



# PERF Newsletter

Environmental,  
Health,  
& Safety  
Solutions for the  
Petroleum Industry

77<sup>th</sup> PERF Meeting  
Water Treatment  
February  
27-29 Antwerp, Belgium

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F. Joseph Gormley, Esq.

The 2008 winter PERF meeting will be held on February 27 - 29 at the Park Plaza Astrid Antwerp Hotel in Antwerp, Belgium. The theme of this meeting will be "Water production & Water treatment". Prior to the technical meetings, the PERF Board will meet on February 26.

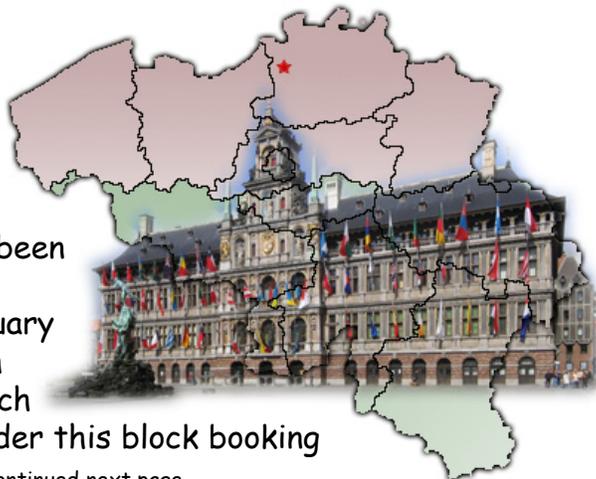


On February 27 the technical sessions will start at 9:00 a.m. Catering arrangements have been made at mid-morning and lunch. After the day's session close, there will be a reception, offered by VITO, and a poster session.

On February 28 the technical presentations will begin at 9:00 a.m. and will include discussion groups. Catering arrangements have been made for mid-morning and lunch.

On February 29, we leave at 9:00 a.m. by bus towards VITO in Mol, for a visit to VITO's labs and poster presentations. Estimated time of arrival back at the hotel is 12:30 p.m.

**Hotel:** Each person is responsible for making his or her own hotel reservation. A block of rooms (please quote Block Booking "PERF") has been reserved at the Park Plaza Astrid Antwerp until February 20 after which, in line with hotel policy, any rooms which have not been reserved under this block booking



continued next page

will be released. Anyone making a reservation against this block booking and subsequently wishing to cancel, must do so by February 20 or they will be charged for the room if it is not subsequently re-booked. Credit card details will be requested from those making a reservation. Rooms are guaranteed to be available by 2:00 p.m. on the day of arrival and must be vacated by noon on the day of departure. All rooms are single, en suite, with breakfast at a cost of 146 EUR per person per night, which is a special rate. Please make your reservation (Block Booking "PERF") by February 20 to avail of this rate.

Park Plaza Astrid Antwerp

Koningin Astridplein 7

2018 Antwerp, Belgium

Telephone +32 (0) 3 203 1234

Fax: +32 (0) 3 203 1251

E-mail: [appres@pphe.com](mailto:appres@pphe.com)

Website: <http://www.parkplaza.com/webExtra.do?hotelCode=BELANTWE>

"Map & directions" leads to a map & gives directions coming from several airports.

**Airport:** BRU - Brussels Airport (approximately 45 km from the hotel)

**Transportation:** The Park Plaza Astrid Antwerp Hotel is situated across Antwerp's central railway station (exit Astrid). From Brussels Airport, there are several trains per hour going towards Antwerp. More information on: <http://www.b-rail.be> (stations: Brussels Airport → Antwerpen-Centraal). The cost of a one-way ticket would be c. 7 EUR. Taxis are available at the airport. Brussels Airport → Antwerp would be c. 45 EUR. Both train & taxi will take about 50 minutes to get from Brussels to Antwerp. Please use the registration form found on the PERF website to register by February 13.

**VITO** is an independent and customer-oriented research organization. Their goal is to provide innovative technological solutions as well as scientifically based advice and support in order to stimulate sustainable development and reinforce the economic and social fabric of Flanders.

In its Environmental and Process Technology research domain VITO develops and validates new industrial technologies for (effluent) water treatment and decontaminating polluted soils and sludge. Furthermore, in this research domain VITO provides companies with objective consultancy in the introduction of environmentally friendly production and management techniques and for solving environmental problems. The research activities are concentrated on water and soil. The environmental technology program consists of seven project groups:

[Air.](#)

[Membrane technology;](#)

[Process optimization;](#)

[Reactor technology;](#)

[Soil decontamination;](#)

[Waste;](#)

[Water treatment.](#)

The agenda for the meeting can be found on the PERF website.

**Antwerp** is a city and municipality in Belgium and the capital of the Antwerp province in Flanders, one of Belgium's three regions. Antwerp's total population is ca. 461,496 (as of January 2006) and its total area is 204.51 km<sup>2</sup> with a population density of 2,257 inhabitants per km<sup>2</sup>.

Antwerp has long been an important city in the nations of the Benelux both economically and culturally. It is located on the right bank of the river Scheldt, which is linked to the North Sea by the Westerschelde. Antwerp's seaport, one of the world's largest and after the port of Rotterdam the second largest in Europe, has a high level of cargo shipping and oil refineries traffic. Families of the large Hasidic Jewish community have traditionally controlled Antwerp's global centre of the diamond trading industry, although the last two decades have seen Indian and Armenian traders become increasingly important. (Source: Wikipedia.com)

### Antwerp Weather in February

The average low for February is 34° F (1° Celsius). The average high is 45° F (7° C). Average rainfall for the month is 1.7 inches (4.3 cm).



## New Projects Proposals

### 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 (EPRT)). 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](mailto: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

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](mailto:james.m.phelan@exxonmobil.com)



### 2006-4 Evaluation of Novel Monitoring Techniques proposed by Chevron

Chevron is proposing a PERF study to evaluate new and novel air quality monitoring techniques. New monitoring technologies that are inexpensive and have very low detection limits have become available or are in the process

of being developed. One potential monitoring technique is the personal badge technology. These technologies are being used by various government and non-governmental organizations to assess emissions and community exposure from oil and gas production, storage, refining, and marketing facilities. In some cases these organizations are conducting inaccurate analysis and presenting incorrect results. The purpose of the study would be to evaluate one or more of the novel personal badge technologies in an industrial complex for a two to four week period. It would be desirable to conduct the field test in an area that has an existing monitoring network or an industrial complex that has ambient air quality monitors for comparison purposes. Also, if a company has a location with some of the newer monitoring technology, the resulting monitoring results and analysis can be shared for inclusion and participation in this project.



For more information or to join the project, please contact Chris Rabideau at [CRabideau@chevron.com](mailto:CRabideau@chevron.com) or 713-954-6981.

### 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](mailto: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.



### New Projects Proposals (Continued)

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](mailto:marie-france.benassy@total.com)) or DaveFashimpaur ([dave.fashimpaur@bp.com](mailto: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](mailto:anne.basseres@total.com)).

### Current Projects

#### 2006-07 Arsenic Remediation Sharing Cooperative: Update

The PERF arsenic sharing project held its second meeting in Houston that was hosted by Shell at their Westhollow Technology Center on November 29. In attendance were representatives from BP, ConocoPhillips, Shell, Chevron, Total and API (via conference call). API reported that have received funding for hiring a contractor that will be used to assemble the company information appropriate for sharing in a "best practices" paper to be published by API. At our meeting we discussed information that companies might have on a variety of issues related to fate and transport of arsenic, background concentrations, etc. that will be available for sharing. The contract for this project has been signed by two companies with others needing only minor revisions in order to be signed. API is currently working towards assembly of a short list of contractors suitable to submit bids for the work. Once the contractor has been selected another meeting will be held to start assembling the information and identifying data gaps. Contact person for this PERF project is: Todd Ririe at [todd.ririe@bp.com](mailto:todd.ririe@bp.com).



### 2004-06 Reducing Desalter Environmental Impacts Update

BP is coordinating a Petroleum Environmental Research Forum (PERF) project "Reducing Desalter Environmental Impacts". The objective of this project is to assess the performance of refining desalter systems when running various slates of Heavy Crude Oil, determine effects on desalter effluent characteristics, and evaluate desalter effluent treatment options.

This is a joint-industry project and currently there are eight participating companies: BP, ConocoPhillips, RepsolYPF, Total, Marathon, CITGO, Shell, and ExxonMobil. KBW Process Consultants is the primary contractor for the project. The project utilize a phased approach to survey issues relating to desalters, technology options, and then progress to a subsequent field test phase of promising technologies.

Pilot plant testing of different vendor technologies is starting up at Naperville. Data will be obtained from the test skid on separation of oil, water, and solids from brine mudwash andrag layer feed materials.

The project builds upon an earlier PERF project (91-14) knowledge base. It will provide better understanding of emulsion and rag layer fundamentals, new hardware technology, new emulsion breaking chemistries, and operational experience to the database. 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 ([fashimdn@bp.com](mailto:fashimdn@bp.com))



## Cooperative air program proposal

Discussions during the 2007 PERF meetings in Annapolis and Bartlesville identified gaps in research and technology that stimulated further discussion and ideas about how to meet those needs through a cooperative air program.

Previous PERF projects have been cooperative programs, and these can be broad with multiple initiatives under one project. A cooperative program can include a variety of funding sources, and participants, i.e. member companies, government agencies (DOE, EPA, BLM), and national laboratories.

An initial bucket-list of brainstorming ideas is listed here:

- Development of more accurate approaches for estimating oil and gas growth.
- A critical review of visibility impairment assumptions.
- Rethinking ozone compliance (national level).
- Photochemical modeling
- Meteorological modeling.
- An analysis of emission trends and monitoring trends.
- Advances in control technology
- Climate change,
- Interaction of climate and air quality,
- Trans-oceanic emissions,
- Interactions between PM and ozone,
- Secondary organic aerosols,
- Need to know actual pollutant background levels,
- Multiple pollutant strategies,
- Instrumentation for continuous monitoring,
- New fuels and their air quality and climate impacts.
- CO2 concentration and capture

Summaries of these meeting discussions can be found on the PERF website. For more information on this project contact Dave Fashimpaur ([dave.fashimpaur@bp.com](mailto:dave.fashimpaur@bp.com))

## Reduction of Total Dissolved Solids in Water Sources at Upstream Heavy Oil Locations

- by ExxonMobil & ConocoPhillips

At the recent "Environmental Challenges of Heavy Crude Oils" PERF Meeting, it was evident there is a need to assess the performance of select novel Total Dissolved Solids (TDS) removal technologies to reduce TDS to acceptable levels for re-use at Heavy Oil Production Facilities. ExxonMobil and ConocoPhillips expect to propose a project that will potentially include three phases: Phase 1 will assess and evaluate novel TDS removal technologies; Phase 2 will establish a test plan, define the analytical sampling protocol and conduct technology bench scale testing using participant(s) water samples; Phase 3, if

warranted, will include slip-stream testing of select technology/technologies at a participant Heavy Oil Production Facility.

Due to freshwater availability and consumption constraints, brackish, salt water (high TDS), and recycled produced water is being evaluated for water make-up at Heavy Oil Production Facilities. The high TDS water must be treated before use based on existing process equipment constraints (i.e. Steam Make-up Water). There is a need to evaluate novel TDS removal technologies capable of meeting reduction targets based on the following criteria:

- s Reduction of produced sludge and solids handling
- s Reduced Air Emissions
- Energy Consumption
- Reduced Cost
- Reliability
- Footprint

The project plan will consider contributions of in-kind work as well as monetary funding from participating companies. For more information contact: Chad Shockley ([chad.e.shockley@exxonmobil.com](mailto:chad.e.shockley@exxonmobil.com), 703-846-7378) or Cindy Smith ([cindy.l.smith@conocophillips.com](mailto:cindy.l.smith@conocophillips.com), 918-661-0185)

## RMDG Update

The Research Managers Discussion Group (RMDG) met on Oct 16, 2007 to review the draft charter and discuss the role of the RMDG. The RMDG meets twice a year during the spring and fall PERF meetings, and is comprised of research managers from the PERF member organizations. The mission of the RMDG is to provide strategic direction, guidance, and assistance to the Board of Directors and member companies on critical and emerging environmental issues that can be addressed by the organization.

The RMDG will:

- Identify and prioritize environmental technology needs for PERF consideration;
- Help develop and facilitate resources to effectively and
- Efficiently implement PERF programs and projects; and develop and maintain organizational competency to ensure the viability and sustainability of the PERF organization.

The RMDG is also developing a marketing tool to encourage companies to participate in PERF. For further information on the RMDG, contact Larry Goodheart ([LarryGoodheart@chevron.com](mailto:LarryGoodheart@chevron.com)) or Rob Crane ([Robert.a.crane@exxonmobil.com](mailto:Robert.a.crane@exxonmobil.com)).

## NEW PERF OFFICERS FOR 2008-2009

Chairman: Todd Ririe; BP  
 Vice Chair: Bob Finley; Aramco  
 Treasurer: Karen Haynes, Shell  
 Secretary: Charles Perrot, Total  
 Former Chair: Dave Fashimpaur, BP

### At Large:

Jill Kerr, ExxonMobil  
 Chad Shockley, ExxonMobil  
 Roland Borey, Chevron  
 Sung-I Johnson, ConocoPhillips  
 Marta García Ariza, Repsol YPF

## Next PERF Workshop

, May 6-7, 2008, Pau, France  
 "Risk assessment of substance and impact of industrial waste water in inland aquatic ecosystem: From regulation to technical challenges"

The oil industry produces a lot of discharge water mainly rejected in estuaries, seas, rivers and lakes. By now in Europe, the environment has been regulated through standards parameters. But the combined implementation of the "Water Framework Directive", which aims to reach a good chemical and ecological status of surface water by 2015, and "REACH" substance directive, about Registration, Evaluation, Authorization and Restriction of Chemicals, will challenge oil companies. Actually, by nature, oil cut are a mixture of hundreds of compounds which cannot be analysed and handled separately.

Rather than just trying to analyze and study the fate and effect (by modeling or other predicting way) of all these substances, it should be possible to optimize in parallel experimental risk assessment approach for complex substance, either in lab or in mesocosm. All presentation in relation with the following topics are welcome (presentation summary requested before mid March):

- European regulations: WFD, REACH;
- Relevance and limit of:
  - Risk assessment through the hydrocarbon block approach;
  - Risk assessment through the Whole Effluent assessment;
  - Risk assessment on substances: data validation through microcosm experiment
- In situ impact assessment in receiving water

For further information please send a mail to [anne.basseres@total.com](mailto:anne.basseres@total.com) and [charles.perrot@total.com](mailto:charles.perrot@total.com).

A mail will be sent after the Spring Meeting with additional information (hotel, registration form, agenda and title of presentation).

## PERF Fall Meeting

ConocoPhillips Hosts PERF Meeting on Environmental Challenges of Heavy Oil

ConocoPhillips hosted the Petroleum Environmental Research Forum (PERF)

Fall meeting on October

17-18, 2007 in the Bartlesville Technology Center. The meeting theme was "Environmental Challenges of Heavy Crude Oils". Seventy five people from industry (including most major petroleum companies plus service companies and the DOE) attended the meeting. Feedback indicated that this PERF meeting was of value in addressing many environmental issues associated with heavy oil.

PERF was established in 1986 among major petroleum companies to stimulate cooperative research and development in environmental technologies for the petroleum industry. Today most of the major petroleum companies, as well as a number of industry service companies and the DOE, are PERF members.

The meeting theme and activities recognized that heavy oil will play an increasing role in the industry's business in years to come, and this will impact operations from production in the field, through transportation, and finally through refining to the final product. Heavy oil will involve some new processes and challenges in each of these steps, including thermal and other specialized recovery mechanisms applied in the field, the need for handling of viscous materials and emulsions in transportation and storage, and additional steps and components in the refining process. In each of these steps there can be environmental issues that are introduced or made more challenging in dealing with heavy oil versus conventional resources.

In addition to the presentations, a Heavy Oil Panel Discussion with industry experts was held in the meeting. The following topics were discussed:

What are the most challenging environmental issues for heavy oil (by media -- air, water, waste)?

- In resource production/extraction?
- In upgrading?
- In movement to refining?
- In impacts on refining and products?

Potential to need to address "unique"/emerging environmental issues (water availability, zero discharge, regional haze, air toxics, land use, etc)

What are the major issues for which technologies need to be developed?

What would be an appropriate role for PERF (especially in regards to future PERF projects)?




**Petroleum Environmental Research Forum**  
**P.O. Box 425**  
**Bellaire, Texas 77402-0425**  
**United States of America**

|                    |  |
|--------------------|--|
| <b>Chair:</b>      | Todd Ririe   |
|                    | <a href="mailto:todd.ririe@bp.com">todd.ririe@bp.com</a>                       |
|                    | +1-(714)-670-3062  |
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|                    | <a href="mailto:RW.Finley@aramcoservices.com">RW.Finley@aramcoservices.com</a> |
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| <b>Teamwork</b>    | <b>Together we achieve the extraordinary!</b>                                  |

#### PERF External Group Liaisons

**P**ERF 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 analyze research information relating to practical and theoretical science and technology concerning the petroleum industry, and a mechanism to establish joint research projects in that field.

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

#### Member Companies & Representatives

|                     |                    |
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| Amerada Hess Co.    | Gerry Bresnick     |
| Aramco Services Co. | Robert Finley      |
| BP                  | Dave Fashimpaur    |
| Chevron             | Roland B. Borey    |
| ConocoPhillips      | Sung-I Johnson     |
| EniTecnologie       | Patrizia Buttini   |
| ExxonMobil          | Jill Kerr          |
| INA-Naftaplin       | Domagoj Zelic      |
| Petro-Canada        | David McIntyre     |
| Repsol YPF          | Marta García Ariza |
| Shell               | Karen G. Haynes    |
| Statoil             | Stale Johnsen      |
| Suncor              | Anthony Congram    |
| Total               | Pierre Scherrer    |

#### Associate Members & Representatives

|  |                      |
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| BOC  | Ram Ramachandran     |
| Canadian Petroleum Products Institute (CPPI) | Adolfo Silva         |
| Champion Technologies, Inc.                  | Ashley Dunham        |
| Pall   | Tom Wines            |
| Petrobras                                    | Paulo Negrais Seabra |