character of ground deformation. Spatial analysis of these coefficients values has identified high risk areas, and gives additional information in thegeological structures definition.

Power plants ashes recovery in eco-friendly mortar compositions

Cetean V.[1], Széll L.[2] and Ciornei N.[1]

[1]Procema Geologi S.R.L., Preciziei street, No.6, RO-062203 Bucharest, Romania, procema.geologi@gmail.com
[2]Procema Cercetare S.R.L., Cluj-Napoca, Beiusului street, No. 1, RO-400394 Cluj county, Romania, procema.cluj@clicknet.ro

The paper treats the possibilities to recover the waste from coal combustion in some power plants in Romania. The greenhouse gas and the ashes have a huge impact on environment and the living species. The using of ash – recovered wastes – induces decreasing of the demand of natural resources. They also reduce the energy - intensive production of other concrete ingredients, leading to energy saving and decreasing the "greenhouse gas" emission. Replacing one tone of cement with fly ash it would save enough electricity to power an average home for 24 days, and reduce carbon dioxide emissions equal to a two months use of an automobile.

During the study, in the experimental work were compared the properties of five different compositions of masonry mortars were prepared replacing the cement with different amounts of ash. The setting time and the workability were determined on the fresh mortar. After 28 days of hardening in standard conditions (5 days in moulds at 20°C and 90% humidity; 2 days without moulds at 20°C and 90% humidity; 21 days without moulds at 20°C and 65% humidity) the density and water absorption of the mortars were determined using the methods indicated in the European standards. The flexural and compressive strength of the compositions were determined after 28 and 56 days of hardening.

The fresh and hardened mortars characteristics were investigated. The compositions (cement, Zalau ash, sand and water, in different proportions) were prepared by forced mixing using a laboratory mixer. The fresh mortar was cast in metallic moulds obtaining 160x40x40 mm prisms which were subjected to testing in hardened state.

The study demonstrated that it is possible to use ashes in the mortar compositions, by replacing a part of the cement by ashes. The replacement of cement in proportion of 5, 10, 20 and 30 wt% was experimented. Thus, the setting times of the mortars increases. The difference between the initial setting time of the composition without ash and the composition in which 5 wt% of cement was replaced by ash is only 5 minutes. The differences are bigger for higher ash content; it reaches 80 minutes for composition 5 in which 30 wt% of cement was replaced by ash.

The differences are more evident in the case of the final time of setting, where replacement of 5 wt% cement lead to a 30 minutes longer final setting time and replacement of 30 wt% cement with ash a 310 minutes longer time, which means an increase of 1,5 times.

In the case of mortars workability no differences were observed between the composition with no ash and the composition in which 5 wt% of cement were replaced, after that every 10wt% of cement replaced by ash brings 5 minutes in plus.

The density increases slowly by replacing 5% of cement, after that a decrease is observed, every sample densities being under the density of the standard composition. The water absorption is in agreement with the results obtained for the densities. The water absorption decreases from 8.96 % (in the standard composition) to 8.34% (for composition 2 with 5wt% ash). For the other compositions the value of absorption increases to 12.87%, while the ash proportion was increased to 30 wt%.

The values for the mechanical strength state the observations at the density and absorption determination. For the composition with 5 wt% ash was observed an increasing of flexural and compressive strength. While the ash content was increased the mechanical strength decreased and it is situated below the standard composition strength. The mechanical test after 56 day of hardening shows that the strength increase is higher for the compositions with ash.

It can be concluded that the Zalau power plant ash can be used in mortar compositions 5 wt% replacement of cement by ash brings both economical and qualitative benefits.

Protection measures against geological failures, during the construction of Thessaloniki - Kavala Section of Egnatia Highway in N. Greece

Chatziangelou M. and Christaras B.

Department of Geology, School of Geology, Aristotle University of Thessaloniki, 54124, Thessaloniki, Greece, mcha@geo.auth.gr, christar@geo.auth.gr

The present paper refers to the major part of the Egnatia highway, about 100 km long, which connects Thessaloniki and Kavala cities in North Greece. Actually, it is divided in three parts: i) Nymphopetra-Asprovalta, about 40 km long, ii) Asprovalta-Strymonas, about 20 km long and iii) Strymonas-St. Andreas, about 40 km long. The highway has already been constructed. Driving from the west to the east, the highway, at the beginning of Nymphopetra-Strymonas part, passes nearby Volvi lake, at the foot of Vertiscos Mountains. Easterly, it passes through Kerdillia Mountains, Strymona's river and it leads to Pangeo's mountain, ending through Symbol Mountains. The highway also passes through five tunnels; i) Vrasna tunnel, which is located at Nymphopetra – Asprovalta's part, ii) Asprovalta's tunnels, which are three tunnels locating at Asprovalta – Strymona's part and iii) Symbol tunnel, which is located at the last Strymonas – st. Andrea's part. The paper describes the support measures against geological failures during the construction of the highway. For this purpose, the mechanisms of sliding and rock falling procedures were studied. As far as slopes concern, the orientation of the discontinuities and the poor quality of the rock mass, that creates cyclic sliding, were responsible for the instabilities. Rainfall also helps landslides to be occurred. During the tunnelling excavation, the sliding along a plane, the décollement from the roof and the fall of wedges were the common failure causes.

Historical faulting in Aghios Konstantinos area (central Greece), based on archaeological indications

Chatzipetros A.[1], Pavlides S.[1], Caputo R.[2] and Ganas A.[3]

[1]*Department of Geology, Aristotle University of Thessaloniki, 54124, Thessaloniki, Greece, ac@auth.gr, pavlides@auth.gr*
[2]*Department of Earth Sciences, University of Ferrara, 44100, Ferrara, Italy, rcaputo@unife.it*
[3]*Institute of Geodynamics, National Observatory of Athens, 11810, Athens, Greece, aganas@gein.noa.gr*

Aghios Konstantinos lies on the foothills of the Atalanti fault system scarps. The area is located in central Greece and the fault system is the primary morphology-controlling agent. It defines the west shoreline of northern Euboea gulf and is associated with several historical earthquakes.

Morphologically this zone forms steep high bedrock scarps, on the foot of which extensive colluvial deposits are observed. Several minor fault scarps have been mapped and they were classified in three classes: a) bedrock fault scarps with visible fault plane, b) soft-sediment scarps with visible fault plane and c) soft-sediment scarps with no visible fault plane. The minor scarps are generally aligned in en échelon pattern, following the general WNW – ESE trend of the major fault zones, while their general dip direction is towards the NNE. Fault analysis shows that there is extensive tilting of hangingwall blocks, as well as of the minor faults themselves. Faults tend to "lock" with each other forming a complex pattern that is inherited to the overlying Upper Miocene-Pleistocene and Holocene sedimentary cover.

A small settlement was found at "Karvouna" site, west of Aghios Konstantinos, during the works performed for the construction of a new segment of E75 highway. This settlement comprises of low-lying houses, storage rooms and a small temple. A larger and more