

DATE December 6, 1982

SUBJECT Bioavailability Studies with Dioxin-
Contaminated Soil

REFERENCE

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A brief rationale, some assumptions, and an outline of bioavailability studies follows. The latter are single dose level experiments. If things go well, the extracted TCDD administered in a solvent should produce a marked effect. The contaminated soil doses should be harmless, or at least measurably less harmful.

The contaminated soil should be finely ground, mixed, and analyzed to determine its TCDD content. There may be some problems in dosing animals with contaminated soil. If so, some adjustments will need to be made.

For illustrative purposes, soil containing 1000 ppb of TCDD was used. This is akin to the 900 ppb levels reported in some areas of Missouri. About 600g, or more, of contaminated soil will be needed. This would call for 600 µg of TCDD.

Original signed by
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alw

attachment

P.S. Since drafting this, I have been informed that 2,3,7,8-TCDD can be obtained in 5 mg quantities as an analytical standard. That would enable all these expts. to be done.

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Rationale

male g.pig most sensitive

oral LD50 ca. 1 $\mu\text{g/kg}$

Assumptions

dermal LD50 is 2X oral LD50
(ca. 2 $\mu\text{g/kg}$)

soil binding decreases absorption by factor of 10 - 50

oral administration of 10 g/kg of dirt feasible

soil can be insufflated into g.pig trachea

soil has 1000 ppb TCDD
= 1000 $\mu\text{g/kg}$
= 1 $\mu\text{g/g}$

1) Oral toxicity comparison - 110g contaminated soil

- Demonstrate - at least 10-fold decrease in acute oral toxicity of soil-bound TCDD. Need higher conc. in soil to show bigger safety factor.

a) extract 10g of soil - administer extract to 10 g.pigs

b) administer aqueous suspension 10 g/kg contaminated soil to each of 10 g.pigs

2) Dermal toxicity comparison - 120g contaminated soil

- Demonstrate - at least 10-fold decrease in acute dermal toxicity of soil-bound TCDD.

a) extract 20g of soil - administer extract to 10 g.pigs

b) apply aqueous paste 10 g/kg contaminated soil to each of 10 g.pigs

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3) Chloracnegenic potential comparison - 220g contaminated soil

- Demonstrate - at least 10-fold decrease in chloracnegenic potential of soil-bound TCDD.
- a) extract 1g of soil daily - administer extract to ears of 10 rabbits daily - 5 days/week/4 weeks
- b) apply 1g soil as aqueous paste to each of 10 rabbit ears daily - 5 days/week/4 weeks

4) Inhalation toxicity comparison (insufflation) - ?

- Demonstrate - some reduced degree of risk from inhalation of TCDD contaminated soil.
- a) extract 1g of soil daily - insufflate extract into trachea of 10 g.pigs - dose daily for 5 days
- b) insufflate finely powdered contaminated soil into trachea of 20 g.pigs - dose 10 daily for 5 days - dose 10 daily/5 days/week/2 weeks

(volume of powdered soil which could be administered is not known)

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