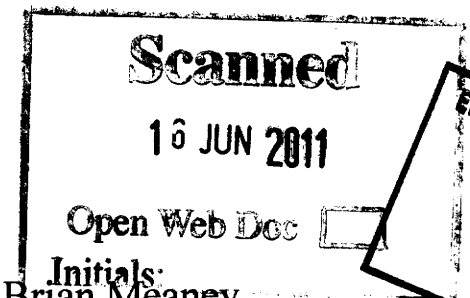


Hands Lane
Rush
Co Dublin
14/6/2011

Mr Brian Meaney
EPA Waste Licensing Dept
PO Box 3000
Johnstown Castle Estate
Co Wexford
Your ref. WO 129-03
Our Ref

http://www.ws.chemie.tumuenchen.de/groups/hydrogeo/research/reactions-bottom-ash /

Application by MEHL for a Hazardous Waste Landfill at Hollywood, Naul, Co Dublin

Dear Sir.

On behalf of the Nevit Lusk Action Group (NLAG) I wish to draw your attention to the attached article published on the internet by TECHNISCH UNIVERSITAT MUNCHEN, Institute of Hydrochemistry entitled Hydrogeology: Reactions, Bottom Ash, "Exothermal Reactions in Bottom Ash Monofills" in relation to a study carried out on a similar facility as that proposed.

The contents of this study were discussed at some length at the An Bord Pleanala hearing by representatives of the applicant and NLAG. However we are not satisfied that a suitable solution to the problem of temperature build-up has been proposed to date.

In view of the fact that it has been demonstrated in this study that failure of the liner system can occur we would request the EPA to investigate the matter thoroughly and to provide evidence to the NLAG that no such failure could occur at the Hollywood facility.

Yours truly,

Patrick Boyle, BE.

Patrick Boyle

TECHNISCHE UNIVERSITÄT MÜNCHEN

Institute of Hydrochemistry

Hydrogeology: *Reactions Bottom Ash*

Chair for Analytical Chemistry

Exothermal Reactions in Bottom Ash Monofills

Objectives

- Better understanding of the exothermal reactions in Municipal Solid Waste Incinerator (MSWI) bottom ash.
- Simulation of the temperature development in a MSWI bottom ash landfill.
- Quantification of the mineral phases in the bottom ash.
- Quantification of the water, mass and energy balance of a MSWI bottom ash landfill.
- Development of stategies for landfill operation

Method of

- Installation of a field laboratory in a bottom

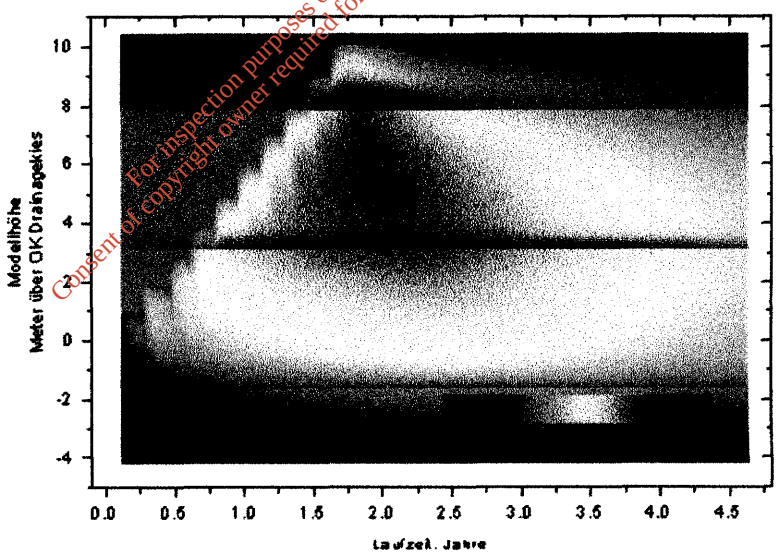
Approach

ash landfill
- Container and laboratory tests with different environmental conditions
- Tracer tests and meteorological monitoring
- Chemical analyses of bottom ash, leachate and precipitation
- Determination of isotopic ratios in landfill gas to quantify microbial degradation
- Mineralogical characterization with SEM/EDX, polarisation microscopy, XRF, and XRD
- Leaching tests
- Geochemical modeling of the reactions in the landfill
- Numerical modeling to assess different emplacement strategies for the landfill

Results

Until the 1970s, bottom ash from the municipal solid waste incineration (MSWI) was believed to be almost inert, but since then several studies have shown that several exothermic reactions may cause a temperature increase in the landfill of up to 90 °C. There are reported several exothermic reactions in bottom ash material. The most decisive reactions for the temperature increase in the stored bottom ash are the corrosion of iron and aluminium, the slake of lime (CaO) and the carbonisation of portlandit (Ca(OH)2). Although the exothermic reactions in the bottom ash are well known, the speed of reaction and its amount of the specific heat are still unknown. We have shown, that the main temperature increase due to the exothermic reactions have a time scale of 2 to 3 months and pointed out an initial specific heat of 26 W for one m^3 of the 4 weekly stored bottom ash. Assessing the thermal capacity of the residues is essential since bottom ash has been deposited in landfills with poor landfill liner systems in Europe and in other countries during the last decade. In the US, bottom ash was commonly landfilled without processing, even though

metals and other materials can be recovered by magnetic separation and screening. In some European countries (e.g. Germany, The Netherlands and France) bottom ash is partly reused (about 60 %) in road construction or as raw material for the ceramic and cement industry, whereas in Switzerland almost 100% of the bottom ash is disposed in landfills. High temperatures at the base of a landfill may affect the stability of the landfill liner system (flexible membrane liner (FML) and mineral clay layer). Temperatures above 40 °C may affect the stability of the FML (made of High-Density-Polyethylene, HDPE) due to depoly-merisation and oxidation. Sudden ruptures of the FML may follow. Due to a diffusive transport of water and water vapour along the temperature gradient in the mineral clay layer, the clay barrier may desiccate and fail to retain leachate. In order to prevent thermal damages on the liner system, it is necessary to minimise temperature development in the landfill.



Simulated temperature development at a bottom ash disposal.

There are several factors such as the ambient temperature, the surface-to-volume-ratio and the deposition temperature of the bottom ash influencing the temperature development in a landfill. A numerical model incorporating basic concepts from chemistry and physics was developed to simulate the spatial and temporal distribution of heat in a bottom ash landfill. This objective was accomplished in two steps: (1) the observation of the temperature development in a bottom ash

landfill under several modes of emplacement, and (2) the development of a heat generation and transport model and coupling this with the obtained data from the landfill field experiments. With this numerical simulation model, we have a possibility to predict the temperature development in a bottom ash landfill regarding several modes of emplacement. The image above shows the predicted temperature development for a MWSI bottom ash landfill with a flat emplacement strategy (poster download 1.9 MB, german).

Partners

- Müllverwertungsanlage Ingolstadt
- Bayer. Landesamt für Umweltschutz

Financial Support

- BayFORREST F158

Responsible Biber

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(c) 2011 Institute of Hydrochemistry, Technische Universität München, Marchioninistr. 17, D-81377 München
phone: +49 89 2180-78231, fax: +49 89 2180-78255, reinhard.niessner@ch.tum.de