

CALL FOR ENTRIES



CHAIRMAN'S
STEWARDSHIP
AWARDS

The Interstate Oil and Gas Compact Commission is seeking nominations for the 2016 Chairman's Stewardship Awards. The winners will be honored at the IOGCC Annual Conference in Little Rock, Arkansas, October 2 - 4. All nominations received will be mentioned in the Winners Booklet along with project title. All past winners and their projects will also be mentioned in the Winners Booklet.

You may apply on your behalf or nominate another project. Past winners are encouraged to apply with new projects. If you have applied in the past and received honorable mention and you feel your project has been added to we encourage you to resubmit your project. In the nomination form you will find the four different categories. Please choose one that best fits your nomination and provide a brief project summary. To see previous winning nominations, visit the IOGCC website at iogcc.ok.gov/chairmansstewardship. For any questions or additional information please contact Carol Booth, communications manager for the IOGCC at 405-525-3556 ext. 114.

Nominations must be received on or before August 11, 2016.

HISTORY

The Chairman's Stewardship Awards represent the Interstate Oil and Gas Compact Commission's highest honor for exemplary efforts by the oil and natural gas industry in environmental stewardship.

Since 1935 the IOGCC has voiced the need for sound oil and natural gas environmental policy. Many organizations have gone far beyond the basic mandates of law and regulation to protect and enhance natural resources. The Chairman's Stewardship Awards are an effort to single out these achievements as examples for others in industry, government and the public.

AWARD CATEGORIES

Energy Education

This award is presented to a group or organization that has created a program to educate the public about oil and natural gas and the hundreds of ways it affects the lives of Americans.

Small Company

This award recognizes an innovative project by a small oil and natural gas company that demonstrates positive environmental stewardship. Small companies are those that operate in a limited area or region.

Environmental Partnership

The Environmental Partnership award recognizes an innovative project led by a non-industry organization(s) in cooperation with an industry partner(s).

Large Company

This award recognizes an innovative project by a large oil and natural gas company that demonstrates positive environmental stewardship. Large companies are those that operate nationwide and in many instances internationally.

Briefly describe the nominated program on a separate attachment. Please limit your summary to 3 pages or less. Key points to include in your project summary:

- Provide a brief explanation of the project.
- Describe the purpose of the project.
- Explain the process taken to complete the project.
- Describe any contributions made to the environment.
- Describe what has been accomplished.

Nominee Information:

Company Houston Advanced Research Center

Contact Richard Haut

Address 4800 Research Forest Drive

City/State/Zip The Woodlands/TX/77381

Phone 281-364-6053 Fax _____

E-Mail rhaut@HARCResearch.org

Submitted by:

Company Houston Advanced Research Center

Contact Richard Haut

Address 4800 Research Forest

City/State/Zip The Woodlands/TX/77381

Phone 281-364-6053 Fax _____

E-Mail rhaut@HARCResearch.org

Visual Aids, if available: (Electronic submissions are accepted)

Video/DVD (10 minutes or less)

Photos

Brochures/Publications
(10 copies)

Other

Category:

Energy Education

Environmental Partnership

Small Company

Large Company

SEND NOMINATIONS TO:

Stewardship Awards
IOGCC
P.O. Box 53127
Oklahoma City, OK 73152-3127
Email: carolbooth@iogcc.state.ok.us
Fax: 405-525-3592

For more information call
405-525-3556 or log on to
iogcc.ok.gov/chairmansstewardship

Houston Advanced Research Center
Environmentally Friendly Drilling Systems – Technology Integration Program – 2012-2016 (EFD-TIP)
Nomination for IOGCC Chairman’s Stewardship Award – Environmental Partnership

Letters of Support (attached)

Letters supporting this nomination have been obtained from the following:

- | | | |
|------------------------------|---------------------------|-----------------------------|
| 1. Statoil | 4. GE | 7. West Virginia University |
| 2. Pioneer Natural Resources | 5. GSI Environmental | |
| 3. NOV | 6. The Nature Conservancy | |

The Environmentally Friendly Drilling Systems Technology Integration Program (EFD-TIP)

The Houston Advanced Research Center (HARC) managed the Environmentally Friendly Drilling Systems (EFD) – Technology Integration Program (TIP), funded by the Research Partnership to Secure Energy for America (RPSEA) and various industry sponsors that focused on innovative, new, environmentally motivated projects offering cost effective solutions to industry. The HARC-EFD Team provides unbiased science concerning environmental and societal aspects of all oil and gas activities.

The original EFD program began in 2005 with 3 partners. The non-profit collaboration has grown to incorporate ~30 Universities, 3 government programs and over 100 industry and environmental organization stakeholders with over \$16 million in funding. The EFD program is directed by its Managing Director, Dr. Richard Haut (HARC), and co-directors David Burnett (Texas A&M GPRI), and Tom Williams (LEID, LLC). There are 4 advisory organizations: EFD Alliance, EFD Advisory Council, Environmental Organizations, and Collaborating Organizations. Governmental agencies and non-governmental organizations also are represented. The program has made significant improvements in environmental performance and awareness, as these successes have allowed EFD to be considered a valued resource by stakeholders across the energy spectrum.

The EFD-TIP was initiated in 2012 and was completed in 2016. The funding came from RPSEA with substantial cost sharing from sponsors and the EFD program team. The program enhanced the EFD overall mission of working with industry, environmental organizations, universities, national laboratories, regulators and government agencies. This has been a unique, multi-disciplined effort over the past four years, conducting over 40 field trials and having brought various stakeholders, dedicated researchers and industry professionals together to make a number of significant accomplishments addressing:

- **Flaring Mitigation** – Successfully demonstrated reduction in NO_x, VOC’s, GHG emissions through the use of an Organic Rankine Cycle to generate electricity using flare gas.
- **Engine Emissions** – Determined emission differences between hydraulic fracturing engines powered by diesel and engines powered with natural gas/diesel dual fuel.
- **Air Emissions** – Demonstrated the difference between an emissions inventory using worst case estimates and an emissions estimate using actual field data.
- **Water Management** – Developed map of non-potable water sources in the Eagle Ford. Also identified promising technologies for processing flow-back and produced water.
- **Site Selection** – Commercialized tool to mitigate environmental issues when siting facilities.
- **Drilling/Production Operations** – This effort addressed efficiency, safety and environmental performance. A key initiative was with the Nature Conservancy and the Osage County Cattlemen’s Association in reviewing effectiveness of regulatory authority in Osage County. This led to facilitating a more cooperative regulatory awareness of the issues performance improvements and a process for needed regulatory changes.

Purpose of the EFD-TIP Project

The EFD program provides unbiased science to address environmental and societal aspects of all oil and gas activities, from site selection through gas compression. The purpose of the EFD-TIP project, as part of the EFD program, was to perform field trials across the USA to advance technologies and processes related to mitigating environmental concerns and to advance the knowledge of all stakeholders in understanding of environmental awareness.

Process Taken to Complete the EFD-TIP Project

Funding from RPSEA, industry and environmental organizations supported the evaluation of new applications related to measuring/reducing air emissions, reducing the environmental footprint, protecting surface and ground waters, and measuring/improving industry-community relations. The EFD-TIP team tested water treatment and re-use technologies by field testing processes and products prior to commercial development. The goals were to validate technology under field-conditions and to gather data on process systems so that engineers can scale up systems to full-size commercial operations. TIP worked with other programs and built upon the EFD’s network of operators, service companies, universities, national laboratories and environmental organizations. Through the EFD Alliance of universities and laboratories, more than 40 field operations were performed. EFD-TIP provided a unique opportunity for industry, academia, environmental organizations, researchers and government to collaborate in a systematic approach to improve environmental stewardship and safety while increasing production of oil and gas through a variety of efforts including:

- **Flaring Mitigation** – issued a white paper concerning recommendations based on a series of nationwide workshops. Completed two field trials in the Bakken.
- **Engine Emissions** –field tested hydraulic fracturing engines that include dual fuel/bi-fuel.
- **Air Emissions** –measured air constituents at various locations in the Eagle Ford and Marcellus Shales. Developed technology to capture VOC’s and successfully tested prototype.
- **Water Management** –worked with sponsors at two different locations (Permian and Utica) to help develop of water management strategies.
- **Advancing Technologies** –tested high performance, water-based drilling fluids to displace oil-based muds in the Marcellus and Utica Shales.
- **Outreach/Technology Transfer** – Over the past four years when the EFD-TIP was underway, the EFD team held 54 presentations/workshops with 25,000+ attending across the USA, reaching out to all stakeholders, from k-12, universities, regulators, service provides and operators. EFD also expanded the virtual site (www.efdvirtuallsite.org) to include hydraulic fracturing and will roll out a Production Pad site to assist inspectors in their knowledge/understanding of operations, and as they train future inspectors. Taking the virtual site on the road, it has been presented at high schools and oil-patch introductory courses along with numerous conferences and public events. In addition, the broadly used best management practices and comparative law sites (www.oilandgasbmps.org and www.lawatlas.org/oilandgas) greatly improve stakeholders’ understanding of key issues.
- **Societal Engagement** –performed public perception studies in the Tuscaloosa Marine Shale and the Eagle Ford Shale. Also applied the EFD Scorecard in the Utica and Duvernay Shales and made them available to the EFD sponsors. Worked with landowners in the Eagle Ford to advance application of EFD technologies.

One of the key features of the EFD-TIP program was to develop regional expertise to address regional issues. An EFD Alliance of universities, national laboratories and other regional experts across the USA was developed. The Alliance holds monthly teleconference calls to exchange information, enabling each region to advance knowledge and experience in their area.

Contributions to the Environment and Accomplishments of the EFD-TIP Project

Over 40 field trials were performed from 2012-2016. These led to many advancements in the understanding of environmental and societal aspects of oil and gas operations, as summarized in the following table. During the time period of the EFD-TIP project, the EFD program was mentioned in the Hess Sustainability Report to their shareholders for three consecutive years (2013, 2014, 2015).

Project Area	Contributions made to the Environment	Accomplishments
Flaring Mitigation	Demonstrated reduction in NOx, VOC’s, GHG emissions	<ul style="list-style-type: none"> • Performed full-scale prototype testing of equipment at a Bakken Hess site. • Successfully demonstrated the ability of the equipment utilized to produce onsite power from otherwise wasted flare gas. • Demonstrated that this equipment would meet the goals of the EPA and the North Dakota Department of Health – Air Quality standards by reducing emissions and providing energy through the reuse of the produced natural gas.

Project Area	Contributions made to the Environment	Accomplishments
Engine Emissions	Developed understanding of Non-Combusted Methane when using dual fuel engines to power hydraulic fracturing and drilling rig operations.	<ul style="list-style-type: none"> Tested four different dual fuel engines and developed an intrinsically safe data-recording system to perform tests during field operations. Determined differences between hydraulic fracturing engines powered by diesel and engines powered by natural gas/diesel dual fuel.
Air Emissions	<ul style="list-style-type: none"> Performed various field trials to measure air emissions throughout the Eagle Ford and Marcellus shales. Developed emission factors. 	Demonstrated that the difference between an emissions inventory using worst case estimates and an emissions estimate using field data resulted in significant differences, for example, 539 pounds per hour overestimation of NOx emissions, 13 pounds per hour of VOCs, and 129 pounds per hour CO at oil and gas sites.
Water Management	<ul style="list-style-type: none"> Mapped non-potable water sources that may be used in the Eagle Ford to reduce dependency on fresh water. Performed various field trials to determine performance of nano-filtration and micro-filtration devices and processes. 	<ul style="list-style-type: none"> EFD operating sponsors reduced the use of fresh water for their operations in the Eagle Ford and Permian basin. Identified promising technologies in processing flow-back and produced water.
Site Selection	Collaboratively developed tool with Latitude Geographics to assist in permit applications and mitigating environmental issues when siting well pads, roads and infrastructure.	Tool is now commercially available and is being licensed by Seneca, Devon and others after being successfully prototype tested in the Marcellus shale.
Drilling Operations	Determined the factors that influence how drilling fluid systems are selected based on environmental impact, cost, regulations and performance in the Utica and Marcellus Shales.	<ul style="list-style-type: none"> Results provide information on how more environmentally acceptable fluids are being considered by operators. The results are also assisting service providers with direction on product development.
Drilling/Production Operations – Osage County, OK	<ul style="list-style-type: none"> Team invited by The Nature Conservancy (TNC) to offer advice to large landowners, all members of the Osage County Cattlemen's Association (OCCA). Assisted the OCCA in reviewing the effectiveness of the regulatory authority in Osage County, current regulations as compared to other States and Federal government and needed changes in the regulations through the Rulemaking Progress which is the result of the 2011 Federal Court settlement between the U.S. government and the Osage Nation. 	<ul style="list-style-type: none"> The overall objective was to provide an unbiased assessment of the regulatory process in Osage County. Because of the organized response by landowners a first ever meeting between BIA, Osage Mineral Council, BLM, EPA, USF&WL, the State of OK DNR and the attorney general's office, and landowners took place in Tulsa in 1Q 2014. That meeting started a process for regulatory improvement, remedies for landowners to report violations and seek remediation.
Societal - Outreach	<ul style="list-style-type: none"> Increased public knowledge of the importance of environmental awareness that exists throughout the industry. Performed surveys throughout the Marcellus, Barnett, Eagle Ford and Haynesville shales. 	<ul style="list-style-type: none"> Expanded the EFD Virtual Sites: www.efdvirtuallsite.org Developed a comparative law web site for air emissions, water quality/ quantity: www.lawatlas.org/oilandgas Delivered improvements and tools in public communications including data, presentations, workshops and publications to associations, legislative reps, teachers, students, industry, and environmental groups.

Items Submitted with the Nomination

Items being submitted with the nomination include:

- Letters supporting nomination
- Excerpts from the Hess Sustainability Reports (2013, 2014, 2015)
- Summary Presentation of the EFD-TIP Project
- 2015 EFD Sponsors Report
- EFD-TIP final report
- Video summarizing various accomplishments of the EFD-TIP project