

Hydro Asia  
Kuching Malaysia  
March 29-30, 2010

ICQP-Bridges  
Delhi-India  
May 25-27, 2010

Hydro 2010  
Portugal  
Sep 27-29, 2010



**MARCH 2010**

### Chairman's Note

Incorporated in 1966, Encardio-rite is a leader in the field of Instrumentation and Monitoring of Civil Structures during construction and post construction.

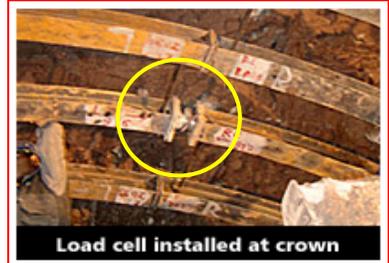
This is first of our bi-monthly newsletters. You will regularly get them. In these newsletters, in addition to giving information on our Company, we will also give information on useful field experiences on Instrumentation and Monitoring. For example in this newsletter, we are giving information on instrumentation of concrete segments during TBM tunneling. We are also giving results of excessive subsoil grouting resulting in more than allowed lateral movement.

### INSTRUMENTATION OF SEGMENTAL LINING FOR A MACHINE BORED TUNNEL

Method of tunnel construction involves excavation by TBM and simultaneous erection of segmental concrete lining that provides both support and a final lining. The concrete segments are earlier cast and then transported to site. Easy way of instrumenting the segments during concreting is illustrated in the three adjoining pictures. Top picture shows mounting of an Encardio-rite concrete pressure cell and a few Encardio-rite embedment strain gages in different axis before concreting. The bottom picture shows the segment being completed. These pictures are courtesy our Marketing Associate GD Test Srl in Italy who used the instrumentation for online monitoring of the stresses in the segments.



### RAIL TUNNEL PROJECT IN HIMALAYAN RANGE



USBRL project could be described as one of the largest and most challenging railway project in the world. Encardio-rite is instrumenting 20 large tunnels on this rail link project, including the around 11 km long Pir Panjal Tunnel. The toughest section of this stretch is the 90 km long Katra to Laole section in which 80 % of the railway line passes through a tunnel or is on a bridge. Encardio-rite is doing the instrumentation work on turnkey basis, which includes supply, installation and monitoring of data.

## EXCESSIVE GROUT INJECTION PRESSURE DETECTED BY INCLINOMETER

Data analysis of inclinometer results, which showed excessive deformations at an increasing rate at around 15 m from the installation's top, revealed that the grouting pressure was the culprit!

The above happened in one of our projects in the Middle East region, where grouting

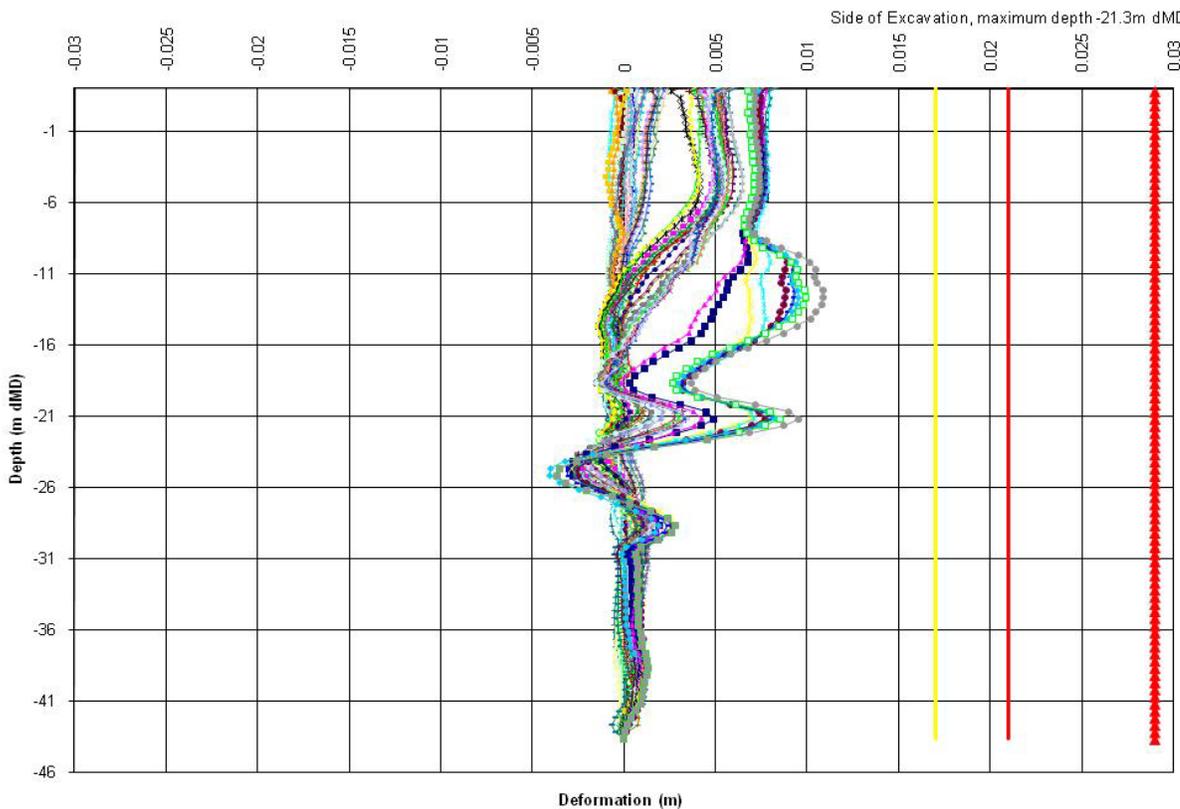
was carried out in the TBM launch area adjacent to a TBM launch shaft, for ground improvement purpose. The deformation with respect to the base readings - which were established long before the activities started, increased towards the excavated area as the grouting proceeded.

Seeing the above deformation (mm) v/s depth (m) results, in which the deformations approached the alert level of 17 mm set by the project designers,



grouting pressures were moderated not only for the above site but also for the future ground improvement works in other areas of the project.

Inclinometer in diaphragm wall



## DAM IN TURKEY

Encardio-rite recently supplied instruments and provided Installation services for Koprubasi dam in Turkey. Contractor for this project is Yüksel Enerji Elektrik Üretim ve Ticaret AŞ Owner is General Directorate of State Hydraulic Works (DSİ).

## DAM IN NEPAL

Encardio-rite recently also bagged an instrumentation job of Chameliya HEP in Nepal including concrete gravity dam. Installation works will start soon. Contractor for this job is a China based Company. Instrumentation scheme includes piezometers, pressure cells, strain gages, joint meters, water level measurement, weather station, strong motion accelerometer, and automatic data acquisition system.

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