

GROUP I - METALS TREATMENT AND REPROCESSING OF NEUTRALIZATION SLIMES

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INTRODUCTION

Disposal of waste slimes from plating plants is no problem that would be specific for the Czech Republic only. This problem can be encountered in all countries with engineering industry. Wasteless technologies of metal coating are not available so far. Some processes are known to reduce the volume of slimes considerably, for instance the recycling of rinsing waters, electrodialytic processes etc. The application of a modern method is, however, a longterm and expensive matter. Considering the fact that the producers of slimes are exposed to a more and more higher public and economic pressure supported by existing legislation, it appears imperative for them to liquidate their wastes in a manner that would be adequate to the weightness of this problem.

ALTERNATIVES OF HOW TO RENDER THE SLIMES HARMLESS

Neutralization slimes produced in the course of metal coating processes represent an extremely varied mixture of organic and inorganic substances. According to available analytic data, more than 200 compounds are comprised herein. This fact influences not only the choice of the hydrometallurgical reprocessing technology, but also the method of detoxication of final wastes discharged from this process.

If we ignore direct deposition of slimes, it is possible to blend chosen slimes with an organic waste and to burn this mixture then. This procedure enables elimination of cyanides, it is true, but it doesn't solve the problem of toxic metals that pass in various chemical forms over into the ash. There is also a real danger here that combustion products of a high toxicity can be generated if the combustion temperature is not kept at a proper level.

Another possible alternative how to liquidate galvanic slimes, showing a low metal content only, is to use them as admixture in production of building materials. Firmly bound metal silicates should be produced in the course of thermal treatment. This method has not been applied to a larger extent so far and it could be considered only for a certain part of slimes resulting from surface finish of metal structures.

The procedures mentioned above don't solve the problem as far as the total production of slimes is concerned.

PRESENTATION OF A PROJECT SOLUTION

An entrepreneurial plan dealing with hydrometallurgical reprocessing, fixation and following final wasting of slimes from plating plants, submitted by the Chemical Treatment Plant Dolní Rožínka, was examined in the Institute of Occupational Hygiene in Uranium Industry (further referred to as IOHUI) early in the year 1991. The purpose of this plan was – besides the later reprocessing of slimes as of a secondary raw material – to ensure the detoxication of slimes and to lower the degree of danger inherent herein. The plan was divided in

3 phases. The phase number one comprised construction of a preoperational store yard where the slimes intended for treatment and reprocessing could be stored as a stock-pile. The phase number two comprised construction of the detoxication line and the phase number three comprised the hydrometallurgical reprocessing itself. The detoxication line was meant for treatment of low-grade slimes, the reprocessing of which wouldn't be profitable and for other slimes as well, shouldn't the construction of hydrometallurgy for reprocessing rich slimes be realized. The investor was obliged by the decision of the Deputy Chief Hygienist to ensure this "emergency" treatment of rich slimes.

REALIZATION CONDITIONS

The condition was imposed to the investor, to take measures so that the reprocessing of neutralization slimes would not affect the environment. As to the solution of involved problems, safe deposition of detoxicated and/or reprocessed slimes was of primary importance, recovery of metals was a matter of secondary importance. The investor had very good preconditions to meet the above mentioned requirements. His chemical treatment plant has a closed cycle of process waters and the method of processing neutralization slimes is analogous to that used for enrichment of uranium ores. It is possible to make use of existing tailings ponds, where a free storing capacity of over 1 mil. m³ is available. These ponds can be characterized as safe workings of hydraulic engineering monitored via a system of checking bore holes. And not least, there is a team of qualified and experienced workers at disposal here.

LAWS, REGULATIONS

No laws concerning wastes were in force in the Czech Republic at the time, when the first process of approval relating to the construction of the preoperational store yard within the area of the tailing pond II – Zlatkov was initiated. The Instruction of the Ministry of Health and Social Affairs of the Czech Socialist Republic ref. HBM-323 of November 14th, 1988 could be used to evaluate the degree of danger in relation to solid industrial wastes. According to this Instruction and on the basis of chemical analyses and ecotoxicological tests, the neutralization slimes were assigned to the class II and III, it means, they were classified as dangerous and slightly dangerous. On the contrary, the slimes arising from enrichment of uranium ores, that are deposited in these tailing ponds, were assigned to the class I, it means, they were classified as highly dangerous. Consequently, the neutralization slimes could not increase the toxicity of slimes that have been already deposited in these tailing ponds. The requirements of the state administration, the aim of which was to prevent the environment from being affected, were based on the legislation in force at that time, it means on hygienic regulations and on technical standards.