

# **Disposal of NORM contaminated filter strainer cloth in compliance with German regulations for radiation protection and transport of radioactive material**

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## **Abstract**

The production of specific metal oxides from slag and ores requires the separation of salts from a suspension. The raw material contains radionuclides of the U-238 and Th-232 decay chain, radium is dissolved in the suspension. The filter strainer cloth used for the separation accumulates Ra-226 and Ra-228 by absorption, Th-228 is built up by decay of Ra-228. Consequently, replaced filter strainer cloths have to be disposed of as NORM waste. Respective requirements of the German Radiation Protection Ordinance (RPO) and of regulations for the shipment of dangerous goods have to be complied with. In the past, the disposal path was combustion in an incinerator for conventional hazardous waste. However, recently a high number of packages containing this NORM waste was not accepted by the operator of the incinerator because of too high activity resulting from an extended operation time of the filter strainer cloths. The acceptance criterion, transport as Excepted Packages under the regulatory framework of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), was not met. These filter strainer cloth packages had to be classified as Low Specific Activity radioactive material of group LSA-II.

Two objectives were defined for present and future management of replaced filter strainer cloths: (1) find an accepted disposal path/site for the existing LSA-II NORM waste to comply with relevant RPO and ADR regulations, (2) specify an optimal operation time of the filter strainer cloth for the adherence to acceptance criteria for combustion in an incinerator for conventional hazardous waste. Regarding the first objective, the possibilities of combustion in an incinerator for radioactive waste, and the determination of a conventional waste disposal site, which accepts this NORM waste (ADR-LSA-II transport) in compliance with the RDO guidance level for radiation exposures of the public of 1 mSv/a, were considered. The combustion in an incinerator for radioactive waste turned out to be too expensive. Shipment of LSA-II material to disposal sites for conventional hazardous waste is rarely accepted by respective operators, because the required placarding of vehicles carrying packages

for radioactive material could arouse suspicion by the public. Nevertheless, a landfill for hazardous waste with sufficient capacity for NORM and acceptance for LSA-II shipment was found in Saxony. With respect to the second objective, a model for the buildup of activity in the filter strainer cloths was developed with model parameters that have been estimated on the basis of laboratory analyses of filter strainer cloth samples representing different operation times. This model is used for the forecast of Ra-226 and Ra-228 activity accumulation and Th-228 buildup, which enables optimization of the filter strainer cloth operation time to comply with the radiological acceptance criterion of the incinerator plant for conventional hazardous waste. With current raw material characteristics, the operation time is about six month.

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