European Working Group on Internal Erosion
In Embankment Dams & Their Foundations

Program

21st ANNUAL MEETING

18th to 21st of June 2013
Vienna / Austria

Univ. Prof. Dipl.-Ing. Dr.techn.
Dietmar Adam
Vienna University of Technology
Institute of Geotechnics

Dear members of the Working Group,
Dear participants of the 21st Annual Meeting,

Welcome to the "birthplace" of modern Science of "Soil Mechanics"!
The publication of Karl von Terzaghi's fundamental book "Erdbaumechanik" with the addendum "auf bodenphysikalischer Grundlage" (Mechanics of Earthwork based on Soils Physics) published in Vienna, 1925, is considered worldwide as the birth of modern Science of "Soil Mechanics". In 1928 Karl Terzaghi was appointed as full professor at the Technische Hochschule Wien (now Vienna University of Technology), where he founded the Institute of Soil Mechanics and Ground Engineering as a new branch of the Department of Hydro Engineering. Hence, it was internally also called "Hydro-Engineering II", and this underlined from the very beginning the close link and interaction between soil and water, or soil mechanics, hydrogeology and hydro engineering, respectively.

Karl von Terzaghi's close relationship to hydraulic engineering can be outlined by his well-known fundamental findings with respect to mechanics of piping due to heave and the formulation of the elementary filter criteria (named after him) amongst many other pioneering works in this field.

Since those times hydraulics of soils has been continuously in the focus of the research interest at the Institute of Geotechnics (today's name of the institute). Current disastrous floods in Austria and in other countries in Central Europe highlight the importance and timeliness of flood protection dikes, levees and dams, one of the main areas of research, which was established by Prof. Heinz Brandl more than one decade ago.

During the meeting ongoing projects will be demonstrated and, moreover, a technical visit to the large scale internal erosion test facility of the Institute of Geotechnics northeast of Vienna will be offered. Current experimental tests serve to investigate the time-dependent behavior of groundwater flow and to quantify the outflow from relief elements (stone columns) by underseepage of dams and dykes during hydraulic loading.

I wish you an interesting Meeting on Internal Erosion in Embankment Dams & Their Foundations with fruitful discussions and memorable social events in the venerable ambience of the Vienna University of Technology. I hope you feel a bit of Karl von Terzaghi's spirit during your stay in Vienna!

Prof. Dr. Dietmar Adam
Institute of Geotechnics

Rodney Charles BRIDLE
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Dam Safety Ltd, United Kingdom

I write on behalf of the Chairman of the ICOLD European Working Group on Internal Erosion, Dr Stephane Bonelli. He sends deep apologies to our hosts and colleagues for being unable to be with us. We are most grateful to our Austrian colleagues, Prof. Dietmar Adam and Dr. Alexius Vogel, for inviting us to the Vienna University of Technology. It is a delight to be here, where, in 1928, Karl Terzaghi, the father of soil mechanics, was appointed as Professor of Hydraulic Engineering II, which included the new subject of soil mechanics. We much appreciate that Professor Heinz Brandl, Terzaghi's retired successor is with us today as well. Professor Terzaghi travelled widely on consulting assignments from Vienna, advising particularly on drainage and filtering to defend against internal erosion. When at the Institution of Civil Engineers in London, he spoke of piping in dams and outlined the principles of critical hydraulic gradient (of about one) causing heave. He inspired Professor Alec Skempton, who many years later, working with an undergraduate student, wrote an authoritative paper showing that erosion could occur at gradients less than one – in soils susceptible to what we now call suffusion. The good effects of the Vienna University of Technology continue to play a part in our work on internal erosion. We hope that we will be inspired while here to complete our major task – the ICOLD Bulletin on Internal Erosion – and advance our understanding of internal erosion and the ability of dams to resist it.

Dipl.-Ing. Dr.techn.
Alexius Vogel
Risk Assessment DI Dr.A.Vogel GmbH

Considering the aspect of recent flood events in Europe and many other countries in the world the safety of water retaining structures and the threat of dam failures, connected with economical and human damages are facts of our daily life. If we consider that such events are global realities and strike all countries, the world-wide communities are confronted in average with one dam failure per week and with the failure of a large dam every two months.

Catastrophic failures of levees and dikes which strike in some times also historical structures, which stand in operation under flood conditions during very short periods within a year, have changed the opinion that low dams are structures without risks.

Failures of tailings dams connected with the loss of the structural integrity and the outbursts of storages are always connected with pollution of the environment.

After the failure of any kind of storage facilities investigations are executed to assess the circumstances and investigate the causes and impacts of such events. Today it is obvious that internal erosion is the main cause for the destruction of storage facilities. Failure facts are often published somehow, somewhere and it is necessary and helpful to record this knowledge for coming generations of dam safety engineers.

	MONDAY, June 17, 2013
16:00-18:00	Registration

	TUESDAY, June 18, 2013
8:30	Registration
9:30 - 10:00	Welcome session
10:00 - 10:15	Session I: Data (on IE failures, incidents) Chairman: Riha J. **Vogel A.:** *Internal Erosion Dam Failure Cases*
10:15 - 10:45	Coffee break
10:45- 11:05	**Redlinger C.**: *Wister Dam Case History*
11:05 - 11:40	Session II: ICOLD Bulletin Internal Erosion *Vol.1. Processes and Engineering Assessment* Chairman: Riha J. **Bridle R.**: *The ICOLD Bulletin on Internal Erosion in Existing Dams*
11:40 - 12:00	Discussion
12:00 - 13:15	Lunch
13:15 - 13:55	Session III: ICOLD Bulletin Internal Erosion Vol.2. Investigations, testing, monitoring and detection, remediation and case histories Chairman: Tschernutter P. **Bridle R.**: *Presentation of Vol. 2 of the ICOLD Bulletin*
13:55 - 14:15	**Beck Y.L.**: *Progress to date on the table summarising information about Geophysical Methods*
14:15 - 14:45	Discussion
14:45 - 15:15	Coffee break
15:15 - 15:35	Session III cont.: ICOLD Bulletin Internal Erosion Vol.2. Investigations, testing, monitoring and detection, remediation and case histories Chairman: Tschernutter P. **Bridle R.**: *Monitoring for internal erosion before it happens*
15:35 - 15:55	**Smith M.**: *Monitoring for internal erosion, case histories*
15:55 - 16:30	Panel discussion
19:00	Welcome Reception TU Vienna

	WEDNESDAY, June 19, 2013
9:15 - 9:45	Session IV: Risk Assessment Chairman: ? **Hartford D.**: *Roles for soil mechanics and systems theories in the analysis of dam failure risks from internal erosion*
9:45 - 10:00	Discussion
10:00 - 10:30	Session V: Hydraulic approach Chairman: ? **Hoffmans G.**: *Piping determined by internal erosion and heave*
10:30 - 10:45	Discussion
10:45 - 11:15	Coffee break
11:15 - 11:35	Session V cont.: Hydraulic approach Chairman: ? **Vandenboer K.**: *Physical erosion mechanism of the progression of backward erosion piping*
11:35 - 11:55	**Bezuijen A.**: *Piping, influence of singularities in the groundwater flow equations*
11:55 - 12:10	Discussion
12:10 - 13:25	Lunch
13:25 - 13:45	Session VI: Experimentation Chairman: ? **Szabo M.**: *Experimental and numerical modelling analysis of the effectiveness of relief drainages by underseepage of dykes*
13:45 - 14:05	**Shire T.**: *The application of a network model for the suffusion form of internal erosion*
14:05 - 14:20	Discussion
14:20 - 14:50	Coffee break
14:50 - 15:10	Session VI cont.: Experimentation Chairman: ? **Marot D.:** *Systematic method for assessing soil sensibility to suffusion process*
15:10 - 15:30	**Benamar A.:** *Assesment of the suitability to suffusion of a dam earthfill*
15:30 - 15:50	**O'Sullivan**: *Micromechanical evidence for a hydromechanical envelope governing the onset of internal instabililty in cohesionless soils*
15:50 - 16:05	Discussion
20:00	Cocktail Reception City Hall of Vienna

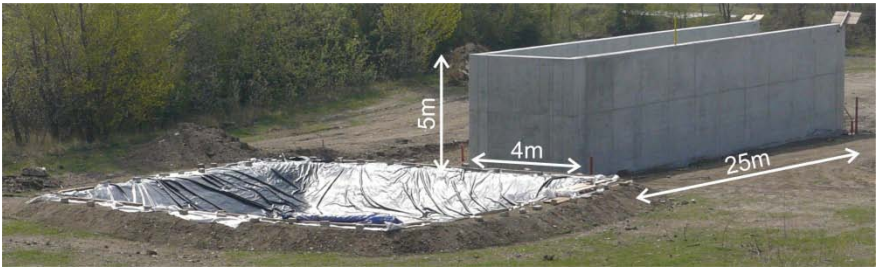
	THURSDAY, June 20, 2013
9:15 - 9:35	Session VI cont.: Experimentation Chairmen: Marot D. **Philippe P..:** *Stochastic modelling of contact erosion test from flow measurements at the pore-scale*
9:35 -9:55	**Beguin R.:** *Laboratory detection of contact erosion initiation and progress at a plurimetric-scale*
9:55 - 10:15	**Douglas K.**: *Backward erosion piping of dams – experimental progress*
10:15 - 10:25	Discussion
10:25 - 10:55	Coffee break
10:55 - 11:15	Session VII: Monitoring Chairman: Sjödahl P. **Beck Y.-L.**: *On-site validation of fiber optic technology for leak monitoring: what experiments have been done?*
11:15 - 11:35	**Smith M.**: *Seepage detection methods, a dam owner's perspective*
11:35 - 11:50	Discussion
12:00 - 13:15	Lunch
13:15 - 13:35	Session VIII: Remediation Chairman: Redlinger Ch. **Di Pietro P.**: *Stabilizing and waterproofing a levee in Italy / Geotechnical and hydrological challenges of repairing a levee on the* Ombrone River
13:35 - 13:55	**Herrier G.**: *Internal erosion resistance of soils treated with lime: an evolutive benefit*
13:55 - 14:10	Discussion
14:10 - 14:40	Coffee break
14:40 - 15:00	Session VIII cont.: Remediation Chairman: Redlinger Ch. **Koelewijn A.**: *Tests on backward erosion prevention measures on various scales*
15:00 - 15:20	**Müller G.**: *Innovative Soil Sealing - BioSealing*
15:20 - 15:35	Discussion
15:35 - 15:50	Annual meeting summary

	FRIDAY, June 21, 2013
9.30 - 12:30	Technical Tour (optional)

Technical Tour

Site Visit "Large Scale Testing Plant – Effects of Seepage beneath Dams"

In the scope of the site visit the large scale testing plant of the Institute of Geotechnics, Vienna University of Technology, located in a quarry north-east of Vienna will be presented, where large scale model tests on a dam section including the subgrade are currently performed. The experimental tests serve to investigate the time-dependent behavior of groundwater flow and to quantify the outflow from relief elements by underseepage of dams during hydraulic loading. The relief stone columns are installed on the landward dyke toe to reduce the risk against hydraulic failure during simulated flood stages. At the same time they increase the safety factor for the stability of the dam.



Testing plant of the Institute for Geotechnics, Vienna University of Technology, for large scale model tests on dams including subgrade.

Aquifer “sandy gravel” after installation (left); large scale dam model (right)

Preliminary tests

ORGANIZERS:

RAI (Risk Assessment International)
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http://www.risk-assessment.at

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