

THE TIMES

Chronicling Life in the Sage Family October 2013

CONTENTS

Celebrating Sage & Family's Successes

We're on a roll! We've made the ENR 200 and Inc 5000 lists again, received nominations for the Oil and Gas Awards, Soc's hard work is paying off with some sweet project work, Troy made a splash at the Petroworld conference, and David and Troy (there he is again!) just hit gold in California!

What's Happening Now

Find out how Chicago's interns are raking it in, what's special about SageSafety, how H&S is saving time and money by going virtual, and all about the new air pro that just joined the fam!

Special Feature

Our Top 10 Groundbreaking White Papers

Our quick bites give you the scoop to keep you in the loop — get the most recent on everything from flares to the latest EPA happenings and find out how they affect your future.

Resources: The New Salesforce and Brand Book

Great new resources for you! The new Salesforce is practical magic, with even more available at your fingertips, and the Brand Book — 3 years in the making — answers your burning questions about what makes the Sage brand.

This month's all-star contributors include Soc Lindholm, Troy Boley, David Ranum, Ryan Kahn, Bill Fink, Shane Kling, Nick Jourdan, and all our white paper authors. Thanks for keeping us in the know on the cool stuff you're doing!

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ENVIRONMENTAL
SAGE life
CONSUMERS

Where to next...

CELEBRATING SAGE & FAMILY'S SUCCESSES

- Sage Reaps Rewards A-Plenty
- A Little Time and Attention
Go a Long Way
- PetroWorld 2013 a Success!
- Gold Rush: Sage Wins Big in California

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

TABLE OF CONTENTS

CELEBRATING SAGE & FAMILY'S SUCCESSES

Sage Reaps Rewards A-Plenty

The Sage family makes a showing in the ENR Top 200, the Inc 5000, and at the Oil & Gas Awards.

What does it all mean?

Find out here.

A Little Time and Attention

Go a Long Way

Soc's regulatory update emails to clients make a big difference and bring in some amazing work.

PetroWorld 2013 a Success!

Troy globetrots in the name of Sage to speak about U.S. flare enforcement and scope out new markets.

Gold Rush: Sage Wins Big in California

With the help of David Ranum, we are leading the way in air emission fracking studies.

Where to next...

CELEBRATING SAGE & FAMILY'S SUCCESSES

► Sage Reaps Rewards A-Plenty

- A Little Time and Attention

Go a Long Way

- PetroWorld 2013 a Success!

- Gold Rush: Sage Wins Big in California

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

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What does it all mean? Find out here.

◀ Prev. | Next ▶

Roll out the red carpet because we are taking our place amongst the industry elite, and Engineering News Record, Inc 5000, and the Oil & Gas awards are screaming it from the rooftops! Through our exceptional revenue and growth to our outstanding H&S and environmental initiatives, we cement our status as a go-to company and reinforce the Sage value with existing and prospective clients. Go team!

ENR Top 200 Ranking 162

Sage leaps 10 spots ahead of last year's ranking on the Environmental Firms List for 2013 (162 from 172), which is great because it means we are on a list that many of our current and prospective clients use as a starting place to make big decisions. Rankings for ENR are based on environmental revenue, so it also means that our hard work paying off and we're making more money -- Cha-ching! Want to see how we compare to our competitors? Check out [The Top 200 Environmental Firms List](#).

Inc 5000 Ranking 33 in Industry

We did it again! Sage and Dexter continue to dominate the Inc 5000 List in the Environmental Services Industry, with Sage coming in at 33, well ahead of last year's 64. The list includes the 5,000 fastest-growing private U.S. companies ranked according to percentage growth of annual revenue over a 3-year period – which means our jump to 33 was practically warp speed! So keep up the good work – we're growing faster than many of our competitors and building our name! Click [here](#) for the full list.

[Read on ▶](#)

Where to next...

CELEBRATING SAGE & FAMILY'S SUCCESSES

► Sage Reaps Rewards A-Plenty

- A Little Time and Attention

Go a Long Way

- PetroWorld 2013 a Success!

- Gold Rush: Sage Wins Big in California

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

Sage Reaps Rewards A-Plenty

Continued...

◀ Prev. | Next ▶

Oil and Gas Awards TBD

And then there's the Oil and Gas Awards! Though we don't know what our rankings are yet – they'll be announced at the upcoming gala in a few weeks – we do know that we're on the lists.

Thanks goes to Ron Clark and Dana Smith, we're up for H&S Initiative of the year (for Southwest, West Coast, and Mid-Continental) and thanks also to Robert Sherrill for his submissions in passive sampling that earned us a place on the Environmental Initiative of the Year (Southwest and Mid Continental) and for his submissions in transactions that earned us a place in environmental innovation of the year.

Recognition at the O&G Awards shows our industry peers that we're doing some pretty important work that has a very real effect on our world and the people in it – projects are considered for ethical, environmental, and social benefit.

This year Sage is an H&S finalist for our work doing real-time leak detection & repair monitoring, product loss reduction, and GHGs/VOCs/HAPs fugitive emission reduction studies for a confidential O&G client. The project is unique in its implementation of infrared technology to sniff out fugitive emissions – look out for IR Technology for Automatic Flare Steam Control in the Special

Feature Section for more on IR technology.

We're also up for environmental initiative for using polyethylene diffusion bags for sampling/monitoring groundwater quality. The bags present a cheaper and faster alternative to traditional purge and sampling methodologies with a smaller margin of error. And we're up for an award in environmental innovation for business and acquisition by developing a strategy of liability sharing which proposed asset distribution in such a way that it created a win-win for both the buyer and seller. The result: a \$4.2 M upstream transaction. Nice!

Where to next...

CELEBRATING SAGE & FAMILY'S SUCCESSES

- Sage Reaps Rewards A-Plenty
- **A Little Time and Attention Go a Long Way**
- PetroWorld 2013 a Success!
- Gold Rush: Sage Wins Big in California

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

A Little Time and Attention Go a Long Way

Soc's regulatory update emails to clients make a big difference and bring in some amazing work.

◀ Prev. | Next ▶

Ain't life grand when a Sage seed takes root? To keep his clients up-to-speed on the latest directives, Soc Lindholm began emailing them regulatory updates, [click here](#) for one of them, complete with his own quick-bite summaries of what they really needed to know – boy were they pleased!

Soc's clients appreciated being spared the effort of pouring through Mine Safety and Health Administration (MSHA), Texas Commission on Environmental Quality (TCEQ) and the Environmental Protection Agency (EPA) guidelines, and not long after hitting the "send" button, Soc's clients started expressing their gratitude in words – and work.

Here are a few examples of the kind of work Soc's emails have brought in:

- **TXI**, one of the largest cement producers, is drawing up general agreements with Sage to provide TXI Midlothian and Hunter with environmental consulting services. TXI is a mammoth corporation, which can mean way more work down the road – how's that for an email?

- **A Confidential Company** (sorry, can't divulge at time of this newsletter's publishing) is enlisting Sage's help to sell their reused waste as alternative fuel to an existing customer base.

Incidentally, the process involves the company listed below ...

- **Five Points Industry** (so new they don't have a website yet), a contract welder, is counting on Soc and his brother Jay to prepare the environmental permitting to allow Five Points to shred onsite. From there, the material is sent to a Five Points customer to use as an alternative fuel or material source.

This project is especially cool because if we're successful with this full-scale recycle program we may be able to branch out into yet another service offering for customers, which means bigger 'n better projects.

[Read on ▶](#)

Where to next...

CELEBRATING SAGE & FAMILY'S SUCCESSES

- Sage Reaps Rewards A-Plenty
- **A Little Time and Attention Go a Long Way**
- PetroWorld 2013 a Success!
- Gold Rush: Sage Wins Big in California

WHAT'S HAPPENING NOW

Special Feature

**MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS**

RESOURCES

A Little time and Attention Go a Long Way

Continued...

◀ Prev. | Next ▶

The moral of this article is that these projects are a direct result of Soc's emails and customer satisfaction. It's a perfect example of Sage's relationship-based business approach and Soc's motivation to better serve his customers. The winning combination is producing big results!

Please contact **Soc** or **Jay** to find out more, or if you want to get involved.

Where to next...

CELEBRATING SAGE & FAMILY'S SUCCESSES

- Sage Reaps Rewards A-Plenty
- A Little Time and Attention
Go a Long Way

► **PetroWorld 2013 a Success!**

- Gold Rush: Sage Wins Big in California

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

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Troy globetrots in the name of Sage to speak about U.S. flare enforcement and scope out new markets.

◀ Prev. | Next ▶

The sound of applause is still resonating in space somewhere following Troy Boley's trip to **PetroWorld India (PWI)** 2013. PWI is one of three conferences related to petroleum in India – “all things oil,” according to Troy –and this year he presented on U.S. flare enforcement and the tendency for domestic issues to influence policy worldwide. And it's already happening – India recently implemented a new flare rule that could provide Sage with future opportunities for regulatory work.

It all started with a trip to Milan in 2012 – sigh, can you picture it– where Troy met the Chief Executive Officer (CEO) of Indian Oil Corporation and connected on expansion opportunities in India. It turns out there are 19

refineries in India, and most of them have expansion plans, which means new permits are needed to follow newly implemented rules.

The new rules cover tanks, flares and leak detection and repair (LDAR), which are three areas

where Sage excels. The rules in India are different from U.S. rules (and we mean really different) -- India's regulatory documents can be summarized in only nine pages, whereas a single U.S. regulation can easily span that.

Why India business is exciting:

- *Opportunity to grow Sage presence*
- *Low cost of doing business*
- *Potential gateway to the Middle East markets*
- *No language barriers*

Eventually, we'll need to hire local leaders in India to jumpstart our work there. Next steps are falling into place, and Sage has set a goal to conduct a flare demonstration and prepare papers to present at the Jan 2014 conference.



Troy - We love yer smilin' face!

[Read on ▶](#)

Where to next...

CELEBRATING SAGE & FAMILY'S SUCCESSES

- Sage Reaps Rewards A-Plenty
- A Little Time and Attention
Go a Long Way
- PetroWorld 2013 a Success!
- **Gold Rush: Sage Wins Big in California**

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

Gold Rush: Sage Wins Big in California

With the help of David Ranum, we are leading the way in air emission fracking studies.

◀ Prev. | Next ▶

David Ranum, Chris Lehmann, and Troy Boley struck gold in Cali, winning a \$400,000 project commissioned by the California Air Resources Board (CARB) to assess air emissions from the hydro-fracking of gas wells.

The high-level project shows we are fast-becoming recognized for our technical experience and approach in assessing the environmental impacts of fracking. The project team will use innovative sampling techniques to evaluate the effect of fracking upon air quality including infrared camera imaging, EPA Method 21 screening, direct emission measurements with the Bacharach High Flow Sampler, and the emission isolation flux chamber. In addition, Sage

plans to incorporate a new sampler, designed by CARB scientists for the collection of liquid samples from pressurized vessels, in order to characterize flashing emissions.

The win comes in on the heels of the 2011 Sage ground-breaking (literally and figuratively speaking) **investigation of emissions** from natural gas wells, processing facilities, and compressor stations in the Fort Worth area. Sage teamed with the Eastern Research Group, Inc (ERG) on this 9-month study, which ultimately supported the Texas Commission on Environmental Quality (TCEQ) determination to provide a minimum 600-ft distance between gas well operations and residences.

However, despite the recent flurry of interest surrounding fracking, very little scientific data is publicly available, and only a handful of consultants are positioned to take the lead in further characterizing fracking emissions. Sage's experience in Fort Worth resulted in a recommendation to bid on a project that would have otherwise been off our radar. Though Sage received notice at the eleventh hour, David Ranum, Chris Lehmann, and Troy Boley burned the midnight oil while on-site in Marseille, France to get the bid submitted in time and secure Sage's position as a leader in the field of fracking emissions.

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

- Your Turn for Interns?
- What and Who Is SageSafety?
- The PSM Team Goes Virtual
- The Sage Family Welcomes IMACC!

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

TABLE OF CONTENTS

WHAT'S HAPPENING NOW

Your Turn for Interns?

The Illinois internship and co-op
program is a major success.

What and Who Is SageSafety?

Learn about our latest safety
offerings and the heroes
behind it.

The PSM Team Goes Virtual

The PSM team evaluates facility
processes from behind a
computer screen.

The Sage family welcomes  IMACC

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

► Your Turn for Interns?

- What and Who Is SageSafety?
- The PSM Team Goes Virtual
- The Sage Family Welcomes IMACC!

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

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◀ Prev. | Next ▶

Sage's Chicago and Urbana-Champaign Offices would certainly say IT IS your turn for interns and co-ops, considering the success of the program that is boosting Sage's growth. Flashback to early September and you'll see Ryan Kahn and Eric Allen setting the groundwork, visiting Purdue University to present to bright-eyed AIChE Society members.

An impressive 50+ students attended, eager to learn about opportunities beyond process engineering, and Ryan and Eric took advantage of the opportunity with a plug for the intern program. They left with 13 résumés in-hand, and the rest is Sage history. A team that included Tom Smith, Nina Dace, Nick Manser, Drake Fitzsimmons,

Andrea Sayles, and Jim Miralgio undertook a 'Recruiting Blitz' at the University of Illinois, which spanned three days of recruiting at a U of I football game, as well as presentations to more than 75 students for the AIChE and OXE student organizations.

What's the Plan for These Interns and Co-ops?

PT interns and co-ops (who take time off of school to work full-time) are making their presence known at Sage, logging LDC hours to support a wide-range of activities including LDAR, BWON, flares, permitting, as well as a variety of Clean Air Act compliance projects related to various MACT, NSPS, and NESHAP regulations. Currently, the Chicago and Urbana-Champaign Offices have 2 PT

co-ops and 4 interns during the Fall 2013 semester, and we're searching for more students to add to our in-semester and/or summer internship programs. According to Shane Kling, the company's aim is to have each Sage Office with a co-op student year-round and summer interns to evaluate as future PT hires into the Sage family.

Program Contributions

Where to start? "The program is boosting Sage's short and long-term growth," according to Shane. It reduces recruiting costs and improves the company's financial performance while also preparing the students for future careers. Also, the success of the intern program is already apparent from the Summer 2013 program, which employed 39

[Read on ▶](#)

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

► Your Turn for Interns?

- What and Who Is SageSafety?
- The PSM Team Goes Virtual
- The Sage Family Welcomes IMACC!

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

Your Turn for Interns?

Continued...

◀ Prev. | Next ▶

interns in 13 Sage offices. The best part: the program generated \$400,000 while only costing the company \$192,000 – a very good ROI indeed!

Bottom Line

The program provides vast support for Sage. In the words of our CEO, Steve, “If we get paid \$200,000 to evaluate 39 interns for future employment at Sage, then that is a success.”

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSES

WHAT'S HAPPENING NOW

- Your Turn for Interns?
- **What and Who Is SageSafety?**
- The PSM Team Goes Virtual
- The Sage Family Welcomes IMACC!

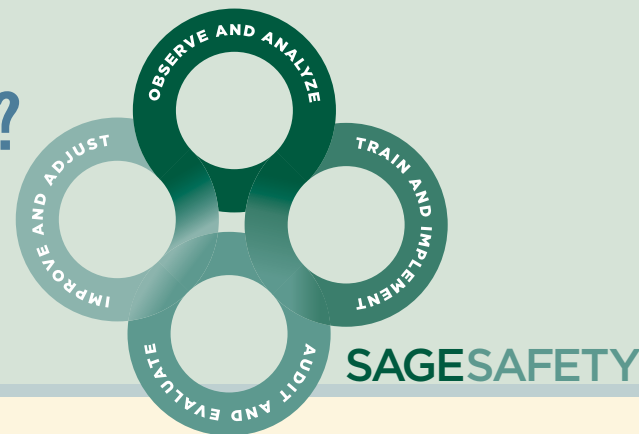
Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE: 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

What and Who Is SageSafety?

Learn about our latest safety offerings and the heroes behind it.



◀ Prev. | Next ▶

Sage, through SageSafety, now offers a wide variety of health and safety services to all of industry, and deals with both the process and human sides of safety, offering services in management systems, program development, culture development, audits, root cause analysis, emergency response planning, industrial hygiene and training. With our extensive regulatory knowledge and global compliance experience, our H&S leaders are well-equipped to create a successful and compliant H&S management system.

Process Safety Management (PSM) represents the process sides of things. PSM Essential Services include PSM program

implementation & auditing, process hazard analysis, procedure development and implementation, risk management, process safety information, management of change, mechanical integrity, incident investigation, and facility siting.

Our PSM Rock Stars

- **Bill Fink** is a PSM master in petroleum and chemical industries, providing industrial, municipal, petroleum & chemical fire protection, safety, emergency response, and process safety services for over 34 years. His specialty is Process Hazards Analysis and Layer of Protection Analysis.
- **Faheem Kazimi** is all things health and safety, bringing over 30 years of experience

in environmental health and safety with a specialty in the petrochemical industry.

- **Janice DeVelasco, P.E.** has a handle on everything from refining, base oil and lubricants, to pipeline operations, petrochemicals, and nitrogen fertilizer, that's the kinda payoff only 30 plus years of experience can bring. Her specialty is RMP and PSM.
- **Jerry Buck** has focused on safety and risk management for the last 14 years, with over 28 years of experience in refining. [Click here](#) for more on Jerry, we sent this out to customers when he first joined the family.

[Read on ▶](#)

Where to next...

CELEBRATING SAGE & FAMILY'S SUCCESSES

WHAT'S HAPPENING NOW

- Your Turn for Interns?
- **What and Who Is SageSafety?**
- The PSM Team Goes Virtual
- The Sage Family Welcomes IMACC!

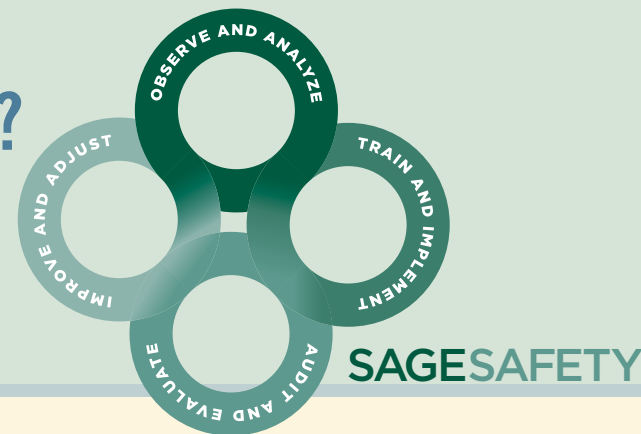
Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

What and Who Is SageSafety?

Continued...



◀ Prev. | Next ▶

- **Jimmy Miller** knows how to get people involved, improving employee participation during his tenure as HSE director, and bringing over 16 years of refinery experience and 12 years of H&S, security, and environmental experience.

Health and Safety (H&S) deals with the human side of things. H&S essential services include Safety Program Development, Training, Design, Audits, Industrial Hygiene, and Safety System Support.

Our H&S Athletes

- **Russell Townsend** is the industry veteran with 35 years of experience in both the H&S and PSM side of things and is charged with leading the H&S team.
- **David Ellison** is an accomplished EHS leader with more than 29 years of experience in all aspects of EHS, development of management systems, culture development, risk management, strategic planning, PSM, and loss prevention in multinational

organizations.

Want to get involved or need SageSafety's services for your clients? Contact one of the team members listed above or call the SageSafety line at 855-747-3911.

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

- Your Turn for Interns?
- What and Who Is SageSafety?
- **The PSM Team Goes Virtual**
- The Sage Family Welcomes IMACC!

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

The PSM Team Goes Virtual

The PSM team evaluates facility processes from behind a computer screen.

◀ Prev. | Next ▶

A facility process hazards analysis...over the internet? It's like something out of a 1950's sci-fi flick, okay not really, but it's definitely something most PSM programs don't offer. Our PSM team started performing certain evaluations, like small Process Hazards Analysis (PHA) and Layer of Protection Analysis (LOPA), for Management of Change (MOC) items via WebEx.

Basically, when a facility makes a change, they have a procedure in place that may require a process hazards analysis evaluation to identify hazards and implement protections that may result from the change. But facilities

face a very real challenge of scheduling an outside or onsite facilitator to conduct the studies in a timely fashion - that's where SageSafety comes in.

SageSafety has been conducting these small studies via WebEx with a little ingenuity: a scribe sits at the computer in one location, while a facilitator leads the study via WebEx with the client's team of operators, process engineers, instrument specialists and others present in a conference room at the facility. The method improves the timeliness of the MOC completion, saves on travel costs and labor fees, and is generally much more efficient and hassle-free for the

client. If a client has an urgent need to complete a MOC that requires a PHA or LOPA study, this remote approach is best.

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

- Your Turn for Interns?
- What and Who Is SageSafety?
- The PSM Team Goes Virtual
- **The Sage Family Welcomes IMACC!**

Special Feature

**MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS**

RESOURCES

The Sage family welcomes



◀ Prev. | Next ▶

With much fanfare and signing of papers - yes, Troy you already said it best in your email to all on August 28th - we welcomed **IMACC** (Industrial Monitor and Control Corporation), specializing in custom design and manufacturing of FTIR monitoring systems, to the Sage family in late August. FTIR is a powerful, real-time monitoring technique for detection and quantification of multiple compounds, and IMACC technology is found at major industrial, petrochemical, and chemical facilities world-wide.

What's really exciting is the new service opportunities it creates for our clients, including FTIR-based and QCL-based analytical platforms to meet specialized gaseous measurement requirements and instrumentation, repairs, and services on FTIR analyses, including experimental considerations.

With the list of products that could be sold, the new IMACC is a stepping stone toward fence line and ambient monitoring, stack and CEMS systems, and specialty testing

services for our clients. The purchase was done in partnership with Clean Air Engineering and IMACC is headquartered out of Round Rock.

For more information, refer to the new **page** on our site and/or get in touch with **Troy** to find out more.

Where to next...

**CELEBRATING SAGE & FAMILY'S
SUCCESSES**

WHAT'S HAPPENING NOW

Special Feature

**MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE PAPER
PRESENTATIONS, 5 POSTERS**

- Paradigm Shift Regarding Flare Combustion Efficiency
- IR Technology for Automatic Flare Steam Control
- BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare
- Method of Early PRV Detection of Releases to Refinery Flares
- Fence Line Monitoring at a Major Petroleum Refinery- IR Technology for Automatic Flare Steam Control
- Finding and Fixing Heat Exchanger Leaks
- 2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues
- Examining the Risks of the PSM 'Replacement in Kind'
- MSS Permitting: Coming to a State Near You?
- Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions

RESOURCES

Special Feature

MAJOR SHOWING AT THIS YEAR'S AFPM CONFERENCE : 10 WHITE PAPER PRESENTATIONS, 5 POSTERS

◀ Prev. | Next ▶

Boy are we excited – never before have we had this kind of presence at AFPM (American Fuel and Petrochemical Manufacturers, previously known as NPRA – National Petroleum and Refining Association). The annual conference is touted as the world's premier refining meeting and assembles key executives, decision-makers, and technical experts, (e.g., people who can really affect change) to connect and share ideas that shape the future of our industry. Leading industry experts – that's us! – share valuable insights on

major issues, including energy and environmental initiatives and the latest technical developments impacting the refining and petrochemical industry communities.

The 10 white papers we are presenting at the conference are summarized into quick bites for easy digestion, with links to the full white paper and poster (as applicable):

Paradigm Shift Regarding Flare Combustion Efficiency

IR Technology for Automatic Flare Steam Control

BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare

Method of Early PRV Detection of Releases to Refinery Flares

Fence Line Monitoring at a Major Petroleum Refinery

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MSS Permitting: Coming to a State Near You?

Use of the Emission Isolation Flux Chamber to Determine Area Source

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE PAPER
PRESENTATIONS, 5 POSTERS

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- IR Technology for Automatic Flare Steam Control
- BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare
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- Finding and Fixing Heat Exchanger Leaks
- 2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues
- Examining the Risks of the PSM 'Replacement in Kind'
- MSS Permitting: Coming to a State Near You?
- Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions

RESOURCES

PARADIGM SHIFT REGARDING FLARE COMBUSTION EFFICIENCY

◀ Prev. | Next ▶

Derick G Kopp (Sage)

Marcus Herald (Marathon)

Troy Boley, PhD (Sage)

New monitoring and measurement techniques are providing further insight flare combustion efficiency (CE), resulting in an evolution of operational parameters that may be used to continuously determine CE.

Why the Shift?

Due to safety concerns and cost, it is not practical to continuously measure CE directly from open flame flares. Therefore, it has been necessary to identify predictive or surrogate parameters which can be correlated to CE.

These parameters can be integrated into the control logic of the Distributed Control System (DCS) for the flare in order to optimize flare

performance, increase CE, and potentially minimize flare emissions.

The Parameters

Parameters must address the following factors: oversteaming, excess aeration, flare gas composition, high cross winds, and flame lift-off.

Surrogate parameters have been introduced since the mid-1980s and can be grouped into three broad categories:

Tip velocity-based

- *Tip velocity*
- *Momentum flux ratio*

Assist gas-based

- *Steam-to-vent gas ratio*
- *Stoichiometric air ratio*

Heating value-based

- *Static net heating value (NHV) calculated in the flare header*
- *Lower flammability limit and Dynamic NHV calculated at the flare tip*

What it Means

Inclusion of these “new” parameters in federal rulemaking may prove to be that on which the combustion efficiency paradigm of the future is built.

However, it is not yet clear which, if any, of the new parameters will be included in the next proposed rule-making for flares.

Research continues to be conducted with respect to identifying additional parameters upon which to develop the combustion efficiency paradigm to ensure greater than 98% combustion efficiency at the flare tip.

[Read the full white paper.](#)

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE PAPER
PRESENTATIONS, 5 POSTERS

- Paradigm Shift Regarding Flare Combustion Efficiency
- **IR Technology for Automatic Flare Steam Control**
- BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare
- Method of Early PRV Detection of Releases to Refinery Flares
- Fence Line Monitoring at a Major Petroleum Refinery- IR Technology for Automatic Flare Steam Control
- Finding and Fixing Heat Exchanger Leaks
- 2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues
- Examining the Risks of the PSM 'Replacement in Kind'
- MSS Permitting: Coming to a State Near You?
- Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions

RESOURCES

IR TECHNOLOGY FOR AUTOMATIC FLARE STEAM CONTROL

◀ Prev. | Next ▶

John D. Ditmore (CVR Energy, Inc.)

Troy M. Boley (Sage)

Herman Holm (Sage)

Derick G. Kopp (Sage)

In October 2011, CVR Energy Inc (CVR) installed Williamson Flare Monitors (Model #FM-17-N4) on several of their steam-assisted flares to assess the potential for automatically controlling the flow rate of steam to the flare tip based upon infrared analyses of the combustion zone.

About Steam Flow Rate

The most important factors that affect the degree at which combustion occurs are the amount and distribution of oxygen within the combustion zone. Steam is often used to increase mixing rate of oxygen at the flare tip, which leads to increased combustion efficiency (CE). The flow rate of steam must be carefully

controlled in order to maintain optimal CE because both an excess amount of steam and lack of steam can lead to poor CE.

How it Works

The Williamson Flare Monitor utilizes dual wavelength infrared technology to monitor the ratio of carbon to available oxygen (C/O) deep within the hot flare flame. This ratio can be correlated to combustion efficiency and may be used to adjust the flow of steam to steam-assisted flares.

The flare monitor is incorporated into the refinery's Distributed Control System (DCS) that controls the flow rate of steam. The flare monitor continuously analyzes C/O and instantaneously stores the data in the DCS. The DCS calculates a rolling average C/O, which provides a signal to the steam control valve to automatically increase or decrease the flow rate of steam.

Potential Challenges

Implementation of infrared technology to automate steam control may present one or more challenges including the potential need for temperature correction, gaps in information that may necessitate approximation, and the possible obstruction of the instrument due to wind or physical objects.

Validation

Identifying the optimal carbon-to-oxygen ratio that yields the highest combustion efficiency can be determined with a Passive Fourier Transformation Infrared (PFTIR) test using a typical gas composition for that flare. The testing can clearly demonstrate the correlation between the reported C/O and CE.

[Read the full white paper and the poster.](#)

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE PAPER
PRESENTATIONS, 5 POSTERS

- Paradigm Shift Regarding Flare Combustion Efficiency
- IR Technology for Automatic Flare Steam Control
- **BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare**
- Method of Early PRV Detection of Releases to Refinery Flares
- Fence Line Monitoring at a Major Petroleum Refinery- IR Technology for Automatic Flare Steam Control
- Finding and Fixing Heat Exchanger Leaks
- 2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues
- Examining the Risks of the PSM 'Replacement in Kind'
- MSS Permitting: Coming to a State Near You?
- Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions

RESOURCES

BP WHITING'S SOUTH FLARE – DESIGN HIGHLIGHTS OF A NSPS SUBPART JA AND CONSENT DECREE COMPLIANT REFINERY FLARE

◀ Prev. | Next ▶

Ken Comey (BP Products)
Brandon Mik (BP Products)
Troy M. Boley (Sage)
Herman Holm (Sage)
Thomas D. Smith (Sage)

The Forward-Looking Flare

In light of the recent promulgation of the New Source Performance Standards Subpart Ja for petroleum refineries (NSPS Ja) and the consent decree (CD) recently entered by the refinery, the BP Whiting South Flare is one of the most heavily monitored and regulated flares in the country and represents the direction flare enforcement within the U.S. Environmental Protection Agency (EPA) is headed.

Overview of the South Flare

The BP Refinery in Whiting, IN was originally constructed in 1889 and has the capacity to process over 400,000 barrels of crude oil per day.

Construction of the South Flare was commenced in 2011 and is defined as a “new, non-emergency” flare under NSPS Ja. The CD, entered in May 2012, requires enhanced monitoring of current and future refinery flares. The South Flare commenced operation in May 2013 and is fully compliant with the CD and NSPS Ja.

SF Systems & Instrumentation

The South Flare has implemented a flare gas recovery system (FGRS); vent gas, supplemental gas, and steam flow monitoring; two gas chromatographs for continuous compositional analysis – one for Net Heating Value (NHV) and one for analysis of the 162 ppm limit; one total sulfur analyzer for NSPS Ja sulfur monitoring; integrated distributed control system (DCS) logic to automate the control scheme; and 40 CFR § 60.18 flare operational requirements.

The South FGRS is designed to capture all flows resulting from normal refinery and includes a seal drum, air cooler, compressors, and a 3-phase separator. Data is collected on a continuous basis (i.e., from cycles within seconds to nearly 10 minutes) and routed to a DCS that adjusts according to set points dictated by the CD.

[Read the full white paper.](#)

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE PAPER
PRESENTATIONS, 5 POSTERS

- Paradigm Shift Regarding Flare Combustion Efficiency
- IR Technology for Automatic Flare Steam Control
- BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare
- **Method of Early PRV Detection of Releases to Refinery Flares**
- Fence Line Monitoring at a Major Petroleum Refinery- IR Technology for Automatic Flare Steam Control
- Finding and Fixing Heat Exchanger Leaks
- 2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues
- Examining the Risks of the PSM 'Replacement in Kind'
- MSS Permitting: Coming to a State Near You?
- Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions

RESOURCES

METHOD OF EARLY PRV DETECTION OF RELEASES TO REFINERY FLARES

◀ Prev. | Next ▶

George Semrau (Marathon)

Troy M. Boley (Sage)

Herman Holm (Sage)

Why This Sounds Good: NSPS Subpart Ja

As per New Source Performance Standard (NSPS) Subpart Ja, flare operators cannot burn any fuel gas that contains hydrogen sulfide (H₂S) in excess of 162 ppmv determined on a 3-hour rolling average basis. Unwanted leaks from process unit valves into the flare can contribute to H₂S concentration and must be detected early to mitigate effects.

Say What? How It Works

During a valve leakage, fuel loss is accompanied by a loss in acoustic energy. Acoustic energy lost can be detected using an acoustic emission (AE) device such as the Emerson Model 708 Wireless Hart Acoustic Transmitter.

AE equipment utilizes sensors that detect sound at a frequency range of 60 to 600 kHz. The noise generated from a leaking valve is carried through the fluid, valve, and pipe walls to be detected by the sensors.

Factors affecting seat leakage rates include type of process fluid, fluid density, pressure differential, valve type, and pipe size.

Pros and Cons

Pro: Valve leakage information is valuable for determining if valve maintenance must be performed immediately or may be scheduled to correspond with future shutdowns.

Con: Monitors can exhibit different levels of “normal” non-zero acoustic levels due to process vibration.

Pro: Emerson's software provides a simple user interface.

Pro: The transmitter also provides pipe

surface temperature, which can be an indication that a leak is occurring.

Conclusion

Consider a Hearing Aid.

In light of the new NSPS Ja H₂S limits, the early detection the Emerson transmitters provide may be critical.

[Read the full white paper and the poster.](#)

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S AFPM CONFERENCE : 10 WHITE PAPER PRESENTATIONS, 5 POSTERS

- Paradigm Shift Regarding Flare Combustion Efficiency
- IR Technology for Automatic Flare Steam Control
- BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare
- Method of Early PRV Detection of Releases to Refinery Flares
- **Fence Line Monitoring at a Major Petroleum Refinery- IR Technology for Automatic Flare Steam Control**
- Finding and Fixing Heat Exchanger Leaks
- 2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues
- Examining the Risks of the PSM 'Replacement in Kind'
- MSS Permitting: Coming to a State Near You?
- Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions

RESOURCES

FENCE LINE MONITORING AT A MAJOR PETROLEUM REFINERY

◀ Prev. | Next ▶

Elizabeth Olavesen (Marathon)

Ashok Patel (Sage)

David Ranum (Sage)

In 2007, Marathon Petroleum Company LP (MPC) entered into a voluntary agreement with the Louisiana Department of Environmental Quality (LDEQ) to establish an enhanced ambient air quality monitoring network at the Garyville, LA facility. The network consists of four monitoring stations situated at fence line positions NE, NW, NE, and SW of the refinery.

A Change in Operations

Sage assumed operations on April 1, 2012, and a 90-day variance was received from the LDEQ to provide time for the changeover. However, due to continuing problems with both gas chromatography (GC) systems (two at each station), a request for a second variance was made.

The LDEQ granted the second variance with an expiration date of October 31, 2012. However, information about the extent and nature of previous GC modifications were not made available to MPC, and by mid-August little progress had been made.

An alternative approach was needed, and a request was approved to replace the BTX+hexane GCs with a triggered canister system and the H2S GCs with continuous H2S analyzers.

Alternatives to the GCs

The idea is simple – whenever the ambient non-methane hydrocarbon concentration, as measured by the station's Model 55C Methane/Non Methane Hydrocarbon analyzer, exceeds a pre-defined level, a canister sample is collected for analysis, and an email/text notification is delivered. Construction of the system

required a re-design of the existing six-day canister sampling system, and modifications to the data logger operating program and communication software.

Conclusion

Replacement of the trigger systems and the H2S GCs with continuous H2S analyzers met the required deadline; produced an improved monitoring system with automatic hydrocarbon level alerts and higher data completeness rates; and reduced maintenance and operation costs.

[Read the full white paper.](#)

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE PAPER
PRESENTATIONS, 5 POSTERS

- Paradigm Shift Regarding Flare Combustion Efficiency
- IR Technology for Automatic Flare Steam Control
- BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare
- Method of Early PRV Detection of Releases to Refinery Flares
- Fence Line Monitoring at a Major Petroleum Refinery- IR Technology for Automatic Flare Steam Control
- **Finding and Fixing Heat Exchanger Leaks**
- 2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues
- Examining the Risks of the PSM 'Replacement in Kind'
- MSS Permitting: Coming to a State Near You?
- Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions

RESOURCES

FINDING AND FIXING HEAT EXCHANGER LEAKS

◀ Prev. | Next ▶

Taras Lewus (Sage)

Monitoring heat exchange systems in organic hazardous air pollutant (HAP) service for leaks is something refineries are already familiar with.

However, there are varying strategies for how to identify culprit leaking heat exchangers and make any necessary repairs within the required timeframe.

Common Leaks

Modified El Paso Method (MEPM) monitoring has been required of existing heat exchange systems in refineries since October 2012. We found:

- *Refineries did a good job of reducing large leaks.*
- *Many leaks greater than 6.2 ppmv did not qualify for provisions (required repair within 45 days).*
- *Leaks detected above 62 ppmv are often orders of magnitude larger than the limit.*

- *Large leaks can easily take in excess of a month to repair, and 2-3 days to flush out residual contaminants.*

- *MEPM results < 6.2 ppmv but > 3.1 ppmv show that moving to quarterly monitoring with a reduced limit of 3.1 ppmv may not be favorable.*

What's Leaking?

These methods worked best to identify the leaking heat exchanger post MEPM results:

- *Significant contact with operations is essential*
- *Grab sampling and Flame Ionization Detector (FID) sniffing.*
- *Speciation when the leak has been due to a single bank of or single heat exchanger.*

The Gold Standard

- *Identify every heat exchanger in the refinery.*
- *Prepare a simplified diagram identifying all cooling water flows and returns.*

- *Identify if inlets and outlets have taps currently installed such that samples could be collected.*

- *Identify if each heat exchanger in organic HAP service can be bypassed or repaired online.*

- *Have a written procedure in place that includes specific instructions for leaks.*

- *Install additional sample taps and bypasses for heat exchangers.*

- *Use a consistent MEPM team and dedicated monitoring equipment.*

- *Ensure refinery operations is involved with the compliance program.*

- *Ensure refinery operations notifies Environmental immediately when a leak is expected.*

Read the **full white paper** and the **poster**.

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S AFPM CONFERENCE : 10 WHITE PAPER PRESENTATIONS, 5 POSTERS

- Paradigm Shift Regarding Flare Combustion Efficiency
- IR Technology for Automatic Flare Steam Control
- BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare
- Method of Early PRV Detection of Releases to Refinery Flares
- Fence Line Monitoring at a Major Petroleum Refinery- IR Technology for Automatic Flare Steam Control
- Finding and Fixing Heat Exchanger Leaks
- **2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues**
- Examining the Risks of the PSM 'Replacement in Kind'
- MSS Permitting: Coming to a State Near You?
- Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions

RESOURCES

2011 REFINERY ICR SUBMITTALS IMPACT ON TRI & OTHER REGULATORY ISSUES

◀ Prev. | Next ▶

Melissa Hart (Sage)

Karl Duckworth (Sage)

Kari Keegan (Sage)

Jonathan Brockhaus (Sage)

Jon Brubaker – Dow Chemical
(formerly Sage)

On March 31, 2011, the EPA Office of Air and Radiation (OAR) sent a letter to all petroleum refineries operating under the North American Industry Classification System Code of 32411 with an Information Collection Request (ICR) to release monitoring, air release, and stack test data.

The Letter

Then they sent another letter. As early as April 2013, USEPA Regional Offices sent email “form” letters to various refineries requesting the facility review 2011RY TRI Reports for potential errors of “missing” Toxic Release Inventory (TRI) chemicals

based on information obtained through the 2011 Refinery ICR. These letters may have been generated under the premise that facilities were mistakenly not reporting chemicals when in fact, facilities may not have been required to submit under permitting thresholds that did not require testing, analysis, or reporting.

What it Means

The concern at the facility level is a misapplication of the data to other sources where process and other operating parameters are dissimilar. It is becoming clear refiners will need to begin the process of reconciling their current and historical reporting methodology to mirror the ICR Protocol. However, this should be done in the appropriate regulatory setting, through rulemaking and stakeholder participation.

What to do

The petroleum refinery industry should convey a consolidated, consistent opinion regarding the use of ICR emission data as emission factors.

Consequences of incorrect reporting are significant, and facilities have been urged to respond to these letters with revisions where appropriate. The implications of the air release and testing data submitted extend beyond TRI and have the potential to impact permitting and emission inventories for all refineries.

[Go here for the white paper.](#)

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S AFPM CONFERENCE : 10 WHITE PAPER PRESENTATIONS, 5 POSTERS

- Paradigm Shift Regarding Flare Combustion Efficiency
- IR Technology for Automatic Flare Steam Control
- BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare
- Method of Early PRV Detection of Releases to Refinery Flares
- Fence Line Monitoring at a Major Petroleum Refinery- IR Technology for Automatic Flare Steam Control
- Finding and Fixing Heat Exchanger Leaks
- 2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues
- **Examining the Risks of the PSM 'Replacement in Kind'**
- MSS Permitting: Coming to a State Near You?
- Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions

RESOURCES

EXAMINING THE RISKS OF THE PSM 'REPLACEMENT IN KIND'

◀ Prev. | Next ▶

Karl Duckworth (Sage)

Bill Fink (Sage)

The Management of Change (MOC) process is one of the 14 essential elements of Process Safety Management (PSM) and includes an exemption for changes that will not have an impact on the process (a.k.a. replacement in kind).

However, the PSM/MOC program should be reviewed to ensure that compliance with PSM regulations does not result in non-compliance with other areas. Of particular concern are the LDAR, Air Permitting, and PSD Permitting programs.

The LDAR Program

The changing of a valve according to replacement in kind, without changing the associated LDAR tag, may result in a leaking valve that is not monitored in accordance

with regulatory requirements. This could ultimately result in a possible LDAR evaluation if the environmental group is not made aware.

Air Permitting

The replacement of a storage tank according to replacement in kind could result in the triggering of a regulatory requirement and possible deviation and notice of violation if the environmental group is not made aware.

Prevention of Significant Deterioration (PSD) Permitting

The replacement of a pump that has reached end-of-life, in accordance with replacement in kind, may result in misinterpretation of operating data and a subsequent consent decree if the environmental group is not made aware.

Mind the Gaps!

1. Eliminate the replacement-in-kind exemption use.
2. Hold regular meetings with the technical services and maintenance groups to discuss upcoming projects.

Conclusion

By adopting programs (MOC or other methods) that keep the environmental program aware of changes, companies can ensure that the proper compliance guidance is provided in both Safety (PSM) and environmental areas of the facility whenever a change is made.

[Read the full white paper and the poster.](#)

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S AFPM CONFERENCE : 10 WHITE PAPER PRESENTATIONS, 5 POSTERS

- Paradigm Shift Regarding Flare Combustion Efficiency
- IR Technology for Automatic Flare Steam Control
- BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare
- Method of Early PRV Detection of Releases to Refinery Flares
- Fence Line Monitoring at a Major Petroleum Refinery- IR Technology for Automatic Flare Steam Control
- Finding and Fixing Heat Exchanger Leaks
- 2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues
- Examining the Risks of the PSM 'Replacement in Kind'
- **MSS Permitting: Coming to a State Near You?**
- Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions

RESOURCES

MSS PERMITTING: COMING TO A STATE NEAR YOU?

◀ Prev. | Next ▶

Tim Jensen (Sage)

Jakilyn McDonald (Sage)

Larry G. Darcey, P.E. (Sage)

One of the 36?

If you live in one of the 36 states highlighted in the accompanying table, the EPA may soon require a revision to your State Implementation Plan to eliminate any exemptions to the Clean Air Act previously made for planned activities such as maintenance, startup, and shutdown (MSS). States subject to the SIP call will have 18 months to remove exemptions for such events, remove affirmative defenses for startup and shutdown, and modify malfunction affirmative defenses so that they are consistent with EPA guidance.

What to Expect

The most likely solution will be for the states to incorporate these planned activities

into their normal permitting programs. By identifying these activities in advance, the state can establish and enforce Best Available Control Technology, which is both the most likely aspect of MSS permitting to reduce emissions and the most expensive to implement.

However, there are gaps in information. Many facilities are on a four- to five- year turnaround schedule, and detailed recordkeeping for MSS activities was historically not required to a level beyond what was necessary to calculate the emissions that were then classified as “unauthorized emission events.”

What to Do

Facilities facing the possibility of MSS permitting should begin identifying and quantifying the maximum emissions from MSS activities as soon as possible so that they feel comfortable with the completeness and correctness of their representations by the time their application is due.

States Subject to EPA's SIP Call

Alabama	Kansas	North Carolina
Alaska	Kentucky	North Dakota
Arizona	Louisiana	Ohio
Arkansas	Maine	Oklahoma
Colorado	Michigan	Rhode Island
Delaware	Minnesota	South Carolina
District of Columbia	Mississippi	South Dakota
Florida	Missouri	Tennessee
Georgia	Montana	Virginia
Illinois	New Hampshire	Washington
Indiana	New Jersey	West Virginia
Iowa	New Mexico	Wyoming

Read the full **white paper**.

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE PAPER
PRESENTATIONS, 5 POSTERS

- Paradigm Shift Regarding Flare Combustion Efficiency
- IR Technology for Automatic Flare Steam Control
- BP Whiting's South Flare – Design Highlights of a NSPS Subpart Ja and Consent Decree Compliant Refinery Flare
- Method of Early PRV Detection of Releases to Refinery Flares
- Fence Line Monitoring at a Major Petroleum Refinery- IR Technology for Automatic Flare Steam Control
- Finding and Fixing Heat Exchanger Leaks
- 2011 Refinery ICR Submittals Impact on TRI & Other Regulatory Issues
- Examining the Risks of the PSM 'Replacement in Kind'
- MSS Permitting: Coming to a State Near You?

► **Use of the Emission Isolation Flux Chamber to Determine Area Source Emissions**

RESOURCES

USE OF THE EMISSION ISOLATION FLUX CHAMBER TO DETERMINE AREA SOURCE EMISSIONS

◀ Prev. | Next ▶

CE Schmidt (Independent)
David Ranum (Sage)

What is it Used for?

A flux chamber is used to estimate mass emission rates of gaseous pollutants from an area source such as an open tank, a storage pile, a lagoon, or a surface contamination.

It typically is constructed with a plexiglass dome mounted to a stainless steel base. Ports in the plexiglass cover provide access for sweep air inlet and outlet ports, as well as temperature measurements. Because the chamber is inserted into the subsurface, the sampling area is effectively "isolated" from external influences.

How it works

The flux chamber is a dynamic mixed tank reactor. The volume of the chamber (30 liters) and the sweep air flow rate of five

liters per minute determines the residence time of the standard chamber to be six minutes. After five residence times (30 minutes), the contents of the chamber are at equilibrium and grab and/or integrated samples can be collected.

Measurements A-Plenty!

The flux chamber in combination with various sampling and analytical techniques can be used to quantify many types of area source emissions:

- *Total volatile organic compounds*
- *Individual toxic organic compounds*
- *Semi-volatile compounds*
- *Greenhouse gases*
- *Odor causing compounds*
- *Radioactive compounds*

Versatility - Land and Sea

The flux chamber can be used on any land-based area source emitting air emissions or on liquid surfaces such as open tanks, surface spills, lagoons, storage ponds, waste treatment facilities, dissolved air flotation tanks, treatment units and discharge points.

Downhole Design

The downhole flux chamber is a small (0.6 liter) acrylic chamber design that allows space to fit a hollow stem auger for measurement of subsurface emissions from spills.

Conclusion

The technology is proven, accurate, and cost-effective for answering your area source emission questions.

Read the full [white paper](#) and the [poster](#).

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

- May the New Salesforce be with You
- Check out the Brand Book

TABLE OF CONTENTS

Resources

May the New Salesforce be with You

Master the new Salesforce via the
Chatter App!

Check Out the Sage Brand Book

Tell us what you think about the
official guide to the Sage brand
in print!

.

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

► [May the New Salesforce be with You](#)
- Check out the Brand Book

May the New Salesforce be with You

Master the new Salesforce via the Chatter App!

◀ Prev. | Next ▶

New and improved Salesforce tools incorporate the functionality of MySage into Salesforce for lightning fast service to your clients.

Already up is the Sage Library - remember Nick's email from September - which means SOPs, SSOs, service sheets, past newsletters, etc... are available at your fingertips. Access the libraries via the Chatter app on your mobile to email your client a list of Sage services before your next meeting.

Upcoming improvements: the Salesforce version of our My Skills Matrix (expected in January), which includes a search function that identifies subject matter experts and skills across the company. Pull together the right people for the job and have a team in lickity-split!

And then there's Domo software - expected 2014 - that integrates Salesforce information with ERP and ADP to graphically represent data and stream Sage financials via an iPad in every

office (what that really means is still technically under wraps, so be sure to look for more in upcoming newsletters).

Finally you can download, comment on, and share Salesforce information on your mobile phone via the new Chatter App. Check out this [chatter group](#) for tutorials highlighting the new features

Where to next...

CELEBRATING SAGE & FAMILY'S
SUCCESSSES

WHAT'S HAPPENING NOW

Special Feature

MAJOR SHOWING AT THIS YEAR'S
AFPM CONFERENCE : 10 WHITE
PAPER PRESENTATIONS, 5 POSTERS

RESOURCES

- May the New Salesforce be with You
► [Check out the Brand Book](#)

Check Out the Sage and Family Brand Book

Tell us what you think about the official guide to the Sage brand in print!

◀ Prev. | Next ▶

It's finally here and we want to hear from you! The official guide to the Sage brand, the Sage and Family Brand Book, combines and clarifies a score of brand information that previously lived solely in the hearts of Sage founders and every member of the Sage family.

The Sage and Family Brand Book is a resource that introduces new hires to the Sage brand and presents company vision, mission statement, company history, partnerships, in addition to technical questions about presentation of the Sage logo.

But even if you've been a member of the family since '98, you'll want to be sure to take a look to find out the answers to all your burning branding questions like Why the Sage buddha? What drives Sage messaging? How does our brand reinforce our culture and vice versa?

The Sage and Family Brand Book is a living document that changes with your suggestions and how we as a company evolve! Please read, and provide comments/questions to Ramona. Future issues will be housed in it's own section in Sage Libraries.

*Have some feedback or want to share for the next newsletter? Contact **Ramona Liszt** or call her at 512-327-0288; 1001.*