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JULY 1988

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LIQUEFACTION OF COAL
DP/CPR/83/002/11-55

PEOPLE'S REPUBLIC OF CHINA

REPORT OF CONSULTANCY WORK
"KINETICS OF DIRECT LIQUEFACTION REACTIONS"
MAY 1 - 16, 1988

Prepared for the Government of China
by the United Nations Industrial Development Organization
acting as executing agency for the United Nations Development Programme

Based on the work of Dr. I. ROMÉY
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United Nations Industrial Development Organization
VIENNA

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Summary

Under contract No. DP/CPR/83/002/11-55 I have visited the Central Coal Mining Research Institute (CCMRI) Beijing.

The complete timetable is listed elsewhere.

The main subjects discussed with scientists and technical staff of CCMRI are:

- . The status of coal liquefaction development including FRG programmes
- . Data for application to scale up process units
- . Mass transfer mechanisms and kinetics in coal liquefaction reactions
- . Discussion of CCMRI laboratory and PDU research programmes in direct coal liquefaction

In the past CCMRI has invited coal liquefaction experts from different countries representing different developments in coal liquefaction technologies. Therefore discussion of the progress in direct liquefaction technologies with CCMRI scientists and technical staff was very fruitful. However, by continuation, of this programme I recommend to invite leading experts in direct coal liquefaction representing different developments together for a common workshop with CCMRI scientists in Beijing.

That will in my opinion improve the effectiveness of the research project and it will also save time and money.

The advantage of such a workshop will be not only the presentation of the state of the art in different process routes at the same time. Also the open discussion of questions between the experts representing different process developments might improve the RGD-research work in coal liquefaction at CCMRI.

An appropriate time for such a workshop might be autumn 1989. The liquefaction results presented by CCMRI scientists pointed out that excellent product oil yields can be obtained using Chinese feed coals. Due to the fact that the national liquefaction programme at CCMRI will be continued until 1991 I also recommend that UNIDO continues supporting the R & D programme in direct coal liquefaction until 1991.

R & D facilities at CCMRI

During my stay at CCMRI I had the opportunity to visit the laboratories and the PDU-units for direct coal liquefaction. Mr. Wu Chunlai, deputy director informed that more than 60 scientists and technical staff of CCMRI had been trained in China and abroad. At present the coal liquefaction group consists of 39 persons (full-time). In phase II of the national coal liquefaction programme (1986 - 1990) a wide range of Chinese hard coals and lignites as well as different catalysts will be investigated in continuous bench scale operations. For the testing programme two continuous working units with about 10 - 20 kg input/h are available representing different routes in direct coal liquefaction.

One unit is build in cooperation with a Japanese group (20 kg/h purchased from Mitsui Engineering an Shipbuilding Comp.), the other unit is build in cooperation with FR Germany. For upgrading of coal oils a small PDU is also available which was built in cooperation with the USA (5 kg/h Xytel unit). Recent tests have shown that the PDU's can be operated successful. For the Beisu coal more than 50 % oil yield was obtained.

Jilin coal as well as Tengxian coal of Shandong Province have delievered oil yields between 50 - 60 %. In addition also brown coal from Xunnan and Inner Mongolia is under investigation.

Besides production of motor fuels and aromatics also processing of the residues by coking or delayed coking will be part of the testing programme.

Characterization of feed coals as well as product samples for liquefaction test runs can be investigated in the laboratories at CCMRI. Modern equipment like NMR, DTA, Gas-Chromatograph, Liquid Chromatograph, IR-Spectrometer and others is available. The staff is very well trained on this equipment.

Lecturing and advising programme

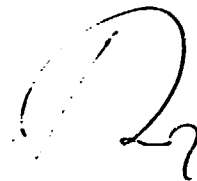
A programme was set up by CCMRI including lectures, discussion and advising of technical staff.

- May 2: Arrival at Beijing in the afternoon
Transport to the Ritan-Hotel and short discussion
about the lecturing and advising programme
- May 3: Visit of the UN Beijing Office
Meeting at CCMRI: general introduction and visit
of some laboratories
In the evening banquet hosted by CCMRI
- May 4 - 6: Lectures and discussion with scientists and
technical staff of coal liquefaction department
of CCMRI
Publications and technical process descriptions
with new results in coal liquefaction technologies
were delivered. A copy "Synthetic Fuels from
Coal" is added to this report
- May 7, 8: Sightseeing, including visit of the Great Wall,
Summer Palace and Forbidden town
Leaving for Anshan
- May 9, 10: Lecture at Anshan Institute of Iron and Steel
Technology
The lecture was organized in agreement with
CCMRI and UN Beijing Office (Detail Programme
see enclosure
- May 11, 12: Continuation of lecture and advising programme
at CCMRI
Visit of PDU's for direct coal liquefaction
Final discussion
Leaving for FR Germany

Final remarks

My programme at CCMRI, Beijing was very well organized. The scientists and technical staff of the coal liquefaction group at CCMRI are very well trained, laboratory equipment as well as PDU's for continuous liquefaction operations are on a high standard. Therefore I have the impression that liquefaction results based on Chinese coals obtained at CCMRI are comparable with results from other groups elsewhere. Due to the fact that VR China has a wide range of coals available for direct liquefaction technologies it is strongly recommended to support CCMRI in the further development of the direct liquefaction technology.

I have to thank Mr. Wu Chunlai, deputy director and head of the liquefaction department for the excellent arrangements to make my consultancy work successful as well as Mrs. Lei who did an excellent work in translation.

A handwritten signature in dark ink, appearing to be the initials 'DQ' or similar, located in the lower right quadrant of the page.

Schedule of Accepting Dr. Ingo Romey

To Our Institute

Date		Contents
	<i>19:00 or 20:00</i>	
8	22:00	Dr. I. Romey arrive in Anshan.
9	7:00	Breakfast
	8:00	Ceremony of inviting the honourable professor
	9:30	Making lectures
	11:00	Visiting library
	11:30	Dinner Prepared by Institute
	14:00	Visiting laboratory
	15:30	Glancing at Anshan Corporation of Iron and Steel
	18:00	Visiting Prof. Zhou 's family
10	8:00	Trip to Thousand Mountain
	12:00	Dinner prepared by Department of Chemical Engineering
	15:00	Glancing at the feature of Anshan city
	16:30	Seeing Dr. I. Romey off to train station
11	<i>8:50</i>	<i>airport:</i>