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Re: Request for Expedited Business Review Letter Concerning Advanced Energy Consortium

Dear Sir:

This letter is submitted to you pursuant to the Business Review Procedures set forth in 28 C.F.R. § 50.6, and seeks a statement of the Antitrust Division's enforcement intentions with respect to the formation and activities of the Advanced Energy Consortium ("AEC"), a group currently consisting of five petroleum producing companies and two oilfield service companies (identified below in paragraph 2 and referred to collectively as the "Member Companies") who propose to fund and conduct research and development activities, under the management of the Bureau of Economic Geology of The University of Texas at Austin ("the University"), concerning nanotechnology as applied to oil and gas exploration and production. This letter is submitted on behalf of the Member Companies and the University and requests "expedited" treatment in accordance with the procedures announced by the Department on December 1, 1992.

The proposed activities described in this letter will constitute a research "joint venture" within the meaning of the National Cooperative Research and Production Act of 1993, and notification concerning them will be given in accordance with section 6(a) of that Act.

Set forth below is the information required for "expedited" treatment of this request (paragraph numbers below correspond to the numbered paragraphs in the "Joint Venture" section of the Department's December 1, 1992 press release announcing the "expedited" review procedure).

1. The name of the venture is Advanced Energy Consortium. The address of its principal place of business is The University of Texas at Austin *on behalf of* the Bureau of Economic Geology, P.O. Box 7726, Austin, Texas 78713. Research activities will take place at

the Houston Research Center operated by the Bureau of Economic Geology at 11611 West Little York Road, Houston, Texas 77401, and at the Carbon Nanotechnology facility on the campus of Rice University in Houston, Texas, 6100 Main Street, Houston, Texas 77005. The venture is not a legal entity and there is no ownership structure as such. The activities of the venture will be carried out pursuant to a Research Participation Agreement ("Agreement"), the parties to which are The University of Texas at Austin ("the University") and the Member Companies, who are identified in paragraph 2 below. A copy of the Agreement and Appendices A - I is attached hereto (UT0012-41). The Agreement has been agreed to by the University and the Member Companies, but has as yet been executed only by Marathon Oil Company and Halliburton Energy Services, Inc. It may be executed by the remaining members during the pendency of your review, but as provided in Section I thereof, the Agreement shall not be effective, and the parties do not intend to commence activities relating to the venture, until receipt of a favorable business review letter from the Department.

The venture will be governed by a Board of Management composed of one representative of each Member Company, each of whom will have one vote. The Director of the University's Bureau of Economic Geology will serve on the Board of Management *ex officio* but will not have a vote. The Board of Management will define the Research Program and provide overall direction for the venture. (See Agreement, sec. 3.2, and App. D.)

2. The participants and the nature of their contributions are as follows:

The University, through its Bureau of Economic Geology, will serve as the Management Organization of the proposed research program. The University will furnish facilities and staff necessary to carry out the research and will conduct the research program under the direction of the Director and one of the Associate Directors of the Bureau of Economic Geology. The Bureau provides wide-ranging advisory, technical, informational and research-based services to industries, nonprofit organizations and governmental bodies. It functions as a research unit of the University, the Texas State Geological Survey, and the Regional Lead Organization for the Petroleum Technology Transfer Council. The Bureau's Annual Report for 2005 and related materials are attached hereto (UT0042-44).

The Founding Member Companies are five petroleum producing companies -- BP America Inc., ConocoPhillips Company, Marathon Oil Company, Occidental Oil & Gas Corporation, and Shell International E & P Inc. -- and two oilfield service companies -- Schlumberger Technology Corporation and Halliburton Energy Services, Inc. The Member Companies will each contribute \$1 million for each of the initial three years of the research program and thereafter will provide funding as determined by the Board. (See Agreement, sec. 4.1.) In addition, Member Companies may temporarily assign certain of their employees to support the research effort. (See Agreement, sec. 5.2.)

Additional qualified companies may become participants in the venture, upon approval of two-thirds of the Board of Management and concurrence of the University, subject to

the numerical limit on total number of participants as set from time to time by the Board (currently limited to ten members in the interest of maintaining the ability of the group to function quickly and efficiently). Companies are eligible to become participants who can demonstrate likely business viability during the period for which they would commit to financially support research, who are prepared to pay for access to research results achieved prior to their becoming participants, and who are in the judgment of the Board likely to bring value to the venture. (See Agreement, sec. 3.8.)

Pursuant to a separate agreement with the University of Texas that has yet to be negotiated, Rice University will contribute nanotechnology expertise and research facilities (see Agreement, Appendices B and C); but it is not anticipated that Rice will become a participant in the venture.

3. The purpose and objectives of the venture are to develop subsurface microsensors and nanosensors and associated nanomaterials that will allow for collection of more accurate information regarding the physical characteristics of hydrocarbon reservoirs than it is possible to obtain through existing technology. Improvements in the accuracy of reservoir characterization will lead to more efficient reservoir management, and ultimately to enhanced recovery of oil and gas. The focus of the proposed research program will be the development of mobile micro- and nanosensors that can be injected into oil and gas well bores and, owing to their extremely small size, can migrate out of the well bores and into the pores of the surrounding geologic structure, with the objective of collecting accurate data concerning areas of the reservoir that are outside the well bores themselves. Existing technologies (coring; wireline logging; measurement while drilling; surface seismic; multiwell pressure and other crosswell testing) are all subject to the fundamental limitation that they can acquire data only in the well bore and immediately surrounding area. Many important reservoir management decisions hinge on understanding conditions in areas between wells. Given the limitations on existing technologies, these conditions can only be estimated at present. The goal of the venture is to develop micro- and nanotechnology that will overcome the limitations of existing data collection methods and thereby allow for better-informed and more efficient management and exploitation of hydrocarbon resources. (See Agreement, Appendices A, G and H.)

Commercializing the results of the proposed research is beyond the scope of the venture. (See Agreement, Appendix B [“technology R&D collaboration of the AEC is constrained to ‘pre-competitive’ programs.”].) The University will own all inventions made by the University or jointly by the University and one or more Participants during the course of the program, including all patents thereon (Agreement, sec. 9.1), but each Member Company will, with respect to inventions resulting from the Research Program during or prior to its participation, receive a royalty-free, nonexclusive, irrevocable, worldwide, perpetual license (a) to use such inventions for noncommercial, internal purposes and (b), subject to payment of patenting costs as provided in Section 9.3, to make, use and sell any such patented inventions (Agreement, sec. 10.1). This license will extend to (a) the 50% or more parent entities of the Participants, (b) any 50% or more owned or controlled affiliates of Participants and (c) oil and

gas exploration operators in which a Participant has a 25% or greater interest. (Id.) The University contemplates licensing its rights to results of the research program to third parties on a royalty-bearing basis, subject to the approval of the Board of Management, which shall not be unreasonably withheld. Royalties received for such licenses are to be shared between the University and the Participants on a reasonable basis to be negotiated by them. (Agreement, sec. 10.3.)

4. As explained above, the venture does not propose to produce, market, or distribute anything. Rather, its activities will be limited to developing micro- and nanosensor technology for use in oil and gas exploration and production, and associated nanomaterials. Production, sale or other commercial exploitation of products incorporating the resulting technology is beyond the venture's scope, and is a matter to be addressed by individual Member Companies as they see fit.

5. One of the participants is a party to a pre-existing bilateral research effort with another institution of higher learning. That bilateral research effort has been underway since late 2003. The focus of that bilateral research effort is "micro memory modules" for use in wellbore telemetry, e.g., for real time data from downhole Measurement-While-Drilling ("MWD") tools. Wellbore telemetry is a different industry problem than that upon which the proposed venture intends to focus (micro and nano sensors for deployment "interwell" within subsurface hydrocarbon reservoirs), but these different industry problems may both have solutions involving the broadly defined class of micro or nano devices. The future vision of this particular participant's existing micro memory module project has been recognized to potentially include communications into fractures, which may be complementary to the AEC goal of in-situ sensing. It is unknown at this time whether the technology resulting from one project could benefit the other. In addition, the participant referred to above holds U.S. Patent No. 6,898,529, "Method and System for Determining Parameters Inside a Subterranean Formation Using Data Sensors and a Wireless Ad Hoc Network."

Otherwise, none of the participants currently develops, produces, markets or distributes anything that is within the proposed focus of the venture, or has plans to do so except insofar as it may take steps to commercialize the results of the venture. Since the Research Participation Agreement expressly permits the participants to engage in related research independently of the venture, the participants do not believe that the formation or implementation of this venture will lessen existing or potential competition in any relevant product, service or innovation market.

6. While there are a number of existing research efforts underway around the world that are focused on various aspects of nanotechnology and nanomaterials, so far as the University and the Member Companies are aware, none of those efforts is intended to achieve precisely the results desired by the AEC. A recent literature search revealed the following nanotechnology research efforts with potential application to the general subject of petroleum exploration and production:

a. Foresight Nanotech Institute and Battelle Memorial Institute [www.foresight.org/impact/GillettWhitePaper.txt] are conducting research into the cheap, large-scale fabrication of nanomaterials.

b. Australian Institute for Bioengineering and Nanotechnology [www.aibn.uq.edu.au], affiliated with the University of Queensland, Australia, is conducting multidisciplinary research to understand and exploit nanostructures. It has developed nanotechnology to help extract more petroleum from oil fields. Known as Pepfactants®, this is a peptide technology that can control emulsions and foams used in a wide range of industry processes.

c. Baker Institute Energy Forum, Rice Alliance for Entrepreneurship and Technology, and the University of Houston's Richard E. Smalley Institute for Nanoscale Science and Technology [www.rice.edu/energy/research/energyprogram/nanotechnology.html] have begun a major initiative on the role nanotechnology will play in the development of clean, affordable and sustainable energy.

d. Center for Integrated Nanotechnologies (CINT) [<http://cint.lanl.gov>] is a Department of Energy/Office of Science Nanoscale Science Research Center (NSRC) entity operating as a national user facility devoted to establishing the scientific principles that govern the design, performance, and integration of nanoscale materials. CINT is one of five NSRCs throughout the U.S. that form an integrated national program, affiliated with major facilities at the DOE's National Laboratories, to cover the diverse aspects of nanoscience and technology.

e. Victoria University of Wellington's MacDiarmid Institute for Advanced Materials and Nanotechnology [www.macdiarmid.ac.nz/ABOUT/initiative.html], in partnership with the University of Canterbury and Industrial Research Ltd., and with participation by staff from Massey University, the University of Otago, and the Institute for Geological and Nuclear Sciences, are seeking to develop nanostructured materials for use in energy applications, with particular emphasis on energy generation (photovoltaic cells), highly efficient energy use in lighting and displays (electroluminescent materials) and electrocatalysis for hydrogen energy technologies.

f. Rutgers University [<http://urwebsrv.rutgers.edu/focus/article/Nanotechnology%20facility%20receives%20state%20grant/1855/>], with funding from the New Jersey Commission on Science and Technology, is developing a facility with advanced nanotechnology instrumentation and fabrication equipment for use by companies in the biotechnology, communications, energy, pharmaceutical and petrochemical fields.

g. National Science Foundation is funding five years of research by a Western Michigan University chemist doing pioneering work in the nanotechnology field,

seeking to create nanoscale materials that trap and store the sun's energy and use it to carry out chemical reactions for specialized purposes, including breaking down pollutants in groundwater and generating hydrogen for use as an alternative fuel [www.wmich.edu/wmu/news/2006/03/036.html].

h. Nanostellar Inc., formed by researchers at Stanford University and NASA Ames Research Center, aims to develop concepts for computationally modeling nanomaterials into technologies for designing and fabricating controlled nanomaterials with optimized properties for catalytic reactions.

i. National Nanotechnology Initiative is an interagency nanotechnology research and development effort on behalf of 25 federal agencies to support fundamental and applied research in nanotechnology. Participating agencies include the National Science Foundation and the Department of Energy. Its budget for fiscal year 2007 is \$1.2 billion. Further information may be found at www.nano.gov.

In addition to the foregoing research efforts, numerous privately-funded research efforts in the general field of nanotechnology are believed to be underway. Measuring the magnitude of private investment in this area and ascertaining its precise research objectives are difficult, because private corporations and investors often consider such information to be proprietary. In 2003, the European Commission estimated worldwide nanotechnology research funding to be approximately € 2 billion. In 2004, according to estimates prepared by Lux Research, \$8.6 billion was spent on nanotechnology research worldwide, including \$1.7 billion in the United States, \$1.4 billion in Asia, and \$650 million in Europe. In addition, an estimated \$400 million was invested in nanotechnology research by venture capital firms in 2004.

7. There are no restrictions in the Research Participation Agreement on the ability of the participants to compete with the venture, either individually or through other entities. To the contrary, the Research Participation Agreement explicitly states, "Nothing in this Agreement is intended to limit the ability of any Party to conduct research or development activities alone or with others, concerning any subject whatever." (Agreement, sec. 3.9.)

8. The only restrictions on the flow of information to Member Companies contained in the Research Participation Agreement, apart from a general confidentiality obligation (Agreement, sec. 8.1, 8.2) are (a) the requirement that no information be shared except insofar as it is reasonably related to and necessary to the accomplishment of the research program (Agreement, sec. 8.3) and (b) the requirement that access to confidential information be limited to individuals who need to have access to it in order to carry out the research program (Agreement, sec. 8.4). Moreover, there is a general prohibition on the exchange of any confidential information prior to receipt of a favorable business review letter from the Department (Agreement, sec. I.).

9. The venture itself will have no customers or licensees, as it will not be engaged in commercial exploitation of the research results. If the research program succeeds in reaching any of its goals, the resulting technology will be of interest to oil and gas producers and oilfield service companies, because it will improve the efficiency of oil and gas exploration and production. The University plans to publish the research results as often as possible. The manner in which the research results are commercialized, however, will be left entirely to individual Member Companies. For this reason, it is not possible at this time to identify by name any likely customers for any resulting technology.

10. Organizing and conducting a research effort with objectives similar to those of this venture would require (a) petroleum engineering knowledge and skills including knowledge of existing reservoir characterization technologies and their limitations (available in most large petroleum producing firms worldwide and in several academic institutions), (b) nanotechnology expertise (also available at several academic institutions), (c) research and development facilities and a staff adequate to conduct the research and (d) an adequate source of funding. The AEC's anticipated research effort will have an annual budget of approximately \$7 million (see Agreement, Appendix E), most of which will pay salaries of the approximately 30 to 40 persons to be employed through direct hires or subcontracts. Owing to the need to draw on expertise in both the petroleum engineering and nanotechnology fields, it is unlikely that a research project of this nature could be conducted by any individual petroleum producer or academic institution. Moreover, in view of the highly uncertain nature of the success of the project, it is also unlikely that any individual for-profit organization would undertake a project of this nature. This is especially true in the present environment of reduced R&D budgets and deployment of personnel to exploit existing technology. The participants in the instant venture estimate that the contemplated research program will continue for at least three years and will cost in excess of \$20 million. (See Agreement, Appendix E.)

11. If the venture's research efforts succeed, it will have developed technology that will radically improve the accuracy of information concerning hydrocarbon reservoir characteristics, thereby enabling more intelligent reservoir management and ultimately enhancing the quantity of oil and gas that can be recovered.

Deciding between different reservoir management options usually requires running computer models to predict the behavior of the reservoir in response to different management techniques. The sophistication of reservoir performance modeling has been steadily increasing throughout the past half-century, but the weak link in the process has always been, and remains, the accuracy of data inputs. (See Agreement, Appendix H.) The proposed research is intended to develop technology that greatly improves the accuracy of these data inputs. Currently, subsurface characterizations are estimated by computer simulations and interpretations from above ground images. Nano-probes will provide the opportunity to put "eyes and ears" below ground, thus providing a much higher degree of confidence in characterization of subsurface features. With this better understanding of subsurface conditions, identification and recovery of oil and gas reserves should be markedly improved.

Documentary Attachments: In addition to the Bureau of Economic Geology materials referenced earlier in this letter, the following materials are submitted herewith:

1. Formation documents: Research Participation Agreement and Appendices, attached as UT0012-41.

2. Business plans or strategies of the venture: In addition to the Appendices to the Research Participation Agreement, all responsive documents located after a reasonable search of participants' files are attached (UT0001-11). These attachments consist of notes and agendas of meetings and conference calls to discuss the formation and scope of the proposed venture.

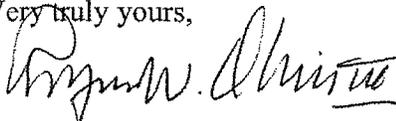
3. Venture participants' own plans to engage in the subject research independently of the venture: A reasonable search of the participants' files has failed to disclose any such plans, except insofar as the activities of the one participant described above in paragraph 5 of this letter may be considered to fall into this category, and the participants do not believe that any other such plans have existed during the two years prior to the formation of the venture.

4. Documents discussing legality of venture or impact of venture on competition or prices: Apart from internal communications within individual participants concerning advice from their respective legal counsel, a search of the participants' files has failed to disclose any such documents, and the participants do not believe that any such documents exist.

As indicated below, I am sending copies of this letter, without enclosures, to individual representatives of the University and of the Member Companies.

If you have any questions or wish to discuss this matter, please do not hesitate to contact the undersigned at 713-229-1366.

Very truly yours,



Rufus W. Oliver III
Counsel for The University of Texas at Austin

RWO:
Enclosures

cc: Mr. Scott W. Tinker
Mr. Jay Kipper
Mr. Juan Sanchez
Mr. Barry Burgdorf

Ms. Patricia Ohlendorf
Mr. Charlie Williams
Ms. Jackie Mutschler
Mr. Lou Burke
Mr. Dan Gleitman
Mr. Tim Tipton
Mr. Bill Roby
Mr. Rod Nelson