry's ability to test and monitor the proposed practices outlined in the proposed code, for example: "the main problem with this approach, in my opinion, is whether the BC government has available enough people and resources to adequately monitor and enforce if the guidelines are not followed"; "soil amendment material must have a government managed program of testing and monitoring"; "the chemical mix in the waste materials may be very complex, and the proposed testing processes appear inadequate to determine just what toxic constituents may be present"; "I am concerned that assessment of impacts on the affected farmland and adjacent surface groundwater is inadequate"; and "any spreading of industrial waste onto to the land must be reported and the report filed with the ministry of the environment – the onus must be on the company proposing to dispose of their waste in this way to have it tested by government approved testers at their own expense, for all items of concern." Several respondents urged the ministry to collect additional information concerning the materials being considered for soil amendment before considering further development of the code, for example: " independent research on industrial sludge and fly ash needs to be conducted and the results

made public before this proposal is considered;" "until it is proven safe by independent scientific study, industrial waste belongs in a properly managed waste site"; and "I am not an environmentalist or a tree hugger but I do feel that the proposed practice requires much additional research over a long period of time, before being implemented."

Several respondents provided suggestions for alternatives to the use of industrial wastes for soil enhancement, for example: "rather than deeming these wastes to be harmless and possibly useful, the government should be encouraging and requiring industry to stop producing them, or requiring industry to pay for separating and reusing them in ways that are safe and sustainable"; "there are far better options available for dealing with bio-solids – pyrolysis or gasification would allow pulp mills to dispose of their waste with far less risk to the environment"; and "all heavy metals and other toxic materials must be removed… extract whatever materials can be recycled and then deal very carefully with the remainder."

Appendix 1: Common Acronyms and Abbreviations Used in Submissions

Acronym/Abbreviation	Term
BC	British Columbia
BSc	Bachelor of Science
CCME	Canadian Council of Ministers of the Environment
CFIA	Canadian Food Inspection Agency
COP	code of practice
CSR	Contaminated Sites Regulation
EMA	*Environmental Management Act*
h	hectare
LAP	land application plan
m	metre
m^3	cubic metre
MHO	Medical Health Officer
MoE	Ministry of Environment
MoH	Ministry of Health
MoT	Ministry of Transportation
N	Nitrogen
NaOCl	Sodium hypochlorite
NaOH	Sodium hydroxide
OI	Organic Inspected
OMRR	Organic Matter Recycling Regulation
P	Phosphorous
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
pH	concentration of hydrogen ions (measure of acidity or alkalinity)
ppm	parts per million
QP	Qualified Professional
S	Sulphur
T	Tonne
VOC	Volatile Organic Compounds
WDR	Waste Discharge Regulation