

## LABORATORY TRIALS AND TESTS FOR THE IDENTIFICATION OF THE OPTIMUM MIXTURE (PREPARATION) OF THE DENSE SLURRY OF ASH, FLY ASH, SULPHUR REMOVAL BY-PRODUCT FROM CET SUD, FOR HYDRAULIC TRANSPORTATION OF THE NEW RESULTING SLURRY, WITH THE EXISTING EQUIPMENTS, AT UTVIN DEPOSIT OF ASH AND FLY ASH

### Goal of the project

- The aim of the research activities consists in the reduction of the natural environment pollution due to the waste resulting from CET Timisoara. The resulted materials from the burning process, the fly ashes, are transported through pipes to an open deposit placed nearby Utvin village. To reduce the atmosphere and underground water pollution due to wind and water infiltrations into the soil, the fly ash is transported and deposited as dense slurry. By the research activity are determined the geotechnical parameters of the deposited slurry as a granular cemented material, stable from mechanical point of view after the sedimentation process.

### Short description of the project

- A. Experiments and laboratory findings to identify optimal blending network (preparation) of the sludge ash, slag, a by-product of desulphurization at CET South Timisoara, ensuring the resulting slurry transport depot slag safely without deposits on pipes or installations.
- B. Studies and laboratory determinations for establishing the category of waste and inert waste confirmation of the rock resulting from the sludge from waste combustion from CET Sud Timisoara to the new profile.
- Providing the services is the performance of the University Politehnica Timisoara at the request of local companies District COLTERM SA, analysis and determinations laboratory for getting the recipe optimal preparation of the sludge corresponding to the new profile and to adapt the existing operation of technology exhaust slag and slurries dense ash from CET Sud Timisoara to new operating conditions, which require:
  - The need for transport of desulfurization by-products (deriving from the treatment of flue gas);
  - The need for evacuation as dense and desulfurization sludge resulting from the treatment of flue gases;
  - requirement, compliance provisions: operating permits safe deposit ash and slag Utvin issued by the Ministry of Environment and Forests, nr. 202/3 / 20.12.2010 and the advice C.O.N.S.I.B. no. 202/3/2010;
  - The obligation of compliance with legal regulations, such as for example:
    - O.U.G. 244/2000 (Dam Safety Ordinance).
    - Quality Construction Law - Law No.10 / 1995, Section 5 (Obligations and responsibilities of building owners), article 25, pct.c), as amended and supplemented.

### Implementation period

May-October 2015



Instruments used for the research in UPT labs

### Main activities

- Step 1 – Determination of the recipe and permeability characteristics of the dense sludge
- Step 2 - Chemistry laboratory tests on components of the sludge, the sludge dense rock and water seepage
- Step 3 - Laboratory measurements on materials such as consolidated lands

### Results

- In order to prepare the new recipe comprising dense slurry and desulfurization residue or residues it is necessary to delay the crystallization of the products of chemical reactions based on calcium residue contained in the desulfurization.
- The time delay for the solidification of the sludge and residue comprising the desulphurisation product is realized in two ways: by using liquid additives or carbonation of the desulfurization residue using flue gas CO<sub>2</sub>.
- By applying the method for the preparation of the sludge using liquid additives to give a reaction retarding the solidification / crystallisation the resulted properties do not affect the curing of the slurry stored in the discharge of the sludge and the thus prepared material retains its pumpability for a period of 120 min.

## Results

- If an extension of the delay time of solidification of the sludge is desired one must apply recipes with additives with increased use of additives.
- One recommends the additive AD2 - WRDA 31 / R or similar, based on its technical report / comparable price.
- Technologically method of preparation of the sludge using liquid additive is much easier to implement and involves minimal changes in the sludge preparation facility exists inside CET South Timisoara.
- Experiments on the pilot plant for the preparation of the sludge by the method of carbonating are not conclusive but promising.
- Preparation of the sludge residue desulphurization by carbonation is possible to be implemented by the CET South Timisoara, but this is technologically difficult, as in order to implement it requires complex installations for carbonation which are major energy consumption.
- To prevent fouling of the pipe in the warehouse slurry transport system it is recommended to maintain optimal speed transmission through the pipelines pin the sludge; and states the use of additives which retard crystallization phenomena during the transport of the sludge in the hydraulic storage.
- The results of the performed laboratory tests pointed out that the granular material deposited as dense slurry (composed of 70 % fly ash and 30 % sulfur removal by-product) transforms after the pumping and depositing process in a material with high resistances, stable from mechanical and chemical point of view.

## Applicability and transferability of the results

1. Treatment process of residues resulting from the incineration of household waste by means of solidification – stabilization of the roc ash
2. Integration process for the sub-product of the dry desulphurization by a recipe of dense slurry for the hydraulic transport through pipeline system.

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District Local Company) COLTERM S.A



Test rig built up for the research (original set up) mounted in the UPT lab and on spot at the beneficiary for final tests

## Research Centre

- Research Centre for Thermal Machines and Equipments, Transportation and Environmental Pollution Control
- Research institute for renewable energy – ICER TM

## Research team

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