

**IEA - ECES
THE 46th EXCO MEETING IN LULEÅ, JUNE 14-16**

June 7, 1999

**ANNEX 13
DESIGN, CONSTRUCTION AND MAINTENANCE
OF UTES WELLS AND BOREHOLES**

PROGRESS REPORT 3

1. General information

Annex 13 cover aspects of testdrilling, well and borehole design, construction and maintenance of wells and boreholes for UTES applications. The main target is set upon aquifer and borehole systems (ATES and BTES).

The final goal of the Annex is to work out a set of guidelines covering the following subtasks.

- How to gain information of the underground properties by testdrilling (Subtask A)
- How to design well or borehole systems properly (Subtask B)
- How to construct wells or boreholes cost effective, safe and properly (Subtask C)
- How to keep the storage systems functional during operation (Subtask D)

The annex was planned during 1997 and eventually approved by the 43rd EXCO Meeting in Paris 4-5 of December 1997.

Prior to the EXCO meeting there was a Annex Preparatory Workshop to review and correct the annex proposal.

The workplan takes into consideration that a number of participating countries will contribute to the further development of the annex following the task shearing principle. The target is set to finalise the work at the end of year 2000.

2. Previous events

The Annex started with a minor Workshop in Stockton, March 18, 1998 and continued with a first Expert Meeting in Giessen, June 15-16, 1998.

During these meetings the over all workplan was established and the project was consolidated in its working forms.

As was reported on the 44th EXCO Meeting in Chester, June 22-24 most participating countries were still in a starting stage, trying to form national "working teams", and looking for financial resources for their work. Nether the less, a lot of valuable state of the art information was presented as the first input to the state of the art report.

The 2nd Expert Meeting took place in Malmö, Sweden, October 12-13 and the results were reported to the 45th EXCO Meeting in Albuquerque, December 7-10. A general conclusion from this meeting was that there are still problems with organising and financing the work in several participating countries and that this will delay the progress of the work. However, a lot of useful information was presented for the benefit of the scope of the annex.

3. Results from the 3rd EM

3.1 General

The third Expert Meeting took place in Appenzell, Switzerland March 17-19.

The proceedings were held at hotel Hof Weissbad and with Foralith AG represented by Stefan Berli as host.

3.2 Participants and countries represented

The meeting was attended by 12 persons, representing eight different countries. These were

- Belgium (1)
- Canada (1)
- Denmark (1)
- Japan (1)
- Netherlands (1)

IEA - ECES
June 7, 1999
Annex 13
Design, construction and maintenance of utes
wells and boreholes
Progress report 3

- Sweden (4)
- Switzerland (1)
- USA (2)

Two countries were missing (Turkey and Germany). The German representative reported not being able to come due to other obligations, while Turkey reported financial reasons. Japan and Denmark attended the meeting as observers.

3.3 Current status each country

The current situation when it comes to forming national working teams, financial questions and level of participation as expressed at the meeting is shown in table 1.

Table 1 Current country status

Country	Joinment	Financial support	Working team
Belgium	Formal	Missing	Not achieved
Canada	Formal	Some extent	Under progress
Denmark	Observer ¹⁾	Private	Not applicable
Germany	Observer ²⁾	Missing	Not applicable
Japan	Observer ³⁾	Not yet known	Under progress
Netherlands	Formal	Fully	Formed
Sweden	Formal	Fully	Formed
Switzerland	Informal ⁴⁾	Private	Not applicable
Turkey	Formal	Missing	Not achieved
USA	Formal	Fully	Formed

- 1) Private company interest, active
- 2) Active linked to Annex 12. Private company interest
- 3) Will be formally joined in June
- 4) Private company interest

3.4 Presentations and discussions

All together eight presentations were made. Related to the annex subtasks, these were

Subtask A

- Recent developments of thermal conductivity testing in USA. *J Spitler, USA*
- The selection of sites suitable for ATES in Japan. *H Umemiya, Japan*

Subtask B

- Experimental results regarding different borehole tubing. *G. Hellström, Sweden*
- Different alternatives for well design at Ramlösa - a case study. *A Malmberg, Sweden*

Subtask C

- Conventional and advanced drilling methods for geothermal drilling applications. *S Berli, Switzerland*
- Efficiency of different well development methods. *O Andersson, Sweden*

Subtask D

- Chemical treatment procedures and experiences in Sweden. *O Andersson, Sweden*
- Presentation failure check list for existing UTES plants. *G Bakema, The Netherlands*

Following the presentations there were general discussions on two special topics.

- Borehole tubing, and
- well development methods

The reason was to find out differences in technologies being used and different views in approach.

3.5 Findings and conclusions

At the closing of the meeting it was concluded that the finalisation of the state of art reports will be delayed. This is due to the fact that many countries have had financial and organisation problems.

Even if valuable information's from some countries are missing the most essential material (form a technical point of view) have now been obtained to form state of the art draft reports.

There are also enough findings to start to identify areas or subjects for further research and development. A number of these are stated in table 2. Most of these will be further analysed in the evaluation phase of the annex, but some might come up as approved subjects for research and development (R/D).

Table 2 Potential areas/subjects for further research and development

Related subtask	Areas on subjects for further analyses and R/D activities
A (Site investigations)	<ul style="list-style-type: none"> • Reliability of samples at different drilling methods (ATES) • Cost effectiveness and technical value of using MWD, Geophysical logging and Flowlogs (ATES) • Duration of Thermal Response Test (TRT) versus data quality (BTES) • Uncontrolled disturbances using TRT and their effects on data quality (BTES)
B (Design)	<ul style="list-style-type: none"> • Drilling cost versus working temperature requirements when selecting tubing (BTES) • Choice of back fill material with respect to thermal properties and legislation's (BTES) • Additional criteria for screen design to minimise the flowrate factor (ATES)
C (Construction)	<ul style="list-style-type: none"> • Drilling costs related to methods and countries (ATES/BTES) • Potential UTES applications for the hydraulic DTH system (ATES/BTES) • Installation problems using new type of tubes (BTES) • Sealing methods for boreholes using the coaxial tubing system (BTES) • Quality differences on gravel packs related to method of

	placement (ATES) <ul style="list-style-type: none"> • Efficiency evaluation of different well development methods (ATES)
D (Main- tenance)	<ul style="list-style-type: none"> • Efficiency evaluation of different well rehabilitation methods (ATES) • Criteria for the usage of advanced monitoring systems (ATES/BTES)

4. Workplan

4.1 Time schedule

The state of the art reports will be delayed of a certain extent. This will not have a major effect on the evaluation phase. This phase will instead be more integrated with the state of the art work.

4.2 Homework

Till the next meeting participating countries have the obligation to forward information's to the subtask leaders.

The subtask leaders are to work out draft reports and have them sent to the co-ordinators prior to the meeting.

4.3 Next meeting

The 4th expert meeting will be hosted by National Ground Water Association, Ohio, USA. The date is preliminary set at October 6-9, 1999.

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