उच्च प्रौद्योगिकी केन्द्र
(पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय)

Centre for High Technology
(Ministry of Petroleum & Natural Gas, Govt. of India)

उ.प्रौ./एस.ए.सी./ 3084
CHT/SAC/

दिसम्बर 23, 2002
December 23, 2002

सेवा में,
To,

1. पेट्रोलियम और प्राकृतिक गैस मंत्रालय हाइड्रोकार्बन्स की वैज्ञानिक सलाहकार समिति के सभी सदस्यों को
   All Members of the Scientific Advisory Committee on Hydrocarbons of the Ministry of Petroleum and Natural Gas.
2. संयुक्त सचिव (एस)/संयुक्त सचिव एवं वित्त सलाहकार / संयुक्त सचिव (एम)/ संयुक्त सचिव (वी)/ सलाहकार (रिफाइनरी), सलाहकार (ई), पेट्रोलियम और प्राकृतिक गैस मंत्रालय
   JS (S) / JS&FA / JS(M) / JS (V) / Advisor (R) / Advisor (E) / - MOP&NG.
3. सचिव, तेल उद्योग विकास बोर्ड
   Secretary, Oil Industry Development Board
4. सभी सार्वजनिक क्षेत्र की तेल कंपनियों के मुख्य कार्यकारियों को
   Chief Executives of all PSU Oil Companies.
5. निदेशक (रिफाइनरीज / परिचालन) - आई.ओ.सी.एल., बी.पी.सी.एल., एच.पी.सी.एल., सी.पी.सी.एल., के.आर.एल., बी.आर.पी.एल., एन.आर.एल.
   Director (Refineries / Operations) - IOCL, BPCL, HPCL, CPCL, KRL, BRPL, NRL
6. पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय के सचिव के निजी वैयक्तिक सहायक को
   PPS to Secretary, MOP&NG

विषय : पेट्रोलियम और प्राकृतिक गैस मंत्रालय की हाइड्रोकार्बन्स पर 53वीं वैज्ञानिक सलाहकार समिति के कार्यवृत्त का परिचालन ।

Sub.: 53rd Meeting of the Scientific Advisory Committee on Hydrocarbons of the Ministry of Petroleum & Natural Gas - Circulation of minutes.

महोदय / महोदया,
Dear Sir / Madam,

पेट्रोलियम और प्राकृतिक गैस मंत्रालय की हाइड्रोकार्बन्स पर 28 नवम्बर, 2002 को सी.एस.आई.आर, विज्ञान केन्द्र, नई दिल्ली में हुई वैज्ञानिक सलाहकार समिति की 53वीं बैठक के कार्यवृत्त की प्रति आपकी सूचना एवं आवश्यक कार्रवाई हेतु संलग्न है ।

Enclosed, please find a copy of the minutes of the 53rd Meeting of the Scientific Advisory Committee on Hydrocarbons of the Ministry of Petroleum and Natural Gas held at CSIR, Science Centre, New Delhi on 28th November, 2002 for your information and necessary action.

धन्यवाद !
Thanking you,

भवदीय,
Yours faithfully,

(एस.जे. चोपड़ा)
कार्यकारी निदेशक
(S.J. Chopra)
Executive Director

संलग्न : यथोक्त
Encl.: As Above.

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Minutes of the 53rd Meeting of the Scientific Advisory Committee on Hydrocarbon of the Ministry of Petroleum & Natural Gas held on 28.11.2002 at CSIR Science Centre, New Delhi

List of the participants is enclosed as Annexure-I

Executive Director, CHT – Dr.S.J. Chopra, welcomed the members and other participants and informed that the Governing Council (GC) of CHT had met on 23rd Sep. 2002, wherein following decisions were taken in respect of R&D projects:

i) ED-CHT has been advised to constitute a "Users' Committee" comprising members from oil industry (ensuring industry participation), for identifying R&D projects relevant to application / commercialization in the industry.

ii) ED-CHT has also been advised to prepare a report on the potential for commercialization of recently completed R&D projects for submission to the Ministry.

Further, in order to pursue vigorously commercialization of R&D projects, quarterly review meetings have been proposed to provide impetus to this activity.

iii) A committee to be constituted under Advisor (R), MOP&NG to review progress of ongoing projects and recommend termination of those projects which have become redundant / or unviable from the point of commercialization in the industry.

iv) The funding should be shared between CHT/OIDB and oil industry members on 50:50 basis for all stages of developmental work involved in the R&D projects. The ratio of funding may, however, be decided on case to case basis. For R&D projects, which will involve setting up of demonstration unit having substantially high cost, separate proposals for each case may be put up for the consideration of MOP&NG. It was also clarified that the cost estimates are to include manpower costs and other overheads.

ED-CHT also mentioned:

i) The earlier recommendation of the Committee of involving SAC members as Chairman of various Activity Committees of CHT, is being followed for the last 6 months, which is expected to lead to suggestions on formulating R&D projects relevant to the operational / technological needs of the refineries.

ii) A Seminar on "Strategic Knowledge Management in the Hydrocarbon Sector" is being organized by CHT in association with NPMP on December 3-4, 2002 and hoped that SAC members and others from oil industry, R&D institutes and academia will actively take part in the

Seminar so as to facilitate an environment of networking for knowledge generation.

iii) A Question-Answer Session on "Environment Management" towards end of March, 2003 is being organized by CHT.

Before concluding his remarks, he welcomed Mr. Mukesh Rohatgi and congratulated him for taking over the charge of Director (Refineries), BPCL.

Dr. R.A. Mashelkar, Chairman, SAC recalled his recent association with the Committee on "Auto Fuel Policy" constituted by Govt. of India, whose report was submitted in September, 2002. He also expressed happiness about the recent announcement on discovering gas fields by Reliance Industries Limited in the Krishna Godavari Basin, which is likely to bridge substantially the energy supply-demand balance of the country. He commended the great enterprising spirit behind such important findings of national importance and emphasized that for all such achievements, the unwavering spirit of enterprise with total dedication is required.

Talk on "Biofuels – Future Prospects":

Mr. Jai Uppal, Advisor (Renewable Energy), Winrock International India made a presentation on the prospects of Biofuels in the country. He emphasized that in view of depleting fossil fuels resources, it is imperative to conserve them by supplementing with biofuels. The major biofuels are Ethanol based on sugar, starch or cellulose and Bio-diesel based on transesterification of vegetable oils with methanol and ethanol. He stated that as per the notification of the Govt. of India of September 13, 2002, it would be mandatory to blend Ethanol in gasoline in 9 States and 4 UTs. by 1st January, 2003.

In regard to the requirement of sugarcane crop for blending of 5% ethanol, around 2.4% of the present level of sugarcane crop will be required. Further, for blending 10% of ethanol with diesel, around 25% of present level of sugarcane crop will be required. He informed that in Brazil 52% of sugarcane crop goes for ethanol and balance 48% for sugar production. Further, the cost of production of ethanol is half the price level in India due to the economics of scale as a result of large farms owned by sugar mills. As regards the global ethanol scenario, the major countries in this field are Brazil and USA, while China, India, Thailand, Mexico, and CIS countries are upcoming in this area. Blending of ethanol in diesel does not improve cetane number and also requires coupler to prevent phase separation, besides the lubricity problem.

On Bio-diesel, he informed that the programme in India involves non edible oils i.e. Jatropha Curcus (Ratan Jyot) & Karanja (Honge-Pongamia Pinnata), to be grown on waste land / degraded forest land. It is estimated that production of 50 MT of Bio-diesel would require plantation of Jatropha in about 10% area of the country. There are several advantages of Bio-diesel,

i.e., low sulphur, reduced Greenhouse gas emission, increased flash point & lubricity and high cetane number etc.

Mr. Uppal pointed out that one of the important areas of action plan for promotion of Biofuels in the country is identification of R&D projects. It would be important to exploit field of biotechnology and to come up with new ideas. He also emphasized that there is urgent need of Govt. support in making Biofuels programme successful in the country.
During discussions, it was pointed out by members/participants that even with 5% blending of ethanol in gasoline, there are problems of RVP and gum formation.

53.1 Discussions on "Approach paper on future work areas of EIL(R&D)"

The following comments / observations were made by the members / participants on the approach paper of future R&D activities conceived by EIL:

i) It was suggested that there should be more emphasis on collaborative R&D programmes to take advantage of the various R&D institutes in the country.

ii) In view of importance of fluidisation processes in future scenario, it was suggested that activities in these areas may also be looked into for the future programmes in addition to catalysis, adsorption processes. The concept of modular refinery may also be worth considering seriously.

iii) It was felt that it would be better to narrow down the areas of future activities in view of the limited budget provision for the R&D activities. It was therefore suggested to concentrate in 2-3 areas which would be relevant for the oil industry for next five years.

iv) In regard to the GTL project, EIL(R&D) informed that this project, sponsored by an overseas client, is a joint programme of EIL in collaboration with NCL and CFRI.

Summing up the discussions and taking note of various suggestions, Chairman advised that it would be worthwhile for EIL(R&D) to invite 2-3 SAC members for a brainstorming session on the subject.

53.2 Presentation on "Perspective Plan of BPCL R&D activities"

Dr. M.A. Siddiqui, General Manager, (R&D), BPCL made a presentation on the R&D Plans of BPCL which are being pursued as a business activity with target of making the R&D Centre a Profit Centre by the year 2007. It is envisaged to devote major portion of R&D inputs on applied research and around 10-15% on basic research. The strategy of R&D programmes comprise adaptation and improvement of imported technologies, technical support to the marketing/refinery operations, and development of breakthrough technologies. The major areas identified for research are :

i) Catalysis / Catalytic Processes
ii) Separation Processes
iii) Products Quality Upgradation
iv) Modeling, Simulation and Optimisation
iv) Residue Upgradation/Utilisation
v) Bio technological Processes
vi) Wastes Utilization/Disposal in Environment friendly way

He informed that the R&D Centre of BPCL has been established at Greater Noida at a cost of around Rs.84 crores, which includes the cost of land, infrastructure and research equipment. The present strength of technical manpower is 20, which is projected to 235 by the year 2009-10.

During discussions, it was suggested that BPCL should focus on few areas in the initial phase and based on the success achieved, future projections in respect of enhanced manpower and areas of activities may be planned.

53.3 <u>Presentation on findings / conclusions of recently completed</u> projects :

53.3.1 Development of catalyst, technology and process knowhow for conversion of C_5-C_6 non cyclic paraffinic naphtha cuts to Aromatics and C_4 – IIP, Dehradun

During presentation IIP informed that Gallium (Ga) incorporated HZSM-5 catalyst was chosen as the most promising material since aromatization occurs through bifunctional pathway. Gallium catalyzes dehydrogenation of paraffins to olefins, and the acid sites catalyze the oliogomerization of light olefins and cyclization of C_6-C_8 olefins. Butane is formed by secondary reactions, i.e. cracking of paraffins on acid sites.

In regard to the economics of the process, the total investment for 0.3 million tons capacity works out to US $ 11.1 million with a pay back period of 3.2 years. In response to a query on commercialization of the process, BPCL informed that the project findings are under review for a decision on its implementation. However, the prospects of commercialization at BPCL do not appear to be bright.

53.3.2 Development of Eco-friendly & Biodegradable Lubricants / Base fluids – IIP, Dehradun

The studies carried out by IIP indicated that most of the vegetable oils could be transformed into hydrocarbon soluble biodegradable base fluids by simple chemical transformation such as transesterification, hydrogenation, epoxidation and acetylation, for application as lubricants/ base fluids. Based on the indicated price of vegetable oils and processing cost of various inputs, the products obtained could be 1.5 to 5 times costlier than conventional hydrocracked base oils.

The results of toxicity evaluation indicated that all the samples are non-toxic. The standard biodegradability tests carried out shows that the vegetable oil based lubricants and synthetics prepared in the laboratory range between fair to very good in terms of biodegradability. The mineral based lubricants however show upto fair biodegradability.

It was, however, point out by IIP that for developing complete technologies for preparation and formulation of lubricants for specific application, further process engineering, scale-up and performance evaluation studies would need to be undertaken.

53.3.3 Development of improved Flash Zone Entry Device for Crude / Vacuum Column – EIL(R&D)

It was informed by EIL(R&D Centre) that four versions of prototype flash zone entry devices were designed and tested in the pilot plant at EIL(R&D) with air-water system. During the experimental studies, it was observed that Vapour Horn Type entry device performs better than Vane Type.

However, in view of plant limitations for evaluating the entry devices in the vacuum column of AVU-II of IOCL-Barauni Refinery, only Vane Type could be tested. From the analysis of the test run, it emerged that with this improved entry device, FBP of wide cut could be raised from 480 deg.C (pre-revamp) to 515 deg.C (post revamp). During discussions, EIL informed that for the BPCL modernization programme, Vane type entry device would be provided based on the findings of this study. EIL also informed that this device which would help in better fractionation because of lower height of disengagement space, would be particularly useful for revamp of vacuum columns in the refineries. Chairman advised EIL to look into the possibility of filing patents on the design of various versions of improved flash zone entry device.

53.3.4 R&D work on Advanced Control – IIT, Kanpur

Prof. D.N. Saraf informed that for the Amine Unit, testing of software by Mathura Refinery was completed in January, 1999 and final product handed over in March, 1999. Although the development work for the CDU project was completed in March, 1999, its testing in the plant was delayed for various reasons. He cited various constraints viz., lack of manpower with requisite skill of process optimization, reliable operating and lab. data, etc., which came in way for finally concluding the project for successful online testing. However, Mathura Refinery is presently testing the packages developed by IIT-Kanpur and IOC was requested to give a feedback on the same.

53.4 Discussions on new R&D project proposals :

53.4.1 Interactions on Organic Molecules at the Solid/Liquid Interface : A combined Quantum Chemical and Classical Approach – IISc, Bangalore

Considering the comments received from members of Peer Group Review expressing doubts that the proposed work would lead to any kind of application or commercialization in the oil industry and also the theoretical nature of the proposal, the Committee decided that the project proposal may be dropped for consideration of funding by CHT/OIDB. The proposal could be more appropriately submitted to SERC in DST.

53.4.2 Development of Power Supply based on Direct Methanol Fuel Cell (DMFC) – IIT, Delhi

It was observed by the members that several organizations viz., DRDO, BHEL, IOC etc. are already working in this field of activity and as such there is nothing new in the proposal. In fact, under CSIR's New Millennium Indian Technology Leadership Initiative (NMITLI), a team comprising NCL, Sud Chemie, BHEL, SPIC, Kirloskar etc. are already working for developing 5-25 KW power supply demonstration unit. The Committee, therefore, decided to drop the proposal for consideration of funding by CHT/OIDB. However, the concerned investigators of the project proposal may be informed that in case they could formulate a project proposal on an improved membrane for high temperature applications, they could submit the same for the consideration of the Committee.

53.4.3 Study of Electro-coalescence Process with special reference to desalting of Crude Oil – IIT, Mumbai

It was pointed out by few members that process of Electrical Desalting of crude oil has been well developed and there are only few well known vendors in the field. However, it was generally felt by other members that this is a well-conceived proposal and might result in good knowledge base for practical applications in the oil industry. It was, therefore, decided to refer the proposal for Peer Group Review.

53.4.4 Multivariable Model Predictive Control without Plant Tests – EIL(R&D)

It was observed by the members that application of the MMPC for process control in ethylene fractionation may not be feasible, since the separation in the column is a fairly difficult operation. However, it was decided by the Committee that the proposal is definitely worth examining for Peer Review.

The Committee advised that the particulars of EIL personnel involved in the execution of the proposal, may be included in the proposal. As regards the consultancy services of Mr. Umesh Mathur of Techwrite Associates under the proposed study, the members advised EIL to ensure that this would not lead to any issues of infringement as per the stringent US laws.

53.4.5 Safety and Health Monitoring of Petroleum Industrial Structures – IISc, Bangalore

The Committee did not recommend the proposal for funding by CHT/OIDB.

53.4.6 Development of Non-Destructive Methodology to detect Hydrocarbons in Soils – IIT, Mumbai

The Committee did not recommend the proposal for funding by CHT/OIDB.

53.4.7 Fate and Transport of Hydrocarbons in Soil and Ground Water during in-situ remediation – IISc., Bangalore

The Committee did not recommend the proposal for funding by CHT/OIDB.

53.4.8 Development of Diesel-Ethanol Emulsion Technology and its Demonstration in Automotive Diesel Engines / Vehicles – IIP, Dehradun

The Committee advised that IIP may be requested to submit a comprehensive proposal with proper scientific content which should also include details of literature survey / patent search carried out by IIP in the subject technology. IIP should also be asked to give clarifications in respect of industrial partner and its contribution towards the activities involved in project execution.

53.4.9 Setting up research facilities to develop low cost options for production of ultra low sulfur diesel

The Committee decided to refer the subject project proposal to Peer Group Review.

53.4.10 Acute/Sub-acute Toxicological Profile of particulate emissions from CNG and Diesel fuelled engine exhaust : An in vivo and in vitro experimental study

The members remarked that the scope of work of the project needs to be modified for focusing in the particular area. It was also felt that ICMR should also be involved in formulating and executing the proposed studies.

The meeting concluded with a vote of thanks to the Chair.

Annexure-I

List of Participants : 53rd Meeting of the Scientific Advisory Committee on Hydrocarbons of Ministry of Petroleum & Natural Gas

1.	Dr. R.A. Mashelkar (Chairman)	Director General	CSIR, New Delhi
Members.			
2.	Dr. S. Vardarajan	Ex Consultant	Planning Commission
3.	Prof. K. Vasudeva	Ex-Head, Ch. Engg. Dept.	IIT-Delhi
4.	Dr. R.S. Venkatraman	Ex-CMD	EIL
5	Sh. A.P. Ram	Advisor (Refineries)	MOP&NG, New Delhi
6.	Mrs. Leena Mahendale	Executive Director	PCRA, New Delhi
7.	Sh. A. Soni	Director (Tech.)	EIL, New Delhi
8.	Sh. S.N. Sharma	Scientist	CSIR, New Delhi
9.	Dr.Mrs.Malti Goel	Advisor, Scientist-G	DST, New Delhi
10.	Prof. D.N. Saraf	Professor	IIT, Kanpur
11.	Prof. A.B. Pandit	Prof.Dept. of Chem.Tech.	UICT, Mumbai
12.	Prof. A.S. Moharir	Prof.–CAD & Chem.Engg.	IIT, Mumbai
13.	Prof. K.D.P. Nigam	Professor	IIT, Delhi
14.	Prof. I.M. Mishra	Prof. & Head, Chem.Engg.	IIT-Roorkee
15..	Dr. S.J. Chopra	Executive Director	CHT, New Delhi

Delegates / Invitees

16.	Ms. Vandana Singhal	Secretary	OIDB, New Delhi
17.	Sh. M. Rohatgi	Director (R)	BPCL, Mumbai
18.	Sh. M.P. Srinivasan	Director (T)	CPCL, Chennai
19.	Sh. R.C. Choudhary	Director (Tech.)	NRL
20.	Dr. R.P. Verma	Executive Director	IOCL(R&D),Faridabad
21.	Sh. V.D. Mahajan	Executive Director(RC)	HPCL, Mumbai
22.	Sh. A.K. Gupta	Scientist 'G'	IIP, Dehradun
23.	Sh. M.O. Garg	Head (RTD)	IIP, Dehradun
24.	Sh. K.K. Acharya	General Manager	IOCL, New Delhi
25.	Dr. M.A. Siddiqui	General Manager (R&D)	BPCL, Greater Noida
26.	Dr. P.K. Sen	General Manager	EIL, Gurgaon
27.	Dr. K.S. Balaraman	General Manager	CPCL, Chennai
28.	Sh. G.K. Phukan	Sr.Advisor (OSD)	OIL
29	Sh. Mukesh Saxena	Head, Engines Lab.	IIP, Dehradun
30.	Sh. S. Rajagopal	DGM (Tech.)	IOCL, New Delhi
31.	Sh. N.J. Thomas	DGM(Chem), KDMIPE	ONGC, Dehradun
32.	Sh. S. Rayarl	DGM (R&D)	KRL
33.	Dr. S. Banik	DGM (R&D)	EIL, Gurgaon
34.	Sh. Prasad Sharma G.S.	Chief Manager (Tech.)	HPCL
35.	Dr. G.P. Rai	Chief R&D Manager	BPCL, Greater Noida

36.	Dr. Alok K. Saxena	Chief R&D Manager	BPCL, Greater Noida
37.	Sh. Sheo Raj Singh	Sr.Manager	EIL, Gurgaon
38.	Sh. Rajdeep Aggarwal	Sr.Manager	EIL, Gurgaon
39.	Sh. Kuldip Sarma	Sr. Manager	BRPL
40	Sh. A.K. Jain	Scientist E-II	IIP, Dehradun
41.	Sh. S. Ailawadi	Manager	EIL
42.	Sh. P. Vijayanand	Scientist 'B'	IIP, Dehradun
43.	Dr. P.V.C. Rao	R&D Manager	BPCL
44.	Sh. B.D. Ghosh	Director	CHT, New Delhi
45.	Sh. P.N. Dodeja	Addl.Director	CHT, New Delhi
46.	Sh. M.K. Dutta	Addl.Director	CHT, New Delhi
47.	Sh. S.K. Shukla	Addl.Director	CHT, New Delhi