# APPENDIX 7

**CSIRO Ash Report**

January 05, 2001

Dear Mr Rosser

In reply to your facsimile dated 4th December 2000, I can provide the following information.

The ash material has a high nutrient content in terms of phosphorus (P) and potassium (K), with ash contents of these nutrients over 9% on a weight basis. There are smaller concentrations of Ca, Mg and S that are also essential nutrients for crops. In addition, the material contains useful concentrations of copper (Cu) and zinc (Zn) that are essential micronutrients for crops.

Assuming the material is to be used as a phosphatic fertiliser, typical application rates to soils would vary depending on the agricultural system into which the ash is marketed. The material has a similar P concentration to that found in single super-phosphate, and after supplementation with additional sulphur (S), would probably find a useful market in the pasture and grazing industries.

Typical application rates for P fertilisers on pastures vary from 5-30 kg P/ha/yr, so that likely application rates for the ash material are in the range 55-330 kg/ha/yr.

Concentrations of heavy metals as noted in your facsimile were as follows:

Arsenic (As) 45 mg/kg

Cadmium (Cd) 0.5 mg/kg

Chromium (Cr) 7 mg/kg

Copper (Cu) 400 mg/kg

Mercury (Hg) < 0.05 mg/kg

Lead (Pb) 11 mg/kg

Nickel (Ni) 12 mg/kg

Zinc (Zn) 1400 mg/kg

It has been suggested by the WA Department of Environmental Protection that a Toxicity Characteristic Leaching Procedure (TCLP) test be performed on the material. I believe this to be an inappropriate procedure to assess risks from heavy metals in the material when it is used as a fertiliser on agricultural soils. The TCLP test (US EPA Method 1311) is designed to simulate the leaching a waste will undergo if disposed to a landfill. As pointed out in the USA EPA notes to this procedure "the test is designed to simulate leaching that takes place in a sanitary landfill only". It involves the extraction of the waste with acetic acid for 18 hours. Such a procedure is inappropriate to assess the suitability of a material when the intended use is on agricultural soils for crop and animal production.

In terms of use on agricultural soils, the heavy metal of most concern is cadmium (Cd), due to the possibility of transfer of this element through the food chain. All States in Australia have regulations governing concentrations of impurities in fertilisers or soil amendments. For example in Western Australia, concentrations of cadmium (Cd) in fertilisers are covered under the Fertiliser Act (1977) amendments 1984, where a phosphatic fertiliser cannot contain in excess of 500 mg Cd per kg P (due to be reduced to 300 mg Cd/kg P in the near future). Under the Act, the ash material would be classed as a phosphatic fertiliser, with the Cd concentration on a per unit P basis around 5 mg Cd/kg P, almost 100 times lower than the present limit value as prescribed under the

Fertiliser Act. Indeed, this ash material has a lower Cd concentration that most other manufactured phosphatic fertilisers marketed in Australia and could be classed as an extremely "clean" product from a cadmium viewpoint.

In terms of other heavy metals, the following comments apply.

Arsenic - As concentrations in fertilisers are currently not regulated in WA or any other State. Typical concentrations of As in commercially used phosphate rocks for fertiliser manufacture vary from 5 to 200 mg/kg, but are usually less than 10 mg/kg. Typical concentrations of As found in unpolluted agricultural soils vary from 1-20 mg/kg. Amounts of As added to agricultural soils through use of bisolids (sewage sludge) are regulated in some States (no guidelines available yet in WA). Maximum permitted concentrations of As in biosolids used on soils for food production are generally set at a value of 20 mg/kg in most States, recognising that biosolids are added to soil in large amounts (usually several tonnes per hectare). South Australia has an annual loading limit of 70 g/ha.

Assuming the poultry litter ash is added at a maximum rate of 400 kg/ha, which would be considered a high rate of P application (37 kg P/ha) not required each and every year to most pasture soils, annual loadings of As to soils would be 18 g/ha.

This figure is well under the SA annual loading limit for biosolids. Assuming a typical WA soil has a background As concentration of 5 mg/kg, it would take over 360 years of repeated annual applications of poultry ash to double the background As concentration. It would take over 1000 years to raise the soil concentration to the current Environmental Investigation Level (20 mg/kg) as determined by the recent National Environmental Protection Measure (NEPM), or until the amounts of As added exceeded the Cumulative Contaminant Loading Limit for As as set out in the National Water Quality Management Strategy Guidelines for agricultural irrigation water quality. Thus, it appears that As in the material is not a major threat to soil or food quality.

Chromium, mercury, lead and nickel - concentrations are low enough in the material to ignore in terms of environmental or food chain risks. Concentrations of these elements are within the range of normal concentrations currently found in agricultural soils. Copper and zinc - these elements are essential micronutrients often added as a supplement to other

fertilisers at 0.1% to 1% levels. The concentrations in the poultry ash are therefore of no concern but add to the commercial value of the product. If you wish to discuss any of the above information, please do not hesitate to call me on 08 8303 8433 or 0409 693 906.

Sincerely

Dr M.J. McLaughlin

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