Perf Newsletter

78th Meeting of the Petroleum Environmental Research Forum (PERF)

Biofuels

Philadelphia, Pennsylvania

17 November 2008: Board of Directors Meeting

18 - 19 November 2008: Fall Meeting

In Conjunction with:
American Institute of Chemical Engineers (AIChE) 100th Annual Meeting
(http://www.aiche.org/Conferences/AnnualMeeting/index.aspx)

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Meeting Theme: Biofuels

Government, private and industry sectors are actively working to address the challenges associated with biofuels development thru research on new technologies and pathways to convert various biomass feedstocks into petroleum substitutes. The goal of the PERF Meeting on Biofuels is to examine the state and potential environmental impacts of "second generation" biofuel alternatives in order to promote research, and develop technology solutions. The alternatives of particular interest are:

- Ethanol from Lignocellulose
- Synthetic Fuels via Biomass Gasification
- Biofuels via Biomass Pyrolysis
- Biofuels from Farmed Algae

Presentations can address individual biofuel production technologies; as well as analyses of the overall environmental footprint of particular approaches - a "Fields to Wheels" analysis which would consider scale, impact on greenhouse gas emissions, land and water resource utilization, waste management, wastewater generation, emissions characterization, secondary contaminant and/or product generation, sustainability, impact on biodiversity, and short and long term environmental impacts.

Hotel:
Hilton Garden Inn Philadelphia Center City (PERF Rate: $179)

1100 Arch Street
Philadelphia, PA
215-923-0100
www.philadelphiacentercity.stayhgi.com

Philadelphia Weather in November

Avg. high	55°f 13°c
Avg. low	38°f 3°c
Avg. rain	3.3 in. 83.8 mm
record high	84°f 29°c
record low	15°f -9°c

Source: Weatherbase

Philadelphia commonly referred to as **Philly** and **The City of Brotherly Love**, is the largest city in Pennsylvania and the sixth most populous city in the United States. It is the fifth largest metropolitan area by population in the United States, the nation's fourth largest consumer media market as ranked by the Nielsen Media Research, and the 49th most populous city in the world. It is the county seat of Philadelphia County, with which it is coterminous. Its name literally means "the City of Brotherly Love" (from Greek: Φιλαδέλφεια, [pʰi.la.□del.pʰe ː .a], Modern Greek: [fi.la'ðɛl.fi.a], "brotherly love" from *philos* "love" and *adelphos* "brother"). The city is recognized as a strong candidate global city.

In 2005, the population of the city proper was estimated to be over 1.4 million, while the Greater Philadelphia metropolitan area, with a population of 5.8 million, was the fifth-largest in the United States. A commercial, educational, and cultural center, the city was once the second-largest in the British Empire, (after London) and the social and geographical center of the original 13 American colonies. During the 18th century, it eclipsed New York City in political and social importance, with Benjamin Franklin taking a large role in Philadelphia's early rise to prominence. It was in this city that some of the ideas, and subsequent actions, gave birth to the American Revolution and American independence, making Philadelphia a centerpiece of early American history. It was the most populous city of the young United States and served as the nation's first capital in 1774. (Source Wikipedia)

Upcoming Events

PERF Remediation Workshop
Berkeley, California
September 3-4

The PERF Remediation Workshop will be hosted by Chevron on September 3 & 4 at the DoubleTree Hotel Berkeley Marina in Berkeley, California. The workshop will address research needs of concern to the Petroleum Industry in four proposed remediation Focus Areas: (1) Source Characterization Tools, (2) In Situ Chemical Oxidation (3) Innovative Tools to Monitor Remediation Processes, and (4) Soil Remediation. Each Focus Area will be followed by discussion sessions to identify actions and projects that could be undertaken to address additional research in these areas.

The Remediation Workshop is free but participants must register to attend. Registration, agenda, and additional information on the workshop will be available at www.PERF.org when the workshop registration opens. Until then, please contact:
Tom Peargin at TPeargin@chevron.com or telephone (+1) 510-242-9246.

Berkley Weather in September

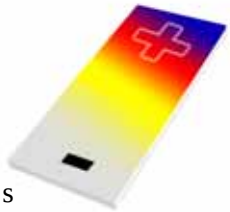
Avg. high	72°f	22°c
Avg. low	56°f	16°c
Avg. rain	.4 in.	1 cm

Berkeley is a city on the east shore of San Francisco Bay in Northern California, in the United States. Its neighbors to the south are the cities of Oakland and Emeryville. To the north is the city of Albany and the unincorporated community of Kensington. The eastern city limits coincide with the county line (bordering Contra Costa County) which generally follows the ridge line of the Berkeley Hills. Berkeley is located in northern Alameda County.
Berkeley is the site of the University of California, Berkeley, the oldest campus of the University of California system, and the Lawrence Berkeley National Laboratory, Lawrence Hall of Science, Space Sciences Laboratory, and Mathematical Sciences Research Institute, which are on the campus grounds. (*Source Wikipedia*)

New Projects Proposals

2008-01: An Optical Sensors for Volatile Organic Compoundsproposal by BP and Questor

BP and QUESTOR are co-sponsoring the project proposal 08-01 to develop cost-effective colourimetric gas sensors tailored for petrochemical applications. The project would develop sensor compounds that change colour upon exposure to specific gases (analytes). Analytes will be defined by project participants for specific applications. Previous research has already developed sensors for ethylene and preliminary positive results have been obtained for xylenes. Possible target analytes are: 1,3-butadiene, HF, H2SO4, HCl, SO2, NOx, CO, CO2, O2, H2S, NH3, benzene.



These colourimetric sensors can be deployed in a variety of supports and formats, to be defined by the project participants depending on application. Potential supports include tape, tags, paint, or LEDs. Colour changes can be monitored manually, by camera, or by wireless networks. The two latter allow for continuous monitoring. Multiple LED devices can be placed in areas of interest to give comprehensive and reliable feedback data sets (e.g., approximately 4-5 such devices would be placed around a pipe joint); compatible with GPS technology.

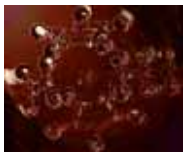
The benefits of this technology are: 1) tailor-made sensors for specific applications not covered by existing methods, and 2) replace more expensive and/or labour-intensive sensing systems.

Cost of research project (PERF/QUESTOR sharing, TBN): 140,000 Euro for two linked 3-year studentships.

For more information contact Dave Fashimpaur (dave.fashimpaur@bp.com)

2007-6 An Assessment of Substances in Refinery Effluents-proposed by **ExxonMobil**

ExxonMobil proposes a PERF project to perform an assessment on refinery wastewater effluent substances that are the focus of EU legislation (i.e. Water Framework Directive (WFD) & European Pollutant Release & Transfer Register (EPRTR)). The objective of this project is to build a comprehensive database of effluent quality to inform the petroleum industry and provide benchmarking opportunities. The project will use results and guidance of a CONCAWE project studying effluent sampling techniques and analytical test methods of these targeted substances. This project will aim to identify substances of regulatory concern that are non-detectable in refinery effluents as well as those detected which may be the focus of future study. The collection of effluent samples from various refineries with different treatment facilities will enable a comprehensive and representative database to be developed. Effluent analysis is proposed to be done at an independent external research laboratory that has demonstrated expertise with the required test methods.



For further information, please contact Frank Kerze at frank.j.kerze@exxonmobil.com or (703) 846-2377.

2007-5 Membrane Bioreactor Demonstration -proposed by ExxonMobil

ExxonMobil proposes a PERF project to evaluate membrane bioreactor (MBR) technology as a competitive alternative to conventional systems. The study will determine if the wastewater treatment technology is comparable or superior in operability and effluent quality.

Advances in MBR technology have increased market growth and driven down capital cost. While not yet commercialized or extensively tested for refinery wastewater, membrane bioreactors could lead to considerable benefits with:

- -Reuse of effluent water
- -Smaller bioprocess footprint
- -Substantial reduction of effluent TSS
- -Elimination of clarifier settling challenges

New Projects Proposals

continued

2007-5 Membrane Bioreactor Demonstration continued

The project will complete bench or pilot scale testing of a membrane bioreactor with side-by-side comparison to a conventional activated sludge system.

During the project, both normal as well as various upset conditions will be tested. Simulated upset conditions that could potentially harm or foul the membrane may include pH swing, oil & grease upset, high organic or nitrogen loading, and excessive debris/solids. Effluent from the MBR will also be analyzed for potential reuse applications in water utility systems.

For more information contact: James M. Phelan (703-846-3611). james.m.phelan@exxonmobil.com

2006-03 – WWTP - Fate & Effects of Pollutants – proposed by **TOTAL**

This project consists of a "mass balance" evaluation to understand how and where pollutants transfers from liquid to gaseous and solid phases occur throughout the unit operations of the Waste Water Treatment Plant system.

It will lead to:

- The environmental impact assessment of each process (gas and solid phases)
- Optimization to reduce the environmental impact of each process

Some points have to be defined:

- The processes to consider (settler, flotation unit, biological process…)
- The chemicals to study (we propose 3 compounds : a BTEX, a HAP and a metal)

For more information please contact Nicolas Lesage (nicolas.lesage@total.com).

2006-02 VOC IR Camera Sharing Cooperative – proposed by **TOTAL and BP**

Total and BP have proposed a project to share knowledge regarding infrared cameras for VOC leak detection. The project type would be shared with a projected participation cost $50,000 of shared value research.

Lessons learned from field trials with different IR camera technologies can be shared among participants. This would help in selecting the right camera for the right purpose, by extending the field of investigation and the type of camera tested.

There are several IR camera vendors that are commercially available: Flir, PAT, GasOptics, Bertin, etc. Some cameras are portable and some are fixed mounted. Some technologies can analyze for specific hydrocarbons and quantify emissions. Each participating member company conducts a field trial with a different technology, then that field test data can be leveraged and shared among participants. This project would include different products, different sites, and different possible application. For more information contact: Marie-France Benassy (marie-france.benassy@total.com) or DaveFashimpaur (dave.fashimpaur@bp.com).

2006-01 Whole Effluent Assessment (WEA) proposed by **TOTAL**

The main goal of this project is to evaluate the relevance of ecological risk assessment with respect to WEA method in comparison with *in-situ* impact assessment. Does WEA predict a real ecosystem risk for the receiving waters? If WEA is a good indicator of ecosystem risk, it could be used to access difficult river or estuary segments, in place of *in-situ* impact assessments; or to predict ecosystem risk for future wastewater effluent.The two alternatives to conduct this project to be discussed are:

- "real world" river analysis, or
- the use of mesocosms called "Rivieres pilotes" (less variability).

For more information contact Anne Basseres (anne.basseres@total.com).

Project Updates

BP is coordinating Project 2004-06 "Reducing Desalter Environmental Impacts"

The objective of this project is to evaluate desalter effluent characteristics, and desalter effluent treatment options, including emulsion breaking technologies.

Current project participants are: BP, ExxonMobil, ConocoPhillips, RepsolYPF, Total, CITGO, Marathon, and Shell). KBW Process Consultants is the primary contractor for the project. The project utilizes a phased approach to survey issues related to desalters (Phase 1), pilot-scale testing of technology options for oil/water/solids separation (Phase 2), and then refinery field testing of promising technologies (Phase 3). Phase 1 and Phase 2 have been completed. Phase 3 field testing is being conducted during the second half of 2008.

The project builds upon the PERF 91-14 knowledge base, increased understanding of emulsion and rag layer fundamentals, new hardware technology, new emulsion breaking chemistries, and adding 12+ years more operating experience. This project is especially relevant with the current trends are toward heavier crude slates, including bitumen, more asphaltenes, resins and emulsion precursors, higher solids content in crude, tighter environmental and product specifications are other issues to be addressed. For more information contact Dave Fashimpaur (dave.fashimpaur@bp.com)

PERF ARSENIC PROJECT

The PERF arsenic sharing project held its first meeting with ERM who was selected to produce the deliverable for this project. The meeting was held on June 9 and 10 in Austin, Texas and was designed to both share company information with ERM, and to discuss how to best summarize this information into a document that can be used by project managers and regulators that are dealing with arsenic issues at petroleum hydrocarbon sites. Over the course of the day and half meeting we agreed that the best path forward is to have ERM produce a detailed outline which can be reviewed by all the companies participating so that there is consensus on the path forward. It is anticipated that there will be a number of outside documents assembled and data gathered to fill in the gaps identified.

Participants in this project include: BP (sponsor), Chevron, Total, ConocoPhillips, Shell, and API. A series of conference calls are planned to ensure that all participants are up to date on progress being made in the assembly of information by ERM. Contact person for this PERF project is: Todd Ririe at todd.ririe@bp.com.

Recent Events

Petroleum companies produce more water than oil
Water treatment and recycling, big concern for the petroleum sector

VITO, the Flemish Institute for Technological Research, in Belgium hosted the 77th PERF meeting in Antwerp on "Water production and water treatment". Marc Van Peel, chief executive of the Port of Antwerp, elucidated why Antwerp was chosen as meeting place. He presented the geography of the harbour and its economical activities, being the second largest petrochemical site in the World.

Representatieves of BP, Chevron, ConocoPhillips, Respsol, ExxonMobil, Shale and Total discussed with VITO, the Univeristy of Antwerp, Queens University of Belfast and environmental companies about the problems related to water treatment and reuse.

Water scarcity and guaranteeing water of a reliable quality is a topic that gains importance in all regions. Within an industrial context, water management includes all managerial and technical approaches that favour the present and future supply of a secured water amount and quality. This includes both the preservation of current water resources (surface water, ground water) as we strive for minimal water use and maximal water reuse within processes.

From the presentations it turned out that water production is increasing faster than oil production leading to the statement that nowadays the petroleum companies produce more water than oil. There is no doubt that water treatment is becoming a very important issue in this world. The problems related to this so called 'Produced Water' gained high attention during this conference. Specialists of the petroleum companies and the research institutes discussed during four days these topics.

The increasing search for new oil reservoirs leads to oil winning under difficult conditions as there are oil-sands in Canada, high water content oil, high naphtenates content etc. This makes the use of advanced environmental technologies for water treatment necessary.

Processes of physico-chemical treatment were compared with biological treatment for their efficiency, economics and CO2 exhaust. Further it turned out that more intense water treatment as membrane separations would become necessary in certain situations. How to implement membrane technology at low

Recent Events

(77th PERF meeting continued)

energy cost in this new area was one of the dominating questions. Or, in other words, how could biological water treatment and membrane technology be combined in a cost effective way? What was the impact on the ecology and the environment and how can an overall impact of many different oil compounds be evaluated? In some sensitive areas a 'Zero liquid discharge' may even be necessary. However water injection for disposal is an energy intensive process leading to CO2 emissions. This forces the PERF members and their associates to search for new water treatment and equipment.

In cases of extensive water treatment specifications the threat can be turned into a blessing. It means the future can probably anticipate with a water treatment in such a way that a small increase of the efforts will not lead to a discharge but to a re-use of the water especially in water scarcity countries.

On the other end also the oil production effluents need to fulfill more stringent standards linked to the Water Framework Directive, Pollution Release and Transfer Register, the Integrated Pollution Prevention and Control and REACH with product assessement in

The last PERF workshop was held May 6 and 7 in Pau, France, at the palais Beaumont. Total coordinated this meeting whose topic was: "Risk assessment of substance and impact of industrial waste water in aquatic ecosystem: From regulation to technical challenges". The first day started by presentations of the European regulations REACH, Water Framework Directive and the OSPAR convention, considered as the starting points of stricter ecosystem assessment request. The end of Day 1 was dedicated to the visit of the Artificial Stream leaded Anne Basseres from Total and her team. Day 2 included four next session, presenting different methods of risk and impact assessment: the hydrocarbon Block Approach, the Whole effluent assessment, data validation through mesocosm experiment and in situ impact assessment in receiving water. This workshop finished by a discussion and a drafting of a conclusion gathering all the main information expressed and justified during these two days. PERF member companies can access all the presentations and the report on the PERF web site at perf.org. No board meeting was held and no new project proposal was formulated because it was a workshop and not a meeting,

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Vice Chair:	**Bob Finley**
	RW.Finley@aramcoservices.com
	+1 (713) 432-5358
Teamwork	**Together we achieve the extraordinary!**

PERF External Group Liaisons

PERF encourages external groups such as trade associations, national laboratories, and research institutes to join as Liaison members. PERF values the partnerships that we have with these external groups and they frequently join PERF projects and contribute valuable research.

Liaison members appoint Representatives that have the right to attend and participate in meetings of PERF and its committees, but they do not have the right to vote or to serve as an officer of PERF. Liaisons are not required to pay the fee paid by Members.

American Petroleum Institute (API)

Department of Energy (USDOE)

Gas Technology Institute (GTI)

Lawrence Berkeley National Laboratory (LBNL)

Water Environmental Research Foundation (WERF)

Argonne National Laboratory (ANL)

Electronic Power Research Institute (EPRI)

International Association of Oil and Gas Producers (OGP)

Oak Ridge National Laboratory (ORNL)

University of Manchester Institute of Science and Technology (UMIST)

The Petroleum Environmental Research Forum (PERF)* is a research and development joint venture, formed to provide a stimulus to and forum for the collection, exchange, and analysis of research information relating to the development of technology for health, environment & safety, waste reduction and system security in the petroleum industry. PERF is a non-profit organization of Members which are corporations engaged in the petroleum industry that recognize the importance of a clean, healthy environment and are committed to support cooperative research and development. PERF does not itself participate in research projects but provides a forum for Members to collect, exchange, and research information relating to practical and theoretical science and technology concerning the petroleum industry and a mechanism to establish joint research projects in the field.

**The name Petroleum Environmental Research Forum and its acronym PERF are registered service marks*

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Aramco Services Co.	**Robert Finley**
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