

Chemical and Biological Processes in Landfills

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Long-term effect of waste deposition on surface water and low cost method of remediation by defined converting of the material

In a interdisciplinary German Research association (DFG) research programme, supplemented by the Volkswagen foundation, the long-term effect of landfills on surface water was investigated. Sixteen institutes have been involved with the investigation of this question over a period of 20 years. The investigation of landfills was mainly carried out on 15 defined landfill sections and 4 defined sections in interstitial groundwater aquifers identical to those found under natural conditions.

It was shown that the present understanding of the extent and duration of surface water contamination is not applicable. The emissions from landfills are considerably more extensive and potent than is at present realised. Particularly important is the recognition that anaerobic landfills which appear to be stable are in fact only conserved in an inactive state. Through physical disturbance or diffusive penetration of oxygen, they are intensively reactivated and give off toxic emissions. Long-term surface and groundwater contamination is particularly caused by the organic toxins from industrial products.

The self-cleansing effect of the groundwater is only partially effective in respect to organic toxins, which means that these decisive long-term pollutants can be widely dispersed.

A reactivation of the emissions can only be avoided by a biological treatment of all slightly contaminated waste material before deposition. This treatment must at least create the preliminary requisites for stable aerobic soil formation. All medium and heavily contaminated waste materials must undergo a thermal treatment.

The solution which at first seems to suggest itself, that is to remove the waste from the respective landfills using building construction machinery and treatment in thermal treatment plants, leads to health risks for the construction workers and residents in the neighbourhood; problems with the treatment of the undefined mixture of domestic garbage, hazardous waste and soil; and increases the treatment costs considerably due to the costs of the construction work.

A reasonably priced solution consists in stabilising the waste in situ biologically to such an extent that the maintenance of industrial health and safety standards is thereby achieved and a into classified fraction separable and utilisable material is won (Fig. 1). The ARGE excavation has, with the completed excavation of the Berger-Landfill, Wiener Neustadt (1 million m³, partly with considerable groundwater levels), proved that with this method the total costs of the excava-

tion with biological treatment do not necessarily need to be higher than a thermal treatment of a newly delivered residual waste.

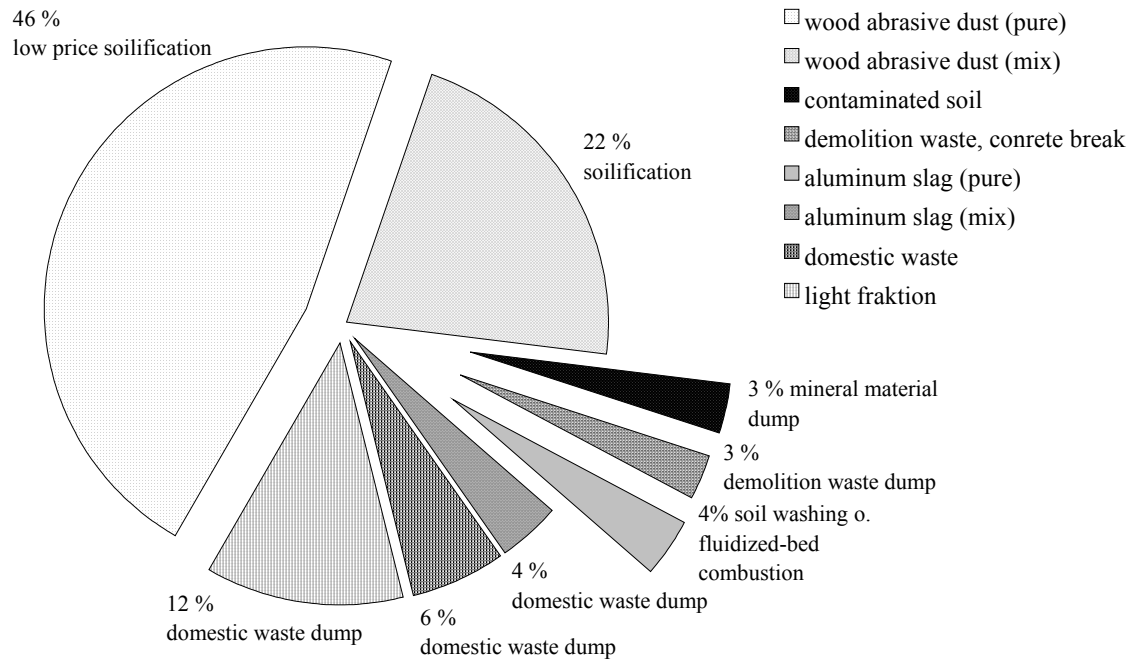


Fig. 1: Cleared Masses [Mass-%] and their Disposal Route (Data: ARGE Clearing)