



Perf Newsletter

June 2013 Issue

Included:

- Announcement of Fall 2013 Meeting
- Announcement of Updated PERF Contract Template
- Summary of Fall 2012 and Spring 2013 Meetings
- Updates on Projects and Proposals



Photo courtesy of Petrobras



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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*





Announcing the Fall 2013 88th PERF Meeting: Optimizing Leveraging Opportunities Through PERF Liaison Members

The Fall 2013 PERF general meeting will be hosted by Chevron on November 5th & 6th at its research facilities in Richmond, California, which is located in the San Francisco Bay Area. The meeting will be focused on a theme of Optimizing Leveraging Opportunities Through PERF Liaison Members. Liaison members include many national labs and joint industry organizations. The objectives of the meeting are to 1) understand common areas of interest; 2) understand possible approaches to partnering on research; 3) learn about novel research and technology advances; 4) re-commit to an active partnership through PERF. The meeting will start with discussions on collaboration approaches and then continue on to technical presentations by liaison members describing their research of interest to the oil and gas industry. We will close with a discussion of PERF project proposals. More details on agenda and logistics, including the registration form will be posted to the PERF Web Site soon.

Also Announcing: The Updated PERF Contracting Template

PERF has long recognized the need for an efficient contracting approach to enable us to respond quickly to industry's research needs with joint industry projects. So we are happy to announce the completion of our recent effort to update our PERF Contract Template. Legal staff from several PERF member companies (BP, Chevron, ExxonMobil, Phillips66, Shell, SaudiAramco, and ConocoPhillips) participated in several rounds of edits to the contract and complete agreement is imminent. The new template is available for use by project teams.

Highlights from the Spring 2013 87th PERF Meeting in Rio de Janeiro: Biodiversity

The 87th PERF meeting was held on March 13th and 14th, 2013, and was hosted by Petrobras Research and Development Center (CENPES), in Rio de Janeiro, Brazil. "Biodiversity Challenges" was the meeting theme. The meeting was divided in three thematic sessions – (a) relevance, challenges and tools to assess the ecosystem services dependencies and impacts of the oil and gas industry; (b) operations in sensitive marine areas; (c) strategies to prevent bioinvasion – and one with a general theme. For each session, experts presented an overview of the practices, tools, challenges, strategies, recommendations, and improvement efforts from both a technical and regulatory perspective. In each area, several case studies were presented by practitioners, which include PERF members, industry groups, universities, and third party subject matter experts.

The following project proposals were generated in the meeting. Champions were selected for each proposal idea to follow-up and arrange a conference call with interested PERF members. The detailed proposal descriptions are presented on pages 7 and 8 in this newsletter.

- 2013-01: DNA-Based Technologies for Environmental Monitoring - to evaluate use of DNA Sequencing methods for environmental risk assessment and management.
- 2013-02: Remote Sensing – to develop safe and cost-effective tools and analyses to characterize and monitor sensitive environments over project life cycle.
- 2013-03: Biofouling Prevention and Removal – to identify and test biofouling prevention and removal technologies and approaches.
- 2013-04: Biodiversity and Ecosystem Services (BES) Assessment Tool Evaluation - Screen and test BES assessment tools: 1) screen available tools and identify pros and cons; and 2) apply the best tools to selected representative projects by project participants.



Highlights from the Fall 2012 86th PERF Meeting in Fairfax, Virginia: Air Emissions Estimating, Modeling, and Monitoring Strategies

The 86th PERF meeting was hosted by ExxonMobil Research and Engineering Company at The Mason Inn on the George Mason University campus in Fairfax, VA, on November 7th and 8th, 2012. The theme was "Air Emissions Estimating, Modeling, and Monitoring Strategies," and the objective of the meeting was to outline the current state of the art in each area, identify possible areas for improvement, and develop joint industry research projects to address those needs. There were over 55 attendees from petroleum companies, technical consultants, and regulatory experts worldwide.

For each focus area (Estimating, Modeling, Monitoring), experts presented an overview of the practices, challenges, objectives, weaknesses, threats, and improvement efforts from both a technical and regulatory perspective. Several case studies were presented by practitioners, which included PERF member companies, industry groups, universities, and third party subject matter experts. Several new joint industry research activities were suggested as possible future PERF programs or workshops and are in the early stages of development.

The Research Manager's Discussion Group also met on November 6, 2012, to help identify mutual research needs that have since been converted into project proposals.

The agenda and meeting presentations are posted to the PERF website, www.perf.org, for PERF member company access. For additional details regarding the meeting, contact Bill Hafker at william.r.hafker@exxonmobil.com.

Fall 2012 Remediation Workshop: Remediation of Refinery Sites

The PERF remediation workshop for 2012 was organized by BP and Chevron and was hosted at the former Indian Refinery site in Lawrenceville, Illinois. This was the fourth PERF remediation workshop that has been held and the first to include a field component. Approximately 40 people from oil companies, consultancies, regulatory agencies, and universities were in attendance for the two day meeting. Mornings included a series of presentations on various aspects of refinery remediation issues while afternoons were utilized for field tours of various remediation projects. Topics on the agenda included free product recovery, vapor intrusion, brownfield redevelopment, safety, NRD negotiations and settlements, acid pond closures, community relationships, sustainable remediation, and sediments/groundwater seeps. The workshop aim was to foster a network among oil companies regarding approaches and technologies for remediation of refinery sites.



Recently Completed Projects

PERF 2011-01

Ultra-low Nutrient Control in Wastewater Effluents

The PERF Program 2011-01: Ultra-low Nutrient Control in Wastewater Effluents was successfully completed in March. The objective of the program was to explore technical options for achieving emerging ultra-low nutrient discharge requirements that are developing in many areas. This was accomplished by sharing company experience on existing methodologies and by engaging a third party to summarize the state of all available technologies in order to understand their feasibility and limitations.

The program facilitated sharing of company experience on existing optimizations, methodologies, and technologies for controlling and/or removing nutrients from wastewater (in-kind contribution via survey; blinded study), which included a summary of municipal and industrial nutrient treatment/monitoring practices and a comparison of the various refinery and municipal wastewater treatment facilities. An outline was developed of the different technologies and processes currently available for nitrification, denitrification, and nutrient removal based on the wastewater treatment model specified by PERF members. A manual was also developed to guide process engineering/operations staff with respect to minimizing nutrient levels from the activated sludge process.

PERF 2009-01

In-Situ Chemical Oxidation

The purpose of the In-Situ Chemical Oxidation (ISCO) project was to provide an objective evaluation of the technology's past performance at petroleum-impacted sites, evaluate diagnostic tools and monitoring approaches used at ISCO sites, develop a deeper understanding of processes occurring during ISCO treatment from lab-scale studies, document typical health and safety practices, and to aggregate the results in a report that is useful for site managers and ISCO practitioners.

Four research projects were conducted or contributed to the PERF Project:

- A characterization of past ISCO site applications with respect to the design and implementation, and an empirical analysis of performance, using available data from petroleum sites,
- A field study to assess the value of a temperature sensor grid to monitor oxidant distribution at a sodium persulfate ISCO site,
- An evaluation of practicable diagnostic tools for assessing hydrogen peroxide distribution at field ISCO applications, and
- Laboratory studies on the effectiveness of hydrogen peroxide and sodium persulfate for reducing emissions from low permeability layers.





Active Projects

PERF 2010-07

Understanding Biodiesel in Total Petroleum Hydrocarbons (TPH)

This PERF project is the first approach to understanding the impact of biodiesel to EPA analytical methods for TPH-D measurement. Different extraction and chromatographic techniques to determine suitable modification on method 8015B are being evaluated. The Project team is composed of Shell, Petrobras, TestAmerica USA, and Chevron. The project team will submit a modified analytical method (8015d) to EPA under 40CFR136.4 and 40CFR210.21 to share findings with Federal Agency. Phase I-baseline experiments were completed in 2Q of 2012. Phase II work to examine the method robustness and accuracy has been partially completed at TestAmerica USA-Pensacola Lab. For more information, please contact Deyuan(Kitty) Kong at kitty.kong@chevron.com.

PERF 2011-04

Effluent Treatment Plant Hazardous Air Pollutants

The object of this project is to improve understanding of biodegradation rates of key hazardous air pollutants in refinery effluent treatment systems to support advocacy. This project will add value in the short term by aiding evaluation and advocacy efforts related to recent ICR and EPA draft Wastewater Uniform Standard. ICR submittals for Hazardous Air Pollutants from wastewater treatment were based on assumptions from the EPA RWET tool. We suspect real data and more accurate modeling would show much lower emissions than what the RWET tool calculated. This project will add value in the long term by enabling better understanding of degradation rates/air stripping of compounds in our effluent treatment plants, which will enable more accurate modeling and performance prediction.

The contract was finalized at the end of 2012. Initial kick-off with the third party contractor

was held. Three of the four project participants are currently working to get permission to release data from past studies to the contractor. An initial model of a representative ETP was sent out to the project participants for comments. Contact: Jim Russell at Jim.Russell@chevron.com.

PERF 2011-05

Comparison of Dispersion Models for Offshore Exploration & Production Activities

The objective of this project is to conduct a comparison among the dispersion models currently used by E&P companies by examining modeling results that arise from a common set of input data applied to different models and by comparing those to the validation test studies derived from the literature. The project originated due to the complexity of numerical modeling of produced water and drilling muds and cuttings discharges, and a shared interest amongst E&P companies to better understand the results of marine dispersion models. As regulations become more stringent globally and the demand for risk management for marine discharges grows, reliable model results and an understanding of the variability in modeled results are needed.

The models to be included in this project are CORMIX, OOC, and DREAM. Produced water and drilling muds and cuttings discharges will be modeled, including six discharge scenarios for each discharge type to capture a range of discharge conditions. Modeling will be conducted by consultants. Chevron is leading the project, and the total cost for consultants will be split four ways between Chevron, TOTAL, BP, and Shell. ExxonMobil will participate by contributing in-kind assistance in the selection of validation test studies and expert input during the study. It is anticipated that the project will be completed in 2013. For more information, contact Maggie Monahan at MaggieMonahan@chevron.com or Lily Baldwin at LilySBaldwin@chevron.com.





Project Proposals

The following section describes project proposals being championed by PERF members. To join a project, please contact the proposal contact listed.

PERF 2011-02

Online Monitoring in Effluent Treatment Plans

The objective of this project is to Increase refining wastewater treatment plant reliability and compliance assurance by sharing company experience on various on-line monitoring approaches, engaging vendors to understand the current state-of-the-art on-line monitoring equipments, and possibly testing monitoring systems at refineries. The scope will be limited to more developed, ready-to-deploy on-line monitoring technologies. The project is currently under the final review of contract. To date five PERF members have expressed interest in joining the project. Contact Dong Li (dxli@chevron.com) for more information.

PERF 2011-06a

Understand and Improve Cooling Tower PM Emission Measurement and Estimation Methods

The objective of this project is to develop emission factor guidance for cooling tower PM and PM_{2.5} emissions. An industry-led approach to improve emission factors will be useful in regulatory discussions and reporting by member companies. An improved knowledge base for cooling tower emissions and analytical methods will improve the accuracy and consistency of emissions reporting. Request for Proposal has been reviewed and contractor selected. Contact Dave Fashimpaur (dave.fashimpaur@bp.com) for more information.

PERF 2011 – 06b

Understand and Improve Cooling Tower VOC Emission Measurement and Estimation Methods

This objective of this project is similar to the project above but with an emphasis on VOC emissions. Possible deliverables include: 1) Analysis of new VOC monitoring data generated by the 'Heat Exchanger MACT' to: a) develop guidance on VOC emissions estimation, b) develop new emission factors to replace the current one(s) in AP-42 or for use internationally, and c) development of method(s) to use MEPM data to estimate

VOC emissions; and 2) Comparative tests with the Modified El Paso Method (MEPM) and water sampling methods (i.e. 8260 and 8270) to determine if simpler water methods produce reasonably representative results.

PERF 2011-07

Flare Destruction Efficiency Estimation and Operating Practices

The objective of this project is to evaluate existing flare configuration, operating, and efficiency data, and from that data, develop options for estimating flare combustion/ destruction efficiency (CDE) from known operating parameters. This program is focused primarily on steam-assisted flares, but could be extended to air-assisted, non-assisted, or pressure-assisted flares, depending upon future interest and available flare efficiency data. Key deliverables of the project include:

- A summary of the range of industrial flare types, sizes, and designs based upon a survey of participating companies,
- A summary of flare CDE data on industrial flares from participating companies and public reports,
- An evaluation of the flare CDE and flare type/design data to determine if flare efficiency testing on additional flare types is beneficial in sufficiently mapping CDE for the majority of industrial flare types and applications, and
- Improved tools for estimating VOC emissions from flares

The project is actively seeking additional companies to participate, particularly to broaden the collective database of flare data. Plans are to finalize the PERF contract and kick-off the investigative work in 3Q 2013. More information can be obtained on this project by contacting Duane McGregor (Duane.R.McGregor@ExxonMobil.com) or Don Clausen (Don.Clauson@Total.com).





Project Proposals

PERF 2012-02

Stranded Wastes and Recyclables in Developing Countries

The purpose of the project is to share and develop strategies and methods, including waste minimization, treatment, reuse, and recycling alternatives, to help overcome stranded waste challenges at international locations. Examples of stranded wastes include: batteries, tires, paints, used oil, plastics, wood wastes, electronics, oily sludge and impacted soils. Remote locations, regulatory climate, and lack of third-party waste management or recycling facilities can be reasons why stranded waste streams exist.

The project currently has six PERF members with active interest. Problematic waste streams and key locations of interest were identified through an initial survey. This project is expected to move forward with a 2-day project meeting planned for 3Q 2013 in Houston, where companies will further share stranded waste experiences, identify common issues, and discuss possible solutions. The workshop can then lead to collaborative research or joint funding for a consultant or research organization to develop methods and/or alternatives targeting priority stranded wastes within industry. For more information, please contact Lara Attayi (LAttayi@chevron.com).

PERF 2012-04

Cost Effective Concentrate/Brine Management of Reverse Osmosis (RO)

The overall goal of this project is to identify technically, economically, and environmentally viable methods of managing the RO concentrate produced by the oil & gas industry from various applications. Current state-of-the-art technologies for managing/treating the RO concentrate are environmentally restrictive, require significant capital investment, and/or incur high operating costs. There are emerging technologies that have shown potential as prospective concentrate management and/or minimization solutions. As the industry incorporates RO more widely into their water treatment and reuse systems, an evaluation of current and emerging technologies to manage the concentrate is becoming more critical.

The project will be executed in two independent phases. In Phase 1, project participants will work together to review existing information on the subject, including unpublished data and in-house experience, and define a scope of work for RO concentrate management that will address the needs of the upstream and downstream applications of RO. Based on the developed scope of work, the project participants will hire a consultant with the appropriate expertise and the key deliverable from the consultant will be a report with a detailed evaluation of the most promising RO concentrate management technologies, including the technical advantages and life-cycle costs. Also, the consultant will recommend the most suitable technologies for potential field-testing in Phase 2 of this project.

The scope of work for the project is currently being finalized for follow up contracting by PERF members. It is anticipated that the project will be launched in the summer of 2013. Contact Samer Adham (Samer.Adham@conocophillips.com) for more information.

PERF 2013-01

DNA-Based Technologies for Environmental Monitoring

The objective of this project is to: 1) gain an understanding of DNA-based technologies for environmental monitoring; 2) understand how companies are currently applying these technologies in their environmental assessments; 3) conduct a field scale project to pilot the application of DNA-based technologies for environmental monitoring for oil and gas activities. DNA-based technologies are a set of tools that can be incorporated into current environmental monitoring processes to provide a comprehensive assessment of biodiversity and ecosystem health. For example, these technologies allow for the processing of large numbers of samples across space and time,





Project Proposals

therefore facilitating the capture of seasonal and geographical variations in ecosystems. In addition, the high-throughput characteristics of the technologies enable the analysis of organisms from different trophic levels (from microbes to animals) in a given ecosystem. DNA-based technologies can be applied to both marine and terrestrial environments. The enhanced monitoring of ecosystems could lead to more effective decision making related to the mitigation of biodiversity risks and impacts. DNA-based technologies for environmental assessment are being tested by various groups. The project will be initiated 1Q2014 by a 2-day knowledge-sharing workshop open to all interested parties, to identify a pilot project to address those issues of greatest interest to interested companies. The workshop location will be Houston, TX, USA. Please, contact Lucie N'Guessan (lucie.nguessan@exxonmobil.com) for more information.

PERF 2013-02

Remote Sensing

The opportunity for this project is the development and use of remote sensing technology, tools and analyses for safe and cost-effective monitoring and characterization of sensitive environments (marine and/or terrestrial) throughout the lifecycle of a project. The initial project would be a workshop to share current state, emerging technology and tools, and identify gaps and need for a joint research project. The workshop is tentatively anticipated for October 8 & 9, 2013 in Houston. Contact Anne Wagner for additional information: awagne@chevron.com.

PERF 2013-03

Biofouling Prevention and Removal

According to the Convention on Biological Diversity, the introduction of alien invasive species (AIS) is one of the main causes of the biodiversity decline worldwide. These species may be introduced deliberately or accidentally by man in various ecosystems. The O&G industry is considered one

of the vectors of bioinvasion through its many activities. In the marine ecosystem, maritime structures such as oil rigs may favor the introduction of AIS through biofouling. So far there are only recommendations for preventing/minimizing this issue and no practical solutions have been developed in an operational large scale. Therefore, identifying and testing biofouling prevention and removal technologies and approaches is very important to reduce O&G marine environmental impacts. The proposal aims at focusing specifically on plastic and other material encapsulation techniques, since, according to the literature, it is a simple cost-effective technique. Contact Anna Scorfano for additional information: ascofano@petrobras.com.br.

PERF 2013-04

BES Assessment Tool Evaluation

There are many challenges in integrating Biodiversity and Ecosystem Services (BES) into oil and gas management systems and governance due to its complexity. Regarding the identification and assessment of dependencies and impacts on BES, there are many external drivers requiring the business sector to address, such as, The Economics for Ecosystems and Biodiversity - TEEB, Convention on Biological Diversity – CBD Decisions, International Finance Corporation – IFC, and other Equator Principles and Natural Capital Declaration signatories etc. Many natural capital valuation guidelines, methodologies, and tools have been developed and most of them have not yet been tested and validated for application in the O&G sector. The goal of this project proposal is to screen and test available BES assessment tools that could help participants develop a consolidated basis for decision making. Contact Taciana Cavalcanti for additional information: taciana@petrobras.com.br.





Member Companies

Company
Hess
Saudi Aramco
BP
Chevron
ConocoPhillips
Phillips 66 Company
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Petrobras
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Poseidon
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Department of Energy (USDOE)
Energy & Environmental Research Center (EERC)
Gas and Technology Institute (GTI)
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Water Environmental Research Foundation (WERF)
Argonne National Laboratory (ANL)
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