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República Dominicana

11th June 2004

Dear Rosa,

Re: analysis of samples of “rock-ash” from Port of Arroyo Barril, Samaná, República Dominicana

Please find attached (Annex 1) the results of the analyses of samples of rock-ash/aggregate forwarded to our laboratory for analysis in April 2004.

A total of 11 samples were received by our laboratory on 29th April 2004. All samples had been collected from the Samaná region on 24th April 2004. Of these 11 samples, four were contained in the original, pre-cleaned glass screw-cap bottles we dispatched from our laboratory, six were in plastic containers (safety containers used for bottle transport) and one was contained in a plastic bag. Because of the possibility of contamination of the samples sent to us in the plastic cases and the plastic bag, we have analysed only those samples received in the glass bottles. These four samples were assigned laboratory codes NGP04005-8:-

Our laboratory code	Original sample code	Description
NGP04005	1B	“Rock-ash” - compacted surface (stabilised base) at port of Arroyo Barril, Samaná, República Dominicana
NGP04006	2B	
NGP04007	3B	
NGP04008	4B	“Rock-ash” – collected from non-compacted slope of rock-ash deposits facing Bay of Samaná

On arrival each sample was homogenised and divided into two sub-samples to allow two types of analysis:-

- a quantitative analysis for heavy metals using Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES) and
- a qualitative analysis for organic compounds using Gas Chromatography / Mass Spectrometry (GC/MS)

The detailed results of both analyses are presented for each sample in Annex 1. Outlines of the methods employed to prepare and analyse the samples are provided in Annex 2.

Heavy metal concentrations are reported as mg/kg dry weight in air-dried samples. Results of the non-quantitative analyses for organic compounds are presented as lists of those compounds identified. These are divided into two groups; compounds identified with a fairly high degree of reliability (match quality better than 90% against library spectra) and compounds more tentatively identified (with match qualities between 50% and 90%). One possible reason for only tentative identification could be the presence of only trace quantities of the compound in the sample.

The results of the heavy metals analysis showed that all metals that have been considered in this study were present in both compacted and non-compacted rock-ash at concentrations in the ranges typically found in uncontaminated soils. All the metals analysed in these samples exist naturally in the environment, though normally at relatively low, "background" concentrations. The results of our investigations indicate that, although these metals were also present in all rock-ash samples analysed (both those compacted at the port and those remaining in non-compacted deposits), the concentrations present in these materials were not significantly elevated above levels expected for uncontaminated soils and do not in themselves give any particular cause for concern. Had the ashes been acidic in nature, or acidified through admixture with other materials, greater mobility of metals in the ashes (than in soils) might have been expected, resulting in more rapid leaching into underlying soils and groundwater. In this instance, however, the ashes were alkaline in nature.

The results of the qualitative organic screen analysis do indicate the presence of some organic (carbon-based) contaminants, though very few compounds were detected in total. All those identified were simple linear aliphatic hydrocarbons. Although their presence in ash samples is of some interest, given that the thermal processes from which the ashes arise might have been expected to have destroyed all such combustible material, these particular compounds are unlikely to be of any toxicological significance at the trace levels in which they appeared in the materials sampled. Whether these compounds are present as a result of carry-over from the combustion process itself, or arise from post-combustion contamination of the ashes with other materials during storage, transport or compaction, cannot be determined from these results.

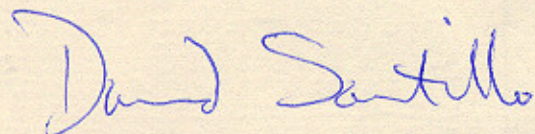
In summary, on the basis of the analytical procedures conducted at our laboratory, we can conclude that the four rock-ash samples as received by our laboratory in glass containers did not contain heavy metals at concentrations of particular toxicological significance, nor contained organic contaminants (detectable using the methods employed) which would give rise to significant toxicological concerns.

In interpreting these conclusions, however, it is important to bear in mind that:-

1. the qualitative organic screen analysis conducted would NOT have detected the presence of certain trace contaminants of particularly high toxicological significance, such as chlorinated dioxins and furans – determination of these trace contaminants would necessitate a separate and dedicated suite of analyses and would incur substantial costs.
2. these analyses have been conducted on four discrete samples, representing only a small fraction of the total quantity of rock-ash material deposited and compacted – while it is reasonable to assume that the composition (very similar in the case of all four samples analysed in this study) maybe broadly typical of the material as a whole, it is possible that samples from other parts of the deposits may have revealed different patterns of contamination.
3. the apparent absence of significant chemical contamination in the samples provided does not negate the possibility that the rock-ash, particularly in non-compacted deposits, may give rise to other significant hazards at a local level, e.g. deposition and/or inhalation of windblown particulates/dust. A separate study would be necessary to determine the significance of any such additional hazards.

I hope that the results themselves and the information provided above are of interest and value to you. If you have any questions relating to the information presented here, or require any further information, please do not hesitate to contact me.

Yours sincerely,



Dr David Santillo, Senior Scientist

Copies to: René Ledesma, Subsecretario de Gestión Ambiental
Dr. Frank Moya Pons, Secretario de Estado
Jochen Schmitz, Director, Helvetas
Patricia Lamelas, Directora Ejecutiva, CEBSE
Ramiro Espino, Senador Provincia Samaná
Zeina Al-Hajj, Greenpeace International Toxics Campaign