

**IEA - ECES
THE 48th EXCO MEETING IN ADANA, MAY 24-27, 2000**

May 15, 2000

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

PROGRESS REPORT 5

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 an 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. However, an extension in time has been recommended by the participating experts.

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 1998 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 1998 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.

The 3rd Expert Meeting took place in Appenzell, Switzerland, March 17-19 1999 and the results were reported to the 46th EXCO Meeting in Luleå, June 14-16. At this meeting it was stated that several countries have delays in forming national teams and to find financial support for the work. For this reason, it was concluded that the state-of-the-art stage would be delayed. It was also concluded that the most essential material have been obtained, to start the process of identifying areas or subjects for further research and development and to start preparing most of the state of art reports.

The 4th Expert Meeting took place in Westerville, Ohio, USA, October 6-8, 1999 and the results were reported to the 47th EXCO Meeting in Berlin, November 1-3, 1999. At this meeting it was stated that seven countries formally had joined the Annex, but there were still problems with fundings and forming of national teams. It was also found that recently activated countries must be given time to forward country specific information for the state of the art reports. To speed up the progress of work it was agreed to add simple questionnaire surveys to the input that is obtained by presentations.

3. Results from the 5th EM

3.1 General

The 5th Expert Meeting was held in Edmonton, Alberta, Canada April 10-11 2000.

The proceedings were held in conjunction with the Can'Well Convention 2000 at Mayfield Inn and with Canadian Ground Water Association (CGWA) as a host, represented by Mr Maurice Lewis (Executive Director).

April 13, the Annex 13 experts had a special UTES seminar for the visitors of the Can'Well Convention.

3.2 Participants and countries represented

The meeting was attended by 16 experts, representing seven different countries. These were

- Canada (5)
- Germany (1)
- Japan (1)
- Netherlands (1)
- Sweden (4)
- Turkey (2)
- USA (2)

Two countries have redrawn from the Annex (Denmark and Switzerland). As earlier announced Denmark will no longer participate. The other country, Switzerland, has chosen not to sign the implementing agreement leaving the Swiss representative without any funds. The Belgian representative was not able to come due to an accident.

3.3 Current status each country

The current situation when it comes to forming national working teams, financial status and level of participation as expressed at the meeting is shown in table 1. Compared to the situation at the 4th meeting, Germany has formally joined. Furthermore, the necessary funding and organisation issues seem to be settled.

Table 1 Current country status

Country	Joinment	Financial support	Working team
Belgium	Formal	Some extent	Under progress
Canada	Formal	Some extent	Under progress
Germany	Formal	Fully	Under progress
Japan	Formal	Fully	Formed
Netherlands	Formal	Fully	Formed
Sweden	Formal	Fully	Formed
Turkey	Formal	Fully	Formed
USA	Formal	Some extent	Formed

3.4 Presentations and discussions

All together 12 presentations were made. Related to the annex subtasks, these were

Subtask A and B

- Thermal In Situ Response Tests. Experiences from the last experiments, *Manfred Reuss*
- Thermal Response Testing in Canada, *Howard Williams*
- Draft State of the Art Report on In Situ Testing of Ground Thermal Conductivity for Borehole Heat Exchangers, *Jeff Spitler*
- State of the Art on Borehole Heat Exchangers, *Göran Hellström*
- Sample Collection and Design Criteria for Screened Wells, *Diana Allen*
- The first results of Subtask A survey, *Fred Michel and Benjamin Andersson*

Subtask C and D

- Drilling Methods in Japan – an overview, *Hiromishi Umemiya*
- Drilling Methods in Turkey – an overview, *Bekir Turgut*
- Well Stimulation by Hydraulic Fracturing. Experiences from Newfoundland, *Howard Williams*
- Recent Experiences with the Wassara Water Hammer, *Andreas Malmberg*

- Well Clogging Processes and Methods for Prevention – General Experiences, *Olof Andersson*
- Well and Borehole Failures in UTES. State of the Art, *Guido Bakema*

3.5 Conclusions

The current information status, survey material excluded is shown in table 2. A general conclusion at the closing of the meeting was that the country specific state of the art material now is almost completed. Missing information will be covered by additional inputs to the draft reports during the review stage.

Table 2 Current information obtained from different countries

Country	Number of presentations that cover			
	Subtask A	Subtask B	Subtask C	Subtask D
Belgium	1	-	-	1
Canada	3	3	3	1
Germany	2	-	-	1
(Denmark) ¹	-	1	-	-
Japan	1	1	1	1
Netherlands	1	1	1	5
Sweden	6	9	7	7
(Switzerland) ¹	-	-	1	-
Turkey	1	1	2	-
USA	5	-	-	-
Total	20	16	16	16

1) Withdrawn from formal participation

Currently three subtasks (A, B and D) have presented their state of the art reports in draft forms (subtask D in second draft form).

Subtask C suffers from the withdrawal of Switzerland. On the meeting it was preliminary decided that Germany shall take over the subtask leadership. Meanwhile, the operating agent will submit the first draft report till the next meeting.

Due to the delay with having the Annex consolidated in terms of formally participating countries, funding and organisation issues the experts recommended that the time schedule should be extended with one full year. The finalisation of the Annex will then be at the end of year 2001.

It was also agreed that the next Expert Meeting should be focussed on three main subjects.

1. Presentation and comments on the state of the art reports
2. Identification of items that need further research and development
3. Identification of firm knowledge that can be used for general guidelines.

4. Workplan

4.1 Time schedule

According to the recommendation from the experts the time schedule has been revised. The proposed new schedule is shown in Enclosure 1.

4.2 Homework

State of the art reports

Subtask leaders shall continue to write there reports and have draft versions distributed to the country co-ordinators not later than September 1.

Identification of R o D

Experts within country working teams shall consider and prepare opinions on items that need further research and development.

Additional information

Country specific information that has not yet been presented and discussed on expert meetings shall be sent to subtask related leader. This information shall be presented in conjunction with the state of the art discussions.

Guidelines

A proposal covering the goal, structure and content of guidelines will be presented by the operating agent. The experts shall be prepared to give country specific opinions.

4.3 Next meeting

The 6th Expert Meeting will be hosted by VITO, Belgium. The date is preliminary set to October 16-18. The meeting will be held in conjunction with Annex 12.

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