

CSST Record of Response to Major Results and Recommendations Forthcoming from Eco-Workshop

CONTAMINATED SITES SOIL TASK GROUP

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CSST Approved : October 20, 1995

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The following represents a record of CSST responses to major concerns and recommendations as recorded in the summary report "Contaminated Sites Soil Task Group Workshop on the Development and Implementation of Soil Quality Standards for Contaminated Sites". - October, 1995.

Major Result/Recommendation (i):

1. *"Methods developed for formulating ecological SQSs will significantly improve the assessment and management of contaminated sites in British Columbia".*

Response:

1. No response required from CSST. CSST views this statement as a general endorsement of the matrix standards approach and the underlying methods.

Major Result/Recommendation (II):

1. *"matrix of SQSs... concerned that the process was complex."*

2. *"...recommended that a guidance document be prepared to support the implementation of the SQSs".*

3. *"recommended that BCMOE provide guidance on the sampling of environmental matrices at contaminated sites and on the methods for analyzing these samples (particularly to address the bioavailability of soil-associated contaminants)."*

Response:

1. Acknowledged, however CSST notes that flexible processes are usually complex.

2. Agreed, CSST believes that its combined protocol and SSS document will serve this purpose.

3. CSST notes that extensive BCE guidance relating to the sampling of environmental media already exists and would seem adequate. CSST Agrees that further guidance and analytical methodology is desirable to address issues of contaminant bioavailability. BCE is currently investigating the possibility of developing or approving existing analytical procedures relevant to bioavailability. However, physiologically relevant eco-bioavailability analytical procedures are unlikely to be available prior to the release of draft 3 of the [Contaminated Sites Regulation](#).

Major Results/Recommendation (III):

1. re: derivation of SQSs for direct soil contact (i.e. soil invertebrates and plants protective standard) - *"recommended that minimum data requirements be established"*.

2. *"recommended that the criteria for accepting the hypothesis that dose-response data are linear be reevaluated and more fully justified"*.

Response:

1. Due to data limitations, CSST can only acknowledge this recommendation as a goal and retain its original policy decision relating to ecological data requirements (i.e. that all data contained in CCME substance assessment documents be used in SQSs derivation). CCME data compilations represent peer-reviewed data, thus CSST will continue to accept the data of any study published in a peer-reviewed journal as its operative minimum data quality requirement for SQS derivation.

2. As shown in Appendix 2 of the report, workshop experts were in fact divided on the issue of forcing linearity on ecological data. Two of the four groups accepted CSST's method of forcing linearity as appropriate. Two of the four groups cautioned that biological data are rarely linear and that forcing of

linearity might invalidate parametric assumptions. These latter groups suggested other techniques might be used (e.g. curve fitting, sensitivity analysis, raising the critical correlation coefficient from 0.25 to 0.5, etc..)

CSST acknowledges that forcing linearity is a matter of policy rather than of statistical justification. As the ecological effects databases for substances improve over time, alternative statistical treatments and SQS derivation procedures might be developed. However, in view of the existing data limitations and the divergence of opinion expressed by the workshop experts, CSST sees no clear benefit in changing its current derivation method in the short term.

Major Result/Recommendation (iv):

1. *"concerns were expressed about the level of protection afforded at agricultural sites"*
2. *"... relating to "adverse effects at higher trophic levels in the food web" (i.e. bioaccumulation)"*
3. *" ... and "marketability of agricultural products"*

Response:

1. CSST policy decisions have been taken which relate to these concerns. Specifically, CSST has as a matter of policy determined that the level of human and ecological protection to be accorded at agricultural sites will be equivalent to, and not more stringent than, that accorded at residential and urban park sites. This policy reflects the fact that identical human and ecological critical receptors are assumed in the defined exposure scenarios developed for these three types of sites.

2. The issue of bioaccumulation was discussed by CSST. However, CSST has agreed to defer the issue of developing standards to protect against bioaccumulative substances (e.g. mercury) as no consistent and appropriate derivation procedure dealing with all bioaccumulative substances is available to CSST.

3. CSST has as a matter of policy, rejected the requirement to develop soil quality standards to ensure marketability of livestock or produce raised at remediated sites. Rather CSST has stated that issues of marketability are the joint responsibility of Agriculture Canada and Health Canada under the Food and Drug Act and has recognized the role of Agriculture Canada's "maximum residue limits" for contaminants in ensuring the quality of agricultural products.

Major Result/Recommendation (v):

1. *"The experts ... agreed that the SQSs would have significant ecological consequences on site ... It is unlikely, however that the SQSs would have adverse significant impacts at the regional or provincial levels. On the contrary, the SQSs may result in net ecological benefit..."*

Response:

1. No response required by CSST. The expert's conclusion confirms CSST's belief that any ecological consequences provoked by SQSs would at most be limited to the local ecological community level, no ecosystem level effects would be expected.

Major Result/Recommendation (vi):

1. *"SQSs for the protection of livestock are reasonable ... need to consider the effects of organic contaminants on livestock and on the marketability of agricultural products"*

2. *"... information on the effects of certain organic contaminants is available and that cross- species extrapolations from these data was preferable to not considering these substances at all".*

Response:

1. See major result/recommendation (iv) above for CSST's response to the marketability issue.

2. On the issue of using cross-species extrapolations from information on the effects of certain organic contaminants to derive livestock protective SQSs, CSST agrees that the published literature on the effects of organic contaminants to "agricultural" receptors (i.e. biota) is limited at this time. Several approaches to address the extrapolation of laboratory and field ecological data across species have been published. However, CSST also notes that the great variability reported for these benchmark toxic responses has also resulted in the generation of extremely conservative estimates of benchmark doses and/or toxicity reference values (TRVs). CSST believes therefore, that there exists little value in attempting to establish matrix standards for organic substances based on highly variable and/or uncertain cross-species extrapolation TRVs.

Major Result/Recommendation (vii):

1. *"... unanimous agreement ... important to develop soil quality standards that would protect designated groundwater uses ... that the chemical transport model that has been proposed for deriving SQSs is scientifically-defensible. While the experts agreed that the model assumptions for the generic site matrix were reasonable, they thought that these assumption were too conservative for certain areas of the province (e.g. interior areas with little precipitation). Therefore it was suggested that groundwater-contact based SQSs be derived which account for differences in easily definable parameters, such as regional precipitation patterns."*

2. *" ... that the model be calibrated with field-collected data to assure the default assumptions are valid".*

Response:

1. In regard to the specific issue of precipitation. CSST notes that region specific changes in such parameters can be more readily handled through the re- calculation of site-specific standards rather than by further complicating generic matrix standards.

An ancillary point raised in regard to the conservative nature of the groundwater protective standards was the observation that the aquatic life standard by targeting the BCE aquatic life ambient water quality criteria does not take into account consideration of any dilution which may be available on site. In the case of permitted discharges, and for some existing regulations (i.e. the Antispapstain regulation), an assumed availability of 20:1 dilution is used in establishing concentration limits.

This issue of assumed dilution capacity has now been decided as a matter of policy by CSST. Three options were considered:

Option 1: assume no dilution is available. This assumption albeit conservative, might be argued as appropriate for derivation of generic provincial matrix standards for which no site-specific information relating to dilution capacity is known. This option would in effect mirror situations where little or no dilution was available (e.g. small streams and creeks where groundwater seepage represents the origin of essentially all the water present in the stream).

Option 2: assume standard 20:1 dilution was available. This assumption has some precedent in permits and some existing regulations and therefore might be considered generally reasonable for use

in setting generic provincial matrix standards for which no site-specific information relating to dilution capacity is known. This option would in effect mirror situations where some constant surface water dilution of groundwater is available (i.e. larger creeks and rivers).

Option 3: assume standard 10:1 dilution was available. This assumption represents a compromise between the no dilution and the standard site-specific permitted discharge assumption of 20:1. Use of a 10:1 dilution assumption has been used by the State of Mass. in derivation of generic standards to protect aquatic life from water borne contamination.

CSST has decided to adopt option 1, i.e. assume no dilution, for purposes of calculating soil-groundwater protective matrix standards.

2. Agreed, such calibration will be possible with the implementation of the CS reg.

Major Result/Recommendation (viii):

1. *"... contamination by metals and polar organics must be addressed by other means" ... recommended ... compiling information from existing contaminated sites, ... leachate tests, and using more conservative SQSs (e.g. applying a safety factor to a soil-contact based SQS)."*

2. *"In addition ecological risk assessments should be conducted at sites where potential groundwater concerns are identified".*

3. *"... longer term, appropriate models should be developed and calibrated for these chemical classes".*

Response:

1. CSST agrees with this recommendation in principle. BCE has performed some preliminary comparative analysis for sites with known groundwater heavy metal problems to determine if corresponding exceedances of the proposed soil invertebrate and plant protective standards are also observed. It is apparent that it is possible to have exceedances in groundwater of schedule 6 water quality standards at sites where soil quality meets the soil invertebrate and plant standard. This indicates that the soil invertebrate and plant standard can not be presumed to also be protective of groundwater on these sites. Since no correlation exists between these two standards, it does not seem

likely that simple application of a safety factor to the soil invertebrate and plant standard can adequately protect the future use of groundwater.

Rather, CSST believes that the use of a leachate-test based soil standard designed to protect groundwater use at remediated sites holds considerable promise. To ensure protection of future groundwater use a "rainwater-mimic" leachate test can be used together with a transport model to protect to the appropriate water use standard (e.g. drinking water, aquatic life protection, irrigation, etc.). Such a model and analytical test has been proposed by the US EPA , but it has not yet been widely implemented or validated. Based on the empirical evidence that having no groundwater protection soil standards for heavy metals and polar organics presents a real and significant risk, CSST recommends the use of the US EPA leachate test and model.

2. Sites are deemed to be contaminated or not contaminated on the basis of exceedances of soil or water quality standards. A site is not a contaminated site simply because "*potential groundwater concerns are identified*". The requirement to perform an ecological risk assessment is a component of choosing the risk-based standards approach to site remediation. The decision to remediate a contaminated site to either applicable numerical standards or to risk based standards lies solely with the proponent. Consequently, CSST has rejected this recommendation.

3. Agreed, CSST acknowledges development of more appropriate models to deal with the issue of protecting groundwater from soil metal contamination as a long term goal.