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ABSTRACT DUE DATE: JUNE 27, 2011

Authors will be notified in September 2011 regarding the status of their submitted abstract. Authors will be required to provide a PowerPoint-type presentation at the conference for inclusion in the on-line proceedings. An accompanying paper may also be provided for inclusion in the conference proceedings. If requested and selected for peer review, manuscript must be submitted by November 15, 2011.

Please include your **complete** contact information and a brief biography of the presenter highlighting career and presentation experience.

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ABSTRACT GUIDELINES

- 1. TITLE OF PAPER:** The title is entirely capitalized, with the exception of scientific names, which should be upper/lower case and italicized. Scientific names should not be preceded or followed by commas or parentheses or other markings.
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COMPOST USE: UPDATE ON POTENTIAL IMPACTS OF HEAVY METALS AND

DIOXINS. Rufus L. Chaney, USDA-ARS, Environmental Chemistry Lab, Bldg. 007, BARC-West, Beltsville, MD 20705; Philip G. Reeves, Grand Forks Human Nutrition Center, Grand Forks, ND 58202; Sally L. Brown, University of Washington, Seattle, WA 98195

Heavy metals and xenobiotics such as dioxins can limit acceptance of composts for markets. Recent research results and progress in understandings of risks, and development of regulations on such chemicals in composts and biosolids will be presented. Beneficial use of composts/biosolids plus limestone to remediate metal killed ecosystems will also be summarized.

Exciting progress has been made which confirms that Cd in composts has no significant risk to humans or the environment. Soil Cd has harmed humans only where subsistence farmers consumed rice grown on flooded soils contaminated by mining or smelting of metals in Japan and China; soils with as little as 2-10 mg Cd plus 200-1200 mg Zn/kg soil caused Cd-disease contaminated soils, no Cd-adverse effects on humans were found at three cities even where soils contained up to 100 mg Ca and 10,000 mg Zn/kg. This difference is believed to result from the unique properties of rice regarding Cd. When grown in flooded soils, rice accumulates Cd to dangerous levels in grain, but grain Zn is not increased – very different from crops grown in aerobic contaminated soil. Further, modern high quality composts and biosolids cause little increase in crop Cd even at the 1000 t/ha used in regulation development. We had hypothesized that the lack of Zn movement to grain, coupled with malnutrition of zinc, iron and calcium in subsistence rice consumers, caused much greater Cd absorption than other foods – allowing soil Cd to cause disease after 30-50 years. But when lettuce or Swiss chard were grown on compost or biosolids amended soils, even when Cd and Zn were increased 5-fold on acidic treatments, feeding tests showed no increase in Cd in kidney or liver of the test animals – zero increase in bioavailable Cd when these crops were grown on amended soils.

ARS conducted feeding tests with rats fed sunflower or rice with ¹⁰⁹Cd and about 0.5 mg Cd/kg grain using a factorial experimental design: diet Zn, Fe, and Ca were provided at marginal or adequate levels. Although low dietary Zn normally increases Cd uptake by animals, sunflower supplied enough Zn to prevent Zn-deficiency and gave low Cd uptake. With the multiple deficient treatment (low Zn, low Fe, low Ca), 2.7% of rice ¹⁰⁹Cd but only 0.78% of sunflower ¹⁰⁹Cd were absorbed to the kidney and liver of the test rats; with the adequate supply, 0.35% of rice ¹⁰⁹Cd and 0.22% of sunflower kernel ¹⁰⁹Cd were absorbed to liver and kidney. This study confirms the remarkable difference between rice and other crops, and confirms the very low food-chain transfer, bioavailability and risk of compost-applied Cd.

Dioxins: Research has indicated that garden foods other than peel of carrot do not accumulate soil dioxins. Farm family consumption of milk and meat of grazing livestock which ingest soil or compost/biosolids on the soil surface, is the most limiting pathway for dioxin and PCB risks; but composts do not adhere to crops which greatly limits exposure compared to surface applied fluid biosolids. Farm families which consume “home-grown” meat and milk products are the Highly Exposed Individuals. A critical research finding in the last year is that dioxin residues in pentachlorophenol-treated wood is an important source of dioxins in meat products. It is critical to exclude PCP-treated wood from compost feedstocks.