

## Helping Father Bob grow organic vegetables at the South Melbourne Commons

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We ASSSI members should be thankful the Australian Soil Science Society Inc. is registering with the public at a time that some politicians demonstrate their scientific illiteracy to peddle cheap nonsense about locking up carbon in the soil. At least one must draw that conclusion, when Martin Pritchard of the Friends of the Earth knows to find Linda Bennison to request some soil science help on behalf of the Father Bob Maguire Foundation to develop a community garden at the South Melbourne Commons. Melbourne South Commons is situated in a very old former school building. The project was actually much broader than just a community garden and features a food co-operative, community café, community hall, community office space and a space for children's playgroups. The two of us love gardening ourselves and we particularly admire Father Bob Maguire's outlook on life and the world. Of course we will help! We had already assisted the West Footscray Primary School with their vegetable garden as volunteers. But this job is more complicated because it is known there are contaminated soils on the property. The main known problem was polycyclic aromatic hydrocarbons, particularly benzo(a)pyrene (BaP). The vegetables were to be grown in 500 mm high raised planter boxes filled with imported soil and two large heaps of soil were already waiting on the premises. These also needed testing. Some vegetables were already flourishing in newly built raised planter boxes.

We discovered that the much of the soil on the premises must have been fill and some of it contained slags and sintered material, possibly wastes from generation of town gas that may have been put to a "useful" new use at the time. It could have come from burning coal in domestic heaters with the ashes thrown out on the garden. A big part of the day of 22 August was used to collect soil samples, store them on ice in glass jars and return them to the lab the same day. The glass ware and laboratory services were provided by MGT-LabMark Environmental Laboratories at Oakleigh, *pro bono* also, but nevertheless on condition "*that Father Bob could sneak one in for the Dees that would also be much appreciated, because our operations manager is a long suffering Tigers fan*". All soil samples collected from the stockpile and future garden beds were subjected to determination of the full range of analytes listed in EPA Screen IWRG621. We also collected a soil-like sediment from the gutter of the building, on the hypothesis that it could contain many years' worth of PAHs dust from nearby industry and a gas generator, and that aerial contamination was part of the soil's contamination. That sample was only analysed for PAHs.

It has always been the policy of van de Graaff & Associates to assess risk to human health or to the environment posed by contaminants in the soil on good science and not mere, literal adherence to official environmental criteria set by the EPA, NEPM, ANZECC-NHMRC, etc. Therefore, the absolute concentrations in the soil of any contaminant are always interpreted in terms of their solubility in water, which controls mobility within the soil and the chance of uptake by plants through their roots. In addition, we take into account any possible amendments that can be made to the soil, which, through their effect on soil pH or other soil parameters, can render a contaminant insoluble and inert. This meant that Helena spent many hours researching the literature on PAHs, their potential impact on the potential uptake by plants and human health if consumed.

Helena found that in the USA about 97% of human exposure to BaP is through the food chain, but exposure through the food chain is also documented in Australia in work done by Food Standards Australia New Zealand (FSANZ) and in Europe by the Health and Consumer Protection Directorate-General, European Commission, published in 2002. The results of many studies indicated that much of the PAH contamination in edible produce is associated with their peel and that above ground parts of the edible plant have much reduced PAH concentrations than below ground parts. However, plants tend to take up PAHs very poorly from contaminated soil in any case. If the soil is enriched with compost, plants take up even less from a contaminated soil than if grown in sand. Thus an extra safeguard to health is implied. The FSANZ study seemed to say that generally the health risk to the Australian public from dietary exposure to PAH is unlikely to be of public health and safety concern.

We found that the imported heaps of soil, donated from a residential re-development in an older suburb not too far away, was itself contaminated with lead at up to 2800 ppm (from old outdoor house paints?) and zinc up to 560 ppm. We recommended that the heaps of soil be taken off the site and replaced by purchased garden soil that would be guaranteed to meet AS 4419 "Soils for landscaping and garden use" quality criteria.

One corner of the property where a planter box was planned had elevated levels of a range of PAHs, total PAHs at 280 ppm and B(a)P at 19 ppm, but these soils would be covered by at least half a metre of good soil. PAHs are usually strongly bound to soil and very poorly soluble in water. In a planter box that is regularly watered, the net flow of water through the soil is downwards. Analysis of historic soil samples (1893 and 1944) at the famous long running Rothamsted, Harpenden, experiment in a rainy climate showed that PAHs can migrate downwards but did not migrate upwards. That downward migration was considered to be with very fine soil particles created by annual cultivation, and not as a solute. We reckoned that it was safe to remove just another 300 mm of the contaminated surface material prior to filling the boxes with good soil.

It should also be kept in mind that critical health thresholds of consumption of contaminants by people are based on the assumption that the persons living on contaminated land obtain all their food from that land and live their entire lives on it. This can never be the case at the Melbourne Commons where people just drop in for a coffee and a quick meal. We are quite pleased with the outcome of all of this and it shows that soil science is positive support for good initiatives, and we are sorry that Father Bob has lost his job *vis a vis* the hierarchy of his church. However, the South Melbourne Commons will continue to develop and thrive.

 <p>Helena sampling the soil in one of the planter boxes</p>	 <p>Black fill soil is often contaminated</p>
 <p>Imported soil that was contaminated itself</p>	 <p>Future planter boxes to be used for vegetable growing</p>



Father Bob

