



We would like to inform you that the University of Pécs organises “mini” research conferences-workshops called “Almond Blossoming Days” in different topics.

The University of Pécs was founded in 1367 and it is the oldest University of Hungary, and one of the oldest universities of Europe with 30000 students (<http://english.pte.hu>).

The city of Pécs was the Cultural Capital of Europe in 2010, and it is located at the Southern part of Hungary, 200 km from Budapest.

One of the topics is

### **“Collapses – understanding the problems and finding solutions”**

The mini geotechnical conference-workshop will be held on the **2<sup>nd</sup> of March, 2012**. at the representative aula of the University. (<http://www.mandula.pte.hu>)

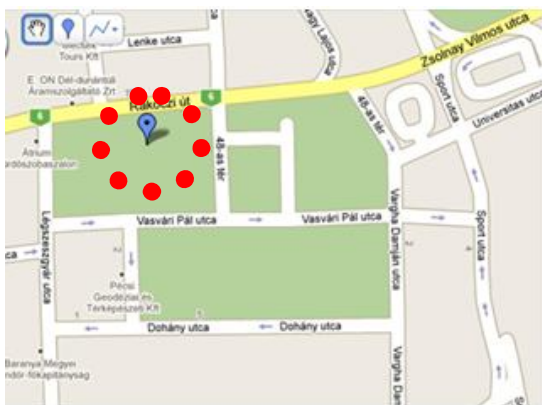
The co-organizers of the workshop are: The International Society of the Soil Mechanics and Geotechnical Engineering (ISMGE) Hungarian Committee, and the ISSMGE TC 302 Committee (Forensic Geotechnical Engineering), Regional Committee of the Hungarian Academy of Sciences at Pécs, and the Pollack Mihály Faculty of Engineering and Information Technology.

The workshop language is English. Simultaneous interpretation is provided.

Only the accommodation is to be paid by the participants. **Pre-registration required.**



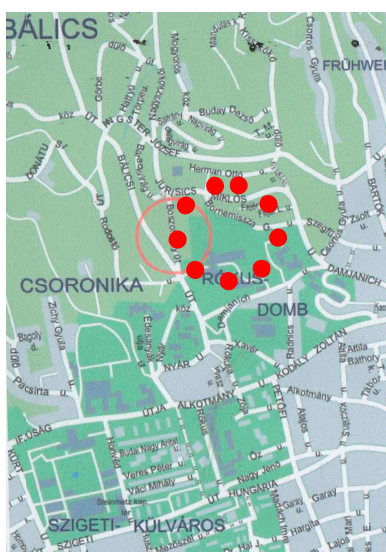
The place of the workshop is the Dr. Halasy-Nagy József Aula, PÉCS



Venue of the workshop: University of Pécs, Dr. Halasy-Nagy József Aula, PÉCS, Rákóczi street 80.



After the official lectures we organize a dinner in a wine cellar of the famous wine region, Villány. We provide transfer to the cellar and back to Pécs by buses.



Together with this program the professional college student members organize an exhibition in the faculty assembly hall, presenting more than 100 photos and engineering presentations on the red mud disaster; not only the disaster, but first of all the engineering analysis of the causes of the disaster.

The exhibition open 1<sup>st</sup> of March and 2<sup>nd</sup> of March. Pollack Mihály Faculty of Engineering and Information Technology, Pécs, Boszorkány u.2.

The number 37 bus runs from the train station and the stop of the street is "Rodosto".

On 1<sup>st</sup> of March and 2<sup>nd</sup> of March organize a major exhibition of Pécs Expo area. The event is the largest technical exhibition in South Transdanubia's called Pollack-Expo. There are more than 150 exhibitors at the exhibition area of 4000 m<sup>2</sup>. The number of visitors in recent years has exceeded 3000. There will be 50 oral presentations about various firm products, new technologies. <http://pollackexpo.hu/galeria>

From the faculty building (Pécs, Boszorkány u.2.) there will be a free bus service every hour, between Pollack Expo exhibition area and back.



Oral presentation at the Pollack-Expo 2011



One of the exhibition halls

## FAILURES: FROM UNDERSTANDING TO SOLUTIONS

In recent years there have been several extensive failures, the background and cause of which are not known to the public; there have been plenty of untrue opinions which were not based on factual knowledge. The topic of the scientific session is the presentation of the complex causes of the failures, putting special emphasis on **understanding, the drawing of conclusions and – after obtaining this information – the seeking of appropriate and rational solutions.**

The main topic of the lecture session is the question of the stability of flood protection and special tailings dams. Due to its location in the Carpathian Basin, Hungary has special hydrographical features, since it **can be considered one of the most closed basins of the world** but which – fortunately – has a run-off. **The length of flood protection dams in Hungary is 4200 km, there are 646 settlements in the area protected by these dams, giving home to 2.3 million people. 40% of arable lands and 32% of the railway tracks are found in the protected areas.** The presentation of Heinz Brandl, professor of the Technical University of Vienna, offers an interesting review on the question of stability of flood protection dams illustrated by practical examples and good solutions.

Everybody was shocked by the disaster caused by the rupture of the dam of the 'red sludge' reservoir. A scientific analysis of the engineering causes of the rupture is presented based on the work carried out by the experts of PTE PMMIK.

The presentation entitled 'The risks of climate change for the Hungarian motorway network' which contains the findings of the PTE PMMIK OTKA research is connected to the topic of.

### LECTURERS



**PROF. DR. HEINZ BRANDL**  
Vienna University of Technology



**PROF. DR. MECSI JÓZSEF**  
University of Pécs

**Prof. Dr. András Tímár** **Prof. Dr. Mihály Klincsik**  
University of Pécs



**PROF. DR. JÁNOS SZÉPVÖLGYI**  
Research Institute of Chemistry,  
Hungarian Academy of Sciences



2 March 2012 (Friday)

Venue: University of Pécs, Faculty of Business and Economics (PTE KTK) Dr. Halasy-Nagy József Aula (Pécs, Rákóczi út 80.)

<b>Damage Cases Through Understanding to Solutions</b> <b>Chairman: Prof. József Mecsi, PhD habil.</b> (University of Pécs, Pollack Mihály Faculty of Engineering and Informatics (PTE PMMIK) – Department of Materials Science, Geotechnical and Transport Engineering, President of the Hungarian National Committee of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE))				
13.20 - 13.25	<b>Prof. Dr. József Mecsi</b>	professor	President of the Hungarian National Committee of ISSMGE	<b>Topic initiator</b>
13.25 - 14.05	<b>Prof. Dr. Heinz Brandl</b>	Professor	Vienna University of Technology	<b>Failures of Flood Protection Dyke</b>
14.05 - 14.45	<b>Prof. Dr. József Mecsi</b>	professor	PTE PMMIK, Department of Materials Science, Geotechnical and	<b>Engineering Analyses Related to Tailings Dam Failures and the Lessons Drawn</b>
14.35- 14.50	<b>Prof. Dr. János Szépvölgyi</b>	professor, institute director	Research Institute of Chemistry, Hungarian Academy of Sciences	<b>Material properties in the red mud disaster</b>
14.50- 15.05	<b>György Kossa</b>	colonel, head of the National Industrial Safety Authority	National Directorate General for Disaster Management, Ministry for Home Affairs	<b>Industrial Safety in the Mirror of Redsludge Disaster</b>
15.15 - 15.25	<b>COFFEE BREAK</b>			
15.25 - 16.05	<b>Prof. Dr. András Tímár</b> <b>Dr. Mihály Klincsik</b>	professor emeritus professor	PTE PMMIK, Department of Public Utilities, Geodesy and Environmental Engineering PTE PMMIK Department of Engineering Mathematics	<b>The Impact of the Frequency of Extreme Weather Conditions on the Condition, Maintenance and Operational Costs of the Hungarian Public Road Network</b>

# Failures of Flood Protection Dykes

O.Univ.-Prof.Dipl.-Ing. Dr .techn. Dr.h.c.mult. Heinz BRANDL

## Abstract

The increasing frequency and magnitude of floods have caused several catastrophic events since the year 2002 in Middle and Eastern Europe.

The knowledge of possible failure modes is an essential prerequisite for a reliable quality assessment of existing dykes/dams and for an optimized design of new ones and for rehabilitation work.

The dominating failure modes are:

- Slope failure due to excessive pore-water pressures, seepage or inner erosion
- Overtopping of the dyke/dam crest;
- Slope failure due to a quick drop of the flood water level;
- Hydraulic fracture;
- Surface erosion and failure of the water-side slope due to wave action;
- Piping due to animal activities, especially from beavers and rats;
- Unsuitable planting of dykes (especially trees with flat roots).

The Keynote Lecture bridges the gap between theory and practice giving several examples of failures, rehabilitation work and quality assessment. Special cases (e.g. beaver attack) are also mentioned - and the fact that hydraulic failure due to a critical hydraulic gradient is frequently underestimated.

# Engineering Analyses Related to Tailings Dam Failures and the Lessons Drawn

Dr. József Mecsi (PTE PMMIK)

mecsi@pmmik.pte.hu

## Abstract

This presentation aims at providing an informative fact-based description of the complex reasons resulting in dam ruptures. The investigations focus on the tragic damage of redsludge reservoir X in Ajka and restrict to the engineering aspects of the damage without studying the chemical effects of an alkaline medium.

The analysis of the direct and indirect reasons for the tragic incident may serve as a lesson to our engineers and specialists as well as provide guidelines and revelations with the intention of improvement while emphasizing the necessity of deeper comprehension.

Neither this presentation nor the engineering analyses aimed at the search for scapegoats behind the failures.

(After studying further data, the investigations and consequences can be subject to complement, refinement.)

After showing the caused damage in pictures, the presentation touches on the following basic conditions:

- relief and height conditions;
- characteristic features of subsoil and groundwater conditions in the surroundings of the damaged dam body;
- characteristic features of the dam body;
- characteristic and specific features of 'red sludge'.

Engineering interventions carried out in accordance with environmental regulations:

- to emborder the reservoirs with slurry-curtain walls.

Demonstration of the impacts affecting the dam body and their specific features:

- monitored data on groundwater levels and groundwater pressures;
- rainfall amounts between the years of 2000 and 2010;
- experience on measuring water yield on the basis of the data measured by the drainage system built in the surroundings of reservoir X/a;
- wind speed and wind direction conditions in the investigated area;
- the effects of loading the internal slope on the rigid movements of the dam body;
- experience on satellite monitoring.

After demonstrating the above mentioned conditions, the presentation reveals the complex engineering reasons resulting in the failure (rupture) of the dam body (without trying to be complete).

It also provides an overview of similar dam tragedies abroad.

**The author of this analyzing work was guided by the intention to reveal the engineering reasons and conditions leading to this tragic incident and to show, with true humility towards science, how to avoid the recurrence of such damage cases.**

# THE IMPACT OF THE FREQUENCY OF EXTREME WEATHER CONDITIONS ON THE CONDITION, MAINTENANCE AND OPERATIONAL COSTS OF THE HUNGARIAN PUBLIC ROAD NETWORK

*Dr. Klincsik Mihály – Dr. Timár András (PTE-PMMIK)*

## Abstract

The research was carried out in the scope of the research contract OTKA-NKTH K69164 entitled '*A New Method for the Definition of Design Parameters for Meteorological Impacts (2007-2011)*' at the Pollack Mihály Faculty of Engineering and Information Technology, University of Pécs concerning the Hungarian public road network which was approximately 31,600 km long at the end of 2010. The authors defined the temporary matrix of Markov chains deduced from the typical data of change in the condition of the Hungarian road network between 2000 and 2010. Then they predicted the matrix depending on the changes of the main influencing factors.

Using the data of extreme weather conditions in 2010 they put forward a proposal on the definition of extreme climatic events which can be applied in the calculation of the risk of climate change for the road network and in the classification based on their frequency and the economic damage caused by them.

Based on the frequency of extreme weather events that may influence the condition and performance of the national road network and the estimated probability of these changes, they estimated the increase in maintenance and operational costs caused by these kinds of events.

They found that the change in the condition (accelerated deterioration) of the Hungarian road network due to the expected increase in the frequency of extreme weather events between the years 2070 and 2100 (compared to 1960-1990), and consequently the increase in the average annual maintenance and operational costs. These extra costs can be managed with slightly modified design, construction, maintenance and operational procedures, which are already in use today, and through the provision of essential, significant funding for their execution.