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## Submissions on Proposed National Environmental Standard for Assessing and Managing Contaminants in Soil

This submission is made by :

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### Introduction

I wish to make submissions on two points of the proposed standard. These are:

- i) The proposed Soil Guidelines Value - SGV for arsenic in residential 10% produce being set at 24 mg/kg.
- ii) The proposal to disallow bioavailability considerations in site-specific assessment of arsenic in soils.

I oppose both of these proposals on the grounds set out below.

### My submissions:

#### i) **Arsenic SGV**

The proposed arsenic SGV of 24 mg/kg for "residential 10% produce" is much lower than it should be.

In the Hastings area where my company has been developing residential sections for over five years, the SGV has been set at 30 mg/kg. I believe that even 30 mg/kg is overly conservative to the extent that it is based upon daily intake values taken from the WHO drinking water standards (I understand) which themselves presuppose 100% solubility of arsenic present. Solubility of arsenic is significantly less than 100% in Hawkes Bay soils.

The existing 30 mg/kg SGV in the Hawkes Bay is also based upon 100% bioavailability. Bioavailability in Hawkes Bay soils is significantly less than 100%. In fact, my company has paid for bioavailability studies of Hawkes Bay soils by Professor McLaren of Lincoln University which have demonstrated bioavailability levels of approximately 35% which should allow an SGV of approximately 42 mg/kg for arsenic.

I am also concerned about a virtual complete lack of evidence of any actual bad health outcomes in the Hawkes Bay area as a result of arsenic in their soils. The arsenic present has come from agricultural applications beginning over 50 years ago. One would think that if it is in fact a serious or significant risk to human health that after 50 years, there would be some actual cases of sickness or disease that people could point to now. To the best of my knowledge, that is not the case; instead we are given a rambling and disorganised litany of "potential risks" from a vague selection of "overseas studies".

Australia has an NES for arsenic in soils of 100 mg/kg but to the best of my knowledge, there is no evidence there of actual sickness or disease risk that can be put down to the presence of arsenic. If Australian regulators are not concerned with arsenic levels of less than 100 mg/kg I think we are being very silly worrying (without evidence) about levels of around 30 mg/kg. The proposed level of 24 mg/kg is making an overly conservative situation worse for no good reason.

*My submission is that the NES SGV for arsenic in "residential 10% produce" should be set at 30 mg/kg.*

## ii) **Bioavailability of Arsenic in Soils**

In the Tech Note on p. 83, Bioavailability Considerations, a case is put to completely disallow bioavailability carried out on a site specific basis to be used to modify guidelines on specific sites on the basis that bioavailability considerations are "not appropriate".

The argument in favour of this position is extremely weak. It says essentially that because bioavailability is "not a fixed value" but depends on the contaminants, the soil makeup, the chemical form of the contaminant, and other factors, that the whole attempt to determine bioavailability on a site-specific basis should be abandoned. This is an extremely bad argument to the extent that it is a test that very few biological parameters would meet; having a single "fixed value" or a single "one size fits all" methodology, would be the exception rather than the norm in most biological sciences.

The history of science and scientific progress is precisely the history of investigators persevering in the face of uncertainty and the unknown. It is nonsense to argue that because an investigatory process or a methodology or an approach is uncertain that all attempts to continue with it should be abandoned. If anything it is quite the reverse: a process or methodology not fully understood should not be abandoned but should be investigated further.

This is a case of the regulatory and bureaucratic tail wagging the scientific dog.

I think it is self-evident that if bioavailability could be scientifically established it would be a good thing and not a bad thing. A well made case for bioavailability is by definition an enhancement of the accuracy of identifying a risk to biological systems from a given contaminant in given circumstances. Surely the pursuit of this, though difficult and uncertain, should be encouraged and not precluded by fiat. How else are advances to be made in soil science?

As mentioned above, my company has commissioned and paid for two bioavailability studies on arsenic in Hawkes Bay soils. The first was carried out in 2006/2007 by Environmental Earth Sciences in Australia. This study found bioavailability of 35% for arsenic in soils. However, the

study was inadequate to the extent that the number of soil samples tested was too low, and because some of their methodology was inconsistent.

As a result, we undertook a second study to improve the scientific efficacy of bioavailability. This was carried out by Professor McLaren at Lincoln in 2008. Professor McLaren carried out a comprehensive and sophisticated fractionation investigation on a whole range of metals and metalloids, including arsenic, in some 27 samples of Hawkes Bay soils. Amongst a whole range of other things, he found that bioavailability was generally less than 35% of total arsenic present. A copy of his report is attached.

We have been planning to continue this research via Professor McLaren this year. However, if bioavailability is disallowed on a site-specific basis by regulatory fiat, it will not be economically viable for my company to continue to fund these general bioavailability studies. This will obviously be a loss to a small but important branch of research in New Zealand.

In 2008 my company also established and funded a soil science post-graduate scholarship at Lincoln University (called the Frimley Estate Soil Science Scholarship) to carry out research on soil science topics.

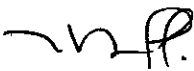
Again, if bioavailability is disallowed as proposed, unfortunately there would not be much point in my company continuing to fund the Frimley Estate Soil Science Scholarship. This would also be a loss to Lincoln as well as New Zealand.

*My submission is that bioavailability carried out on a site specific basis should be recommended as a proper and valid area of investigation. There is no conceivable reason why this should not be the case.*

**My proposal:**

I would like two changes made to the proposed standard and I would like the Minister for the Environment to declare:

- i) *That the NES SGV for arsenic in "residential 10% produce" should be set at 30 mg/kg.*
- ii) *That bioavailability carried out on a site specific basis should be recommended as a proper and valid area of investigation.*



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Nick Duff