40TH MEETING

HELD AT

IOCL, HALDIA REFINERY

ON

DECEMBER 26-27, 1997

उच्च प्रौद्योगिकी केन्द्र

(पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय)

पाँचवा तल, कोर 6, स्कोप काम्प्लेक्स, 7, इन्स्टीट्यूशनल एरिया, लोधी रोड़, नई दिल्ली - 110 003

Centre for High Technology

(Ministry of Petroleum & Natural Gas, Govt. of India)

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उ.प्रौ.के./एस.ए.सी/
CHT/SAC/

जनवरी ८, १९९८
January 8, 1998

सेवा में ,
To,

१. पेट्रोलियम और प्राकृतिक गैस मंत्रालय की हाइड्रोकार्बन पर वैज्ञानिक सलाहकार समिति के समस्त सदस्य।
1. All Members of the Scientific Advisory Committee on Hydrocarbons of the Ministry of Petroleum and Natural Gas.

२. समस्त तेल कंपनियों के मुख्य कार्यकारियों
2. Chief Executives of all Oil Companies.

विषय : पेट्रोलियम और प्राकृतिक गैस मंत्रालय की हाइड्रोकार्बन पर वैज्ञानिक सलाहकार समिति की ४०वीं बैठक के कार्यवृत्त का परिचालन (सर्क्यूलेशन) ।

Sub.: 40th Meeting of the Scientific Advisory Committee on Hydrocarbons of the Ministry of Petroleum & Natural Gas - Circulation of minutes.

प्रिय महोदय,
Dear Sirs,

दिनांक २६ व २७ दिसम्बर, १९९७ को इण्डियन ऑयल कॉ. लि., हल्दिया रिफाइनरी में पेट्रोलियम और प्राकृतिक गैस मंत्रालय की हाइड्रोकार्बन पर वैज्ञानिक सलाहकार समिति की हुई ४०वीं बैठक के कार्यवृत्त की एक प्रति आपकी सूचना एवं आवश्यक कार्रवाई हेतु भेजी जा रही है ।

Enclosed, please find a copy of the minutes of the 40th Meeting of the Scientific Advisory Committee on Hydrocarbons of the Ministry of Petroleum and Natural Gas held at IOC, Haldia Refinery on 26 & 27, December, 1997, for your information and necessary action.

सधन्यवाद !
Thanking you,

भवदीय,
Yours faithfully,

(के. रविकुमार)
कार्यकारी निदेशक
(K. Ravikumar)
Executive Director

अनुलग्नक : यथोक्त ।
Encl.: As Above.

प्रतिलिपि प्रेषित : प्रो० एम.एम. शर्मा,
५०२, सौरभ ,
प्लॉट नं० ३९ए कुण्डेर मार्ग,
स्वास्तिक पार्क, चैम्बूर,
मुम्बई - ४०० ०७१.

Copy to : Prof. M.M. Sharma,
502, Saurabh,
Plot No. 39, Kunder Marg,
Swastik Park, Chembur,
Mumbai - 400 071.

प्रतिलिपि प्रेषित :१. सलाहकार (आर) / सलाहकार (ई) / संयुक्त सचिव (आर) / संयुक्त सचिव (ई) / ए.एस. (एम) / डी. एस. (सी.सी)

1. Adviser (R) / Adviser (E) / JS(R) / JS (E) / AS (M) / DS (CC)

२. वित्त सलाहकार एवं मुख्य लेखा अधि., ओ.आई.डी.बी.

2. FA & CAO, OIDB

३. पेट्रोलियम और प्राकृतिक गैस मंत्रालय के सचिव के पी.पी.एस ।

3. PPS to Secretary, MOP&NG

Minutes of 40th Meeting of the Scientific Advisory Committee on Hydrocarbons of the Ministry of Petroleum & Natural Gas held on 26 & 27 December, 1997 at IOCL - Haldia Refinery

List of participants is enclosed.

Shri P.K. Biswas, Executive Director, Haldia Refinery, extended a warm welcome to the Chairman, Scientific Advisory Committee, other distinguished members of the SAC and all the invitees. He acknowledged the tremendous efforts made by Scientific Advisory Committee in supporting various R&D projects, particularly in the area of product development, quality improvement / indigenisation of technologies and also in facilitating absorption of developed technology. He mentioned that the R&D initiatives in the field of process and catalyst development and lube oil quality improvement are some of the noteworthy examples of the contributions made by Scientific Advisory Committee. In this regard, he also mentioned that Haldia Refinery was a classic example of an industry which has absorbed quite a few indigenous technology developments - Naphtha pretreater catalyst developed jointly by IIP / IFP, Internals developed by EIL, R&D in the vacuum column, and RTF additive & lube formulations developed by IOC - R&D. Also the NMP Extraction process technology developed by IIP / IFP is presently under execution at Haldia Refinery. While highlighting the achievements made by Haldia Refinery, in the areas of energy conservation, environment protection, process automation, information technology etc., he informed the group that Haldia Refinery was accredited the ISO - 9002 in 1994 and recertification in 1997 for its Quality management System. He further added that Haldia Refinery was awarded the ISO - 14001 accreditation for environment management system in August 1997. He also made a special mention of the 1.0 MMTPA new crude distillation, which was successfully completed within the scheduled time and cost frame. The unit was designed and engineered totally thru in-house expertise. He wished the deliberations in the next two days, a grand success.

Shri B.K. Mukherjee, General Manager (Technical), Haldia Refinery made a brief presentation, on the salient features of Haldia Refinery including background of the refinery, milestones achieved, performance highlights and the future projects being conceived / implemented for maintaining the continuous pace of progress.

Prof. M.M. Sharma, Chairman, Scientific Advisory Committee thanked Haldia Refinery for hosting the meeting. While appreciating the performance of Haldia Refinery and its dedicated efforts in continuous improvement and steady growth, Prof. Sharma said that he was struck by the sense of pride the Haldians had about their refinery. He further emphasised on the following points :

(i) Petroleum refining is undergoing a sea change with product specifications becoming more and more stringent, requiring hydroprocessing facilities to be put up. Thus the refineries are becoming hydrogen oriented. The investment costs have thus gone up but the Ex-refinery price of products have not seen a commensurate change. Refineries must now give thought to integrating power plants within the refineries. Refineries could become energy

companies and produce and export power for further increasing their profitability.

(ii) The refineries should no longer continue to be only fuel or lube refineries. They should seize any opportunities available to them look into the possibility of producing petrochemical feedstocks like benzene, cyclohexane, cumene etc. for improving their profitability.

(iii) Chairman, Scientific Advisory Committee expressed his disappointment over the slow progress of most of the projects supported by Scientific Advisory Committee, and desired that all out efforts should be made for implementation of the R&D projects as per schedule.

The agenda items were taken up for discussion.

40.1 Proposal on "Development of Technology for Flame Arresters" by CBRI, Roorkee.

Dr. Manju Mittal of CBRI, Roorkee made a presentation on the proposal for "Development of Technology for Flame Arresters to Protect Petroleum Gas / Oil and Petrochemical handling Installations against spread of fire and explosion.

The proposal considers development of flame arresters suitable for use as protection for fuel / air supply to a burner or in a vent. Where there is a length of pipe between the arrester and the point of discharge to atmosphere to protect process plant, storage or transport vessels. The work will cover design and development of flame arresters for pipe size 1" to 12", their performance, evaluation and testing. The project cost is Rs. 25.0 lakhs, and completion schedule is 24 months. CBRI, Roorkee has testing facilities for studies related to explosion.

Shri B.K. Mukherjee, General Manager (T), Haldia Refinery stated that as per experience the flame arresters, when used for Bitumen blowing etc. gets fouled up and pressure drop across the flame arrester goes up. Ms Mittal clarified that the fouling could be prevented by selection of proper material of construction and also cleaning the dirt during shutdown and then putting back into operation.

However, Mr. Mukherjee, suggested that on-line cleaning of the Flame Arresters should be taken into account, while carrying out the studies. On a query from Dr. Kudchadker, it was clarified that in case of shock wave generation in pipelines, detonation flame arresters are used. However this aspect has not been taken into consideration in the present study.

The Scientific Advisory Committee members felt that this area is important and the proposal deserves to be supported. However, the final proposal should be put up to Scientific Advisory Committee for discussion after revising the same in consultation with EIL / Refinery and also taking into

consideration safety aspects due to handling of huge a}ount of hydrocarbon vapours in 12" line.

40.2 Proposal on "Research Facilities in Advanced Control" by IIT - Kanpur.

Prof. D.N. Saraf of IIT - Kanpur made a presentation on revised proposal on "Research Facilities in Advanced Controls" taking into consideration the recommendations made by the Scientific Advisory Committee on the proposal during the 38th Scientific Advisory Committee meeting held at IOCL - R&D Centre Faridabad in June 1997.

BPCL representatives stated that BPCL was interested in having bilateral programme in the area of Advanced Process Controls with IIT Kanpur.

The present proposal of IIT- Kanpur includes details on four projects as under, based on problems of BPCL's interest and also facilities for Centre for Advanced Control proposed to be set up at IIT - Kanpur.

1. Modelling, Advanced Control and Optimisation of CRU - ARU.

2. On-line Inferencing and optimisation of Blending operations.

3. Profit Maximization with Inferential Control for CDU.

4. Decision Making through on-line Model Execution Parallel to the Plant.

The proposal envisages work to be taken up on one or more projects.

IIT - Kanpur also clarified that the problem of manpower recruitment and retention has also been sorted out.

The Scientific Advisory Committee members, after deliberations, recommended financing of one project viz. "On-line Inferencing and optimisation of Blending operations" at a cost of Rs. 89.0 lakhs and completion schedule of 2 years. However, the committee expressed its inability to consider the request for setting up a Research Centre for Advanced Process Control at IIT - Kanpur.

40.3 Proposal for "Development of Catalyst & Process Studies for Single - Step Synthesis of Di Methyl Ether from Syngas" by IIP, Dehradun.

Dr. K. Narasimhan, Scientist, IIP, made a presentation on the proposal for "Development of Catalyst & Process Studies for Single - Step Synthesis of Di Methyl Ether from Syngas".

IIP had earlier made a presentation to the Scientific Advisory Committee in August'97 on techno-economic feasibility of DME synthesis from Syngas and its usage as an environmental friendly fuel to substitute diesel.

The present proposal considers catalyst development, evaluation and characterisation strategies for DME production in a single step from syngas, at a total project cost of Rs. 865 Lakhs.

Chairman, Scientific Advisory Committee, after deliberations stated that the estimated project cost was on a very high side and a fresh proposal with revised cost estimates (not exceeding Rs. 4.5 crores) may be put up to Scientific Advisory Committee in the next meeting.

40.4 Proposal on "Technology Development of Dimethyl Ether as Diesel Engine Fuel for Automotive Application" by IIP - Dehradun.

Dr. J. Sharma, Scientist, IIP made a presentation on the proposal for "Technology Development of Dimethyl Ether as Diesel Engine Fuel for Automotive Application".

The proposal considers technical feasibility study and development of suitable technology for application of DME in diesel engines and vehicles and to demonstrate its feasibility for introduction on national level.

The committee felt that DME certainly scored over diesel on emission levels w.r.t. CO_2, NOx & Particulate Matters, when used in diesel engines. However, there were certain limitations in use of DME w.r.t. fuel injection system which will have to be redesigned, and safety precautions in handling DME at dispensing points and in trucks.

The committee recommended IIP to put up a revised proposal in the next meeting after taking into consideration the above aspects and also consulting engine developers.

40.5 Presentation on "Delayed Coker Pilot Plant" by EIL, R&D.

In line with the request of Chairman, Scientific Advisory Committee in the last Scientific Advisory Committee meeting held in August,'97, Dr. R.N. Lahiri, Manager, EIL made a presentation on necessity of Delayed Coker Pilot Plant to be put up at EIL, R&D Centre. With new delayed cokers being installed at NRL and Digboi Refinery and also revamping of existing coker at IOC - Barauni Refinery, Chairman, Scientific Advisory Committee emphasised that R&D work in this area was very essential.

This presentation covered the details on process mechanism of Delayed Coking, types of petroleum cokes, process variables, effect of operating parameters on Distillate yield, feedstock requirement & properties affecting yield & quality of coke.

The total job is contemplated to be a joint activity amongst BRPL, EIL (R&D) and IIP, Dehradun and involves study related to

* effect of process variable on yield for various feedstocks

* optimum operating condition for distillate yield maximisation

* Development of yield corelations

* Evaluation of heat of reaction for various feedstocks and

* Development of mathematical model for coker heater simulation.

EIL stated that the cost of the project based on preliminary calculations works out to be very high and they are looking into the aspect of reducing the cost, and will submit a proposal in the next Scientific Advisory Committee Meeting.

Chairman, Scientific Advisory Committee requested, EIL to include the following in the proposal :

(i) Whether the facilities could be put up in an operating refinery.

(ii) Collaboration part to be firmed up with IIP / BRPL before finalising the proposal.

40.6 Proposal on "Sour Natural Gas and Industrial Gas Treating" by IIT - Kharagpur.

Prof. S.S. Bandopadhyay of IIT - Kharagpur made a presentation on the proposal for "Sour Natural Gas and Industrial Gas Treating".

The proposal considers experimental and theoretical studies on absorption of CO_2, simultaneous absorption of H_2S & CO_2 and selective absorption of H_2S from refinery sour gas streams in various alkanolmines, new amines & amine blends.

The study also includes effects of staric hindrance and influence of additives on rate of absorption.

Chairman, Scientific Advisory Committee stated that the selective absorption of H_2S & CO_2 posed a perennial problem in the sulphur units in the refineries and treatment of sour natural gas and this area of work is of evergreen importance and worth supporting.

The committee recommended financing of the project at a total cost of Rs. 15.0 lakhs. The completion schedule is 3 years.

40.7 Presentation on "Resid Hydrotreatment" by IIP - Dehradun.

As desired by Chairman, Scientific Advisory Committee in the last Scientific Advisory Committee meeting held in August, 1997. Dr. S.K. Bej, Scientist, IIP - Dehradun made a presentation on "Resid Hydrotreatment".

The presentation covered the need for Residue hydrotreatment, technologies available, major technology licensors and the proposal for "Development of Catalyst & Technology for Hydrotreatment of Atmospheric Residue & Vacuum Residues at IIP".

After deliberations, Chairman Scientific Advisory Committee suggested that, IIP may also look into the following aspects before finalising the proposal for presentation in the next meeting :

(i) Disposal of the used catalyst

(ii) Low pressure operation of the unit (in line with Akzo Nobel Catalysts)

(iii) Since investments for vacuum residue hydrotreatment would be very high, IIP may consider only Atmospheric Residue Hydrotreatment to begin with.

Chairman, Scientific Advisory Committee also desired that IIP, Dehradun should present a summary of the projects sponsored at IIP and funded by CHT during the last 10 years. The details of equipment provided under such projects may also be listed out, since stand alone facilities for each project may not be supported.

40.8 Presentation on "Deep Catalytic Cracking (DCC)" by IIP, Dehradun.

In line with request made by Chairman, Scientific Advisory Committee in the last meeting, Dr. Uma Shankar of IIP, Dehradun made a presentation of "Deep Catalytic Cracking" of heavy feeds into light olefins for important petrochemicals, oxygenates & alkylates.

The presentation covered the important features of Deep Catalytic Cracking, effect of operating variables and process options w.r.t. feedstock composition, Reaction time, Catalyst, Reaction Temperature Pressure etc.

40.9 IOCL - R&D and CRL representatives shared their experience of operation of their existing Cat Cracker pilot plants for handling resids to provide data for Deep Catalytic Cracking.

Shri Mathu Kutty Cyriac, of CRL shared the FCC related R&D activities undertaken at CRL. He shared details on the facilities available, operating data, and achievements.

CRL has been successful in carrying out activities related to catalyst and additive selection for higher conversion & less coke make, feedstock evaluation and process parameters optimisation.

Dr. S. Ghosh, General Manager, IOCL - R&D Centre also shared the details on data generation & operation of their FCC pilot plant, which include :

- Simulation studies in micro reactors for high CCR feed (8-9% wt.) processing. Lot of data have been generated and a semi commercial plant for Guwahati Refinery Deep Catalytic Cracking is being designed by IOCL - R&D.

- Also studies w.r.t. catalyst and additive changes in refineries, Bottom Cracking additive in Mathura Refinery, Sulphur control additive etc. has been carried out successfully.

- IOCL - R&D Centre has also generated data for Haldia FCC unit for given feedstocks, and operating conditions, which has helped in vendor selection.

Chairman, Scientific Advisory Committee expressed satisfaction w.r.t. operation of the above pilot plants.

40.10 Status of Project on "Technology Development for Production of high quality Micro Crystalline Waxes using SPD technology" at RRL - Jorhat.

ED, CHT informed the Chairman Scientific Advisory Committee & other committee members that in the Executive Committee Meeting of CHT held on 2.12.97 at Ministry of Petroleum & Natural Gas, JS (R), Chairman, Executive Committee had expressed his grave concern on the slow progress of this project. JS (R) also desired that further course of action on this project could be reviewed in the Scientific Advisory Committee and brought to the notice of Ministry of Petroleum & Natural Gas.

The status of the project and further course of action as discussed & decided by the committee is as under :

(i) Scientific Advisory Committee had already expressed serious concern on the lack of progress of the project in the meeting held on 26th August, 1997 at New Delhi.

(ii) Prof. M.M. Sharma, Chairman Scientific Advisory Committee, along with Prof. K. Vasudeva, member Scientific Advisory Committee, separately took up the matter with DG, CSIR & expressed grave concern in the lack of progress in this highly worthwhile project. An official communication from CHT to DG, CSIR was also sent in September, 1995 as a sequel to the Scientific Advisory Committee meeting held in August, 1997.

(iii) DG, CSIR has expressed his own concern and regret in the delay in the execution of the project. The situation in RRL, Jorhat is extraordinary both due to the political situation in Assam and even

more important, the shifting of the Director, RRL from Jorhat to Calcutta.

The CSIR, inspite of its best efforts, has still not been able to appoint a Director at RRL, Jorhat and the acting Director, R.K. Mathur, during the interim period, has also retired.

(iv) CSIR is keen to pursue this project & deploy its own corporate strength including resources of CSIR notably of IIP and steer the project from CSIR, HQ under direct overseeing by DG, CSIR. It also transpires that a fresh tender for SPD unit has to be issued.

(v) The Scientific Advisory Committee recognizes the truly extraordinary situation prevailing in RRL, Jorhat, the willing support from IOCL - AOD and is of the view that the request made by CSIR for the project to be handled directly from Headquarters should be supported.

(vi) The MOU will be appropriately modified and Dr. H.R. Bhojwani, duly authorised by DG, CSIR will be the main contact man for the project.

(vii) CSIR will forward a progress / status report to CHT every quarter and Scientific Advisory Committee will review the same in subsequent meetings.

(viii) The total project cost will be at the original value.

(ix) It is necessary that the project completion schedule be revised to December, 1999, duly recognizing that the delivery period of the SPD unit is 1 year after placement of purchase order.

(x) Scientific Advisory Committee stresses the relevance of the project and feels that it ought to be continued.

40.11 ED, CHT informed Chairman Scientific Advisory Committee and the members that the proposals on "Environmentally Friendly Lubricants" of IIP, Dehradun and "Computational Fluid Dynamics" of EIL, R&D Centre recommended for approval by the Scientific Advisory Committee in its meeting held in August, 1997 has not been approved by the Executive Committee of CHT.

Chairman Scientific Advisory Committee & other members reiterated the support to the projects. Chairman, Scientific Advisory Committee also said that Scientific Advisory Committee will review the progress of all projects funded by CHT.

40.12 Proposal on "Upgradation of FCC Recycle Oils through Solvent Extraction" by IIP - Dehradun.

Dr. Himmat Singh, Scientist, IIP-Dehradun informed Chairman Scientific Advisory Committee and other members that MRL & HPCL have conveyed

their acceptance to the draft proposal on "Upgradation of FCC Recycle Oils through Solvent Extraction" and agree to all the clauses laid down in the MOU. A meeting will be organised soon among IIP / EIL (R&D) / HPCL / MRL for signing of the MOU.

40.13 Chairman, Scientific Advisory Committee requested that the proposals for presentation in the Scientific Advisory Committee meetings should be circulated to the members in advance. Hence all concerned should ensure that in future the proposals are sent to CHT well in advance.

40.14 Chairman, Scientific Advisory Committee desired that a presentation on methodologies for increasing the existing pipelines capacity to be brain stormed at CSIR and put up in the next SAC meeting.

40.15 The committee decided that the next meeting will be held at CRL, Cochin on 20 & 21 March, 1998.

40.16 At the end of the session, Chairman, Scientific Advisory Committee thanked Haldia Refinery for the excellent arrangements & hospitality extended & for also being responsive to the technological needs.

List of Participants

Members

S/Shri

1. Prof. M.M. Sharma, Chairman
2. K. Ravikumar
3. Prof. A.P. Kudchadkar
4. Prof. K. Vasudeva
5. T.S.R. Prasada Rao
6. S.N. Sharma

Others

7. P.K. Biswas, Executive Director, Haldia Refinery
8. B.K. Mukherjee, General Manager (T), Haldia Refinery
9. M.S. Kumar, Principal, IMA, Haldia
10. S.K. Chattergee, Vice Principal, IMA, Haldia
11. Aloke Roy, CPNM, Haldia Refinery
12. A. Basu, CTSM, Haldia Refinery
13. Dr. Sobhan Ghosh, General Manager, IOC (R&D)
14. Dr. R.P. Verma, Dy. General Manager, IOC (R&D)
15. R.K. Modi, Ch. Tech. Manager, BPCL, Mumbai
16. Dr. G.P. Rai, Sr. Manager, BPCL (R), Mumbai
17. A.S. Rao, Dy. General Manager (Tech.), HPCL, Mumbai
18. Ilyas Ali, Manager (Tech.), HPCL, Mumbai
19. Dr. S.A.A. Rizvi, Scientist, RRL Jorhat
20. Dr. B.S. Gill, Dy. General Manager, EIL (R&D), New Delhi
21. Dr. P.N. Lahiri, Manager, EIL (R&D), New Delhi
22. I.P. Baruah, CQCM, IOCL - AOD
23. Mathukutty Cyriac, Manager, CRL, Cochin
24. Prof. D.N. Saraf, IIT, Kanpur
25. Dr. Himmat Singh, Dy. Director, IIP, Dehradun
26. Dr. Uma Shankar, Scientist, IIP Dehradun
27. Dr. S.K. Bej, Scientist, IIP, Dehradun
28. Dr. J. Sharma, Scientist, IIP, Dehradun
29. Dr. K. Narsimhan, Scientist, IIP, Dehradun
30. K.S. Rao, BRPL
31. Gita Dutta, Jt. Director, CHT