RE: q liquids unloading memo
Minnucci, Chris A. to: Kidman, Timothy M., Melissa Weitz 10/01/2012 09:38 AM

History: This message has been forwarded.

Melissa,

[redacted]
(b)(5) deliberative
[redacted]

I'm not sure which version is being referred to as the "very first version of the unloading memo, but in the last version of the paper we included a summary of the discussion in the Dec. 2011 paper. I've attached that summary in case it helps clarify the calculations performed. Note that it does reference EPA, mainly because we did not know who (EPA or a contractor?) produced the Dec. 2011 paper

Chris

-----Original Message-----
From: Kidman, Timothy M.
Sent: Fri 9/28/2012 3:50 PM
To: Melissa Weitz; Minnucci, Chris A.
Subject: RE: q liquids unloading memo

Hi Melissa,

[redacted]
(b)(5) deliberative
[redacted]

Chris worked on this paper, and will be back in on Monday. He can confirm that this is the origin or point you to the appropriate source.

Sorry I can't be more definitive with an answer right now, but I wanted to get back to you.

Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, September 27, 2012 12:59 PM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: q liquids unloading memo

I got a question (which I should probably know the answer to...) on plunger lift reduction efficiency. Do you know the answer to the question below?

(b)(5) deliberative

(b)(5) deliberative

excerpt on 95% calc.docx

Fw: RE: q liquids unloading memo
Melissa Weitz to: Paula Fields 10/01/2012 05:03 PM

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 10/01/2012 05:02PM -----
To: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/01/2012 09:38AM
Subject: RE: q liquids unloading memo

(See attached file: excerpt on 95% calc.docx)

Melissa,

(b)(5) deliberative

I'm not sure which version is being referred to as the "very first version of the unloading memo, but in the last version of the paper we included a summary of the discussion in the Dec. 2011 paper. I've attached that summary in case it helps clarify the calculations performed. Note that it does reference EPA, mainly because we did not know who (EPA or a contractor?) produced the Dec. 2011 paper

Chris

-----Original Message-----
From: Kidman, Timothy M.
Sent: Fri 9/28/2012 3:50 PM
To: Melissa Weitz; Minnucci, Chris A.
Subject: RE: q liquids unloading memo

Hi Melissa,

(b)(5) deliberative

(b)(5) deliberative

Chris worked on this paper, and will be back in on Monday. He can confirm that this is the origin or point you to the appropriate source.

Sorry I can't be more definitive with an answer right now, but I wanted to get back to you.

Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, September 27, 2012 12:59 PM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: q liquids unloading memo

I got a question (which I should probably know the answer to...) on plunger lift reduction efficiency. Do you know the answer to the question below?

(b)(5) deliberative

(b)(5) deliberative

[redacted]

excerpt on 95% calc.docx

Re: Fw: updated slides for sarah's presentation - 1 UPDATE
Suzanne Kocchi to: Melissa Weitz 10/01/2012 05:05 PM
Cc: Mark DeFigueiredo, Suzanne Waltzer

History: This message has been forwarded.

no, we are covered for now. no worries re: email. if changed a lot anyway.

tomorrow am you should focus on the other briefing we are giving sarah on wed and suzie w and i talked about some next steps re: liquids unloading. paul will want to see the slides before we give them to sarah on wed so by 4 pm bring to him a version that everyone, including bill has reviewed please.

Melissa Weitz	Is there anything you all need from me on thi...	10/01/2012 04:58:23 PM

From: Melissa Weitz/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/01/2012 04:58 PM
Subject: Re: Fw: updated slides for sarah's presentation - 1 UPDATE

Is there anything you all need from me on this? I reviewed it and it looks good. Sorry I missed your email with edits this weekend, Suzie K.

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Mark DeFigueiredo/DC/USEPA/US wrote: -----
To: Suzanne Kocchi/DC/USEPA/US@EPA
From: Mark DeFigueiredo/DC/USEPA/US
Date: 10/01/2012 03:40PM
Cc: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Subject: Re: Fw: updated slides for sarah's presentation - 1 UPDATE

[redacted]
(b)(5) deliberative
[redacted]

Suzanne Kocchi---10/01/2012 03:32:24 PM---FYI - for your records ----- Forwarded by Suzanne Kocchi/DC/USEPA/US on 10/01/2012 03:32 PM -----

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/01/2012 03:32 PM
Subject: Fw: updated slides for sarah's presentation - 1 UPDATE

FYI - for your records

----- Forwarded by Suzanne Kocchi/DC/USEPA/US on 10/01/2012 03:32 PM -----

From: Suzanne Kocchi/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Jackie Krieger/DC/USEPA/US@EPA, Paul Gunning/DC/USEPA/US@EPA
Date: 10/01/2012 03:31 PM
Subject: Re: updated slides for sarah's presentation - 1 UPDATE

Jackie - OAQPS had one update to slide 16 (they deleted one sub-bullet) so if you haven't given this to Sarah yet, please use this version. I have it saved on a thumb drive as well. As we discussed, I am NOT bringing copies, unless I hear otherwise. Thanks - Suzie

(See attached file: 10-1_Dunham slidesv3.pptx)

> Suzanne Kocchi---10/01/2012 01:26:27 PM---Here are updated slides per Sarah's comments. We put some key points in the notes section for a few

From: Suzanne Kocchi/DC/USEPA/US
To: Jackie Krieger/DC/USEPA/US@EPA
Cc: Paul Gunning/DC/USEPA/US@EPA
Date: 10/01/2012 01:26 PM
Subject: updated slides for sarah's presentation

Here are updated slides per Sarah's comments. We put some key points in the notes section for a few of the slides. OAQPS is taking a quick look at the NSPS slides but we don't anticipate any substantive changes. As we discussed we will plan to bring on a thumb drive tomorrow.

If you want to give to her to review again, I think this version is safe,

[attachment "10-1_Dunham slidesv2.pptx" deleted by Suzanne Kocchi/DC/USEPA/US]

[attachment "10-1_Dunham slidesv3.pptx" removed by Melissa Weitz/DC/USEPA/US]

Fw: RE: q liquids unloading memo
Paula Fields to: Melissa Weitz 10/01/2012 05:22 PM

History: This message has been forwarded.

Ah ha! Thanks Melissa, it looks like this was not a value that was documented anywhere, but rather an assumption from the API/ANGA report that was somewhat misplaced. Thanks for clearing this up.

-Paula

****

Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: "Paula Fields" <Paula.Fields@erg.com>
Date: 10/1/2012 2:03 PM
Subject: Fw: RE: q liquids unloading memo

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 10/01/2012 05:02PM -----
To: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/01/2012 09:38AM
Subject: RE: q liquids unloading memo

(See attached file: excerpt on 95% calc.docx)

Melissa,

(b)(5) deliberative

I'm not sure which version is being referred to as the "very first version of the unloading memo, but in the last version of the paper we included a summary of the discussion in the Dec. 2011 paper. I've attached that summary in case it helps clarify the calculations performed. Note that it does reference EPA, mainly because we did not know who (EPA or a contractor?) produced the Dec. 2011 paper

Chris

-----Original Message-----
From: Kidman, Timothy M.
Sent: Fri 9/28/2012 3:50 PM
To: Melissa Weitz; Minnucci, Chris A.
Subject: RE: q liquids unloading memo

Hi Melissa,

As best I can track it down, this statement is from the attached memo which we received from you on September 6th accompanying the outline for the liquids unloading memo (email also attached). It looks like the calculations were run by the author (EPA?) specifically for this memo, but it is not 100% clear.

Chris worked on this paper, and will be back in on Monday. He can confirm that this is the origin or point you to the appropriate source.

Sorry I can't be more definitive with an answer right now, but I wanted to get back to you.

Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, September 27, 2012 12:59 PM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: q liquids unloading memo

I got a question (which I should probably know the answer to...) on plunger lift reduction efficiency. Do you know the answer to the question below?

(b)(5) deliberative

=

Check of Liquids Unloading #s from New API Memo
Marty Wolf to: Melissa Weitz 10/01/2012 05:58 PM
Cc: "Paula Fields"

History: This message has been replied to and forwarded.

Melissa,

I checked the liquids unloading numbers in the new API Memo. As API pointed out in last week's call, the values from Tables 5-7 are identical to what is in Slides 5-7 of their presentation.

(b)(5) deliberative

I have attached our recalculation spreadsheet.

Thanks,
Marty

(b)(5) deliberative

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA

916-635-6594 (phone)
916-859-0185 (fax)

(b)(5) deliberative

[redacted]

marty.wolf@erg.comAPI_final_report_number_check_100112.xlsx

LU file request

Suzanne Waltzer to: eStricklin 10/02/2012 10:24 AM

Cc: Melissa Weitz

History: This message has been replied to and forwarded.

Hi Eric,

As we just discussed, under TO 99, could you please send the liquids unloading excel file that was used to develop the original LU emission factors by NEMS regions. We can locate the detailed memo but have not been able to locate the final file in Lisa's files. You can send the existing file and do not need to spend time formatting or changing the presentation of information in any way. We understand that it is an internal working file. We just need the file that contains all of the input data and calculations. Once we take a look, we will set up a call if we have follow-up questions. If possible to provide by COB tomorrow, that would be great. Please let us know.

I will send an email with the other items we just discussed shortly.

Thanks,

Suzie

Hide Details

LU Questions and Subpart W data

Fri 10/05/2012 11:00 AM - 12:00 PM

Attendance is **required** for Melissa Weitz

Chair: **Suzanne Waltzer/DC/USEPA/US**

Rooms: 1310L Room 757/DC-1310L-OAR@EPA

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA

Optional: Suzanne Kocchi/DC/USEPA/US@EPA

Description

Melissa, it looked like your schedule may be blocked off all day so just let me know if this doesn't work and I can reschedule. Or feel free to propose a different time.

Thanks!

Personal Notes

TO 99 Follow-up
Suzanne Waltzer to: Stricklin, Eric 10/02/2012 11:41 AM
Cc: "Robinson, Donald", Melissa Weitz

History: This message has been forwarded.

Hi Eric,

Thanks for the info and quick responses. Please see my responses below.

[redacted] (b)(5) deliberative [redacted]

Also, as we discussed, if could please provide a brief budget update by COB Wed for TO 99, that would great.

I think that covers everything. Please let me know if you have questions. Thanks!

Suzie

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

"Stricklin, Eric" Suzie, [redacted] (b)(5) deliberative [redacted] 10/02/2012 09:47:04 AM

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>
Date: 10/02/2012 09:47 AM
Subject: Mapping BLM Lands to HPDI and Plunger Lift Analysis

Suzie,

(b)(5) deliberative

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

(b)(5) deliberative

Plunger Lift Emission Reductions Memo - Webcast 7.14.11.pdf

RE: TO 99 Follow-up
Stricklin, Eric to: Suzanne Waltzer 10/02/2012 01:03 PM
Cc: "Robinson, Donald", Melissa Weitz

History: This message has been forwarded.

Suzie,

Thursday morning will work for the summary of plunger lift control effectiveness data.

Could you send the transcript for last year's webcast?

Thanks,
Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Suzanne Waltzer [mailto:Waltzer.Suzanne@epamail.epa.gov]
Sent: Tuesday, October 02, 2012 11:42 AM
To: Stricklin, Eric
Cc: Robinson, Donald; Melissa Weitz
Subject: TO 99 Follow-up
Importance: High

Hi Eric,

Thanks for the info and quick responses. Please see my responses below.

[redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

(b)(5) deliberative

Also, as we discussed, if could please provide a brief budget update by COB Wed for TO 99, that would great.

I think that covers everything. Please let me know if you have questions. Thanks!

Suzie

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

"Stricklin, Eric" ---10/02/2012 09:47:04 AM---Suzie, (b)(5) deliberative

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>
Date: 10/02/2012 09:47 AM
Subject: Mapping BLM Lands to HPDI and Plunger Lift Analysis

Suzie,

(b)(5) deliberative

(b)(5) deliberative

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

(See attached file: Plunger Lift Emission Reductions Memo - (b)(5) deliberative Webcast 7.14.11.pdf)Liquids Unloading EF Calculation (2010Inv).xlsx

Re: workshop summary report and ERG notes

Melissa Weitz to: Paula Fields 10/02/2012 02:59 PM

Hi--

Can you please re-check the attendance list against the excel file I sent? There were some participants on the summary report list who registered but did not actually attend (e.g Bill Whitsitt). The attendance is noted in column A of the excel file.

If it's possible to get this check today, that'd be great. We need it for tomorrow morning. If you are not able to do it, let me know and I'll do it. The version below contains one edit from the earlier one, adding Kristine Wiley.

When you are finished, please send me an updated version of that attachment.

Thanks!

(b)(5) deliberative

[redacted]

2012 Stakeholder Workshop on Natural Gas Registration 09-12-12 (pm)_ETedit.xlsx

Melissa Weitz	By tomorrow COB would be good From: "Pa...	09/27/2012 03:51:46 PM

From: Melissa Weitz/DC/USEPA/US
To: "Paula Fields" <Paula.Fields@erg.com>
Date: 09/27/2012 03:51 PM
Subject: Re: workshop summary report and ERG notes

By tomorrow COB would be good

"Paula Fields"	OK, will do. When do you need it? **********...	09/27/2012 03:50:26 PM

Re: workshop summary report and ERG notes
Paula Fields to: Melissa Weitz 10/02/2012 03:05 PM

History: This message has been forwarded.

Melissa - I'll do it right now....

Paula

****

Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: Paula Fields <Paula.Fields@erg.com>
Date: 10/2/2012 12:00 PM
Subject: Re: workshop summary report and ERG notes

Hi--

Can you please re-check the attendance list against the excel file I sent? There were some participants on the summary report list who registered but did not actually attend (e.g Bill Whitsitt). The attendance is noted in column A of the excel file.

If it's possible to get this check today, that'd be great. We need it for tomorrow morning. If you are not able to do it, let me know and I'll do it. The version below contains one edit from the earlier one, adding Kristine Wiley.

When you are finished, please send me an updated version of that attachment.

Thanks!

(See attached file: 2012 Stakeholder Workshop on Natural Gas Registration 09-12-12 (pm)_ETedit.xlsx)

Melissa Weitz---09/27/2012 03:51:46 PM---By tomorrow COB would be good From: "Paula Fields" <Paula.Fields@erg.com>

From: Melissa Weitz/DC/USEPA/US

To: "Paula Fields" <Paula.Fields@erg.com>
Date: 09/27/2012 03:51 PM
Subject: Re: workshop summary report and ERG notes

By tomorrow COB would be good

"Paula Fields" ---09/27/2012 03:50:26 PM---OK, will do. When do you need it? **********

From: "Paula Fields" <Paula.Fields@erg.com>
To: "MacQueen, Casey" <Casey.MacQueen@erg.com>, Melissa Weitz/DC/USEPA/US@EPA
Date: 09/27/2012 03:50 PM
Subject: Re: workshop summary report and ERG notes

OK, will do. When do you need it?

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: "Casey MacQueen" <Casey.MacQueen@erg.com>
CC: "Fields, Paula" <Paula.Fields@erg.com>
Date: 9/27/2012 12:43 PM
Subject: Re: workshop summary report and ERG notes

Hi,

Yes, please go ahead and summarize the information in the discussion section. I have done so for well counts and liquids unloading as examples.

Melissa

(See attached file: Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.09.27 mw.docx)

"Casey MacQueen" ---09/27/2012 02:17:03 PM---Melissa, Yes, that is the file we used as the basis for the meeting notes attendee list. We used the

From: "Casey MacQueen" <Casey.MacQueen@erg.com>
To: "Fields, Paula" <Paula.Fields@erg.com>, Melissa Weitz/DC/USEPA/US@EPA
Date: 09/27/2012 02:17 PM
Subject: Re: workshop summary report and ERG notes

Melissa,

Yes, that is the file we used as the basis for the meeting notes attendee list. We used the worksheet "Reg. List (Alphabetized)" which seemed to capture those who attended in person. Please let us know if you'd like any changes to the attendee list.

Casey

>>> Paula Fields 9/27/2012 12:58 PM >>>
Melissa - I had this one.

Casey - can you confirm this was the basis for the attachment to the meeting notes?

Tx,
Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: "Paula Fields" <Paula.Fields@erg.com>
CC: "MacQueen, Casey" <Casey.MacQueen@erg.com>
Date: 9/27/2012 9:55 AM
Subject: Re: workshop summary report and ERG notes

Hi Paula,

I'm not sure I sent this to you. It's an updated attendance list for the workshop. I added information from the sign-in sheet at the guard's desk, which added a few more participants.

(See attached file: 2012 Stakeholder Workshop on Natural Gas Registration 09-12-12 (pm)_ETedit.xlsx)

"Paula Fields" ---09/27/2012 12:47:29 PM---OK!
****

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "MacQueen, Casey" <Casey.MacQueen@erg.com>
Date: 09/27/2012 12:47 PM
Subject: Re: workshop summary report and ERG notes

OK!

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: "Paula Fields" <Paula.Fields@erg.com>
CC: "Casey MacQueen" <Casey.MacQueen@erg.com>
Date: 9/27/2012 9:32 AM
Subject: Re: workshop summary report and ERG notes

Hi Paula,

Thanks! I think we'll use the draft stakeholder workshop summary report in its current format as an internal reference, but for the summary for stakeholders, we're probably going to want the discussion to be in a less-detailed summary format. We're meeting on this soon and I'll get back to you to confirm that.

Thanks!
Melissa

"Paula Fields" ---09/27/2012 12:11:57 PM---Hi Melissa - here's the draft stakeholder workshop summary report. I reduced the font to 11 pt. and

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Casey MacQueen" <Casey.MacQueen@erg.com>
Date: 09/27/2012 12:11 PM
Subject: workshop summary report and ERG notes

Hi Melissa - here's the draft stakeholder workshop summary report. I reduced the font to 11 pt. and shrunk the margins to fit it into 6 pages + attachment. Let me know if you'd like any more changes.

Also, I'm attaching mine and Casey's notes. We didn't clean them up, so I hope that they are helpful.

Good luck with the review.

Thanks,
Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.09.27.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "PF Notes_9-13 and 9-14-12.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Workshop Notes DAY 1_CM.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Workshop Notes DAY 2_CM.docx" deleted by Melissa Weitz/DC/USEPA/US]

RE: TO 99 Follow-up
Stricklin, Eric to: Suzanne Waltzer, Melissa Weitz 10/02/2012 03:09 PM
Cc: "Robinson, Donald"

History: This message has been forwarded.

Suzie, Melissa,

I forgot to mention the attachment in my last email. Attached is the spreadsheet that we used to calculate the emission factor for liquids unloading in the Inventory. [redacted] (b)(5) deliberative [redacted]

It may be helpful for me to guide you through the spreadsheet.

Let me know if you have any questions,

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Stricklin, Eric
Sent: Tuesday, October 02, 2012 1:03 PM
To: 'Suzanne Waltzer'
Cc: Robinson, Donald; Melissa Weitz
Subject: RE: TO 99 Follow-up

Suzie,

Thursday morning will work for the summary of plunger lift control effectiveness data.

Could you send the transcript for last year's webcast?

Thanks,
Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Suzanne Waltzer [mailto:Waltzer.Suzanne@epamail.epa.gov]
Sent: Tuesday, October 02, 2012 11:42 AM
To: Stricklin, Eric
Cc: Robinson, Donald; Melissa Weitz
Subject: TO 99 Follow-up
Importance: High

Hi Eric,

Thanks for the info and quick responses. Please see my responses below.

[redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]?

Could you possibly provide the complete summary by Thursday morning? Please let me know.

3. In addition, for tanks, you should have received the invite for tomorrows meeting. Please let me know if you did not or if 11 am does not work for you. Their specific questions are embedded in the invite but please be prepared to also provide a brief overview of (b)(5) deliberative [redacted]. If you are able to send the relevant memos you are referencing for tanks before the call to Melissa and I, that would be great.

Also, as we discussed, if could please provide a brief budget update by COB Wed for TO 99, that would great.

I think that covers everything. Please let me know if you have questions. Thanks!

Suzie

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

"Stricklin, Eric" ---10/02/2012 09:47:04 AM---Suzie, (b)(5) deliberative [redacted]

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>
Date: 10/02/2012 09:47 AM
Subject: Mapping BLM Lands to HPDI and Plunger Lift Analysis

Suzie,

[redacted] (b)(5) deliberative [redacted]

[redacted]

Also, attached is a memo we published for the 2011 Inventory webcast containing a write-up describing Brian's plunger lift control effectiveness analysis. The discussion starts at the bottom of page 4 ends on page 6.

Lastly, I will confirm that within Gas STAR materials, the only place the control effectiveness of a plunger lift is discussed is in the Lessons Learned.

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

(See attached file: Plunger Lift Emission Reductions Memo - (b)(5) deliberative Webcast 7.14.11.pdf)Liquids Unloading EF Calculation (2010Inv).xlsx

Re: workshop summary report and ERG notes
Paula Fields to: Melissa Weitz 10/02/2012 03:38 PM

History: This message has been forwarded.

Melissa - you are right, and I'm fixing the attachment now.

Please confirm whether you want BOTH on-line and in-person attendees on the list, or ONLY in-person attendees.

Thanks,
Paula

****

Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: Paula Fields <Paula.Fields@erg.com>
Date: 10/2/2012 12:00 PM
Subject: Re: workshop summary report and ERG notes

Hi--

Can you please re-check the attendance list against the excel file I sent? There were some participants on the summary report list who registered but did not actually attend (e.g Bill Whitsitt). The attendance is noted in column A of the excel file.

If it's possible to get this check today, that'd be great. We need it for tomorrow morning. If you are not able to do it, let me know and I'll do it. The version below contains one edit from the earlier one, adding Kristine Wiley.

When you are finished, please send me an updated version of that attachment.

Thanks!

(See attached file: 2012 Stakeholder Workshop on Natural Gas Registration 09-12-12 (pm)_ETedit.xlsx)

Melissa Weitz---09/27/2012 03:51:46 PM---By tomorrow COB would be good From: "Paula Fields" <Paula.Fields@erg.com>

From: Melissa Weitz/DC/USEPA/US
To: "Paula Fields" <Paula.Fields@erg.com>
Date: 09/27/2012 03:51 PM
Subject: Re: workshop summary report and ERG notes

By tomorrow COB would be good

"Paula Fields" ---09/27/2012 03:50:26 PM---OK, will do. When do you need it? **********

From: "Paula Fields" <Paula.Fields@erg.com>
To: "MacQueen, Casey" <Casey.MacQueen@erg.com>, Melissa Weitz/DC/USEPA/US@EPA
Date: 09/27/2012 03:50 PM
Subject: Re: workshop summary report and ERG notes

OK, will do. When do you need it?

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: "Casey MacQueen" <Casey.MacQueen@erg.com>
CC: "Fields, Paula" <Paula.Fields@erg.com>
Date: 9/27/2012 12:43 PM
Subject: Re: workshop summary report and ERG notes

Hi,

Yes, please go ahead and summarize the information in the

discussion section. I have done so for well counts and liquids unloading as examples.

Melissa

(See attached file: Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.09.27 mw.docx)

"Casey MacQueen" ---09/27/2012 02:17:03 PM---Melissa, Yes, that is the file we used as the basis for the meeting notes attendee list. We used the

From: "Casey MacQueen" <Casey.MacQueen@erg.com>
To: "Fields, Paula" <Paula.Fields@erg.com>, Melissa Weitz/DC/USEPA/US@EPA
Date: 09/27/2012 02:17 PM
Subject: Re: workshop summary report and ERG notes

> Melissa,
>
> Yes, that is the file we used as the basis for the meeting notes attendee list. We used the worksheet "Reg. List (Alphabetized)" which seemed to capture those who attended in person. Please let us know if you'd like any changes to the attendee list.
>
> Casey
>
> >>> Paula Fields 9/27/2012 12:58 PM >>>
> Melissa - I had this one.
>
> Casey - can you confirm this was the basis for the attachment to the meeting notes?
>
> Tx,
> Paula
>
> **********
> Paula G. Fields
> Principal Air Quality Engineer
> ERG
> 10860 Gold Center Dr., #275
> Rancho Cordova, CA 95670
> Office phone: 916-635-6593
> Cell phone: 916-835-0341
> Fax: 916-859-0185
> >>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: "Paula Fields" <Paula.Fields@erg.com>

CC: "MacQueen, Casey" <Casey.MacQueen@erg.com>
Date: 9/27/2012 9:55 AM
Subject: Re: workshop summary report and ERG notes

Hi Paula,

I'm not sure I sent this to you. It's an updated attendance list for the workshop. I added information from the sign-in sheet at the guard's desk, which added a few more participants.

(See attached file: 2012 Stakeholder Workshop on Natural Gas Registration 09-12-12 (pm)_ETedit.xlsx)

"Paula Fields" ---09/27/2012 12:47:29 PM---OK!
****

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "MacQueen, Casey" <Casey.MacQueen@erg.com>
Date: 09/27/2012 12:47 PM
Subject: Re: workshop summary report and ERG notes

OK!

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: "Paula Fields" <Paula.Fields@erg.com>
CC: "Casey MacQueen" <Casey.MacQueen@erg.com>
Date: 9/27/2012 9:32 AM
Subject: Re: workshop summary report and ERG notes

Hi Paula,

Thanks! I think we'll use the draft stakeholder workshop summary report in its current format as an internal reference, but for the summary for stakeholders, we're probably going to want the discussion to be in a less-detailed summary format.

We're meeting on this soon and I'll get back to you to confirm that.

Thanks!
Melissa

"Paula Fields" ---09/27/2012 12:11:57 PM---Hi Melissa - here's the draft stakeholder workshop summary report. I reduced the font to 11 pt. and

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Casey MacQueen" <Casey.MacQueen@erg.com>
Date: 09/27/2012 12:11 PM
Subject: workshop summary report and ERG notes

Hi Melissa - here's the draft stakeholder workshop summary report. I reduced the font to 11 pt. and shrunk the margins to fit it into 6 pages + attachment. Let me know if you'd like any more changes.

Also, I'm attaching mine and Casey's notes. We didn't clean them up, so I hope that they are helpful.

Good luck with the review.

Thanks,
Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.09.27.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "PF Notes_9-13 and 9-14-12.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Workshop Notes DAY 1_CM.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Workshop Notes DAY 2_CM.docx" deleted by Melissa Weitz/DC/USEPA/US]

Fw: Liquids unloading inventory spreadsheet

Melissa Weitz to: Paula Fields, Marty Wolf 10/02/2012 06:38 PM

Hello,

Can you take a look at this and start trying to determine [redacted] (b)(5) deliberative [redacted]

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/02/2012 06:35 PM -----

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/02/2012 01:16 PM
Subject: Liquids unloading inventory spreadsheet

Just in case it didn't jump out at you in the last email. Eric provided the master spreadsheet.

Thanks!

----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 10/02/2012 01:15 PM -----

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>, Melissa Weitz/DC/USEPA/US@EPA
Date: 10/02/2012 01:03 PM
Subject: RE: TO 99 Follow-up

Suzie,

Thursday morning will work for the summary of plunger lift control effectiveness data.

Could you send the transcript for last year's webcast?

Thanks,
Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Suzanne Waltzer [mailto:Waltzer.Suzanne@epamail.epa.gov]
Sent: Tuesday, October 02, 2012 11:42 AM
To: Stricklin, Eric

Cc: Robinson, Donald; Melissa Weitz
Subject: TO 99 Follow-up
Importance: High

Hi Eric,

Thanks for the info and quick responses. Please see my responses below.

(b)(5) deliberative

Could you possibly provide the complete summary by Thursday morning? Please let me know.

(b)(5) deliberative

Also, as we discussed, if could please provide a brief budget update by COB Wed for TO 99, that would great.

I think that covers everything. Please let me know if you have questions. Thanks!

Suzie

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

"Stricklin, Eric" ---10/02/2012 09:47:04 AM---Suzie, (b)(5) deliberative

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>

Date: 10/02/2012 09:47 AM
Subject: Mapping BLM Lands to HPDI and Plunger Lift Analysis

Suzie,

(b)(5) deliberative

Also, attached is a memo we published for the 2011 Inventory webcast containing a write-up describing Brian's plunger lift control effectiveness analysis. The discussion starts at the bottom of page 4 ends on page 6.

Lastly, I will confirm that within Gas STAR materials, the only place the control effectiveness of a plunger lift is discussed is in the Lessons Learned.

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com
(See attached file: Plunger Lift Emission Reductions Memo - Webcast 7.14.11.pdf)

(b)(5) deliberative

Liquids Unloading EF Calculation (2010Inv).xlsx

Rescheduled: LU and Storage Tank Follow-up Call

Wed 10/03/2012 11:00 AM - 12:00 PM

Attendance is **required** for Melissa Weitz

Chair: **jtichenor@blm.gov**

Location: Call-in: (b)(6) personal privacy Passcode: (b)(6) personal privacy

This reschedule notice has been applied to the meeting.

Required:	Suzanne Waltzer/DC/USEPA/US, ejones@blm.gov, eStricklin@icfi.com, Melissa Weitz/DC/USEPA/US
Optional:	Eric.Stricklin@icfi.com
Time zones:	This entry was created in a different time zone. The time in that time zone is: Wed 10/03/2012 9:00 AM MDT - 10:00 AM MDT

Description

Call-in: (b)(6) personal privacy
Passcode: (b)(6) personal privacy

Hi Suzie,

Please let me know if this time works for you, or feel free to propose another. I'll be out of the office on Wednesday after noon, but the rest of the week should be fine.

Also, please forward to anyone on your end who would like to attend. I believe Eric and I will be the one BLMers in attendance. I will send a call line prior to the meeting.

I had questions about the following:

- (b)(5) deliberative
-
-

Re: Check of Liquids Unloading #s from New API Memo
Melissa Weitz to: Marty Wolf 10/03/2012 01:14 PM
Cc: "Paula Fields"

Hi,

Can you tell me [redacted] (b)(5) deliberative [redacted]

[redacted]

Thanks!
Melissa

"Marty Wolf"	Melissa,	10/01/2012 05:58:50 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 10/01/2012 05:58 PM
Subject: Check of Liquids Unloading #s from New API Memo

Melissa,

I checked the liquids unloading numbers in the new API Memo. As API pointed out in last week's call, the values from Tables 5-7 are identical to what is in Slides 5-7 of their presentation.

The main difference in my number checking [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

I have attached our recalculation spreadsheet.

Thanks,
Marty

If API were to correct the wildly incorrect

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "API_final_report_number_check_100112.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

updated API/ANGA report

Melissa Weitz to: Minnucci, Chris A. 10/03/2012 01:22 PM

Cc: "Kidman, Timothy M."

API/ANGA have provided EPA with an advance copy of their updated report on methane emissions. They have recalculated the liquids unloading numbers and we'd like to have SAIC review the calculations and [redacted] (b)(5) deliberative [redacted]

Is SAIC able to do this review? We'd like your analysis by Friday AM if that is feasible. The report is not for distribution outside of EPA and its technical contractors, so if I send you a copy, do not distribute it outside of the group performing the review.

Melissa

Re: Check of Liquids Unloading #s from New API Memo
Marty Wolf to: Melissa Weitz 10/03/2012 01:35 PM

History: This message has been forwarded.

Melissa,

I have been looking into this issue this morning, but I need a little bit more clarification as to which numbers you are exactly looking at.

Specifically, I need to know exactly what numbers you want us to compare and what you want us to compare them to. As I continue to look, I feel like I am getting a bit confused, so I would appreciate if you could call me to discuss specifics.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> Melissa Weitz
<Weitz.Melissa@epamail.epa.gov> 10/3/2012 10:14 AM >>>

Hi,

Can you tell me why [redacted] (b)(5) deliberative [redacted]?

Thanks!
Melissa

"Marty Wolf" ---10/01/2012 05:58:50 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 10/01/2012 05:58 PM
Subject: Check of Liquids Unloading #s from New API Memo

Melissa,

I checked the liquids unloading numbers in the new API Memo. As API pointed out in last week's call, the values from Tables 5-7 are identical to what is in Slides 5-7 of their presentation.

The main difference in my number checking (b)(5) deliberative [redacted]

[redacted]

[redacted]

I have attached our recalculation spreadsheet.

Thanks,
Marty

If API were to correct the wildly incorrect

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)

916-859-0185 (fax)
marty.wolf@erg.com[attachment "API_final_report_number_check_100112.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

RE: LU and Storage Tank Follow-up Call

Stricklin, Eric to: Tichenor, James C, Suzanne Waltzer, Jones, Eric C, Melissa Weitz 10/03/2012 01:51 PM

Cc: "Robinson, Donald"

History: This message has been forwarded.

James, Eric,

The link for the ALRDC is http://www.alrdc.com/workshops/index.htm. On the left hand side you can click on any of the workshops that the ALRDC has had in the last couple years. The 2012 and 2011 Gas Well Workshop links have the most information about plunger lifts. Once you click on 2012 Gas Well Workshop, click on Abstracts, Posters, and Presentations. Clicking this link will show a table of all the presentations that were given at the workshop.

In order to access the presentations you need to obtain the login information from the ALRDC. In the past, we have obtained the login information for 2011 and 2010 workshops. Attached is a zip file containing some presentations about plunger lifts that we downloaded from their website.

Suzie, Melissa I can send you a separate email since .zip files don't pass through the EPA severs.

James and Eric let me know if you receive the attachment.

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

-----Original Appointment-----
From: Tichenor, James C
Sent: Wednesday, October 03, 2012 9:48 AM
To: Tichenor, James C; Suzanne Waltzer; Jones, Eric C; Stricklin, Eric; 'Weitz.Melissa@epamail.epa.gov'
Cc: Stricklin, Eric
Subject: LU and Storage Tank Follow-up Call
When: Wednesday, October 03, 2012 11:00 AM-12:00 PM (GMT-05:00) Eastern Time (US & Canada).
Where: Call-in: (b)(6) personal privacy; Passcode: (b)(6) personal privacy

Call-in: (b)(6) personal privacy
Passcode: (b)(6) personal privacy

Hi Suzie,

Please let me know if this time works for you, or feel free to propose another. I'll be out of the office on Wednesday after noon, but the rest of the week should be fine.

Also, please forward to anyone on your end who would like to attend. I believe Eric and I will be the one BLMers in attendance. I will send a call line prior to the meeting.

I had questions about the following:

- [redacted] (b)(5) deliberative [redacted]
- [redacted]
- [redacted]

********** ATTACHMENT NOT DELIVERED **********

This Email message contained an attachment named
ALRDC Presentations.zip
which may be a computer program. This attached computer program could
contain a computer virus which could cause harm to EPA's computers,
network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced
into the EPA network. EPA is deleting all computer program attachments
sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you
should contact the sender and request that they rename the file name
extension and resend the Email with the renamed attachment. After
receiving the revised Email, containing the renamed attachment, you can
rename the file extension to its correct name.

For further information, please contact the EPA Call Center at
(866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

RE: TO 99 Follow-up
Suzanne Waltzer to: Stricklin, Eric 10/03/2012 02:01 PM
Cc: "Robinson, Donald", Melissa Weitz

History: This message has been forwarded.

Thanks so much Eric for your quick response on this! We will let you know if we want to talk through anything in more detail. Thanks again!!

Suzie

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

"Stricklin, Eric"	Suzie, Melissa, I forgot to mention the attach...	10/02/2012 03:09:18 PM

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Suzanne Waltzer/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>
Date: 10/02/2012 03:09 PM
Subject: RE: TO 99 Follow-up

Suzie, Melissa,

I forgot to mention the attachment in my last email. Attached is the spreadsheet that we used to calculate the emission factor for liquids unloading in the Inventory. [redacted] (b)(5) deliberative [redacted].

It may be helpful for me to guide you through the spreadsheet.

Let me know if you have any questions,

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Stricklin, Eric
Sent: Tuesday, October 02, 2012 1:03 PM
To: 'Suzanne Waltzer'
Cc: Robinson, Donald; Melissa Weitz
Subject: RE: TO 99 Follow-up

Suzie,

Thursday morning will work for the summary of plunger lift control effectiveness data.

Could you send the transcript for last year's webcast?

Thanks,
Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Suzanne Waltzer [mailto:Waltzer.Suzanne@epamail.epa.gov]
Sent: Tuesday, October 02, 2012 11:42 AM
To: Stricklin, Eric
Cc: Robinson, Donald; Melissa Weitz
Subject: TO 99 Follow-up
Importance: High

Hi Eric,

Thanks for the info and quick responses. Please see my responses below.

(b)(5) deliberative

Also, as we discussed, if could please provide a brief budget update by COB Wed for TO 99, that would great.

I think that covers everything. Please let me know if you have questions. Thanks!

Suzie

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

"Stricklin, Eric" ---10/02/2012 09:47:04 AM---Suzie, I spoke with our HPDI experts and we do not have the HPDI data currently mapped to BLM lands.

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>
Date: 10/02/2012 09:47 AM
Subject: Mapping BLM Lands to HPDI and Plunger Lift Analysis

Suzie,

I spoke with our HPDI experts and we do not have the HPDI data currently mapped to BLM lands. We could map wells to BLM lands, however, with geographical data from BLM. This geographical data could be a key by county or detailed geospatial information using latitude and longitude coordinates.

I have spent a couple hours researching the BLM website and found that for some states (e.g., NM) they have detailed geospatial information (called GIS Shapefiles) showing where they have oil and gas wells. This is the exact information we could use to map the oil and gas data in HPDI specifically to BLM lands. I was not able to find this same geospatial information for other states, but I also didn't want to dive too deep without your go ahead. I may be easier on your end to ask BLM for this information too.

Also, attached is a memo we published for the 2011 Inventory webcast containing a write-up describing Brian's plunger lift control effectiveness analysis. The discussion starts at the bottom of page 4 ends on page 6.

Lastly, I will confirm that within Gas STAR materials, the only place the control effectiveness of a plunger lift is discussed is in the Lessons Learned.

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

(See attached file: Plunger Lift Emission Reductions Memo - Webcast 7.14.11.pdf)[attachment "Liquids Unloading EF Calculation (2010Inv).xlsx" deleted by Suzanne Waltzer/DC/USEPA/US]

Fw: Subpart W task for ERG
Melissa Weitz to: Marty Wolf, Paula Fields 10/03/2012 02:07 PM

Hello,

Below is the ERG review of the earlier API/ANGA report. Sorry, I was confused and thought you had worked on this one.

I am interested in seeing if [redacted] (b)(5) deliberative [redacted]

Thanks,
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/03/2012 02:05 PM -----

From: "Casey MacQueen" <Casey.MacQueen@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Clint Burklin" <Clint.Burklin@erg.com>
Date: 07/16/2012 02:57 PM
Subject: Re: Fw: Subpart W task for ERG

Melissa,

We have performed a detailed review of the underlying data and methodology presented in the API-ANGA report that were used to calculate emissions from well liquids unloading; our [redacted] (b)(5) deliberative [redacted]
Please let us know if you have any questions or comments, or would like to set up a call to discuss.

Thank you,
Casey
Casey MacQueen
Chemical Engineer
Eastern Research Group, Inc.
14555 Avion Pkwy, Suite 200
Chantilly, VA 20151
(703) 633-1686

>>> Casey MacQueen 7/12/2012 4:53 PM >>>
Melissa,

We have reviewed the underlying data and methodology presented in the API-ANGA report that was used to calculate emissions from well liquids unloading. [redacted] (b)(5) deliberative [redacted]

[redacted]

We plan to proceed in developing a memorandum that elaborates on and confirms our findings to deliver on Monday. Please let us know if you would like to discuss anything in further detail in the meantime.

Thank you,
Casey

Casey MacQueen
Chemical Engineer
Eastern Research Group, Inc.
14555 Avion Pkwy, Suite 200
Chantilly, VA 20151
(703) 633-1686

>>> Melissa Weitz <Weitz.Melissa@epamail.epa.gov> 7/9/2012 4:32 PM >>>

Hi Clint,

There is a Subpart W/GHG Inventory question we have and we'd like to get some input from ERG.

We'd like to have ERG review the attached report on the API/ANGA report's information on liquids unloading. [redacted] (b)(5) deliberative [redacted].

We'd like to get some initial thoughts on this by Thursday, and more detailed information by Monday. We'll need an LOE before preceding. Let me know if you can do this task, and would the LOE will be. I'm free all day tomorrow to discuss, or until about 6pm tonight.

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 07/09/2012 04:29 PM -----

From: Akachi Imegwu/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 07/09/2012 02:56 PM
Subject: Re: Fw: Subpart W task for ERG

Hi Melissa,
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It might be best to have a 15 minute discussion with them on the phone about the task so that they are fully understood about the expectations.

Akachi N. Imegwu
Climate Change Division
Greenhouse Gas Reporting Program
Office of Air and Radiation
US Environmental Protection Agency
p(202) 343-9709
f(202) 343-2361

Melissa Weitz---07/09/2012 01:59:45 PM---Hi Akachi, We'd like to have ERG review the attached report on the API/ANGA report's information on

From: Melissa Weitz/DC/USEPA/US
To: Akachi Imegwu/DC/USEPA/US@EPA
Date: 07/09/2012 01:59 PM
Subject: Re: Fw: Subpart W task for ERG

Hi Akachi,

We'd like to have ERG review the attached report on the API/ANGA report's information on liquids unloading. [redacted] (b)(5) deliberative [redacted]

The report is attached below. Please let me know if we can do this task under your TO and if it'd be at all possible to get quick thoughts from ERG on this by Thursday.

Thanks!
Melissa

(See attached file: Memo API-ANGA Report Liquids Unloading Review 7 03 12.doc)

Akachi Imegwu---07/09/2012 11:41:42 AM---Hi Melissa, Yes I do. I have one with ERG and one with ICF that should be closing soon.

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To: Melissa Weitz/DC/USEPA/US@EPA
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Akachi N. Imegwu
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US Environmental Protection Agency
p(202) 343-9709
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From: Melissa Weitz/DC/USEPA/US
To: Akachi Imegwu/DC/USEPA/US@EPA
Date: 07/09/2012 11:08 AM
Subject: Fw: Subpart W task for ERG

Hi Akachi--

Do you have a TO with ERG for W work?

Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 07/09/2012 11:08 AM -----

From: Margo Eaddy/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Akachi Imegwu/DC/USEPA/US@EPA
Date: 07/06/2012 11:19 AM
Subject: Re: Fw: Subpart W task for ERG

I don't. Akachi might. I think she might be out today. Can you wait until Monday?

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Akachi Imegwu/DC/USEPA/US@EPA, Margo Eaddy/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 07/06/2012 10:39AM
Subject: Fw: Subpart W task for ERG

Hi,

Do either of you have a TO in place for W?

Thanks!
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----- Forwarded by Melissa Weitz/DC/USEPA/US on 07/06/2012 10:39 AM -----

From: Katherine Sibold/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 07/06/2012 07:50 AM
Subject: Re: Subpart W task for ERG

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Kitty Melissa Weitz
----- Original Message -----
From: Melissa Weitz
Sent: 07/05/2012 04:24 PM EDT
To: Katherine Sibold
Cc: Suzanne Waltzer
Subject: Re: Subpart W task for ERG
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(b)(5) deliberative

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Cc: Melissa Weitz/DC/USEPA/US@EPA
Date: 03/09/2012 03:45 PM
Subject: Subpart W task for ERG

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Kitty
++++++++++++++
Katherine (Kitty) Sibold
USEPA- Office of Air and Radiation
Mailing address: 1200 Pennsylvania Avenue, NW (6207J)
Washington, DC 20460
p: +202-343-9280/ f:+202-343-2202
Street location: 1310 L St, NW, Rm 742
www.epa.gov/climatechange/emissions/ghgrulemaking.html

Notice: Any communication on the GHG Reporting Program (GHGRP) is intended to provide general and administrative information about Part 98. This communication does not provide legal advice, and responses to questions do not have legally binding effect or expressly or implicitly create, expand, or limit any legal rights, obligations, responsibilities, expectations, or benefits in regard to any person. Facility owners or operators and suppliers are responsible for determining how they would be affected by the requirements of the rule.

-----Forwarded by Katherine Sibold/DC/USEPA/US on 03/09/2012 03:43PM -----
To: Clint.Burklin@erg.com, "Ruth Mead" <Ruth.Mead@erg.com>, crenshaw.john@erg.com
From: Melissa Weitz/DC/USEPA/US
Date: 03/09/2012 02:15PM
Cc: Katherine Sibold/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Subject: Subpart W task for ERG

(See attached file: ENV - GHG - Devon Ltr to EPA-Lisa Hanle on Methane Estimates with Attach (11-30-11).pdf)
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During the comment period for the NSPS on oil and gas, EPA received data on fracturing well completions. The emissions per completion were calculated using equation 11-B in subpart W, according to the 11-30-11 attachment, page 4.

EPA requests a review of this data. Specifically, we are interested in [redacted] (b)(5) deliberative

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We need a very quick turnaround on this, by next Tuesday COB, if possible.

Thanks very much and please let me and Kitty know if you have any questions.

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov[attachment "ENV - GHG - Devon Ltr to EPA-Lisa Hanle on Methane Estimates with Attach (11-30-11).pdf" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Env - GHG - Devon Flowback Methane Emission Raw Data (10-24-11).pdf" deleted by Melissa Weitz/DC/USEPA/US]

(b)(5) deliberative [redacted]

API-ANGA Survey Final Report Use of Eqns W-8 and 9.2012.07.16.docx

(b)(5) deliberative [redacted]

API-ANGA Report Appendix C Data Analysis.2012.07.16.xlsx

RE: LU and Storage Tank Follow-up Call

Stricklin, Eric to: Tichenor, James C, Suzanne Waltzer, Jones, Eric C, Melissa Weitz 10/03/2012 02:16 PM

Cc: "Robinson, Donald"

History: This message has been forwarded.

From: Stricklin, Eric
Sent: Wednesday, October 03, 2012 1:42 PM
To: 'Tichenor, James C'; Suzanne Waltzer; Jones, Eric C; 'Weitz.Melissa@epamail.epa.gov'
Cc: Robinson, Donald
Subject: RE: LU and Storage Tank Follow-up Call

James, Eric,

The link for the ALRDC is http://www.alrdc.com/workshops/index.htm. On the left hand side you can click on any of the workshops that the ALRDC has had in the last couple years. The 2012 and 2011 Gas Well Workshop links have the most information about plunger lifts. Once you click on 2012 Gas Well Workshop, click on Abstracts, Posters, and Presentations. Clicking this link will show a table of all the presentations that were given at the workshop.

In order to access the presentations you need to obtain the login information from the ALRDC. In the past, we have obtained the login information for 2011 and 2010 workshops. Attached is a zip file containing some presentations about plunger lifts that we downloaded from their website.

I have changed the file extension of the attached zip file to .piz so that it can pass through the servers. Please change the file extension back to .zip before opening it.

Eric

<< File: ALRDC Presentations.zip >>

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

-----Original Appointment-----
From: Tichenor, James C
Sent: Wednesday, October 03, 2012 9:48 AM
To: Tichenor, James C; Suzanne Waltzer; Jones, Eric C; Stricklin, Eric; 'Weitz.Melissa@epamail.epa.gov'
Cc: Stricklin, Eric

Subject: LU and Storage Tank Follow-up Call
When: Wednesday, October 03, 2012 11:00 AM-12:00 PM (GMT-05:00) Eastern Time (US & Canada).
Where: Call-in: (b)(6) personal privacy; Passcode: (b)(6) personal privacy

Call-in: (b)(6) personal privacy
Passcode: (b)(6) personal privacy

Hi Suzie,

Please let me know if this time works for you, or feel free to propose another. I'll be out of the office on Wednesday after noon, but the rest of the week should be fine.

Also, please forward to anyone on your end who would like to attend. I believe Eric and I will be the one BLMers in attendance. I will send a call line prior to the meeting.

I had questions about the following:

- (b)(5) deliberative
- [redacted]
- [redacted]
- Presentations.piz

Re: Fw: Subpart W task for ERG
Marty Wolf to: Melissa Weitz 10/03/2012 02:22 PM
Cc: "Paula Fields"

History: This message has been replied to and forwarded.

Melissa,

Please call to discuss. I am still looking for some clarification on what you want me to be looking at.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> Melissa Weitz
<Weitz.Melissa@epamail.epa.gov> 10/3/2012 11:07 AM >>>

Hello,

Below is the ERG review of the earlier API/ANGA report. Sorry, I was confused and thought you had worked on this one.

[redacted] (b)(5) deliberative [redacted]

Thanks,
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/03/2012 02:05 PM -----

From: "Casey MacQueen" <Casey.MacQueen@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Clint Burklin" <Clint.Burklin@erg.com>
Date: 07/16/2012 02:57 PM
Subject: Re: Fw: Subpart W task for ERG

Melissa,

We have performed a detailed review of the underlying data and methodology presented in the API-ANGA report that were used to calculate emissions from well liquids unloading; our [redacted] (b)(5) deliberative [redacted]

Please let us know if you have any questions or comments, or would like to set up a call to discuss.

Thank you,
Casey

Casey MacQueen
Chemical Engineer
Eastern Research Group, Inc.
14555 Avion Pkwy, Suite 200
Chantilly, VA 20151
(703) 633-1686

>>> Casey MacQueen 7/12/2012 4:53 PM >>>
Melissa,

We have reviewed the underlying data and methodology presented in the API-ANGA report that was used to calculate emissions from well liquids unloading. [redacted] (b)(5) deliberative [redacted]

We plan to proceed in developing a memorandum that elaborates on and confirms our findings to deliver on Monday. Please let us know if you would like to discuss anything in further detail in the meantime.

Thank you,
Casey

Casey MacQueen
Chemical Engineer
Eastern Research Group, Inc.
14555 Avion Pkwy, Suite 200
Chantilly, VA 20151
(703) 633-1686

>>> Melissa Weitz <Weitz.Melissa@epamail.epa.gov> 7/9/2012 4:32 PM >>>

Hi Clint,

There is a Subpart W/GHG Inventory question we have and we'd like to get some input from ERG.

We'd like to have ERG review the attached report on the API/ANGA report's information on liquids unloading.
(b)(5) deliberative

We'd like to get some initial thoughts on this by Thursday, and more detailed information by Monday. We'll need an LOE before preceding. Let me know if you can do this task, and would the LOE will be. I'm free all day tomorrow to discuss, or until about 6pm tonight.

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 07/09/2012 04:29 PM -----

From: Akachi Imegwu/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 07/09/2012 02:56 PM
Subject: Re: Fw: Subpart W task for ERG

Hi Melissa,
Yes there is capacity under the subpart task order for this type of work. You can request that he do this work (please get an LOE first) And the contract information is EP-W-11-053-0001 / Task 0001.

The contact for the subpart W work is Clint Burklin. Clint was part of the team that reviewed the completions equation, but I do believe there are others.
It might be best to have a 15 minute discussion with them on the phone about the task so that they are fully understood about the expectations.

Akachi N. Imegwu
Climate Change Division

Greenhouse Gas Reporting Program
Office of Air and Radiation
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[redacted]
(b)(5) deliberative
[redacted].

The report is attached below. Please let me know if we can
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(See attached file: Memo API-ANGA Report Liquids
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USEPA- Office of Air and Radiation
Mailing address: 1200 Pennsylvania Avenue, NW (6207J)
Washington, DC 20460
p: +202-343-9280/ f:+202-343-2202
Street location: 1310 L St, NW, Rm 742
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From: Melissa Weitz/DC/USEPA/US
Date: 03/09/2012 02:15PM
Cc: Katherine Sibold/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA

Subject: Subpart W task for ERG

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Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency

Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov[attachment "ENV - GHG - Devon Ltr to EPA-Lisa Hanle on Methane Estimates with Attach (11-30-11).pdf" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Env - GHG - Devon Flowback Methane Emission Raw Data (10-24-11).pdf" deleted by Melissa Weitz/DC/USEPA/US]

(See attached file: API-ANGA Survey Final Report Use of Eqns W-8 and 9.2012.07.16.docx)(See attached file: API-ANGA Report Appendix C Data Analysis.2012.07.16.xlsx)

RE: updated API/ANGA report
Melissa Weitz to: Minnucci, Chris A. 10/03/2012 03:08 PM
Cc: "Kidman, Timothy M."

Thank you! This will be very helpful. Tim--please call me if you have any questions. We only need review of the liquids unloading piece. The same review you guys did last time. Thanks!

Task 2 API ANGA Survey Report Final 21Sept12 clean ae.pdf

"Minnucci, Chris A."	Melissa,	10/03/2012 03:05:33 PM

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/03/2012 03:05 PM
Subject: RE: updated API/ANGA report

Melissa,

I'm actually going to be out Thursday and Friday, but I've talked to Tim and he believes he can get this done by Friday AM. He'll also be working to finish up the processing sector crosswalk and get that to you by COB Friday. Please just send the report to myself and Tim; we will not distribute it further.

thanks,
Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/3/2012 1:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: updated API/ANGA report

API/ANGA have provided EPA with an advance copy of their updated report on methane emissions. [redacted] (b)(5) deliberative [redacted]

Is SAIC able to do this review? We'd like your analysis by Friday AM if that is feasible. The report is not for distribution outside of EPA and its technical contractors, so if I send you a copy, do not distribute it outside of the group performing the review.

Melissa

DRAFT -
PLEASE DO NOT CITE OR DISTRIBUTE

Characterizing Pivotal Sources of Methane Emissions from Natural Gas Production

Summary and Analysis of API and ANGA Survey Responses

Terri Shires and Miriam Lev-On
URS Corporation and The LEVON Group

FINAL REPORT (Updated September, 2012)
September 21, 2012

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Executive Summary

This document presents the updated results from a collaborative effort among members of the American Petroleum Institute (API) and America's Natural Gas Alliance (ANGA) to gather data on key natural gas production activities and equipment emission sources that are essential to developing estimates of methane emissions from upstream natural gas production.

API and ANGA members undertook this effort as part of an overall priority to develop new and better data about natural gas production and make this information available to the public. This information acquired added importance in 2011, when the EPA released an inventory of U.S. greenhouse gases (GHG) emissions that substantially increased estimates of methane emissions from Petroleum and Natural Gas Systems. Public comments submitted by both trade associations reflected a number of concerns – most notably that EPA's estimates were based on a small set of data submitted by a limited number of companies in a different context (i.e., data not developed for the purpose of estimating nationwide emissions).

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The API/ANGA data set (also referred to as ANGA/API) provides data on 91,000 wells distributed over a broad geographic area and operated by over 20 companies. This represents nearly one-fifth (18.8%) of the estimated number of total wells used in EPA's 2010 emissions inventory.[1] The ANGA/API data set is also more than 10 times larger than the set of wells in one of EPA's key data sources taken from an older Natural Gas Star sample that was never intended for developing nationwide emissions estimates. ***Although more and better data efforts will still be needed, API/ANGA members believe this current collaborative effort is the most comprehensive data set compiled for natural gas operations.***

As Table ES-1 demonstrates, survey results in two source categories – liquids unloading and unconventional gas well re-fracture rates - substantially lower EPA's estimated emissions from natural gas production. The right-hand column of this table shows the impact of ANGA/API data on the estimated emissions for each source category. Gas well liquids unloading and the rate at which unconventional gas wells are re-fractured are key contributors to the overall GHG emissions estimated by EPA in the national emissions inventory. For example, methane emissions from liquids unloading and unconventional well re-fracturing accounted for 59% of EPA's estimate for overall natural gas production sector methane emissions. Overall, API/ANGA activity data for these two source categories indicate that EPA estimates of potential emissions from the production sector of "Natural Gas Systems" would be 53% lower if EPA were to use ANGA/API's larger and more recent survey results.

[1] EPA's 2010 national inventory indicates a total of 484,795 gas wells (EPA, 2012).

TABLE ES-1. EMISSION COMPARISON BETWEEN EPA AND INDUSTRY DATA

Source Category	EPA		API/ANGA		Impact on Source Category Emissions
	Metric tons of CH4	% of EPA Emissions Total	Metric tons of CH4	% of Revised Emissions Total	API & ANGA - EPA / EPA % Difference
Gas Wells Liquids Unloading	4,501,465 *	51%	319,664	8%	-93%
Unconventional Well Re-fracture Rates	712,605 *	8%	197,311	5%	-72%
Other Production Sector Emissions**	3,585,600	41%	3,585,600	87%	
Total Production Sector Emissions	8,799,670		4,102,575		-53%

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* EPA's estimates are adjusted to industry standard conditions of 60 degrees F and 14.7 psia for comparison to the ANGA/API emission estimates.

**The "Other Production Sector Emissions" are comprised of over 30 different source categories detailed in Table A-129 in the Annex of the EPA's 2012 national inventory. The "Other Production Sector Emissions" are the same values for this comparison between the EPA national inventory and the API/ANGA survey to focus the comparison on quantified differences in emission estimates for gas well liquids unloading and unconventional well re-fracture rates.

As mentioned above, the differences between EPA and ANGA/API estimates hinge on the following key differences in activity data and thus considerably impact overall emissions from Natural Gas Systems:

- ***Liquids unloading and venting.*** API/ANGA data showed lower average vent times, a significantly lower percentage of wells venting for liquids unloading, and a higher number of vents per vented well than EPA assumed in their inventory calculation. The API/ANGA survey also found a slightly larger percentage of wells with plunger lifts than EPA assumed, but a significant percentage of wells with artificial lift which EPA had not considered. These findings are particularly significant because liquids unloading accounted for 51% of EPA's total "Natural Gas Systems" methane emissions in the 2010 inventory. Applying emission factors based on ANGA/API data reduces the calculated emissions for this source by 93% (from 4,501,465 metric tons of CH_4 to 319,664 metric tons of CH_4 when compared on an equivalent basis) from EPA's 2010 national GHG inventory.
- ***Re-fracture rates for unconventional wells***. API/ANGA members collected data on re-fracture rates for unconventional wells in two phases. The first phase collected data for all well types (conventional and unconventional), while the second phase targeted unconventional gas wells. Both phases of the survey data show significantly lower rates of well re-fracturing than the 10% assumption used by EPA. As discussed in detail in

this report, the re-fracture rate varied from 0.7% to 2.3%. The second phase of the survey gathered data from only unconventional well activity and using the re-fracture rate data from this second phase of the ANGA/API survey reduces the national emission estimate for this source category by 72%, - from 712,605 metric tons of CH_4 to 197,311 metric tons of CH_4 when compared on an equivalent basis.

This report also discusses an important related concern that the government lacks a single coordinated and cohesive estimate of well completions and well counts. Although the 2010 national GHG inventory appears to under-represent the number of well completions according to the numbers reported through both the API/ANGA data and IHS CERA, differences in national well data reporting systems make it difficult to accurately investigate well completion differences with any certainty. The EPA inventory, which uses data from the Energy Information Administration, various state governments and privately sourced data, such as HPDI, does not consistently distinguish between conventional and unconventional wells.

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The concept of conventional and unconventional wells is used differently by different stakeholders, is not particularly helpful from an emissions standpoint, and should be abandoned in favor of classifications more relevant to the emission source categories being evaluated. For instance, the scale of emissions from well completions is primarily associated with whether the wells are hydraulically fracture stimulated, the size/stages of the hydraulic fracture stimulation, and practices for handling the well clean-up/flow-back post fracture stimulation.

Without a consistent measure for the quantity and type of wells, it is difficult to be confident of the accuracy of the number of wells that are completed annually, let alone the amount of emissions from them. Natural gas producers strongly believe that the effects of any possible under-representation of well completions will be offset by a more realistic emission factor for the rate of emissions per well. Analysis of the data reported under Subpart W of the GHG reporting rule should be used to inform a more realistic emission factor for well completions.

This survey also collected data on centrifugal compressors and pneumatic controllers. While the sample sizes are too small to make strong conclusions, the results discussed in the body of the report indicate that further research is necessary to accurately account for the different types of equipment in this area (e.g., wet vs. dry seal centrifugal compressors and "high bleed," "low bleed," and "intermittent bleed" pneumatic controllers).

As government and industry move forward in addressing emissions from unconventional gas operations, three key points are worth noting:

- ***In addition to the voluntary measures undertaken by industry, more data will become available in the future.*** Emission reporting requirements under Subpart W of the national Greenhouse Gas Reporting Program (GHGRP) went into effect January 1, 2011 with the first reporting due in the fall of 2012. As implementation of the GHGRP progresses from year to year, the natural gas industry will report more complete and more accurate data. If EPA makes use of the data submitted and transparently communicates their analyses, ANGA/API members believe this will increase public confidence in the emissions estimated for key emission source categories of the Natural Gas Systems sector.

- ***Industry has a continuous commitment to improvement.*** It is clear that companies are not waiting for regulatory mandates or incentives to upgrade equipment, or to alter practices like venting and flaring in favor of capturing methane where practical. Instead, operators are seizing opportunities to reduce the potential environmental impacts of their operations. Industry is therefore confident that additional, systematic collection of production sector activity data will not only help target areas for future reductions but also demonstrate significant voluntary progress toward continually 'greener' operations.
- ***Members of industry participating in this survey are committed to providing information about the new and fast-changing area of unconventional oil and gas operations. API and ANGA members look forward to working with the EPA to revise current assessment methodologies as well as promote the accurate and defensible uses of existing data sources.***

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1. Overview

The accuracy of GHG emission estimates from natural gas production has become a matter of increasing public debate due in part to limited data, variability in the complex calculation methodologies, and assumptions used to approximate emissions where measurements in large part are sparse to date. Virtually all operators have comprehensive methane mitigation strategies; however, beyond the requirements of the Environmental Protection Agency's (EPA) Mandatory Reporting Rule or incentives of programs like the EPA's Natural Gas Star program, data is often not gathered in a unified way that facilitates comparison among companies.

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In an attempt to provide additional data and identify uncertainty in existing data sets, the American Petroleum Institute (API) and America's Natural Gas Alliance (ANGA) began a joint study on methane (CH_4) emissions from natural gas production operations in July 2011. The first part of this section offers context to the decision to conduct this survey, while the second offers a brief introduction to the survey itself.

1.1 Context

Onshore gas resources, including shale, will undoubtedly play a key role in America's energy future, and additional information must be collected to better quantify the methane emissions from natural gas production. Meaningful, publicly available data is a priority, especially in light of EPA's 2011 revision of its calculation methodology for Natural Gas Systems in the 2009 national inventory (EPA, 2011c). (EPA added two new sources for unconventional gas well completions and workovers, and also significantly revised its estimates for liquids unloading and made adjustments to other source categories.) These changes substantially increased EPA's estimated GHG emissions for the production sector of the Natural Gas Systems by 204%. Equally problematic is the methodology used by EPA to credit voluntary and regulatory reductions from the emissions reported in Table A-128 in the 2010 inventory. These reductions are taken as a "lump sum" reduction at the segment (e.g. production) level with no transparency of what source categories the reductions are applied towards. Presentation of the pre-reduction values in Table A-129 (over a 300% increase) coupled with lack of source specific transparency has led many stakeholders to use the emissions in Table A-129 directly in their various advocacy actions. API recommends that the EPA change their methodology of crediting reductions to be transparent down to the source type/category and that the post-reduction emissions be reported in the future analogues to Table A-129.

Industry was alarmed by the upward adjustment, especially since previous EPA estimates had been based on a 1996 report prepared by the EPA and GRI – and did not take into account the considerable improvements in equipment and industry practice that have occurred in the fifteen years between 1996 and 2011 (GRI, 1996).

An EPA technical note to the 2009 inventory attributed the changes to adjustments in calculation methods for existing sources, including gas well liquids unloading, condensate storage tanks, and centrifugal compressor seals. EPA also added two new sources not previously included in its inventories, namely unconventional gas well completions and workovers (re-completions) (EPA, 2011f).

Industry did not have an adequate opportunity to examine EPA's rationale for the new emissions factor prior to its initial release due to the structure of the inventory process and the lack of formal opportunity for meaningful input. Unlike changes in regulatory requirements, EPA is not required to initiate a formal comment process for changes in methodologies like emission factors and calculations methods in the national GHG inventory. As such, EPA is not compelled to incorporate or consider input provided by stakeholders and experts. Indeed, changes to methodologies are often made without the benefit of dialogue or expert review. Although EPA further acknowledged in the 2010 inventory (released in 2012), that their natural gas calculations needed work, their practice is to continue using the same numbers until adjusted estimates have been made. It is important to note that EPA has indicated a willingness to engage and discuss this matter with some members of industry. API and ANGA look forward to working collaboratively with EPA to improve the national GHG inventory.

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Under the best of circumstances, EPA had remarkably little information to draw on in determining their new emission estimates. Input from industry on this topic was not directly solicited, specific guidance or information did not exist on the international level, nor was it available from other national regulators. A review of the Intergovernmental Panel on Climate Change (IPCC) and other inventories submitted to the United Nations Framework Convention on Climate Change (UNFCCC) indicate that the U.S. is currently the only country to date to differentiate between conventional and unconventional natural gas production. As discussed above, the distinction between conventional and unconventional natural gas production is not particularly useful from an emission estimation standpoint and should be abandoned. Regulators, academics, and environmentalists around the world therefore considered the new estimated emission factor as an unprecedented development in a controversial issue.

Widespread criticism of the figures and analysis of the assumptions and methodologies revealed problematic methodology and less justification for the underlying numbers than originally anticipated. In a paper entitled *Mismeasuring Methane*, the well-respected energy consultancy IHS CERA succinctly detailed several concerns about the revisions – most notably that EPA's new estimate was based on only four (4) data points that natural gas well operators had submitted voluntarily under the Natural Gas Star Program, which highlights emissions reductions. Together, the four data points cover approximately 8,880 wells – or roughly 2% of those wells covered in the EPA's national greenhouse gas inventory. Those numbers, which were submitted in the context of showcasing achieved emissions reductions and not to estimate emissions, were then extrapolated to over 488,000 wells in the 2009 emissions inventory (IHS CERA, 2011).

With an emerging topic like shale energy development, however, the impact of EPA's revised estimates was, and continues to be, enormous. Emission estimates from production using EPA's figures were used to question the overall environmental benefits of natural gas and have led to speculation of the role natural gas can play in a clean energy future.. They were cited widely by unconventional gas opponents - many of whom used the new figures selectively, inappropriately using the pre-reduction (voluntary and regulatory) figures, and without caveats like "estimated" to argue against further development of shale energy resources. For example, an article published by ProPublica cited the revised EPA emission factors as "new research" which "casts doubt" on whether natural gas contributes lower GHG emissions than other fossil fuels (Lustgarten, 2011). Many of these studies – e.g., the work of Howarth *et al.* were widely

reported in the popular press (Zellers, 2011) with little attention to the quality of analysis behind their conclusions.

Notably, other authors using more robust and defensible scientific methodologies argued that - even with undoubtedly high emissions estimates - natural gas still possessed a lifecycle advantage when its comparative efficiency in electricity generation was taken into account. For example, a study by Argonne National Laboratory utilizing the same EPA data sources concluded that taking into account power plant efficiencies, electricity from natural gas shows significant life-cycle GHG benefits over coal power plants (Burnham, 2011). Unfortunately, the complex technical arguments in these studies generated considerably less media and public attention.

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It is important to understand that the ongoing debate about the accuracy of EPA's adjusted emission factor as contained in the 2009 inventory did not keep these numbers from being used in a series of rules that have wide ranging ramifications on national natural gas policies both in the United States and globally. Many countries considering shale energy development remain bound by the emissions reduction targets in the Kyoto Protocol and their regulatory discussions reflect greenhouse gas concerns. In addition to the very real risk that other countries could adopt the emission factor before the EPA can refine its calculations, the possibility of higher emissions (even if only on paper) might deter other nations from developing their own unconventional energy resources.

By the summer of 2011, it was clear to ANGA/API members (also referred to as API/ANGA members) that gathering additional data about actual emissions and points of uncertainty during unconventional gas production was essential to improve GHG life cycle analysis (LCA) of natural gas for the following reasons: 1) to focus the discussion of emissions from natural gas production around real data; 2) to promote future measurement and mitigation of emissions from natural gas production; and 3) to contribute to improving the emission estimation methods used by EPA for the natural gas sector in their annual national GHG inventory and its use globally.

1.2 Introduction to the API/ANGA Survey

API and ANGA members uniformly believed that EPA's current GHG emissions estimates for the natural gas production sector were overstated due to erroneous activity data in several key areas - including liquids unloading, well re-fracturing, centrifugal compressors, and pneumatic controllers. Members worked cooperatively to gather information through two data requests tailored to focus on these areas and collect reasonably accessible information about industry activities and practices. Specifically, information was requested on gas well types, gas well venting/flaring from completions, workovers, and liquids unloading, and the use of centrifugal compressor and pneumatic controllers.

The actual data requests sent to members can be found in Appendix A, and Appendix B provides more detailed data from the ANGA/API well survey information**.**

Survey results and summaries of observations, including comparisons to EPA's emission estimation methods, are provided in the following sections.

2. Well Data

This section examines well data gathered by API and ANGA members. Overall, ANGA/API's survey effort gathered activity data from over 20 companies covering nearly 91,000 wells and 19 of the 21 American Association of Petroleum Geologists (AAPG) basins[2] containing over 1% of the total well count in EPA's database of gas wells. Members believe that the API/ANGA survey represents the most comprehensive data set compiled for natural gas operations and, as such, provides a much more accurate picture of operations and emissions than the information EPA has relied on for its emission estimates.

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Information to characterize natural gas producing wells was collected by survey in two parts:

- The first part of the survey requested high-level information on the total number of operating gas wells, the number of gas well completions, and the number of gas well workovers with hydraulic fracturing. Data on over 91,000 wells was collected primarily for 2010, with some information provided for the first half of 2011.
- The second part of the survey requested more detailed well information about key activities. The well information collected through the two surveys is provided in Appendix B.

Section 2.1 looks at overall natural gas well counts, Section 2.2 examines completion data from ANGA/API members, and Section 2.3 briefly identifies several unresolved issues concerning well counts and classifications that could benefit from future analysis for examination. For the purposes of this report, unconventional wells are considered to be shale gas wells, coal bed wells, and tight sand wells which must be fractured to produce economically.

2.1 National Gas Well Counts

To provide context for the information collected by API and ANGA, comparisons were made to information about national gas wells from EPA and the U.S. Energy Information Administration (EIA). Unfortunately, the government lacks a single coordinated and cohesive set of estimates for gas wells.

Industry grew concerned when it became apparent that significant discrepancies existed among different sources of national gas well data. The EPA inventory, the EIA, and IHS data EPA published in conjunction with the GHGRP all reported different well counts that do not consistently distinguish between key areas used by the inventory like conventional and unconventional wells. Furthermore, there does not appear to be a single technical description for classifying wells that is widely accepted. Without consistent measures and definitions for the

[2] Basins are defined by the American Association of Petroleum Geologists (AAPG) AAPG–CSD Geologic Provinces Code Map: AAPG Bulletin, Prepared by Richard F. Meyer, Laure G. Wallace, and Fred J. Wagner, Jr., Volume 75, Number 10 (October 1991) and the Alaska Geological Province Boundary Map, Compiled by the American Association of Petroleum Geologists Committee on Statistics of Drilling in Cooperation with the USGS, 1978.

quantity and type of wells, it is difficult to reach agreement on the number of hydraulically fractured and unfractured natural gas wells completed annually - let alone their emissions.

Both the EIA data and the EPA data accompanying the national GHG inventory lack sufficient detail for well classifications to provide a basis for helpful comparison with the survey data reported here. Instead, national well data developed as part of mandatory emissions reporting is used for comparison because it has the most appropriate level of detail in well categories (EPA, 2011e).

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In EPA's database gas well count (EPA, 2011e), 21 of the AAPG basins each have more than 1% of the total well count. The API/ANGA survey has wells from 19 of those 21 basins. In terms of wells represented by these basins, 92% of the total EPA database well count is accounted for by wells in those 21 basins, while 95% of the ANGA/API surveyed gas wells are accounted for by those 21 basins. These results are summarized in Table 1 and illustrated in Figure 1. This indicates that the API/ANGA survey results have good representation for the basins with the largest numbers of wells nationally.

TABLE 1. COMPARISON OF GAS WELL COUNT DATA BY AAPG BASIN: SUMMARY STATISTICS

	EPA Database Gas Well Count*	API/ANGA Survey Data	ANGA/API as a % of EPA
Total number of U.S. gas wells	355,082 gas wells	91,028 gas wells	26%
Number of significant AAPG basins**	21 basins	Data on wells in 19 of those 21 basins	90%
Number of wells in significant AAPG basins	325,338 wells	86,759 wells	27%
% of total wells in significant AAPG basins	92%	95%	

* EPA's database gas well count (EPA, 2011e) differs from the well count provided in EPA's 2010 national inventory, but provides more detail on the types of wells. Additional details are provided in Appendix B.

** Significant basins are defined as basins with more than 1% of the total national gas wells.

As shown in Figure 1, the API/ANGA survey results more heavily represent gas wells in specific AAPG basins when compared to EPA's basin-level well counts (EPA, 2011d). Unlike the EPA data, the ANGA/API data is more heavily influenced by AAPG 160 and 160A. AAPG basins 360, 230, and 580 are important for both data sets.

The smaller data set provided by EPA (2011e) may not include all of the Marcellus shale wells (particularly in Pennsylvania), and the well classification system used in this smaller data set could probably be made more rigorous. Although this comparison may not show a perfect distributional match for the basin by basin distribution of the API/ANGA survey data presented here, it does not change the fundamental conclusion that the ANGA/API survey information is the largest and most representative data set yet collected for onshore U.S. gas production, since this data set does cover 90% of the basins and 27% of the national gas well count for the significant basins as reported by EPA (EPA, 2011e). The data discussed in this report provides substantial new information for understanding the emissions from Natural Gas Systems and offers a compelling justification for re-examining the current emission estimates for unconventional gas wells.

Appendix B contains more detail about the industry well data sample compared to the overall data maintained by the government. Unless otherwise noted, further statistical comparisons of well data throughout this paper are done with reference to the EPA data furnished with the Subpart W sub-basin categorization because it was the only one which effectively parsed the data by well type (EPA, 2011e).

FIGURE 1. COMPARISON OF EPA TO API/ANGA GAS WELL COUNT DATA BY AAPG BASIN

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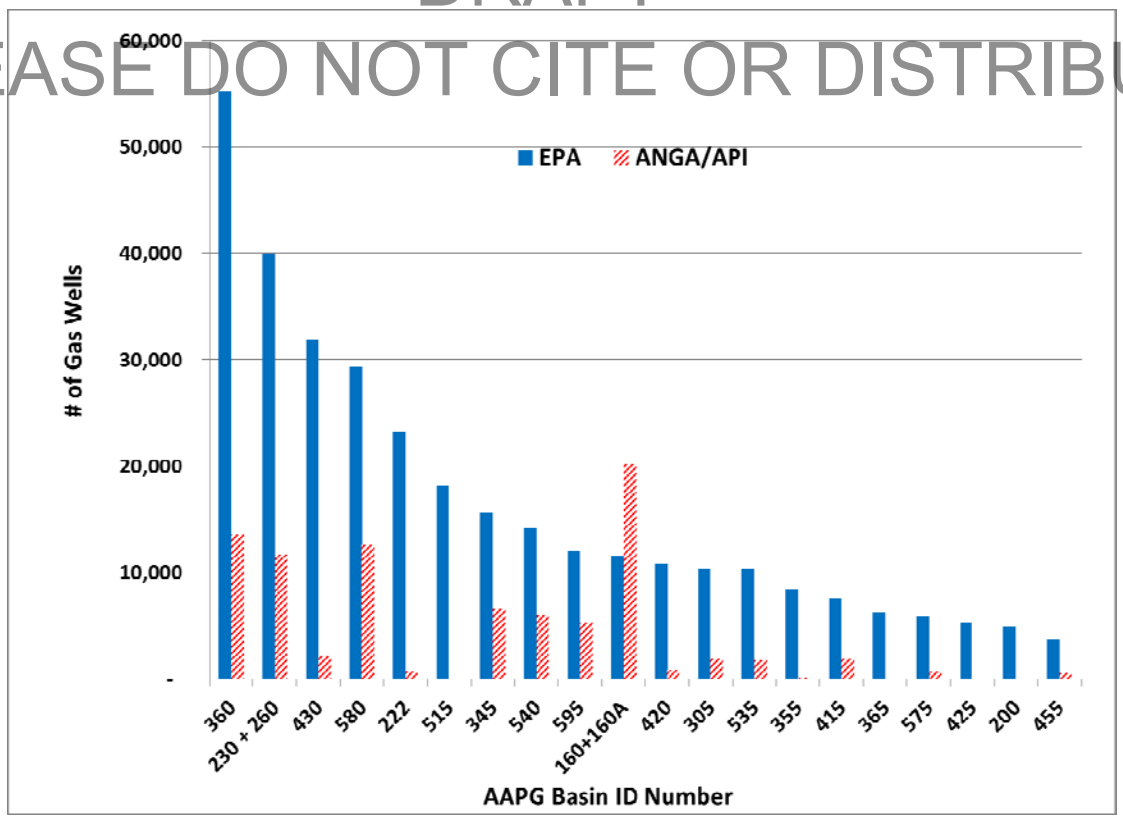

2.2 Gas Well Completions

Acknowledging the somewhat different time periods covered, the API/ANGA survey data represents 57.5% of the national data for tight gas well completions and 44.5% of shale gas well completions, but only 7.5% of the national conventional well completions and 1.5% of coal-bed methane well completions. About one-third of the surveyed well completions (2,205) were not classified into the well types requested (i.e., tight, shale, or coal-bed methane) by the respondents. The survey results for well completions are provided in Table 2 and compared to national data provided to ANGA by IHS.[3]

[3] Data provided in e-mail from Mary Barcella (IHS) to Sara Banaszak (ANGA) on August 29,2011. Data were pulled from current IHS well database and represent calendar year 2010.

EPA's 2010 inventory showed 4,169 gas well completions with hydraulic fracturing (EPA, 2012, Table A-122); however, EPA does not provide a breakout of completions by well type (shale gas, tight gas or coal-bed methane). In comparing the EPA 2010 count of gas well completions with hydraulic fracturing (4,169 completions) to both the survey results and data provided by IHS, it seems that EPA's national GHG inventory underestimates the number of well completions. Even accounting for the difference in time periods (2010 for EPA compared to 2010/2011 data from the ANGA/API survey), the national inventory appears to under-represent the number of well completions.

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TABLE 2. API/ANGA SURVEY – SUMMARY OF GAS WELL COMPLETIONS BY NEMS REGION AND WELL TYPE*
(FIRST SURVEY DATA REQUEST PHASE)

NEMS Region	Conventional Wells	Shale	Coal-bed Methane	Tight	Unspecified	Regional Total
API/ANGA Survey Data Gas Well Completions						
Northeast	2	291	3	67	126	489
Gulf Coast	81	588	-	763	374	1,806
Mid-Continent	22	734	-	375	270	1,401
Southwest	425	442	-	346	310	1,523
Rocky Mountain	10		30	977		1,017
Unspecified	-	-	-	-	1,125	1,125
Survey TOTAL	540	2,055	33	2,528	2,205	7,361
% of Survey Total	7.3%	27.9%	0.4%	34.3%	30.0%	
2010 IHS Gas Well Completions						IHS Total
2010 National Well Completions (from IHS)[1]	7,178	4,620	2,254	4,400		18,452
	38.9%	25.0%	12.2%	23.8%		
API/ANGA as % of IHS National Well Counts	7.5%	44.5%	1.5%	57.5%		

* ANGA/API survey data represents well counts current for calendar year 2010 or the first half of 2011.

** EPA's national GHG inventory does not designate gas wells by classifications of "shale", "coal bed methane" or "tight".

As shown in Table 3, the ANGA/API survey noted 7,361 gas well completions for 2010 and the first half of 2011. This is equivalent to approximately 40% of the gas well completions reported by IHS for 2010. Although EPA's 2010 national GHG inventory appears to under-represent the number of gas well completions according to the numbers reported through both the API/ANGA data and the IHS, differences in national well data reporting systems make it difficult to accurately investigate well completion differences with certainty. Data used in the EPA inventory, which includes information from the Energy Information Administration, various state governments, and privately sourced data, such as HPDI, does not consistently distinguish between conventional and unconventional wells. Without a consistent measure for the quantity and type of wells, it is difficult to be confident of the accuracy of how many wells

are completed annually, let alone to estimate their emissions. Industry strongly believes that the effects of any current under-representation of well completions will be offset by a more realistic emission factor for the rate of emissions per well.

TABLE 3. SUMMARY OF GAS WELL COMPLETIONS DATA (FIRST SURVEY DATA REQUEST PHASE)

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	# Completions for Gas Wells without hydraulic fracturing	# Completions for Gas Wells with hydraulic fracturing	Total Completions
2010 National Well Completions (from EPA; EPA 2012)	702	4,169	4,871
% of National Total	14%	86%	
API/ANGA Survey Well Completions	540	6,821	7,361
% of Survey Total	7%	93%	
Well Completions from IHS	7,178	11,274	18,452
% of National Total	39%	61%	

Table 4 provides detailed data for well completions from the ANGA/API survey. From the survey, 94% of gas well completions in 2010 and the first half of 2011, were conducted on wells with hydraulic fracturing. About one-half of all gas well completions for this time period were for tight wells, and about one-half of all gas well completions were for vertical wells with hydraulic fracturing. Any differences in totals between Tables 2, 3 and 4 are because these tables were derived from the two different data requests sent to member companies as described previously in the introduction to Section 2.

TABLE 4. API/ANGA SURVEY – ADDITIONAL DETAILS ON GAS WELL COMPLETIONS (SECOND SURVEY DATA REQUEST PHASE)

	# Completions for Gas Wells with hydraulic fracturing (HF)				Gas Wells without hydraulic fracturing		Total Completions
	# Vertical wells completions	# Horizontal well completions	Total Wells with HF	% of Wells with HF	# Completions	% of Wells without HF	
TOTAL Conventional	315	57	372	69%	164	31%	536
TOTAL Shale	317	1,863	2,180	99%	30	1%	2,210
TOTAL Tight	2,054	368	2,422	96%	106	4%	2,528
TOTAL Coal Bed Methane	27	3	30	91%	3	9%	33
TOTAL OVERALL	**2,713**	**2,291**	**5,004**	**94%**	**303**	**6%**	**5,307**

The following points summarize survey information provided in Tables 2, 3 and 4. These tables represent a snapshot of well activity data during this time.

- Overall, the survey showed 94% of the 5,307 wells reported in the API/ANGA data set as completed in 2010 and the first half of 2011 used hydraulic fracturing.
- *536 conventional gas wells were completed in 2010 and the first half 2011.*
  - 59% were vertical wells with hydraulic fracturing,
  - 11% were horizontal wells with hydraulic fracturing, and
  - 31% were wells without hydraulic fracturing.
- *2,210 shale gas wells were completed in 2010 and the first half 2011.*
  - 14% were vertical wells with hydraulic fracturing,
  - 84% were horizontal wells with hydraulic fracturing, and
  - 1% were wells without hydraulic fracturing.
- *2,528 tight gas wells were completed in 2010 and the first half 2011.*
  - 81% were vertical wells with hydraulic fracturing,
  - 15% were horizontal wells with hydraulic fracturing, and
  - 4% were wells without hydraulic fracturing.
- *33 coal-bed methane wells were completed in 2010 and the first half 2011.*
  - 82% were vertical wells with hydraulic fracturing,
  - 9% were horizontal wells with hydraulic fracturing, and
  - 9% were wells without hydraulic fracturing.

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2.3 Data Limitations Concerning Wells

In response to follow-up questions on well data, EPA indicated that they classified gas well formations into four types (conventional, tight, shale, and coal-bed) (EPA, 2011e). When developing the gas well classifications, EPA applied their judgment where data were not available in the database. ANGA and API are interested in using the well database compiled by IHS or a similar database, to more completely classify gas wells at some point in the future. The API/ANGA survey did not specifically define conventional wells for collecting the well data presented in this section, leaving the respondents to determine the classification of wells based on their knowledge of the well characteristics or state classifications. As such, this well classification may vary somewhat according to the respondent's classification of wells.

It should be noted that there is not a generally accepted definition for "gas wells." Producers might be producing from several zones in the same formation, and different states define "gas" or "oil" wells differently due to the historical structure of royalties and revenues. There is also no commonly used definition of "conventional" gas wells. Thus, different

definitions of these terms may have produced inconsistency in the classification of wells between gas and oil, and conventional and unconventional for the surveyed results, as well as for the EPA and EIA national data. For the purposes of this report, unconventional wells are considered to be shale gas wells, coal bed wells, and tight sand wells which must be fractured to produce economically. Given the counts of wells in the 2010 inventory versus the API/ANGA survey it is clear that the definition of conventional versus unconventional wells is not uniform and that the definition used by the individual companies responding to the survey likely differs from whatever distinction EPA uses.

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3. Gas Well Liquids Unloading

Gas well clean ups, also known as liquids unloading, account for 51% of total CH_4 emissions from the natural gas production sector in EPA's national GHG inventory (EPA, 2012).[4] Methane emissions from well venting for liquids unloading in the 2010 inventory represent a dramatic increase from the 6% of CH_4 emissions that liquids unloading represented in the 2008 inventory. The magnitude of the increase, the accuracy of the underlying assumptions, and the methodology used in estimating emissions from well venting for liquids unloading became major concerns to API/ANGA members.

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As the name indicates, 'Venting Wells for Liquids Unloading' is a techn que to remove water and other liquids from wellbores to improve the flow of natural gas in gas wells.

In EPA's national inventory, emissions from gas well liquids unloading are based on the following assumptions (EPA, 2011a and Hanle, 2011):

- 41.3% of conventional wells require liquids unloading.
- 150,000 plunger lifts are in service, which equates to 31% of the gas wells in the national inventory.
- The average gas well is blown down to the atmosphere 38.73 times per year.
- The average casing diameter is 5 inches.
- A gas well is vented to the atmosphere for 3 hours.

Due to the dramatic increase in EPA's estimated emissions from this source and ANGA/API's concern, a survey of member companies was conducted to gather data on current operating practices from a large and broad cross-section of the industry regarding well venting for liquids unloading. The survey was structured to gather activity information along with data required for estimating emissions using the methodologies from the GHGRP Subpart W. Sixty-one data sets with information relevant to liquids unloading covering 59,880 wells and 18 AAPG basins were received.

The following information was requested:

- Geographic area represented by the information provided;
- Time period – data were annualized to 12 months if the information was provided for a partial year;
- Number of operated gas wells represented by the information provided;
- Number of gas wells with plunger lift installed;
- Number of gas wells with other artificial lift (beam pump; ESP; etc.);
- Total number of gas well vents;
- Number of wells with and without plunger lifts that vent to the atmosphere;

[4] See EPA Table A-129, of Annex 3 of the 2010 inventory report.

- Total count of gas well vents for time period with and without plunger lifts;
- Average venting time for wells with and without plunger lifts;
- Average daily production of venting gas wells (Mcf/day);
- Average depth of venting wells (feet);
- Average casing diameter of venting gas wells (inches);
- Average tubing diameter of venting gas wells with plunger lift (inches); and
- Average surface pressure of venting gas wells (psig).

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Not all respondents reported information for each parameter requested in the survey. Hence, the subsequent analysis determining the sample size and other factors used the well counts and other information from only those data sets which included information for the parameter being determined or analyzed. As a result, the analysis of the survey data reflects three levels of information:

1. High-level data were used to relate the survey information to national well counts. This survey data set provided the broadest representation of wells, totaling 59,880 total gas wells in the liquids unloading data sets.
2. Mid-level data consisted of survey information used to determine the fraction of both plunger equipped and non-plunger equipped gas wells that vent gas due to liquids unloading. The mid-level survey data represented a total of 49,124 wells.
3. Detailed survey data were used to calculate emissions using the methodologies in the GHGRP Subpart W and to compare the survey data to assumptions EPA used in deriving the emissions for the 2010 national inventory. Detailed survey information was provided for a total of 42,681 wells.

Although the survey was split into "conventional" and "unconventional" categories, this specific distinction was not carried forward into the liquids unloading analysis. Liquid loading of well-bores is a function of the physics of flow up the well-bore and the fluids' properties; the type of producing formation is not relevant when the conditions for liquid loading occur.

Table 5 summarizes the high-level results from the API/ANGA survey and characterizes the national well population in EPA's 2010 inventory using the survey derived information. Based on the survey results, 36% of gas wells are equipped with plunger lift. Applying this percentage to the national gas well count results in 174,743 wells nationally with plunger lift.

TABLE 5. LIQUIDS UNLOADING HIGH LEVEL DATA SUMMARY

High Level Survey Data		
Gas wells with plunger lifts (59,648 in sample)	21,500	wells (36.0%)
Gas wells with artificial lift (54,660 in sample)	7,329	wells (13.4%)
Gas Wells Vented to the atmosphere for Liquids Unloading (49,124 in sample)	6,462	wells (13.2%)
# Vents per vented well	145.1	vents/vented well
Total gas well vents represented by the data sets	937,663	vents
National Well Characterization		
National # of wells from 2010 Inventory	484,795	wells
Calculated national # wells with plunger lift	174,743	wells
Calculated national # wells without plunger lift	310,052	wells
Calculated national # wells with artificial lift (subset of wells without plunger lift	65,003	wells
Methane mole percentage from EPA 2010 national inventory	78.8%	

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The survey also collected information on gas wells with artificial lift. A key distinction is that wells with artificial lift do not build up liquid columns in the well bore and hence are not vented for liquids unloading. The ANGA/API survey results indicated that 13.4% of wells use artificial lift which yields approximately 65,000 wells with artificial lift when extrapolated on a national basis. EPA has acknowledged that their current emission estimation method for liquids unloading does not account for activities used to reduce CH_4 emissions by many different artificial lift methods used in industry.

Table 6 summarizes the mid-level API/ANGA survey results, which characterizes the national **venting** well population, and applies the survey derived annual emissions per venting well to calculate national emissions. Based on the mid-level survey data, 21.1% of plunger equipped wells vent gas for liquids unloading, and 9.3% of wells without plunger lift vent gas for liquids unloading. These percentages were applied to the calculated national gas well counts with and without plunger lift (shown in Table 5) and are used to estimate the number of wells with and without plunger lift that vent for liquids unloading (36,806 and 28,863 wells, respectively, shown in Table 6).

Emissions were calculated for the survey data by applying Equation W-8 or W-9 from the EPA GHG reporting rule in 40 CFR 98 Subpart W, where Equation W-8 applies to gas wells without plunger lifts, and Equation W-9 applies to gas wells with plunger lifts. Appendix C summarizes the survey data used to estimate the emissions shown in Table 6. The total volume of gas emitted based on the survey data was converted to methane emissions by applying the methane content used in the national inventory (78.8%). When the total volume is divided by the number of venting wells represented by the survey data, it results in an emission factor of approximately 254 Mscfy CH_4/well.

Table 6. Liquids Unloading Emission Estimation Based on Survey Data

Mid-Level Survey Data		
Total number of wells with plunger lift (42,681 in sample)	11,518	wells
Total number of wells without plunger lift (42,681 in sample)	31,163	wells
Number of plunger equipped wells that vent (42,681 in sample)	2,426	wells (21.1%)
Number of non-plunger equipped wells that vent (42,681 in sample)	2,901	wells (9.3%)
Total annual volume gas vented for venting wells	1,719,843,596	scf gas/year
Calculated volume vented gas per venting well	322,854	scfy gas/well
Calculated methane volume vented per venting well	**254,409**	scfy ch4/well
Calculated National Well Data		
Calculated national # wells with plunger lift that vent for unloading	36,806	wells
Calculated national # wells without plunger lift that vent for unloading	28,863	wells
National Emission Calculations		
Total gas venting for liquids unloading volume (scaled for national wells)	21,201,410,618	scf gas/yr
Total methane venting for liquids unloading (scaled for national wells)	16,706,711,567	scf CH_4/yr
Total liquid unloading vented methane (scaled for national wells)	319,664	metric tons CH_4/yr
Comparison to 2010 National Inventory Liquids Unloading		
2010 National Inventory CH_4 emissions from Liquids Unloading	4,501,465	metric tons CH_4/yr
% difference between survey and national data	-92.9%	

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For comparison to EPA's estimated emissions from liquids unloading, the survey calculated emission factor was applied to the calculated national number of gas wells with and without plunger lift. When extrapolated to a national basis, as shown above, the survey data estimates that 319,664 tonnes of CH_4 are emitted from liquids unloading, compared to EPA's national emissions of 4,501,465 tonnes CH_4 (based on industry standard conditions of 60 °F and 14.7 psia) – for the same activities. Hence, the results of the ANGA/API survey would predict emissions that are a factor of 14 times lower than the emissions reported in the 2010 national GHG inventory for liquids unloading.

Table 7 summarizes the detailed API/ANGA survey results for relevant individual parameters used in the emission calculation. These are compared to EPA's assumptions to demonstrate why the survey results produce a much lower emissions than EPA's assumptions. It should be noted, the ANGA/API parameters from each data set were weighted by the number of vents in that particular data set, where appropriate.

TABLE 7. DETAILED SURVEY DATA COMPARED TO EPA ASSUMPTIONS

Detailed Survey Data		Survey Data		EPA Assumptions	
Total national number of wells that vent for liquids unloading		65,669	wells	179,391	wells
Average number of vents	per venting plunger well	343.72	vents/well	38.7	vents/well
	per venting non-plunger well	32.57	vents/well		
Average time per vent	plunger equipped wells	0.11	hour	3	Hours
	non-plunger equipped wells	1.90	hours		
Average depth	plunger equipped wells	4,370	feet	6,000	Feet
	non-plunger equipped wells	5,433	feet		
Average tubing diameter - plunger equipped wells		2.15	inches	2	inches
Average casing diameter - non-plunger equipped wells		4.57	inches	5	inches
Average production rate	plunger equipped wells	104.3	Mcfd gas		
	non-plunger equipped wells	45.9	Mcfd gas		
Average pressure	plunger equipped wells	91.0	psig	100 psig sales line pressure (200-1000 psig shut-in pressure)	
	non-plunger equipped wells	110.8	psig		
Calculated methane volume venting per venting wells		254,409 scf CH4/well		1,316,750 scf CH4/well	

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As noted previously, the data sets used to derive the liquids unloading emission estimates are summarized in Appendix C. When examining Appendix C, it is important to note the presence of several data responses that can be viewed as outliers. Two data responses for operations with conventional wells reported very high frequencies of vents to the atmosphere. These data sets represent 174 gas wells with plunger lifts that vent to the atmosphere and are located in the Mid-Continent region (out of a total 1,140 conventional gas wells represented by the two data sets). The wells represented by these data points have plunger lifts that vent to the atmosphere for each plunger cycle. The information was confirmed by the two data respondents and is an artifact of the plunger control for these wells which results in very short venting durations (between 4 and 5 minutes) for each plunger cycle, which is not the operating practice assumed by the EPA in the equations that are used to estimate emissions associated with liquids unloading. Accounting for the high frequency of plunger lift cycles for these wells results in a high average vent frequency, but still leads to the derivation of a lower emission factor than the one derived by EPA in accordance with their assumptions about liquids unloading operations. The survey derived factor is likely somewhat high due to the calculation assumption that the entire tubing string is de-pressured in each venting event which is not likely for the two "outlier" data sets discussed above.

These variances among operators in the ANGA/API data demonstrate the challenge of applying national emissions estimates to conditions in which there can be considerable variation in wells and operating techniques, among and even within various regions. As member companies have noted in various comments to regulators, oil and natural gas production operations vary considerably according to factors such as local geology, hydrology, and state law.

As production companies continue to collect and report information for EPA's mandatory GHG reporting program, better information on liquids unloading frequency and emissions will be available. One area that would benefit from additional information is an investigation of

regional differences, or plunger lift control practices, in view of the high frequency of vents observed for two data sets containing conventional gas wells with plunger lifts in the Mid-Continent region.

Key findings of the API/ANGA survey on liquids unloading are:

- ***Overall, the change in emission factors based on data collected from the ANGA/API survey reduces estimated methane emissions for this source by 93% from the methane emissions reported in EPA's 2010 national GHG inventory. This is a factor of 14 times lower than EPA's reported methane emissions.***
- ***When compared to EPA's assumptions used to derive the national GHG emission estimates for liquids unloading, the API/ANGA survey data indicated a lower percent of gas wells that vent for liquids unloading and a much shorter vent duration. The difference in these two parameters from EPA's assumptions more than offset the higher number of vents observed from the survey data.***

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4. Hydraulic Fracturing and Re-fracturing (Workovers)

A well workover refers to remedial operations on producing natural gas wells to try to increase production. Starting with the 2009 inventory, EPA split the estimation of emissions from producing gas wells into conventional (i.e., without hydraulic fracturing) and unconventional (i.e., with hydraulic fracturing). For workovers of wells without hydraulic fracturing, the 2009 and 2010 national inventories used emission factors of the same order of magnitude as the 2008 inventory (2,454 scf of CH_4/workover). In contrast, the unconventional (with hydraulic fracturing) well workover emission factor increased by a factor of three thousand (3,000).

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EPA did acknowledge that the new emission factor for well workovers was based on limited information (EPA, 2011b). Moreover, several publications including *Mismeasuring Methane* by IHS CERA underscored the perils of extrapolating estimates using only four (4) data points representing approximately two percent (2%) of wells – particularly when the data was submitted in the context of the Natural Gas Star program, which was designed to highlight emissions reduction options (IHS CERA, 2011). Unfortunately, even if the EPA's workover factor is high, it must be used in estimated emissions calculations until it is officially changed.

EPA's new emission factor is 9.175 MMscf of natural gas per re-fracture (equivalent to 7.623 MMscf CH_4/re-fracture). Additionally, EPA used this new emission factor in conjunction with an assumed re-fracture rate of 10% for unconventional gas well workovers each year to arrive at their GHG emission estimate for this particular category.

4.1 API/ANGA Survey

The ANGA/API survey requested counts for gas well workovers or re-fractures in two separate phases of the survey, covering 91,028 total gas wells (Table 8 covering 2010 and first half of 2011 data) and 69,034 unconventional gas wells (Table 9, 2010 data only), respectively.

The first phase of the survey was part of the general well data request. Counts of workovers by well type (conventional, tight, shale, and coal bed methane) and by AAPG basin were requested. The frequency of workovers was calculated by dividing the reported workover rates by the reported total number of each type of gas well. These results are summarized in Table 8, which includes a comparison to national workover data from EPA's annual GHG inventory. The high number of workovers in the Rocky Mountain region is discussed further below.

Table 8 indicates that even for the high workover rates associated with unconventional tight gas wells in the Rocky Mountain region, the workover rate is much less than EPA's assumed 10% of gas wells re-fractured each year. Based on this first phase of the survey,

- The overall workover rate involving hydraulic fracturing was 1.6%.
- However, many of these workovers were in a single area, AAPG-540, where workovers are known to be conducted more routinely than in the rest of the country (as described in more detail below Table 9). Excluding AAPG 540, the overall workover rate involving hydraulic fracturing was 0.7% which is a more likely range for a national re-fracture rate.

- For shale, coal-bed methane, and tight formation wells in Table 8, the overall workover rate involving hydraulic fracturing was 2.2%. Excluding AAPG 540, the overall workover rate involving hydraulic fracturing was 0.5%.

TABLE 8. API/ANGA SURVEY – SUMMARY OF GAS WELL WORKOVERS WITH HYDRAULIC FRACTURING IN 2010 AND FIRST HALF OF 2011 BY NEMS REGION AND WELL TYPE (FIRST PHASE DATA SURVEY)

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NEMS Region	Conventional Wells	Unconventional Wells			Unspecified
		Shale	Coal-bed Methane	Tight	
Northeast	-	-	-	-	-
Gulf Coast	-	5	-	38	73
Mid-Continent	8	1	-	73	33
Southwest	60	25	-	8	7
Rocky Mountain	4	-	25	901	-
West Coast	-	-	-	-	-
Unspecified	-	-	-	-	200
Survey TOTAL	72	31	25	1,020	313
		1,076			
% of national	0.3%	21.3%			
Overall Survey Total % of national	1,461 5.6%				

National Workover Counts (from EPA's 2010 national inventory)	Conventional Wells	Unconventional Wells
	21,088	5,044
	80.7%	19.3%
	26,132	

	Conventional Wells	Unconventional Wells			Unspecified
		Shale	Coal-bed Methane	Tight	
% Workover Rate with Hydraulic Fracturing (from ANGA/API Survey)	0.3%	0.3%	0.5%	3.0%	2.4%
Tight w/out AAPG 540				0.5%	
Unconventional Wells		2.2%			
W/out AAPG 540		0.5%			
All Wells	1.6%				
All Wells w/out AAPG 540	0.7%				

A second phase of the survey was conducted which targeted collecting gas well re-fracture information for 2010 to provide a comparator for EPA's assumption that 10% of wells are re-fractured each year. This portion of the ANGA/API survey requested information just for "unconventional" gas wells (i.e., those located on shale, coal-bed methane, and tight formation reservoirs), where the formations require fracture stimulation to economically produce gas. A re-fracture or workover was defined for this second phase of the survey as a re-completion to a different zone in an existing well or a re-stimulation of the same zone in an existing well. These results are summarized in Table 9.

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While there likely is significant overlap of unconventional well data reported in the first and second phases of the survey (which covered over 62,500 unconventional wells and 69,000 unconventional wells respectively), combined these data indicate an unconventional well re-fracture rate of 1.6% to 2.3% including AAPG 540 and 0.7% to 1.15% excluding AAPG 540.

AAPG Basin 540 (i.e. DJ Basin) which is part of the Rocky Mountain Region stands out in Tables 8 and 9. After four (4) to eight (8) years of normal production decline, the gas wells in this basin can be re-fractured in the same formation and returned to near original production. Success of the re-fracture program in the DJ Basin is uniquely related to the geology of the formation, fracture reorientation, fracture extension and the ability to increase fracture complexity. Also, most DJ Basin gas wells are vertical or directional, which facilitates the ability to execute re-fracture operations successfully and economically. These characteristics result in a high re-fracture or workover rate specific to this basin/formation.

ANGA and API believe the high re-fracture rate observed in the DJ Basin is unique and not replicated in other parts of the country. This was a limited program that was occurring during the data survey activities and has currently stopped. There may be a few other formations in the world that have similar performance, but the successful re-fracture rate in the DJ Basin is not going to be applicable to every asset/formation and there is no evidence of the high re-fracture rate in any of the other 22 AAPGs covered in the API/ANGA survey. It is highly dependent on the type of rock, depositional systems, permeability, etc. For these reasons, re-fracture rates for tight gas wells and all gas wells with and without AAPG Basin 540 are summarized in Tables 8 and 9.

4.2 WRAP Survey

Other information on re-fracture rates is available in a survey conducted by the Western Regional Air Partnership (WRAP). WRAP conducted a survey of production operators in the Rocky Mountain Region (Henderer, 2011) as part of the initiative to develop GHG reporting guidelines for a regional GHG cap and trade program.

TABLE 9. API/ANGA SURVEY – SUMMARY OF 2010 GAS WELL WORKOVERS ON UNCONVENTIONAL WELLS BY AAPG BASIN AND NEMS REGION (SECOND PHASE SURVEY DATA)

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NEMS Region	AAPG Basin	Number of Unconventional Operating Gas Wells	Number of Hydraulic Fracture Workovers on Previously Fracture Stimulated Wells	% Wells re-fractured per year	Regional % Wells re-fractured per year
Northeast	160	1,976	0	0.00%	0%
	160A	760	0	0.00%	
Gulf Coast	200	2	0	0.00%	0.91%
	220	649	2	0.31%	
	222	629	3	0.48%	
	230	820	4	0.49%	
	250	13	0	0.00%	
	260	2,830	36	1.27%	
Mid-Continent	345	3,296	11	0.33%	0.95%
	350	213	3	1.41%	
	355	282	8	2.84%	
	360	7,870	89	1.13%	
	375	12	0	0.00%	
	385	1	0	0.00%	
	400	64	0	0.00%	
Southwest	415	1,834	0	0.00%	1.04%
	420	838	8	0.95%	
	430	1,548	36	2.33%	
	435	2	0	0.00%	
Rocky Mountain	515	1	0	0.00%	4.7%
	540	5,950	866	14.55%	
	580	8,197	8	0.10%	
	595	5,222	32	0.61%	
Not specified		26,025	487	1.87%	1.87%
Unconventional TOTAL (all wells)		**69,034**	**1,593**	**2.31%**	
Unconventional Median		790	3		
Rocky Mountain Region Unconventional Total		19,370	906	4.68%	
Unconventional TOTAL (Without AAPG 540)		63,084	727	1.15%	

Within each basin in this region, the top oil and gas producers were identified and invited to participate in the survey. The goal was to have operator participation that represented 80% of the production for the region. The spreadsheet survey requested information on the completions, workovers, and emissions associated with these activities. An emission factor and frequency of re-fracturing was developed for each basin as a weighted average of the operator responses.

The re-fracture rates from the WRAP survey are shown in Table 10 (Henderer, 2011).

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TABLE 10. WRAP SURVEY – SUMMARY OF GAS WELL WORKOVERS BY AAPG BASIN FOR THE ROCKY MOUNTAIN REGION, 2006 DATA

AAPG Basin	# Wells represented by survey	# Wells Recompleted	% Recompleted
515	4,484	121	2.70%
530	731	5	0.68%
535	4,982	201	4.03%
540	8,247	636	7.71%
580	3,475	14	0.40%
595	4,733	275	5.81%
Total	26,652	1,252	
Weighted average			4.70%

AAPG Basin 540 results in the highest re-fracture rate for this data set, consistent with the ANGA/API survey as noted above. It is noteworthy that, while there are differences among individual AAPG Basin results, the weighted average re-fracture rate from the WRAP survey in 2006 is the same as the Rocky Mountain regional 4.7% re-fracture rate from the API/ANGA survey shown in Table 9.

4.3 Impact of Completions and Re-fracture Rate Assumptions

Table 11 compares the considerable reduction in the national GHG inventory that would result from applying a lower re-fracture rate.

EPA indicated that the national inventory assumes 10% of unconventional gas wells are re-fractured each year. Table 11 replaces this value with results from the ANGA/API survey. A re-fracture rate of 1.15% is applied to unconventional gas wells in the Mid-Continent and Southwest regions (No unconventional gas wells were assigned to the Northeast and Gulf Coast regions. The West Coast region is not shown since the API/ANGA survey did not include any responses for gas well operations in this region.) A re-fracture rate of 4.7% is applied to unconventional gas wells in the Rocky Mountain region.

With these adjustments to the re-fracture rate for unconventional gas wells, the national emission estimate is reduced by 72% for this emission source category, from 712,605 metric tons of CH_4 to 197,311 metric tons of CH_4 when compared on a consistent basis.

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TABLE 11. API/ANGA SURVEY – GAS WELL WORKOVER EMISSIONS COMPARISON

NEMS Region	Well type	2010 EPA National Inventory # workover	Adjusted # workovers (based on API/ANGA survey)	2010 EPA National Inventory		Revised Emissions, tonnes CH_4 (based on ANGA/API survey)	API & ANGA - EPA / EPA % Difference
				Emission Factor, scf CH_4/workover	Estimated Emissions, tonnes CH_4*		
Northeast	Wells without Hydraulic Fracturing	8,208	8,208	2,607	409	409	
	Wells with Hydraulic Fracturing	0	0	7,694,435	0	0	
Mid Continent	Wells without Hydraulic Fracturing	3,888	3,888	2,574	191	191	
	Wells with Hydraulic Fracturing	1,328	153	7,672,247	194,950	22,462**	-89%
Rocky Mountain	Wells without Hydraulic Fracturing	3,822	3,822	2,373	174	174	
	Wells with Hydraulic Fracturing	2,342	1,100	7,194,624	322,402	151,432**	-53%
Southwest	Wells without Hydraulic Fracturing	1,803	1,803	2,508	87	87	
	Wells with Hydraulic Fracturing	1,374	158	7,387,499	194,217	22,382**	-89%
Gulf Coast	Wells without Hydraulic Fracturing	3,300	3,300	2,755	174	174	
	Wells with Hydraulic Fracturing	0	0	8,127,942	0	0	
TOTAL					712,605	197,311	-72%

* EPA Estimated emissions = 2010 # Workovers x EPA 2010 Emission Factor, converted to mass emissions based on 60°F and 14.7 psia.

** Revised emissions = Adjusted # Workovers x Emission Factor, converted to mass emissions based on 60°F and 14.7 psia.

4.4 Completion and Re-fracture Emission Factor

In the 2009 GHG national inventory, EPA applies an emission factor of 2,454 scf CH_4/event for conventional gas well workovers, while the emission factor for unconventional gas well completions and workovers was increased to 7,623,000 scf CH_4/event (EPA, 2011c). Similarly, for the 2010 national GHG inventory, EPA maintained the emission factor of 2,454 scf CH_4/event for gas well workovers without hydraulic fracturing, but applied an average emission factor of 7,372,914 to gas well workovers with hydraulic fracturing (EPA, 2012). (EPA applies slightly different emission factors for each NEMS region based on differing gas compositions.)

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The ANGA/API survey focused on activity data and did not collect data to revise the emission factor for unconventional gas well completions and workovers.

Emissions Data from WRAP Study

The WRAP study discussed in Section 4.2 also gathered data on emissions from completions. This information supports a revised emission factor but was reported by sources outside the ANGA/API data survey. The results are summarized in Table 12. The WRAP emission factor is 78% lower than EPA's emission factor (9.175 MMscf gas/event). The WRAP survey did not provide a methodology for determining emissions data.

TABLE 12. WRAP SURVEY – SUMMARY OF COMPLETION EMISSIONS FOR THE ROCKY MOUNTAIN REGION, 2006 DATA

AAPG Basin	Weighted average gas emissions from completion, Mcf gas/well	# completions represented
515	167	207
530	268	54
535	76	642
540	59	608
580	6,559	283
595	4,053	819
Total		2,613
Weighted average	2,032 Mcf/well	

4.5 Data Limitations for Completion and Re-fracture Emissions

Although the data sets are limited, it appears that EPA's assumed re-fracture rate of 10% is a significant overestimate. Information from the API/ANGA survey indicates that even including what appears to be unique activity in AAPG-540, the re-fracture rate is much less frequent, ranging from 1.6% to 2.3% based on two sets of survey information (Tables 8 and 9, respectively). The re-fracture rate for AAPG Basin 540 appears to be higher than other areas in the U.S. due to unique geologic characteristics in that region (4.7% based on a weighted average

of data reported for that region). Without AAPG Basin 540, the national rate of re-fracturing is between 0.7% and 1.15% of all gas wells annually.

Additionally, limited information on the emissions from completions and workovers with hydraulic fracturing indicate that EPA's GHG emission factor for these activities is significantly overestimated. It is expected that better emissions data will develop as companies begin to collect information for EPA's mandatory GHG reporting program (EPA, 2011d).

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5. Other Surveyed Information

EPA had indicated that activity data for centrifugal compressor wet seals and pneumatic devices used in the national inventory is lacking. Note that the need for better equipment data persists throughout the majority of the U.S. inventory and is not unique to the oil and natural gas industry. The ANGA/API survey requested the following information related to centrifugal compressors and pneumatic devices:

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- The number of centrifugal compressors, reported separately for production/gathering versus processing;
- The number of centrifugal compressors with wet versus dry seals, reported separately for production/gathering versus processing;
- The number of pneumatic controllers, classified as "high-bleed," "low-bleed," and "intermittent," reported separately for well sites, gathering/compressor sites, and gas processing plants; and
- The corresponding number of well sites, gathering/compressor sites, and gas processing plants, associated with the pneumatic controller count.

5.1 Centrifugal Compressors

Processing Facilities

The API/ANGA survey collected the equivalent of 5% of the national centrifugal compressor count for gas processing operations (38 centrifugal compressors from the survey, compared to 811 from EPA's 2010 national GHG inventory). For the gas processing centrifugal compressors reported through the survey, 79% were dry seal compressors and 21% were wet seals. EPA's 2010 national inventory reported 20% of centrifugal compressors at gas processing plants were dry seal, and 80% were wet seal. EPA's emission factor for wet seals (51,370 scfd CH_4/compressor) is higher than the emission factor for dry seals (25,189 scfd CH_4/compressor).[5]

Based on the ANGA/API survey, EPA appears to be overestimating emissions from centrifugal compressors. If the small sample size from the API/ANGA survey is representative, non-combustion emissions from centrifugal compressors would be 173,887 metric tons of methane compared to 261,334 metric tons of methane from the 2010 national inventory (when applying industry standard conditions of 60 °F and 14.7 psia to convert volumetric emissions to mass emissions). Although based on very limited data, if the ANGA/API survey results reflect the population of wet seal versus dry seal centrifugal compressors, the emissions from this source would be reduced by 34% from EPA's emission estimate in the national inventory. Better data on the number of centrifugal compressors and seal types will be available from companies reporting to EPA under the mandatory GHG reporting program.

[5] EPA Table A-123, of Annex 3 of the 2010 inventory report.

Production and Gathering Facilities

Very few of the data sets reported through the API/ANGA survey indicate counts of centrifugal compressors associated with production/gathering operations - only 550 centrifugal compressors from 21 participating companies. EPA's 2010 GHG inventory did not include centrifugal compressors in production/gathering operations. On a well basis, the survey responses equate to 0.07 centrifugal compressors per gas well, with 81% dry seal centrifugal compressors and the remaining wet seal compressors. Information reported through EPA's mandatory GHG reporting program will provide additional information to account for GHG emissions from centrifugal compressors in production operations.

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5.2 Pneumatic Controllers

Table 13 summarizes the survey responses for pneumatic controllers. For each type of location – gas well sites, gathering compressor sites, and gas processing plants – the count of the number of sites represented by the survey data is shown. Table 13 also shows the percent of each pneumatic controller type for each type of location.

TABLE 13. ANGA/API SURVEY –PNEUMATIC CONTROLLER COUNTS

	Gas Well Sites		Gathering/ Compressor Sites		Gas Processing Plants	
# wells, sites or plants	48,046 wells		1,988 sites		21 plants	
# controllers/well, site or plant	0.99 per well		8.6 per site		7.8 per plant	
# Low Bleed Controllers	12,850	27%	5,596	33%	117	71%
# High Bleed Controllers	11,188	24%	1,183	7%	47	29%
# Intermittent Controllers	23,501	49%	10,368	60%	0	0%

The survey requested that the responses designate pneumatic controllers as either "high bleed", "low bleed", or "intermittent" following the approach each company is using for Subpart W reporting. For example, Subpart W defines high-bleed pneumatic devices as automated, continuous bleed flow control devices powered by pressurized natural gas where part of the gas power stream that is regulated by the process condition flows to a valve actuator controller where it vents continuously (bleeds) to the atmosphere at a rate in excess of 6 standard cubic feet per hour (EPA, 2011d).

EPA does not currently track pneumatic controllers by controller type in the national inventory. This information will be collected under 40 CFR 98 Subpart W starting in September 2012. From the API/ANGA survey, intermittent bleed controllers are the more prevalent type at gas well sites and gathering/compressor sites, while gas plants predominately use low-bleed controllers. No intermittent controllers were reported for gas plants by the survey respondents.

Table 14 compares emission results based on applying the emission factors from the EPA's GHG reporting rule to emissions presented in the 2010 national GHG inventory, using the counts of pneumatic controller from the ANGA/API survey for production operations.

For production, the EPA national inventory combines pneumatic controller counts associated with large compressor stations with pneumatic controllers in production. An emission factor for each NEMS region is applied to the count of total controllers in each NEMS region. For this comparison, a weighted average emission factor of 359 scfd CH_4/device was applied to the count of pneumatic controllers located at well sites and gathering/compressor sites.

Under the EPA mandatory reporting rule (40 CFR 98 Subpart W), separate emission factors are applied to pneumatic controllers based on the controller type and whether the controller is located in the Eastern or Western region of the United States, as specified in the rule (EPA, 2011d). For this comparison, an average of the eastern and western emission factors is applied to each device type in computing the emission estimates resulting from the EPA GHG reporting rule.

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TABLE 14. PNEUMATIC CONTROLLER EMISSION COMPARISON – PRODUCTION OPERATIONS

	API/ANGA Survey Count of Controllers			EPA GHG Reporting Rule (Subpart W)		2010 National GHG Inventory	
	Gas Well Sites	Gathering/ Compressor Sites	Total	Emission Factor,* scfh CH_4/device	Emissions, tonnes CH_4/yr	Emission Factor, scfd CH_4/device	Emissions, tonnes CH_4/yr
# Low Bleed Controllers	12,850	5,596	18,446	1.58	4,885	359	46,286
# High Bleed Controllers	11,188	1,183	12,371	42.35	87,814		31,042
# Intermittent Controllers	23,501	10,368	33,869	15.3	86,856		84,987
Total			64,686		179,556		162,315

* Emission factors shown are the average of the eastern and western emission factors from Table W-1A (EPA, 2011d).

Based on the types of pneumatic controllers reported in the ANGA/API survey, EPA's mandatory GHG reporting rule could increase CH_4 emissions 11% over the pneumatic controller portion of the 2010 national GHG inventory. To put this in context, in EPA's inventory report for 2010, emissions from pneumatic controllers accounted for approximately 13% of CH_4 emissions from the natural gas field production stage. Any increase from that initially reported data, however, will likely represent a worst case scenario. It is important to remember that pneumatic controllers operate only intermittently, so variability such as the frequency and duration of the activations will be important information to consider when defining an accurate and effective reporting regime for these sources.

EPA's mandatory GHG reporting rule does not require reporting emissions from pneumatic controllers at gas processing plants, so no emission factors are specified. The GHG national inventory applies an emission factor of 164,721 scfy CH_4 per gas plant for pneumatic controllers. For the national inventory, this results in 1,856 tonnes CH_4 emissions - a very small contribution to CH_4 emissions from onshore oil and gas operations.

6. Conclusions

API and ANGA members believe this to be the most comprehensive set of natural gas data to date and are pleased to share these results with both regulators and the public.

Based on the information gathered from member companies during this project, it appears that EPA has overstated several aspects of GHG emissions from unconventional natural gas production. As summarized in Table 15, the ANGA/API survey data results in significantly lower emission estimates for liquids unloading and unconventional gas well refracturing when compared to EPA's emission estimates in the national inventory. Using the combined emission estimates from the survey for these two key emission sources would indicate a 53% reduction in calculated natural gas production sector emissions compared to EPA's estimates.

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TABLE 15. EMISSION COMPARISON BETWEEN EPA AND INDUSTRY DATA

Source Category	EPA National Inventory		API/ANGA Survey		Impact on Source Category Emissions
	Metric tons of CH4	% of EPA Production Total	Metric tons of CH4	% of Revised Production Total	API & ANGA - EPA / EPA % Difference in Emissions
Liquids Unloading	4,501,465 *	51%	319,664	8%	-93%
Unconventional Well Re-fracture Rates	712,605 *	8%	197,311	5%	-72%
Other Production Sector Emissions**	3,585,600	41%	3,585,600	87%	
Total Production Sector Emissions	8,799,670		4,102,575		-53%

* EPA's estimates are adjusted to industry standard conditions of 60 degrees F and 14.7 psia for comparison to the ANGA/API emission estimates.

**The "Other Production Sector Emissions" are comprised of over 30 different source categories detailed in Table A-129 in the Annex of the EPA's 2012 national inventory. The "Other Production Sector Emissions" are the same values for this comparison between the EPA national inventory and the API/ANGA survey to focus the comparison on quantified differences in emission estimates for gas well liquids unloading and unconventional well re-fracture rates.

This project was directed toward gathering more robust information on workovers, completions, liquids unloading, centrifugal compressors, and pneumatic controllers with the intent of supporting revisions to the activity factors used in EPA's national inventory and cited by many media publications. Although limited information was collected on centrifugal compressors and pneumatic controllers, the survey results indicated potential additional differences, which are not included in the Table 15 comparison, when comparing total emissions

from all sources to the national inventory. Additional future data collection efforts, including more detailed reporting under Subpart W of the GHGRP will likely resolve these differences and continue to inform the overall natural gas emissions data.

While API and ANGA recognize that the data collected for this report represents a sample of the universe of natural gas wells operating in the U.S., we believe that the conclusions drawn from the data analysis are relevant and representative of natural gas production as whole. In EPA's gas well count, 21 of the AAPG basins each have more that 1% of the total well count. The ANGA/API survey has wells from 19 of those 21 basins. In terms of wells represented by these basins, 92% of the total EPA well count is accounted for by wells in those 21 basins, while 95% of the API/ANGA surveyed gas wells are accounted for by those 21 basins. This indicates that the ANGA/API survey results have good representation for the basins with the largest numbers of wells nationally.

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Moreover, the API/ANGA survey results are based on a large number of wells - at least an order of magnitude or more - higher than the number of wells used by EPA to develop their revised emission factors that purport to be representative of U.S. industry operations nationwide. Such a richer data set allows for improved granularity of emission characteristics for various operations. A case in point is the information on liquids unloading where the ANGA/API survey results were obtained from over 59,000 gas wells and which indicate that 21% of wells equipped with plunger lift and 9.3% of wells without plunger lift vent for liquids unloading. In comparison, EPA's approach is based on the assumption that the survey of 25 well sites conducted by GRI (1996) for the base year 1992 continues to provide representative data for the fraction of conventional wells requiring unloading, which EPA set at 41.3%. Industry also believes that the systematic approach in which the API/ANGA data were collected and vetted by natural gas experts is an improvement over the *ad hoc* way in which EPA collected some of their data. This study indicates that EPA should reconsider their inventory methodologies for natural gas production particularly in light of more comprehensive and emerging data from the industry. ANGA and API members look forward to working with the agency to continue to educate and evaluate the latest data as it develops about the new and fast-changing area of unconventional well operations.

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Appendix A. API/ANGA Survey Forms

The following provides the survey forms used to gather data presented in this report.

FIGURE A-1. SURVEY INSTRUCTIONS

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The attached worksheets request data to support both the API/ANGA Natural Gas Life Cycle Analysis Project, as well as updates to EPA's National GHG Inventory. Portions of this information are consistent with data required for Subpart W, in which case data collected for Subpart W can be provided.

EPA's most recent national inventory significantly increased the emission estimates for gas well completions and workovers with hydraulic fracturing and gas well liquids unloading. These increases prompted public criticism of unconventional natural gas production.
While acknowledging their unconventional well workover activity factors were based on limited data, EPA has also indicated that activity data for centrifugal compressor wet seals and pneumatic devices used in the national inventory is lacking.

API and ANGA are requesting this information to develop more rigorous emission estimates for these important emission sources. This spreadsheet primarily focuses on activity factor information. A second data request will be developed later this year to collect information to support improved emission factors.

Company confidential information will be protected.

Please do not send information responsive to the data request to API or ANGA. Neither API nor ANGA will review member data sent in response to this request. Any submission to API or ANGA that appears to contain information responsive to EPA's data request will be returned to the sender unopened.

Please send the completed spreadsheets to:
Terri_Shires@URScorp.com
Questions may be directed to the same address, or by phone: 512-419-5466

Respondents are asked to complete as much information as possible. Some worksheets request data in varying levels of detail, with guidance on the minimum level of information needed. Some worksheets request data for more than one year or more than one production basin, if available. Gaps in the data are OK if the information is not available.

Additional instructions and guidance are provided on each worksheet.

Schedule:

Data indicated in blue font and shading is requested by August 15

Data indicated in green font is requested by September 16, if this level of information available. This more detailed information will help develop more rigorous emissions estimates for these sources.

FIGURE A-2. GAS WELL SURVEY DATA

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Table 1. Producing Gas Wells - Activity Data

Please provide the following information for gas producing wells

		Conventional Wells	Unconventional Wells			Year	Geographic Area Represented	Comments
			Shale	Coal-bed Methane	Tight			
A	Total # of Operating Gas wells							Total of rows A(1) and A(2)
A(1)	# Wells w/out hydraulic fracturing (anytime in their history)							
A(2)	# Wells with hydraulic fracturing (any time in their history)							If counts are not available by vertical and horizontal, please complete this row
A(2)(a)	# Vertical wells with hydraulic fracturing (anytime in their history)							Please provide this level of detail, if available for wells with hydraulic fracturing
A(2)(b)	# Horizontal wells with hydraulic fracturing (anytime in their history)							
B	# Gas well Completions							Total of rows B(1), B(2) and B(3)
B(1)	# Completions for Vertical wells with hydraulic fracturing							
B(2)	# Completions for Horizontal wells with hydraulic fracturing							Please provide this level of detail, if available
B(3)	# Completions for wells without hydraulic fracturing							
C	# Gas well Workovers with hydraulic fracturing (refracs)							Total of rows C(1) and C(2)
C(1)	# Workovers for Vertical wells with hydraulic fracturing							
C(2)	# Workovers for Horizontal wells with hydraulic fracturing							Please provide this level of detail, if available
C(3)	# Workovers for wells without hydraulic fracturing							

Guidance:
2010 data is preferred, with U.S. geographic coverage as broad as possible.

Please duplicate the table to provide data for additional calendar years (if available) or additional geographic areas (if needed).

Note that some of this information overlaps with the data requested under the "Re-frac" worksheet.

Please provide information that you have available.

Blue rows are the minimum level of detail needed

Green rows provide more detailed information and have a longer response time

Geographic area:

Please indicate whether the information provided is for all of your operations in the U.S., or just a sub-part (single basin or multiple basins)

FIGURE A-3. GAS WELL WORKOVER SURVEY DATA

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Table 2. Gas Well Workover Activity Data: Frequency of Re-fractures

	Year	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
A	*Geographic area*										
B	*Number of Unconventional Operating Gas Wells*										
C	*Number of Fracture Stimulation Wells Completed each year (New Completions)*										
D	*Number of Fracture Stimulation Jobs conducted each year on Previously Fracture Stimulated Wells (i.e., # of Workovers or re-fracs)*										

Guidance

Please provide information that you have available.
Please provide data that are available for any or all of the years listed. Gaps in the data are OK.
Copy the table to provide data for additional geographic areas

A Geographic Area: Please indicate whether the information provided is for all of your operations in the U.S., or just a sub-part (single basin or multiple basins)

B Provide the number of Unconventional Operating Wells. This refers to wells located on shale, coal-bed Methane, and Tight Formations reservoirs. Unconventional reservoirs are reservoirs that require fracture stimulation to economically produce.

C Provide the number of new completions conducted in the year. This may be the same value provided in the "Well data" worksheet, Item B.

D Provide the number of re-fractures (workovers). A re-frac or workover is defined as a re-completion to a different zone in an existing well or re-stimulation of the same zone in an existing well. This may be the same value provided in the "Well data" worksheet, Item C. Hydraulic Fracture jobs conducted more than 30 days from the end of one stimulation job to the beginning of another stimulation job in the same well-bore is a new re-frac.

Notes

The EPA uses an assumption that 10% of wells are refractured each year to determine the number of re-frac's per year and then multiplies this by 9.175 MMSCF methane per re-frac to arrive at their inventory for this particular category.

For the year reported in Table 1, this table requests redundant information. The purpose of this table is to collect refracture information over a ten-year time period to provide a better estimate to EPA's assumption that 10% of wells are refractured each year.

FIGURE A-4. GAS WELL LIQUIDS UNLOADING SURVEY DATA

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Table 3. Gas Well Venting for Liquids Unloading (Well Clean-ups)

A Please indicate if the information provided in Table 3 follows the Subpart W methodologies (yes or no)

		Conventional	Unconventional	Total	Comments
B	Geographic Area				
C	Time Period - Months				
D	Number of Operated Gas Wells Represented by the information provided				Unconventional wells are: Shale, coal-bed methane, and tight formation (sand, carbonate, etc.) that must be fracture stimulated to produce economic quantities of gas
E	Number of Gas Wells with Plunger Lift Installed				
F	Number of Gas Wells with Other Artificial Lift (Beam Pump; ESP; etc.)				
G	Number of Gas Wells Vented to the atmosphere for Liquids Unloading				EPA assumes that 41.3% of conventional gas wells (437,800) are vented for liquids unloading
H	Total number of Gas Well Vents for Time Period				EPA assumes that each venting well vents 38.7 times per year
I	Average Venting Time per Vent				EPA assumes that each venting event is 3 hours duration
J	*Number of Wells with Plunger Lifts that vent to the atmosphere*				This is a sub-category of data item #5. Please indicate here the number of wells that vent to the atmosphere
K	*Total Count of Gas Well Vents for Time Period - w/plunger*				
L	*Total Count of Gas Well Vents for Time Period - w-o/plunger*				
M	*Average Venting Time - w/plunger*				Hours per Vent - fractional hours if appropriate
N	*Average Venting Time - w-o/plunger*				Hours per Vent - fractional hours if appropriate
O	*Average Daily Production of Venting Gas Wells*				mcf/day
P	*Average Depth of Venting Wells*				feet
Q	*Average Casing Diameter of Venting Gas Wells*				inches
R	*Average Tubing Diameter of Venting Gas Wells w/plunger Lift*				inches
S	*Average Surface Pressure - Venting Gas Wells*				psig

Guidance:

This table represents data from a sampling of wells (as opposed to data for all of your wells).

If information is not available by conventional or unconventional wells, just provide data in the "total" column.

A If you do not have data based on Subpart W, please indicate this in data item A by typing yes or no in the shaded box

Copy the table to provide data for additional geographic areas

Please provide information that you have available.

Blue rows are the minimum level of detail needed

Green rows provide more detailed information

B Geographic Area: Please indicate whether the information provided is for all of your operations in the U.S., or just a sub-part (single basin or multiple basins).

C Time period: Indicate the number of months represented by the information provided. Ideally this is based on some portion of 2011 data collected for Subpart W reporting.

J This data line is a sub-category if data item E. From the difference between these two items, we are trying to determine the fraction of plunger equipped wells that do not vent.

K,L Please enter the number of liquids unloading events where gas is released to the atmosphere.

Notes:

Many companies have likely been tracking well venting for liquids unloading for several months due to Subpart W. API is soliciting information from members to correct/confirm EPA's assumptions regarding well un-loading. If you do not have the wells split out into Conventional and Unconventional categories then simply report the total counts and information in the Conventional categories.

FIGURE A-5. OTHER SURVEY DATA

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Table 4. Other Activity Data

A

Centrifugal Compressors			
	Production/ gathering	Processing	
Year			2010 data is preferred, but available information from any recent year is OK
Number of Centrifugal Compressors			Include both engine/turbine driven and electric driven
Number with Dry Seals			
Number with Wet Seals			

B

Pneumatic Devices (Controllers)				
	Well Sites	Gathering/ Compressor Sites	Gas Processing Plants	
Year				2010 data is preferred, but available information from any recent year is OK
Number of Sites/Plants Covered				The total number of wells sites, gathering compressor sites, of gas processing plants represented by the inventory of devices below
Number of Low Bleed				EPA defines low bleed as <6 scfh
Number of High Bleed				EPA defines high bleed as >6 scfh
Number of Intermittent				

Guidance

For pneumatic devices: Do not include counts of devices operated on compressed air. Designate pneumatic devices between "high bleed", "low bleed", or "intermittent" following the approach your company is using for Subpart W reporting.

Appendix B. ANGA/API Well Survey Information

Responses from the second part of the API/ANGA survey, which focused on more detailed well information, covered more than 60,000 wells and provided data on:

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- # of gas wells without hydraulic fracturing (anytime in their history)
- # of gas wells with hydraulic fracturing (any time in their history);
  - # of vertical gas wells with hydraulic fracturing (anytime in their history);
  - # of horizontal gas wells with hydraulic fracturing (anytime in their history);
- # of completions for vertical gas wells with hydraulic fracturing;
- # of completions for horizontal gas wells with hydraulic fracturing;
- # of completions for gas wells without hydraulic fracturing;
- # of workovers for vertical wells with hydraulic fracturing;
- # of workovers for horizontal wells with hydraulic fracturing; and
- # of workovers for wells without hydraulic fracturing.

Table B-1 summarizes the well data collected by the ANGA/API survey and presents its distribution by formation type and region. The regional distribution follows the National Energy Modeling System (NEMS) regions defined by the EIA. The data are compared to EPA's national well counts classified by type as provided in the August 2011 database file (EPA, 2011d).

TABLE B-1. API/ANGA SURVEY – SUMMARY OF GAS WELL COUNTS BY TYPE AND NEMS REGION*

NEMS Region	Conventional Wells	Shale	Coal-bed Methane	Tight	Unspecified
Northeast	12,144	3,541	9	3,874	2,563
Gulf Coast	2,870	1,990	-	7,968	1,521
Mid-Continent	9,081	2,333	-	3,747	5,579
Southwest	646	1,208	-	726	2,326
Rocky Mountain	3,707	366	5,458	18,053	11
West Coast	-	-	-	-	-
Unspecified					1,307
Survey TOTAL	28,448	9,438	5,467	34,368	13,307
% of EPA 2010 Well Counts (from database file)	14.2%	30.1%	11.5%	45.6%	
Overall Survey Total	91,028				
EPA Well Counts (2010, from database file)	200,921	31,381	47,371	75,409	
	56.6%	8.8%	13.3%	21.2%	
	355,082				
EPA National Inventory (2010)	484,795				
EIA National Well Count (2010)	487,627				

* ANGA/API survey data represents well counts current for calendar year 2010 or the first half of 2011.

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As shown in Table B-1, data from the API/ANGA survey represent approximately 26% of the national gas wells reported by EPA's database (or 18.7% of the EIA well count data). This includes almost 46% of all tight gas wells and 30% of shale gas wells. This may indicate that the ANGA/API information has an uneven representation of unconventional gas wells, and in particular shale and tight gas wells, but it also appears that EPA's data may mis-categorize these types of wells. For example, the EPA/HPDI data set contains few wells from Pennsylvania and West Virginia while the API/ANGA survey includes 9,422 wells from that area (AAPG 160A).

Table B-2 summarizes additional details on the natural gas wells information collected through the second data collection effort by the ANGA/API survey which covered 60,710 wells.

TABLE B-2. ANGA/API SURVEY – ADDITIONAL DETAILS ON GAS WELL COUNTS*

	# Wells w/out hydraulic fracturing (anytime in their history)	# Wells with hydraulic fracturing (any time in their history)		
		Total	# Vertical wells	# Horizontal wells
TOTAL Conventional	1,498	16,678	14,844	1,834
TOTAL Coal Bed Methane	42	3,475	3,424	42
TOTAL Shale	1,931	9,084	2,012	7,072
TOTAL Tight	122	27,880	24,045	3,835
TOTAL OVERALL	**3,593**	**57,117**	**44,325**	**12,783**

* API/ANGA survey data represents well counts current for calendar year 2010 or the first half of 2011.

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Additional information on natural gas wells with and without hydraulic fracturing was provided for approximately two-thirds (60,710 natural gas wells) of the total well data collected by the ANGA/API survey. For this subset of the well data, 94% of the gas wells have been hydraulically fractured at some point in their operating history, including almost 92% of the conventional wells. EPA's 2010 national inventory reported 50,434 gas wells with hydraulic fracturing. This is very similar to the number of unconventional gas wells that EPA reported in the 2009 national inventory. ***Based on the API/ANGA survey results, it appears that EPA has underestimated the number of gas wells with hydraulic fracturing.***

Of the ANGA/API survey responses for wells that have been hydraulically fractured, most (77.6%) are vertical wells. Vertical wells are predominately conventional gas wells, coal-bed methane and tight gas wells; while the majority of shale gas wells are horizontal. EPA does not currently distinguish between vertical and horizontal gas wells.

A Short Note About EPA and EIA's Well Counts

There is a discrepancy of over 132,000 natural gas wells between the EPA database information (EPA, 2011d) and the EIA national gas well counts (EIA, 2012), and a difference of almost 130,000 gas wells between the two EPA data sources (EPA, 2011d and EPA, 2012). This difference needs to be understood since ultimately both the IHS (EIA) and HPDI (EPA) data originate from the same state-level sources of information.

The EIA provides a gas well count of 487,627 for 2010 based on Form EIA-895A[6], the Bureau of Ocean Energy Management, Regulation and Enforcement (formerly the Minerals

[6] Form EIA-895, Annual Quantity And Value Of Natural Gas Production Report; http://www.eia.gov/survey/form/eia_895/form.pdf

Management Service) data, and World Oil Magazine (EIA, 2010). However, the EIA does not classify gas wells by conventional and unconventional, or by formation types, precluding more detailed comparison against the EIA data. For some parameters the classifications were based on qualitative descriptions of the formations' physical properties (e.g. permeability) rather than on actual measurements (i.e. permeability data in millidarcy readings).[7]

EPA provides a similar well count in the 2010 national inventory: 434,361 non-associated gas wells + 50,434 gas wells with hydraulic fracturing, resulting in a total of 484,795 gas wells (EPA, 2012). Further classification of gas wells or description on what constitutes a "non-associated" gas well versus a "gas well with hydraulic fracturing" is not provided in EPA's national inventory.

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Small differences in the HPDI and IHS original data may arise from definitional differences as HPDI and IHS compile the raw data. In addition, each state may have a different interpretation of well definitions of gas versus oil wells that introduces differences among states for the wells reported. EPA had indicated in discussions with the API/ANGA group that their database well count information may not include all of the wells in the Marcellus basin. EIA indicates 44,500 gas wells in Pennsylvania in 2010. However, even in accounting for these wells, there is still a large difference (almost 88,000 wells) between EPA's total gas well number from their database source and EIA's well data.

Nevertheless, these discrepancies among the well counts need to be understood since these data all originate from the same state-level sources of information. Differences could arise, for example, from different interpretations of well definitions.

Since the EIA data is the *de facto* benchmark in the energy industry, the difference between the EIA and EPA well count data needs to be understood before any meaningful conclusions can be made from the EPA data.

Since EPA's well count from HPDI was much lower than the EIA, this report does not attempt to come up with a national gas well count but chose to use the 355,082 number from the EPA HPDI database because it was the only available database which parsed the wells into conventional and unconventional categories (EPA, 2011d).

[7] Information provided by Don Robinson of ICF (EPA's contractor).

Appendix C. Emission Estimates for Gas Well Liquids Unloading

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Tables C-1 through C-4 summarize the liquids unloading emissions data collected through the API/ANGA survey and the resulting emission estimates. The emission factors reported in Table 4 are based on a regional weighted average of the conventional and unconventional gas wells, with and without plunger lifts. This provided a consistent comparison against the EPA emission factors which are reported only on a regional basis and do not differentiate between conventional and unconventional wells or wells with and without plunger lifts.

TABLE C-1. LIQUIDS UNLOADING FOR CONVENTIONAL GAS WELLS WITHOUT PLUNGER LIFTS

NEMS Region	Northeast		Gulf Coast		Mid-Continent		Southwest
# venting gas wells	190	916	12	6	1	38	220
Total # gas well vents	4,335	39,668	144	60	1	2,444	880
Average casing diameter, inches	5	4.5	5.5	3.65	4.83	4	5.5
Average well depth, feet	3,375	3,448	10,000	19,334	7,033	4,269	8,000
Average surface pressure, psig (for venting wells)	85	50	(Weighted average applied) 65.2	224	25.5	60.8	100
Average venting time, hours	1	2	1	2.5	.25	4.95	1
Average daily production rate, Mscfd	12.83	7.21	300	664	58.43	84	100
Total emissions, scf gas/yr	13,492,728	78,217,933	1,287,782	3,854,938	2,440	38,451,629	9,037,809
Emissions per well, scfy gas/well	71,014	85,391	107,315	642,490	2,440	1,011,885	41,081

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Table C-2. Liquids unloading for Conventional gas wells with plunger lifts

NEMS Region	Northeast		Mid-Continent		
# venting gas wells	33	109	164	2	10
Total # gas well vents	1,272	4,217	489,912	23	7,300
Average tubing diameter, inches	2	2.375	1.995	2	2.375
Average well depth, feet	3,375	3,448	4,269	7,033	9,500
Average surface pressure, psig (for venting wells)	85	50	60.8	25.5	500
Average venting time, hours	1	0.3	0.067	0.75	0.08
Average daily production rate, Mscfd	12.83	7.21	84	58.43	30
Total emissions, scf gas/yr	973,442	1,963,379	232,529,848	23,623	74,495,422
Emissions per well, scfy gas/well	29,498	18,013	1,417,865	11,811	7,449,542

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Table C-3. Liquids unloading for Unconventional gas wells without plunger lifts

NEMS Region	Northeast	Gulf Coast				
# venting gas wells	337	6	8	27	11	15
Total # gas well vents	27,720	6	104	207	572	15
Average casing diameter, inches	4.5	5.5	5.5	4.5	5.5	10.75
Average well depth, feet	4,845	6,000	11,000	9,000	13,752	16,000
Average surface pressure, psig (for venting wells)	121.6	400	200	50	450	540
Average venting time, hours	1.36	3	1	5.3	2	2
Average daily production rate, Mscfd	26	200	25	130	353	8,500
Total emissions, scf gas/yr	148,079,273	267,095	2,749,066	5,736,344	49,326,199	11,004,804
Emissions per well, scfy gas/well	439,404	44,516	343,633	212,457	4,484,200	733,654

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TABLE C-3. LIQUIDS UNLOADING FOR UNCONVENTIONAL GAS WELLS WITHOUT PLUNGER LIFTS, CONTINUED

NEMS Region	Gulf Coast				Mid-Continent			
# venting gas wells	146	2	10	40	177	3	136	215
Total # gas well vents	146	12	120	40	400	7.2	391.2	2,580
Average casing diameter, inches	4.5	5.5	5.5	8.625	5.5	4.92	5.02	5.5
Average well depth, feet	8,500	11,647	11,000	12,500	3,911	10,293	7,888	11,000
Average surface pressure, psig (for venting wells)	15	25	94	530	80	90.04	98.75	200
Average venting time, hours	0.6875	1.5	4	1	2.5	1.58	1.925	0.5
Average daily production rate, Mscfd	99	83	92	6,500	250	727	875	100
Total emissions, scf gas/yr	276,156	82,853	2,985,945	7,496,306	7,908,154	196,019	16,457,032	68,197,984
Emissions per well, scfy gas/well	1,891	41,427	298,594	187,408	44,679	65,340	121,008	317,200

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Table C-3. Liquids unloading for Unconventional gas wells without plunger lifts, continued

NEMS Region	Southwest			Rocky Mountain			
# venting gas wells	228	6	3	5	113	2	28
Total # gas well vents	221	6	1	1800	2,004	4	10,584
Average casing diameter, inches	9.625	5.5	5	2.375	4.038	4.7	4.5
Average well depth, feet	8,725	8,000	15,000	11,597	11,149	11,056	10,844
Average surface pressure, psig (for venting wells)	516	50	200	476	250	250	198
Average venting time, hours	1	0.5	6.67	0.77	1.616	0.75	3.18
Average daily production rate, Mscfd	1,500	12	150	41.54	127	433	83
Total emissions, scf gas/yr	35,075,995	34,759	65,227	76,746,923	42,212,132	95,677	262,702,911
Emissions per well, scfy gas/well	153,842	5,793	21,742	15,349,385	373,559	47,839	9,382,247

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Table C-4. Liquids unloading for Unconventional gas wells with plunger lifts

NEMS Region	Northeast			Gulf Coast				
# venting gas wells	308	103	5	3	2	22	59	5
Total # gas well vents	63,840	75,190	194	156	2	22	354	5
Average tubing diameter, inches	2.375	2.375	2.375	2.375	2.375	2.375	2.375	2.375
Average well depth, feet	4,845	2,500	7,000	13,752	16,000	8,500	11,647	12,500
Average surface pressure, psig (for venting wells)	121.6	200	130	450	540	15	25	530
Average venting time, hours	0.221	0.05	0.1	2	1	0.875	0.3	0.5
Average daily production rate, Mscfd	26	15	628	353	8,500	99	83	6,500
Total emissions, scf gas/yr	87,985,573	84,228,892	410,107	5,522,367	391,212	45,622	341,615	71,050
Emissions per well, scfy gas/well	285,667	817,756	82,021	1,840,789	195,606	2,074	5,790	14,210

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Table C-4. Liquids unloading for Unconventional gas wells with plunger lifts, continued

NEMS Region	Mid Continent				Southwest	
# venting gas wells	48	4	64	29	18	60
Total # gas well vents	155,742	9.6	170.4	348	25	60
Average tubing diameter, inches	2.375	3.88	4.11	2.4	1.995	2.375
Average well depth, feet	3,911	10,293	7,888	(Average Applied) 7,888	8,725	6,800
Average surface pressure, psig (for venting wells)	80	90.04	98.75	74.69	516	110
Average venting time, hours	0.0833	2.99	2.6	0.5425	0.5	0.2
Average daily production rate, Mscfd	250	727	875	(Weighted average Applied) 371	1500	25
Total emissions, scf gas/yr	120,385,033	781,741	13,999,323	751,651	170,468	106,183
Emissions per well, scfy gas/well	2,508,022	195,435	218,739	25,919	9,470	1,770

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Table C-4. Liquids unloading for Unconventional gas wells with plunger lifts, continued

NEMS Region	Rocky Mountain				
# venting gas wells	247	23	296	19	793
Total # gas well vents	1,476	51.43	2,080	21,888	9,516
Average tubing diameter, inches	1.997	1.92	2.375	2.375	2.375
Average well depth, feet	11,149	11,164	11,056	10,844	7,400
Average surface pressure, psig (for venting wells)	250	290	250	198	150
Average venting time, hours	0.407	1.12	2.1	0.455	0.67
Average daily production rate, Mscfd	127	454	433	83	46
Total emissions, scf gas/yr	6,427,381	841,788	72,746,777	105,363,947	27,245,035
Emissions per well, scfy gas/well	26,022	36,599	245,766	5,545,471	34,357

The calculated emissions shown in Tables C-1 through C-4 are based on applying Equation W-8 from 40 CFR 98 Subpart W to gas well liquid unloading without plunger lifts and Equation W-9 to gas well liquid unloading with plunger lifts. The equations and the terms are provided below.

98.233(f)(2) *Calculation Methodology 2.* Calculate the total emissions for well venting for liquids unloading using Equation W–8 of this section.

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$$E_{s,n} = \sum_{p=1}^{W}\left[V_p \times \left(\left(0.37\times10^{-3}\right)\times CD_p^2 \times WD_p \times SP_p\right) + \sum_{q=1}^{V_p}\left(SFR_q \times \left(HR_{p,q} - 1.0\right)\times Z_{p,q}\right)\right] \quad \text{(Eq. W-8)}$$

Where:

$E_{s,n}$= Annual natural gas emissions at standard conditions, in cubic feet/year.
W = Total number of wells with well venting for liquids unloading for each sub-basin.
0.37×10^{-3}= {3.14 (pi)/4}/{14.7*144} (psia converted to pounds per square feet).
CD_p= Casing internal diameter for each well, p, in inches.
WD_p= Well depth from either the top of the well or the lowest packer to the bottom of the well, for each well, p, in feet.
SP_p= Shut-in pressure or surface pressure for wells with tubing production and no packers or casing pressure for each well, p, in pounds per square inch absolute (psia) or casing-to-tubing pressure of one well from the same sub-basin multiplied by the tubing pressure of each well, p, in the sub-basin, in pounds per square inch absolute (psia).
V_p= Number of vents per year per well, p.
SFR_p= Average flow-line rate of gas for well, p, at standard conditions in cubic feet per hour. Use Equation W–33 to calculate the average flow-line rate at standard conditions.
$HR_{p,q}$= Hours that each well, p, was left open to the atmosphere during unloading, q.
1.0 = Hours for average well to blowdown casing volume at shut-in pressure.
$Z_{p,q}$= If $HR_{p,q}$ is less than 1.0 then $Z_{p,q}$ is equal to 0. If $HR_{p,q}$ is greater than or equal to 1.0 then $Z_{p,q}$ is equal to 1.

98.233(f)(3) *Calculation Methodology 3.* Calculate emissions from each well venting to the atmosphere for liquids unloading with plunger lift assist using Equation W–9 of this section.

$$E_{s,n} = \sum_{p=1}^{W}\left[V_p \times \left(\left(0.37\times10^{-3}\right)\times TD_p^2 \times WD_p \times SP_p\right) + \sum_{q=1}^{V_p}\left(SFR_q \times \left(HR_{p,q} - 0.5\right)\times Z_{p,q}\right)\right] \quad \text{(Eq. W-9)}$$

Where:

$E_{s,n}$= Annual natural gas emissions at standard conditions, in cubic feet/year.
W = Total number of wells with well venting for liquids unloading for each sub-basin.
0.37×10^{-3}= {3.14 (pi)/4}/{14.7*144} (psia converted to pounds per square feet).
TD_p= Tubing internal diameter for each well, p, in inches.
WD_p= Tubing depth to plunger bumper for each well, p, in feet.
SP_p= Flow-line pressure for each well, p, in pounds per square inch absolute (psia), using engineering estimate based on best available data.
V_p= Number of vents per year for each well, p.
SFR_p= Average flow-line rate of gas for well, p, at standard conditions in cubic feet per hour. Use Equation W–33 to calculate the average flow-line rate at standard conditions.
$HR_{p,q}$= Hours that each well, p, was left open to the atmosphere during each unloading, q.
0.5 = Hours for average well to blowdown tubing volume at flow-line pressure.

$Z_{p,q}$= If $HR_{p,q}$ is less than 0.5 then $Z_{p,q}$ is equal to 0. If $HR_{p,q}$ is greater than or equal to 0.5 then $Z_{p,q}$ is equal to 1.

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Re: Workshop Summary Report Draft
Suzanne Waltzer to: Melissa Weitz 10/03/2012 03:43 PM
Cc: Suzanne Kocchi, Bill Irving, Mark DeFigueiredo

Attached are my edits on Thursdays summary (through page 3). I wanted to go ahead and send these to you. I will send a second set on Friday's summary very shortly.

For liquids unloading, my main comment is that I think we should capture some of the questions [redacted] (b)(5) deliberative [redacted] so I think we should include that in the summary.

(b)(5) deliberative [redacted]

Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.02_sk.mw sw.docx

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

Melissa Weitz Hi, I addressed Mark's comment on the attendan... 10/03/2012 02:28:50 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/03/2012 02:28 PM
Subject: Re: Workshop Summary Report Draft

Hi,

I addressed Mark's comment on the attendance list, and most of Suzie K's comments.

There a comment on GasStar--page 4--that we'll need Suzie W's input on.

For the next steps summary section, how much detail would Paul like to see? The next steps piece currently in the report is pasted below:

[redacted] (b)(5) deliberative [redacted]

[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft

Report.2012.10.02_sk.mw.docx" deleted by Suzanne Waltzer/DC/USEPA/US]

Suzanne Kocchi	paul also wants to review it before we give to sar...	10/03/2012 09:30:54 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/03/2012 09:30 AM
Subject: Re: Workshop Summary Report Draft

paul also wants to review it before we give to sarah and he wants a summary section of next steps at the end so we need to add that before we give to him,

Suzanne Kocchi	Some track changes edits. A few comments an...	10/03/2012 08:53:24 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/03/2012 08:53 AM
Subject: Re: Workshop Summary Report Draft

Some track changes edits. A few comments and places highlighted in yellow where I think something should be filled in.

Before this goes to Sarah, Bill should review if he hasn't already.

Thanks!

[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.02_sk.docx" deleted by Suzanne Kocchi/DC/USEPA/US]

Melissa Weitz	Hello, The draft workshop summary report is att...	10/02/2012 06:46:08 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA
Cc: Bill Irving/DC/USEPA/US@EPA
Date: 10/02/2012 06:46 PM
Subject: Workshop Summary Report Draft

Hello,

The draft workshop summary report is attached below. Very sorry for the delay in sending this around.

To be able to post the summary by Friday, we'd like to get this to Sarah tomorrow afternoon for review.

Please send me any comments you have by early afternoon tomorrow--sorry for the quick turnaround.

Melissa

[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.02.docx" deleted by Suzanne Kocchi/DC/USEPA/US]

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Re: draft of next steps for review ---Re: Workshop Summary Report Draft
Suzanne Kocchi to: Melissa Weitz 10/03/2012 04:58 PM
Cc: Bill Irving, Mark DeFigueiredo, Suzanne Waltzer

yes, i think that is closer to what paul is thinking. would be good if we can put this in his hands before he leaves. can you print out a draft and run it up to his office now?

Melissa Weitz (Bill--what is your understanding of EDF's timing... 10/03/2012 03:39:00 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/03/2012 03:39 PM
Subject: draft of next steps for review ---Re: Workshop Summary Report Draft

(Bill--what is your understanding of EDF 's timing...I've seen many different dates and the notes from the workshop say January 2014)

(b)(5) deliberative

[redacted]

- [redacted]
- [redacted]
- [redacted]

[redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]

Suzanne Kocchi I am in a mtg but he wants more concrete specifi... 10/03/2012 02:35:05 PM

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/03/2012 02:35 PM
Subject: Re: Workshop Summary Report Draft

I am in a mtg but he wants more concrete specific next steps to manage expectations.

Melissa Weitz	Hi, I addressed Mark's comment on the attend...	10/03/2012 02:28 PM EDT

From: Melissa Weitz
To: Suzanne Kocchi; Bill Irving; Mark DeFigueiredo; Suzanne Waltzer
Cc:
Date: 10/03/2012 02:28 PM EDT
Subject: Re: Workshop Summary Report Draft

Hi,

I addressed Mark's comment on the attendance list, and most of Suzie K's comments.

There a comment on GasStar--page 4--that we'll need Suzie W's input on.

For the next steps summary section, how much detail would Paul like to see? The next steps piece currently in the report is pasted below:

[redacted] (b)(5) deliberative [redacted].

[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.02_sk.mw.docx" deleted by Suzanne Kocchi/DC/USEPA/US]

Suzanne Kocchi	paul also wants to review it before we give to sar...	10/03/2012 09:30:54 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/03/2012 09:30 AM
Subject: Re: Workshop Summary Report Draft

paul also wants to review it before we give to sarah and he wants a summary section of next steps at the end so we need to add that before we give to him,

Suzanne Kocchi	Some track changes edits. A few comments an...	10/03/2012 08:53:24 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/03/2012 08:53 AM
Subject: Re: Workshop Summary Report Draft

Some track changes edits. A few comments and places highlighted in yellow where I think something

should be filled in.

Before this goes to Sarah, Bill should review if he hasn't already.

Thanks!

[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.02_sk.docx" deleted by Suzanne Kocchi/DC/USEPA/US]

Melissa Weitz	Hello, The draft workshop summary report is att...	10/02/2012 06:46:08 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA
Cc: Bill Irving/DC/USEPA/US@EPA
Date: 10/02/2012 06:46 PM
Subject: Workshop Summary Report Draft

Hello,

The draft workshop summary report is attached below. Very sorry for the delay in sending this around.

To be able to post the summary by Friday, we'd like to get this to Sarah tomorrow afternoon for review.

Please send me any comments you have by early afternoon tomorrow--sorry for the quick turnaround.

Melissa

[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.02.docx" deleted by Suzanne Kocchi/DC/USEPA/US]

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Re: Review of email to API following up on the separate factors ----Re: API/ANGA Report (Updated)

Suzanne Kocchi to: Bill Irving 10/03/2012 05:05 PM
Cc: Suzanne Waltzer, Melissa Weitz

i agree with bill. if karin doesn't respond to you by tomorrow am, give her a call.

Bill Irving | No comments (in case you already sent it). It's... | 10/03/2012 03:41:01 PM

From: Bill Irving/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 10/03/2012 03:41 PM
Subject: Re: Review of email to API following up on the separate factors ----Re: API/ANGA Report (Updated)

No comments (in case you already sent it). It's worth following up with a phone call as well.

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Suzanne Waltzer | Looks great. Small comment - in addition to sayi... | 10/03/2012 02:25:34 PM

From: Suzanne Waltzer/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA
Date: 10/03/2012 02:25 PM
Subject: Re: Review of email to API following up on the separate factors ----Re: API/ANGA Report (Updated)

Looks great.

Small comment - in addition to saying early next week, I think we should specify a date, maybe October 10th, so it is not overlooked.

Suzanne Kocchi | looks good to me From: Melissa Weitz/DC/USE... | 10/03/2012 02:05:11 PM

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Bill Irving/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/03/2012 02:05 PM
Subject: Re: Review of email to API following up on the separate factors ----Re: API/ANGA Report (Updated)

looks good to me

Melissa Weitz | Just wanted to get a quick check on whether this... | 10/03/2012 01:36:42 PM

From: Melissa Weitz/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/03/2012 01:36 PM

Subject: Review of email to API following up on the separate factors ----Re: API/ANGA Report (Updated)

Just wanted to get a quick check on whether this is too pushy/not pushy enough...

(b)(5) delibera ive

Thank you,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter	Melissa, Please find attached the updated API/A...	09/28/2012 04:01:33 PM

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 09/28/2012 04:01 PM
Subject: API/ANGA Report (Updated)

Melissa,

Please find attached the updated API/ANGA report for your review. As discussed, we will keep you posted on plans for its release on API's website – in the meantime please do not publicize, cite, or share outside your organization.

As always please let me know if you have any questions.

Much appreciated,
Karin

Karin Ritter
Regulatory and Scientific Affairs
+1 (202) 682- 8472
www.api.org

********** ATTACHMENT NOT DELIVERED
****

This Email message contained an attachment named
  image001.jpg
which may be a computer program. This attached computer program could
contain a computer virus which could cause harm to EPA's computers,
network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced
into the EPA network. EPA is deleting all computer program attachments
sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you
should contact the sender and request that they rename the file name
extension and resend the Email with the renamed attachment. After
receiving the revised Email, containing the renamed attachment, you can
rename the file extension to its correct name.

For further information, please contact the EPA Call Center at
(866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED
****

[attachment "Task 2 API ANGA Survey Report Final 21Sept12 clean
ae.pdf" deleted by Melissa Weitz/DC/USEPA/US]

Re: Fw: Subpart W task for ERG
Melissa Weitz to: Marty Wolf 10/03/2012 05:48 PM
Cc: "Fields, Paula"

Hello,

I'll call tomorrow a.m.

The UNFCCC ERT is doing an in-country review of last year's Inventory this week. It's going well so far; I presented on natural gas/petroleum systems yesterday. I don't expect them to have many/any follow up questions, but we'll see. We probably won't need anything from ERG on this.

Melissa

"Marty Wolf"	Melissa, Paula and I were talking and we we...	10/03/2012 02:52:06 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Date: 10/03/2012 02:52 PM
Subject: Re: Fw: Subpart W task for ERG

Melissa,

Paula and I were talking and we weren't sure about the timing of the UNFCCC review.

I am available to talk until about 2:30 pm Pacific Time. In tomorrow morning around 6 am Pacific.

Thanks,
Marty

>>> Melissa Weitz <Weitz.Melissa@epamail.epa.gov> 10/3/2012 11:43 AM >>>

Hi,

What times are you available to talk today? I'm away from my desk a lot this week as we're hosting a GHG Inventory review team from the UNFCCC. I will hopefully have a chance to call later this afternoon.

Basically I'm looking for the same review that Casey/Clint did of the original report's data and use of equations. It may be possible to use the same spreadsheet but plug in the new values--may be useful to check in with Casey/Clint to see if that approach would work.

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897

Weitz.Melissa@epa.gov

"Marty Wolf" ---10/03/2012 02:22:25 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 10/03/2012 02:22 PM
Subject: Re: Fw: Subpart W task for ERG

Melissa,

Please call to discuss. I am still looking for some clarification on what you want me to be looking at.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> Melissa Weitz <Weitz.Melissa@epamail.epa.gov> 10/3/2012 11:07 AM >>>

Hello,

Below is the ERG review of the earlier API/ANGA report. Sorry, I was confused and thought you had worked on this one.

[redacted] (b)(5) deliberative [redacted]

Thanks,
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/03/2012 02:05 PM -----

From: "Casey MacQueen" <Casey.MacQueen@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Clint Burklin" <Clint.Burklin@erg.com>
Date: 07/16/2012 02:57 PM
Subject: Re: Fw: Subpart W task for ERG

Melissa,

We have performed a detailed review of the underlying data and methodology

presented in the API-ANGA report that were used to calculate emissions from well liquids unloading; [redacted] (b)(5) deliberative [redacted].

Please let us know if you have any questions or comments, or would like to set up a call to discuss.

Thank you,
Casey
Casey MacQueen
Chemical Engineer
Eastern Research Group, Inc.
14555 Avion Pkwy, Suite 200
Chantilly, VA 20151
(703) 633-1686

>>> Casey MacQueen 7/12/2012 4:53 PM >>>
Melissa,

We have reviewed the underlying data and methodology presented in the API-ANGA report that was used to calculate emissions from well liquids unloading. [redacted] (b)(5) deliberative [redacted]

We plan to proceed in developing a memorandum that elaborates on and confirms our findings to deliver on Monday. Please let us know if you would like to discuss anything in further detail in the meantime.

Thank you,
Casey

Casey MacQueen
Chemical Engineer
Eastern Research Group, Inc.
14555 Avion Pkwy, Suite 200
Chantilly, VA 20151
(703) 633-1686

>>> Melissa Weitz <Weitz.Melissa@epamail.epa.gov> 7/9/2012 4:32 PM >>>

Hi Clint,

There is a Subpart W/GHG Inventory question we have and we'd like to get some input from ERG.

We'd like to have ERG review the attached report on the API/ANGA report's

information on liquids unloading. [redacted] (b)(5) deliberative [redacted]

We'd like to get some initial thoughts on this by Thursday, and more detailed information by Monday. We'll need an LOE before preceding. Let me know if you can do this task, and would the LOE will be. I'm free all day tomorrow to discuss, or until about 6pm tonight.

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 07/09/2012 04:29 PM -----

From: Akachi Imegwu/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 07/09/2012 02:56 PM
Subject: Re: Fw: Subpart W task for ERG

Hi Melissa,
Yes there is capacity under the subpart task order for this type of work. You can request that he do this work (please get an LOE first) And the contract information is EP-W-11-053-0001 / Task 0001.

The contact for the subpart W work is Clint Burklin. Clint was part of the team that reviewed the completions equation, but I do believe there are others.
It might be best to have a 15 minute discussion with them on the phone about the task so that they are fully understood about the expectations.

Akachi N. Imegwu
Climate Change Division
Greenhouse Gas Reporting Program
Office of Air and Radiation
US Environmental Protection Agency
p(202) 343-9709
f(202) 343-2361

Melissa Weitz---07/09/2012 01:59:45 PM---Hi Akachi, We'd like to have ERG review the attached report on the API/ANGA report's information on

From: Melissa Weitz/DC/USEPA/US
To: Akachi Imegwu/DC/USEPA/US@EPA
Date: 07/09/2012 01:59 PM

Subject: Re: Fw: Subpart W task for ERG

Hi Akachi,

We'd like to have ERG review the attached report on the API/ANGA report's information on liquids unloading. [redacted] (b)(5) deliberative [redacted]

The report is attached below. Please let me know if we can do this task under your TO and if it'd be at all possible to get quick thoughts from ERG on this by Thursday.

Thanks!
Melissa

(See attached file: Memo API-ANGA Report Liquids Unloading Review 7 03 12.doc)

Akachi Imegwu---07/09/2012 11:41:42 AM---Hi Melissa, Yes I do. I have one with ERG and one with ICF that should be closing soon.

From: Akachi Imegwu/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 07/09/2012 11:41 AM
Subject: Re: Fw: Subpart W task for ERG

Hi Melissa,
Yes I do. I have one with ERG and one with ICF that should be closing soon.

Akachi N. Imegwu
Climate Change Division
Greenhouse Gas Reporting Program
Office of Air and Radiation
US Environmental Protection Agency
p(202) 343-9709
f(202) 343-2361

Melissa Weitz---07/09/2012 11:08:42 AM---Hi Akachi-- Do you have a TO with ERG for W work?

From: Melissa Weitz/DC/USEPA/US
To: Akachi Imegwu/DC/USEPA/US@EPA
Date: 07/09/2012 11:08 AM
Subject: Fw: Subpart W task for ERG

Hi Akachi--

Do you have a TO with ERG for W work?

Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 07/09/2012 11:08 AM -----

From: Margo Eaddy/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Akachi Imegwu/DC/USEPA/US@EPA
Date: 07/06/2012 11:19 AM
Subject: Re: Fw: Subpart W task for ERG

I don't. Akachi might. I think she might be out today. Can you wait until Monday?

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Akachi Imegwu/DC/USEPA/US@EPA, Margo Eaddy/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 07/06/2012 10:39AM
Subject: Fw: Subpart W task for ERG

Hi,

Do either of you have a TO in place for W?

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 07/06/2012 10:39 AM -----

From: Katherine Sibold/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 07/06/2012 07:50 AM
Subject: Re: Subpart W task for ERG

Hi Melissa, the W team has a new TO with RTI in place to cover all the W work--we're not using the ERG TO for W work. I don't know if Margo or Akachi is the

COR but you should ask if the new task order can cover it. If you still have problems getting it done, let me know.
Kitty Melissa Weitz
----- Original Message -----
From: Melissa Weitz
Sent: 07/05/2012 04:24 PM EDT
To: Katherine Sibold
Cc: Suzanne Waltzer
Subject: Re: Subpart W task for ERG
Hi Kitty,

Is the TO we used to for QTA below still in place? If so, we may want ERG to do another related QTA.

(b)(5) deliberative

Please let me know if the TO is still available and whether you might be able to do this QTA.

Thanks!
Melissa

Katherine Sibold---03/09/2012 03:45:28 PM---From: Katherine Sibold/DC/USEPA/US To: Ruth.Mead@erg.com, "John Crenshaw" <John.Crenshaw@erg.com>

From: Katherine Sibold/DC/USEPA/US
To: Ruth.Mead@erg.com, "John Crenshaw" <John.Crenshaw@erg.com>
Cc: Melissa Weitz/DC/USEPA/US@EPA
Date: 03/09/2012 03:45 PM
Subject: Subpart W task for ERG

Ruth and John, here's the email that Melissa sent earlier-- it didn't go through for you two. It looks like Clint's did get delivered.
Kitty
++++++++++++++
Katherine (Kitty) Sibold
USEPA- Office of Air and Radiation
Mailing address: 1200 Pennsylvania Avenue, NW (6207J)
Washington, DC 20460
p: +202-343-9280/ f:+202-343-2202
Street location: 1310 L St, NW, Rm 742
www.epa.gov/climatechange/emissions/ghgrulemaking.html

Notice: Any communication on the GHG Reporting Program (GHGRP) is intended to provide general and administrative information about Part 98. This communication does not provide legal advice, and responses to questions do not have legally binding effect or expressly or implicitly create, expand, or limit any legal rights, obligations, responsibilities, expectations, or benefits in regard to any person. Facility owners or operators and suppliers are responsible for determining how they would be affected by the requirements of the rule.

-----Forwarded by Katherine Sibold/DC/USEPA/US on 03/09/2012 03:43PM -----
To: Clint.Burklin@erg.com, "Ruth Mead" <Ruth.Mead@erg.com>, crenshaw.john@erg.com
From: Melissa Weitz/DC/USEPA/US
Date: 03/09/2012 02:15PM
Cc: Katherine Sibold/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Subject: Subpart W task for ERG

(See attached file: ENV - GHG - Devon Ltr to EPA-Lisa Hanle on Methane Estimates with Attach (11-30-11).pdf)
(See attached file: Env - GHG - Devon Flowback Methane Emission Raw Data (10-24-11).pdf)

Hello!

We have a quick turnaround task we'd like ERG to complete.

This task is a follow-up task to work reviewing the sonic flow equation in Subpart W of the GHGRP.

During the comment period for the NSPS on oil and gas, EPA received data on fracturing well completions. The emissions per completion were calculated using equation 11-B in subpart W, according to the 11-30-11 attachment, page 4.

EPA requests a review of this data. Specifically, [redacted] (b)(5) deliberative

Attached below is the dataset. Despite our follow-up request for data on a representative sample of all of their wells, not just green completions, this data set is the same approach as the original one. It only includes actual data for 98 wells that were NOT green completed. The other data for the green completed wells has only flow back times in about half the green competed wells.

We need a very quick turnaround on this, by next Tuesday COB, if possible.

Thanks very much and please let me and Kitty know if you have any questions.

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov[attachment "ENV - GHG - Devon Ltr to EPA-Lisa Hanle on Methane Estimates with Attach (11-30-11).pdf" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Env - GHG - Devon Flowback Methane Emission Raw Data (10-24-11).pdf" deleted by Melissa Weitz/DC/USEPA/US]

(See attached file: API-ANGA Survey Final Report Use of Eqns W-8 and 9.2012.07.16.docx)(See attached file: API-ANGA Report Appendix C Data Analysis.2012.07.16.xlsx)

Plunger Lift Control Effectiveness

Stricklin, Eric to: Suzanne Waltzer 10/04/2012 03:53 PM

Cc: Melissa Weitz, "Robinson, Donald"

History: This message has been forwarded.

Suzie,

Below is a summary of all the references that have plunger lift data or estimate the control effectiveness for plunger lift:

(b)(5) deliberative

(b)(5) deliberative

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

Fw: RE: updated API/ANGA report

Melissa Weitz to: Suzanne Waltzer 10/04/2012 10:57 PM

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 10/04/2012 10:57PM -----
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/04/2012 08:22PM
Subject: RE: updated API/ANGA report

(See attached file: Analysis of Changes to API ANGA LU calcs.docx)

Hi Melissa,

I've taken a look at the liquids unloading section and put together the attached little memo. [redacted] (b)(5) deliberative [redacted]

[redacted]

Please let me know if you have any questions on this. Hope it's helpful. I'll be turning back to the Processing crosswalks in the morning, and

will get those to you as soon as I can.

Best,

Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 12:09 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: updated API/ANGA report

Thank you! This will be very helpful. Tim--please call me if you have any questions. We only need review of the liquids unloading piece. The same review you guys did last time. Thanks!

(See attached file: Task 2 API ANGA Survey Report Final 21Sept12 clean ae.pdf)

"Minnucci, Chris A." ---10/03/2012 03:05:33 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/03/2012 03:05 PM
Subject: RE: updated API/ANGA report

Melissa,

I'm actually going to be out Thursday and Friday, but I've talked to Tim and he believes he can get this done by Friday AM. He'll also be working to finish up the processing sector crosswalk and get that to you by COB Friday. Please just send the report to myself and Tim; we will not distribute it further.

thanks,
Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/3/2012 1:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: updated API/ANGA report

API/ANGA have provided EPA with an advance copy of their updated report on methane emissions. (b)(5) deliberative [redacted]

Is SAIC able to do this review? We'd like your analysis by Friday AM if that is feasible. The report is not for distribution outside of EPA and its technical contractors, so if I send you a copy, do not distribute it outside of the group performing the review.

(b)(5) deliberative [redacted]

Melissa Analysis of Changes to API ANGA LU calcs.docx

Re: sneak preview on plunger lifts
Suzanne Waltzer to: Melissa Weitz 10/05/2012 10:58 AM

History: This message has been forwarded.

[redacted] (b)(5) deliberative [redacted]. It will be interesting to see what we get.

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Suzanne Waltzer/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 10/05/2012 09:56AM
Subject: sneak preview on plunger lifts

So, I looked at Tim's analysis and [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted] (b)(5) deliberative [redacted]

Re: ERG statistician

Paula Fields to: Melissa Weitz 10/05/2012 11:00 AM

History: This message has been forwarded.

Hi Melissa -

Yes, we do have several folks who can do this. Let me check on their availability.

In terms of time and effort, would you estimate this might take 8-12 hours and you need it ASAP?

-Paula

****
Paula G. Fields
Principal Air Quality Engineer
Eastern Research Group, Inc. (ERG)
10860 Gold Center Dr., Suite #275
Rancho Cordova, CA 95670
office: 916-635-6593
cell: 916-835-0341
fax: 916-859-0185

>>> Melissa Weitz 10/05/12 7:54 AM >>>

Hi Paula,

Does ERG have a statistician we could access under the Inventory TO?

[redacted] (b)(5) deliberative [redacted]

If not, we can probably work with the statistician we used for the NSPS under a different TO.

Melissa

Re: LU API follow-up - one more thing
Suzanne Kocchi to: Suzanne Waltzer 10/05/2012 12:11 PM
Cc: Melissa Weitz

History: This message has been forwarded.

Perfect. All sounds good. You guys are totally on top of it.

From: Suzanne Waltzer
Sent: 10/05/2012 12:09 PM EDT
To: Suzanne Kocchi
Cc: Melissa Weitz
Subject: Re: LU API follow-up - one more thing

Sounds good. Just to clarify in case my previous note was not clear, [redacted] (b)(5) deliberative [redacted] Sound ok?

Also, Mark, Melissa and I just had a good discussion on the information from Subpart W that would be most useful to the inventory analyses. Mark is going to include those questions as part of the priority analysis they are doing of the Subpart W data.

Thanks,

Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

-----Suzanne Kocchi/DC/USEPA/US wrote: -----
To: Suzanne Waltzer/DC/USEPA/US@EPA
From: Suzanne Kocchi/DC/USEPA/US
Date: 10/05/2012 11:04AM
Cc: Melissa Weitz/DC/USEPA/US@EPA
Subject: Re: LU API follow-up - one more thing

you can do one of 2 things: [redacted] (b)(5) deliberative [redacted]

Suzanne Waltzer---10/05/2012 11:01:34 AM---Hi Melissa and Suzie, I too was thinking about Liquids Unloading late last night (sad :) and it o

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA
Date: 10/05/2012 11:01 AM

Subject: LU API follow-up - one more thing

Hi Melissa and Suzie,

I too was thinking about Liquids Unloading late last night (sad :) and it occurred to me that the other [redacted] (b)(5) deliberative [redacted]

[redacted]

Thoughts?

Thanks!

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

RE: updated API/ANGA report
Melissa Weitz to: Kidman, Timothy M. 10/05/2012 01:51 PM
Cc: "Minnucci, Chris A."

Thank you!

(b)(5) delibera ive [redacted]

GHG Inventory LU factor spreadsheet: Liquids Unloading EF Calculation (2010Inv).xlsx

(b)(5) deliberative [redacted]

My calculations of factors from API data: PL.xlsx

Thanks! Let me know if you have questions on either of these.

Melissa

"Kidman, Timothy M."	Melissa,	10/05/2012 12:20:45 PM

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/05/2012 12:20 PM
Subject: RE: updated API/ANGA report

Melissa,

I'd be happy to help with 1 and 2, but Chris may be a better resource for 3, so I'll defer to him on that one. Please send me the spreadsheets and I'll take a look.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, October 05, 2012 7:47 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

This is great. Thanks so much!!

Is SAIC able to do some related follow-on work?

(b)(5) deliberative

Let me know if you'll be able to do these tasks, and I'll send you the spreadsheets. We'd want this information by mid-next week. Earlier the better though.

Melissa

"Kidman, Timothy M." ---10/04/2012 08:22:40 PM---Hi Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/04/2012 08:22 PM
Subject: RE: updated API/ANGA report

Hi Melissa,

I've taken a look at the liquids unloading section and put together the attached little memo. In short, (b)(5) deliberative

Please let me know if you have any questions on this. Hope it's helpful. I'll be turning back to the Processing crosswalks in the morning, and will get those to you as soon as I can.

Best,
Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 12:09 PM
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Cc: Kidman, Timothy M.
Subject: RE: updated API/ANGA report

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"Minnucci, Chris A." ---10/03/2012 03:05:33 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/03/2012 03:05 PM
Subject: RE: updated API/ANGA report

Melissa,

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thanks,
Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/3/2012 1:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: updated API/ANGA report

API/ANGA have provided EPA with an advance copy of their updated report on methane emissions. They [redacted] (b)(5) deliberative [redacted]

Is SAIC able to do this review? We'd like your analysis by Friday AM if that is feasible. The report is not for distribution outside of EPA and its technical contractors, so if I send you a copy, do not distribute it outside of the group performing the review.

Melissa [attachment "Analysis of Changes to API ANGA LU calcs.docx" deleted by Melissa Weitz/DC/USEPA/US]

updated plunger lifts spreadsheet

Melissa Weitz to: Kidman, Timothy M. 10/05/2012 02:17 PM

(b)(5) deliberative

[redacted]

PL.xlsx

Re: ERG statistician
Melissa Weitz to: Paula Fields 10/05/2012 02:20 PM
Cc: "Marty Wolf"

Wonderful--thanks! Let's talk early Tuesday afternoon (east coast time)?

I'm with the review team the rest of the day today and then off Monday. In the meantime, maybe send Tim the spreadsheets to see if he has any questions?

"Paula Fields"	Hi Melissa - Luckily, one of our best statistici...	10/05/2012 02:01:02 PM

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 10/05/2012 02:01 PM
Subject: Re: ERG statistician

Hi Melissa -
Luckily, one of our best statisticians is available: Dr. Tim DeFries. His bio is below. In response to my inquiry he said: [redacted] (b)(5) deliberative [redacted]

I think the best next step would be to have a conference call. When would you like to get together. We should involve Marty, too, since he will be able to help Tim interpret the two datasets.

Paula

Dr. Tim DeFries has a wide variety of experience in the use of statistical tools for the analysis of mobile source data. He has used SAS continuously since 1980 first at Exxon Research and Engineering Company, then at Radian Corporation, and now at Eastern Research Group.

While at Exxon, he learned statistical experimental design techniques from Stuart Hunter. After applying those techniques for several years in the study of motor fuels, including emissions effects in a photochemical smog chamber which he ran, he worked on the review committee that guided Exxon's development of its internal experimental design course. This course integrated these advanced design techniques with the benefits of SAS for use by Exxon scientists. Now at Eastern Research Group, he is one a few who applies statistical experimental design techniques regularly.

Through his long association with SAS and resident statisticians, he has a daily familiarity with ordinary least squares regression, multiple linear regression, nonlinear regression, analysis of variance, logistic regression, variance stabilizing transformations, and measurement-error modeling. As a member of the mobile sources group, he maintains close working relationships with statisticians to help bridge the gap between a project's practical need for data analysis and the fundamental techniques of statistics.

****
Paula G. Fields

Principal Air Quality Engineer
Eastern Research Group, Inc. (ERG)
10860 Gold Center Dr., Suite #275
Rancho Cordova, CA 95670
office: 916-635-6593
cell: 916-835-0341
fax: 916-859-0185

>>> Melissa Weitz 10/05/12 7:54 AM >>>

Hi Paula,

Does ERG have a statistician we could access under the Inventory TO?

On liquids unloading emission factors, [redacted] (b)(5) deliberative [redacted]

If not, we can probably work with the statistician we used for the NSPS under a different TO.

Melissa

RE: updated API/ANGA report
Kidman, Timothy M. to: Melissa Weitz 10/05/2012 03:41 PM
Cc: "Minnucci, Chris A."

History: This message has been forwarded.

Melissa,

Do you have any documentation that goes with the LU factor spreadsheet? If so, could you please send that along?

Thanks

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, October 05, 2012 10:51 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

Thank you!

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Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/05/2012 12:20 PM
Subject: RE: updated API/ANGA report

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This is great. Thanks so much!!

Is SAIC able to do some related follow-on work?

(b)(5) deliberative

Let me know if you'll be able to do these tasks, and I'll send you the spreadsheets. We'd want this information by mid-next week. Earlier the better though.

Melissa

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To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A."

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Date: 10/04/2012 08:22 PM
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[redacted]

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Cc: Kidman, Timothy M.
Subject: RE: updated API/ANGA report

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(See attached file: Task 2 API ANGA Survey Report Final

21Sept12 clean ae.pdf)

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Melissa [attachment "Analysis of Changes to API ANGA LU calcs.docx" deleted by Melissa Weitz/DC/USEPA/US]

Fw: LU memo

Melissa Weitz to: Kidman, Timothy M. 10/05/2012 05:14 PM

This is the background info.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/05/2012 05:14 PM -----

From: Melissa Weitz/DC/USEPA/US
To:
Date: 09/28/2012 03:11 PM
Subject: LU memo

This is all I can find in EPA's files on the liquids unloading EF. It doesn't contain the data. I'll check with ICF.

Melissa

(b)(5) deliberative

[redacted]

Emissions from Well Cleanups 12-13-2010_FINAL_.doc

FW: updated plunger lifts spreadsheet

Kidman, Timothy M. to: Melissa Weitz 10/09/2012 01:31 PM

Cc: "Minnucci, Chris A."

History: This message has been forwarded.

Melissa,

I've checked your calculations and identified and fixed a couple of small errors – nothing major. I included Comment bubbles where I made changes in the attached workbook. To help you navigate, I'm pasting below my own summary table that I created to check your values, with the items on which we had a discrepancy shown in yellow.

We will be sending a memo summarizing the issues below and thoughts on plunger lift efficiency to you tomorrow by COB, but we wanted to share a few observations as you review the averages at different levels of aggregation.

(b)(5) deliberative

(b)(5) deliberative

(b)(5) deliberative

(b)(5) deliberative

Apologies for the lengthy email - again, we will also include some of these observations in a memo covering this issue and additional thoughts on plunger lift efficiency that we will send by COB tomorrow.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, October 05, 2012 11:18 AM
To: Kidman, Timothy M.
Subject: updated plunger lifts spreadsheet

(b)(5) deliberative

(See attached file: PL.xlsx) PL_tk.xlsx

RE: updated API/ANGA report
Melissa Weitz to: Minnucci, Chris A. 10/10/2012 02:42 PM
Cc: "Kidman, Timothy M."

(b)(5) deliberative

(b)(5) deliberative

"Minnucci, Chris A." Melissa, 10/10/2012 12:19:06 PM

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/10/2012 12:19 PM
Subject: RE: updated API/ANGA report

Melissa,

Attached please find a memo addressing (b)(5) deliberative

Please let us know if you have any questions or comments on the attached, or would like us to perform any further analyses in these or other areas. As I will be off this Thursday and Friday (my usual days off), please include Tim in any requests for further work--he should be able to help you during my absence.

Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Fri 10/5/2012 1:51 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

Thank you!

GHG Inventory LU factor spreadsheet: *(See attached file: Liquids Unloading EF Calculation (2010Inv).xlsx)*

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This is great. Thanks so much!!

Is SAIC able to do some related follow-on work?

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Let me know if you'll be able to do these tasks, and I'll send you the spreadsheets. We'd want this information by mid-next week. Earlier the better though.

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Subject: RE: updated API/ANGA report

Hi Melissa,

I've taken a look at the liquids unloading section and put together the attached little memo. In short, they've [redacted] (b)(5) deliberative [redacted]

[redacted]

Please let me know if you have any questions on this. Hope it's helpful. I'll be turning back to the Processing crosswalks in the morning, and will get those to you as soon as I can.

Best,
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To: Minnucci, Chris A.
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Thank you! This will be very helpful. Tim--please call me if you have any questions. We only need review of the liquids unloading piece. The same review you guys did last time. Thanks!

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Fw: updated API/ANGA report
Melissa Weitz to: Suzanne Waltzer 10/10/2012 02:53 PM

(b)(5) deliberative

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/10/2012 02:42 PM -----

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
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Energy | Environment | National Security | Health | Critical Infrastructure

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(b)(5) deliberative [redacted]

Fw: updated API/ANGA report

Melissa Weitz to: Bill Irving 10/10/2012 03:00 PM

You may be interested in this--

[redacted] (b)(5) deliberative [redacted]

[redacted]

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/10/2012 02:42 PM -----

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Preliminary Liquids Unloadings Estimates
Marty Wolf to: Melissa Weitz 10/10/2012 03:01 PM
Cc: "Paula Fields"

History: This message has been forwarded.

Melissa,

This has been outstanding for awhile, so I wanted to close the loop on this.

(b)(5) deliberative

Just a couple of comments on the data and methodology.

(b)(5) deliberative

(b)(5) deliberative

If you have any questions, I am sure that we can discuss on our call tomorrow.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

(b)(5) deliberative

preliminary_liquids_unloading_estimates_101012.xlsx

Hide Details

liquids unloading

Thu 10/11/2012 4:00 PM - 4:30 PM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Suzanne Waltzer/DC/USEPA/US@EPA

Description

RE: updated API/ANGA report
Minnucci, Chris A. to: Melissa Weitz 10/10/2012 04:40 PM
Cc: "Kidman, Timothy M."

History: This message has been forwarded.

Melissa,

Yes, at first I thought [redacted] (b)(5) deliberative [redacted]
Anyway, I'm glad this was useful.

I just talked to Tim, and he is going to work on adding the table up front.

thanks,
Chris

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[redacted] (b)(5) deliberative [redacted]

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To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

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Tim

Tim Kidman | SAIC
Climate Change Analyst
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phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, October 05, 2012 7:47 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

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To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: updated API/ANGA report

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History: This message has been replied to and forwarded.

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RE: updated API/ANGA report
Melissa Weitz to: Kidman, Timothy M. 10/11/2012 09:54 AM
Cc: "Minnucci, Chris A."

This is great, thank you!

New question: [redacted] (b)(5) deliberative [redacted] I'll forward that to you if I haven't already.

Thanks!

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Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Melissa Weitz to: Kidman, Timothy M. 10/11/2012 09:55 AM
Cc: "Minnucci, Chris A."

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov
----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/11/2012 09:54 AM -----

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/09/2012 01:56 PM
Subject: RE: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Melissa,

Attached is the background information/data you requested.

The raw data set is located under the tabs entitled: "Liquid Unloading Conventional" and "Liquid Unloading Unconventional". These tabs contain the raw data and calculations behind our analysis that is in Appendix C of the API/ANGA report. All identifying information for the data sets has been removed.

You also requested that we provide separated liquids unloading emission factors: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent. The tab entitled: "EPA Data" provides the # of wells that vent for liquids unloading, the # vents per year, and the emission factors - for wells with and without plunger lift.

We can discuss the spreadsheets during our call this Friday.

Karin

From: Karin Ritter
Sent: Thursday, October 04, 2012 11:14 AM
To: 'Melissa Weitz'
Subject: RE: API/ANGA Report (Updated)

Hi Melissa,

We are still working on getting you the background information you will need.
I think that Tuesday October 9th is doable. At least we will work towards that date in order to keep you on schedule.
That would also provide enough time before our call on October 12th should you have any questions.

Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 3:45 PM
To: Karin Ritter
Cc: Suzanne Waltzer
Subject: Re: API/ANGA Report (Updated)

Hello Karin,

Thank you again for sharing an advance copy of the updated report with us.

I wanted to follow up with you on an item from our conference call last week. You had mentioned the possibility of providing EPA with the separated emission factors, calculated in the development of the report, for wells with liquids unloading: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent.

The separate factors are critical to our analysis as we try to determine how this information could be applied to the time-series of the GHG Inventory. As we are current working to develop the expert review draft GHG Inventory estimates, we'd like this information by early next week (by October 9, if possible) so that we can stay on schedule. Please let me know if you will be able to provide us with the separate factors.

We are currently reviewing the updated API/ANGA report and we look forward to our follow up conversation next Friday.

Thank you,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---09/28/2012 04:01:33 PM---Melissa, Please find attached the updated API/ANGA report for your review. As discussed, we will ke

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 09/28/2012 04:01 PM
Subject: API/ANGA Report (Updated)

Melissa,

Please find attached the updated API/ANGA report for your review. As discussed, we will keep you posted on plans for its release on API's website – in the meantime please do not publicize, cite, or share outside your

organization.

As always please let me know if you have any questions.

Much appreciated,
Karin

Karin Ritter
Regulatory and Scientific Affairs
+1 (202) 682- 8472
www.api.org

********** ATTACHMENT NOT DELIVERED **********

This Email message contained an attachment named
image001.jpg
which may be a computer program. This attached computer program could contain a computer virus which could cause harm to EPA's computers, network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced into the EPA network. EPA is deleting all computer program attachments sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you should contact the sender and request that they rename the file name extension and resend the Email with the renamed attachment. After receiving the revised Email, containing the renamed attachment, you can rename the file extension to its correct name.

For further information, please contact the EPA Call Center at (866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

[attachment "Task 2 API ANGA Survey Report Final 21Sept12 clean ae.pdf"

deleted by Melissa Weitz/DC/USEPA/US] Liquids Unloading Data Final Shared w EPA 9Oct12.xlsx

Survey Table 3A. Conventional Gas Well Venting for Liquids Unloading (Well Clean-ups)

NEMS Region	Northeast	Northeast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Coninent	Mid-Coninent
Number of Operated Gas Wells Represented by the information provided	1,210	4,365	31	21	232	11	10	969	201	631	607	184	1,692	2,446	519
Number of Gas Wells with Plunger Lift Installed	33	109	0	0		0	0	181	71	166	195	75	0	0	285
Number of Gas Wells with Other Artificial Lift (Beam Pump; ESP; etc.)	223	108	0	3		0		74	0	3	264	22	489	2446	100
Number of Gas Wells Vented to the atmosphere for Liquids Unloading	223	1025	12	6	0	0		114	0	202	3	0	0	0	10
Total number of Gas Well Vents - Annualized	5,607	43,885	144	60	-	-		1,328	-	492,356	24	-	-	-	7,300
Number of Wells with Plunger Lifts that vent to the atmosphere	33	109	0	0	0	0	0		0	164	2	0	0	0	10
Number of Wells without Plunger Lifts that vent to the atmosphere	190	916	12	6	0	0	0		0	38	1	0	0	0	0
Total Count of Gas Well Vents for Time Period - w/plunger - Annualized	1272	4217	0	0	0	0	0		0	489,912	23	0	0	0	7300
Total Count of Gas Well Vents for Time Period - w-o/plunger - Annualized	4335	39668	144	60	0	0	0		0	2444	1	0	0	0	0
Average Venting Time - w/plunger	1	0.3								0.0667	0.75				0.08
Average Venting Time - w-o/plunger	1	2	1	2.5						4.95	0.25				
Average Daily Production of Venting Gas Wells (MCF/day)	12.83	7.21	300	664	49.55					84	58.43				30
Average Depth of Venting Wells (feet)	3375	3448	10,000	19334	11391					4269	7,033	NA		N/A	9500
Average Casing Diameter of Venting Gas Wells (inches)	5	4.5	5.5	3.65	4.62					4	4.83	NA		N/A	4.5
Average Tubing Diameter of Venting Gas Wells w/plunger Lift (inches)	2	2.375	2.375	N/A	0					1.995	2	NA		N/A	2.375

Number of venting wells (from row 8)	223	1025	12	6	0					202	3				10
Average Surface Pressure - Venting Gas Wells (psig)	85	50	Applied wt. avg. pressure	224	20					60.8	25.5	NA		N/A	500

Emissions Calculations															
Conventional wells without Plunger Lift			applied wt. avg. pressure												
Total Emissions, scf/yr	13,492,728	78,217,780	1,287,782	3,854,938						38,451,629	2,440				
Emissions per well, scf/yr	71,014	85,391	107,315	642,490						1,011,885	2,440				
# wells vented w/out plunger lift	190	916	12	6						38	1				
Weighted emissions per vented well, scf/yr															
Conventional wells with Plunger Lift															
Emissions, scf/yr	973,440	1,963,379								232,529,848	23,623				74,495,422
Emissions per well, scf/yr	29,498	18,013								1,417,865	11,811				7,449,542
# wells vented w/ plunger lift	33	109								164	2				10
Weighted emissions per vented well, scf/yr															
# wells with plunger lifts total	33	109								166	195				285
NEMS Region Average Emission Factor	**Northeast**		**Gulf Coast**							**Mid-Continent**					
	75,839		**285,707**							**1,606,991**					

Note: EPA's 2009 National Inventory included emission estimates for 180,811 wells with liquid unloading.

Southwest	Southwest	Southwest	Rocky
2	46	1,111	1,856
0	0	106	428
0	0	271	58
0	0	220	
-	-	880	
0	0	0	
0	0	220	
0	0	0	
0	0	880	
		1	
	44.25	100	
	8157	8,000	
	4.5	5.5	
	0	2.375	

Calculations

Data Sets

19	16,144	Total Wells				
18	15,912	# with plunger info	1649	# w/plunger	10.36%	% w/plunger
17	15,902	# with lift info	4061	# w/lift	25.54%	% w/lift
17	14,056	# with total wells venting info	1815	# vented	12.91%	% vented
17	14,056	# with total vents info	551,584	# vents	303.9	vents/venting well
	1,040	Wells with plunger info and with plungers	12,279	Wells with non-plunger info and w/o plungers		
17	13,319	Wells with plunger well vent info	318	# of plunger wells venting	30.58%	% of plunger wells that vent
17	13,319	wells with non-plunger well vent info	1,383	# of non-plunger wells venting	11.26%	% of non-plunger wells that vent
17	13,319	Wells with plunger vent info	502,724	# of vents from plunger wells	1,581	# vents per venting plunger well
17	13,319	Wells with non-plunger vent info	47,532	# of vents from non-plunger wells	34	# vents per venting non-plunger well
5	7,332	Wells with non-zero plunger venting	0.07	Vent weighted average vent time for vents w/plunger		
7	7,976	Wells with non-zero non-plunger venting	2.04	Vent weighted average vent time for vents w/o plunger		
	82.39	Vent weighted average mcf production for venting plunger wells	15.10	Average mcf production for venting non-plunger wells		
	4,336	Vent weighted average depth for venting plunger wells	3,608	Average depth for venting non-plunger wells		
	4.01	Vent weighted average casing diameter for venting plunger wells	4.54	Average casing diameter for venting non-plunger wells		
	2.00	Vent weighted average tubing diameter for venting plunger wells	2.32	Average tubing diameter for venting non-plunger wells		

		220	
	30	100	

9,037,809 41,081 220	
Southwest **41,081**	**Rocky**

67.15	Vent weighted average pressure for venting plunger wells	54.74	Average pressure for venting non-plunger wells	65.20	Total average pressure for all venting wells
144,345,106	Non-plunger vent volume scf - gas				
309,985,712	Plunger vent volume scf - gas				

Survey Table 3A. Unconventional Gas Well Venting for Liquids Unloading (Well Clean-ups)

NEMS Region	Northeast	Northeast	Northeast	Northeast	Northeast	Gulf Coast	Gulf Coast
Number of Operated Gas Wells Represented by the information provided	8	3,532	1,750	46	1,900	79	33
Number of Gas Wells with Plunger Lift Installed	0	355	103	5	0	0	0
Number of Gas Wells with Other Artificial Lift (Beam Pump; ESP; etc.)	0	24	527	0		8	0
Number of Gas Wells Vented to the atmosphere for Liquids Unloading	0	645	103	5	0	6	0
Total number of Gas Well Vents - Annualized	-	91,560	75,190	194	-	6	-

Number of Wells with Plunger Lifts that vent to the atmosphere	0	308	103	5	0	0	0
Number of Wells without Plunger Lifts that vent to the atmosphere	0	337	0	0	0	6	0
Total Count of Gas Well Vents for Time Period - w/plunger - Annualized	0	63840	75,190	194	0	0	0
Total Count of Gas Well Vents for Time Period - w-o/plunger - Annualized	0	27720	0	0	0	6	0
Average Venting Time - w/plunger (hours)		0.2209	0.05	0.1			
Average Venting Time - w-o/plunger (hours)		1.3638				3	
Average Daily Production of Venting Gas Wells (MCF/day)		26	15	628	N/A	200	
Average Depth of Venting Wells (feet)		4845	2500	7000	N/A	6000	not applicable
Average Casing Diameter of Venting Gas Wells (inches)		4.5	7	4.5	N/A	5.5	not applicable
Average Tubing Diameter of Venting Gas Wells w/plunger Lift (inches)		2.375	2.375	2.375	N/A	2.375	2.875
Number of venting wells (from row 8)		645	103	5	0	6	0

Average Surface Pressure - Venting Gas Wells (psig)		121.6	200	130		400	

Emission Calculations				
Unconventional wells without Plunger Lift				
Total Emissions, scf/yr	148,079,273			267,095
Emissions per well, scf/yr	439,404			44,516
# wells vented w/out plunger lift	337			6
Weighted emissions per vented well, scf/yr				
Unconventional wells with Plunger Lift				
Emissions, scf/yr	87,985,573	84,228,892	410,107	
Emissions per well, scf/yr	285,667	817,756	82,021	
# wells vented w/ plunger lift	308	103	5	
Weighted emissions per vented well, scf/yr				
NEMS Region Average Emission Factor	**Northeast**			
	425,902			

Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast
48	436	198	169	220	1,223	406	134	460	84
0	0	47	4	0	262	370	4	66	52
0	2	48	0	0	232	25	15	0	
8	27	14	17	0	168	61	10	45	0
104	207	728	17	-	168	366	120	45	-

0	0	3	2	0	22	59	0	5	0
8	27	11	15	0	146	2	10	40	0
0	0	156	2	0	22	354	0	5	0
104	207.4	572	15	0	146	12	120	40	0
		2	1		0.875	0.3		0.5	
1	5.3	2	2		0.6875	1.5	4	1	
25	130	353	8500		99	83	92	6500	
11,000	9,000	13752	16000		8500	11647	11000	12500	
5.5	4.5	5.5	10.75		4.5	5.5	5.5	8.625	
2.375	2.375	2.375	2.375		2.375	2.375	2.375	2.375	
8	27	14	17		168	61	10	45	

200	50	450	540		15	25	94	530	

2,749,066	5,736,344	49,326,199	11,004,804		276,156	82,853	2,985,945	7,496,306
343,633	212,457	4,484,200	733,654		1,891	41,427	298,594	187,408
8	27	11	15		146	2	10	40
		5,522,367	391,212		45,622	341,615		71,050
		1,840,789	195,606		2,074	5,790		14,210
		3	2		22	59		5
			Gulf Coast					
			242,406					

Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Southwest
2,080	98	1,385	90	278	2,002	151	1,620	700
69	30	460	48	118	1,144	16	54	145
213	0	0	0	9		0	39	0
225	7	200	0	0	29	0	215	246
156,142	17	562	-	-	348	-	2,580	246

48	4	64	0	0	29	0	0	18
177	3	136	0	0	0	0	215	228
155742	9.6	170.4	0	0	348	0	0	25
400	7.2	391.2	0	0	0	0	2580	221
0.0833	2.99	2.6			0.5425			0.5
2.5	1.58	1.925					0.5	1
250	727	875			Unavailable		100	1500
3911	10,293	7,888		N/A	Unavailable	NA	11000	8725
5.5	4.92	5.02		N/A	5.6	NA	5.5	9.625
2.375	3.88	4.11		N/A	2.4	NA	2.75	1.995
225	7	200	0	0	29	0	215	246

80	90.04	98.75			74.69		200	516

7,908,154	196,019	16,457,032		68,197,984	35,075,995
44,679	65,340	121,008		317,200	153,842
177	3	136		215	228
			applied wt. avg. depth & production		
120,385,033	781,741	13,999,323	751,651		170,468
2,508,022	195,435	218,739	25,919		9,470
48	4	64	29		18
		Mid-Continent			
		338,279			

Southwest	Southwest	Southwest	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky
105	86	297	61	1	1,787	594	263	1,285	297	238
25	0	233	33	1	674	452	242	1,120	112	48
80	0	64	0	0	0	0	0	0	2	223
6	3	60	5	0	915	360	23	298	47	
6	3	60	1,800	-	7,371	3,480	51	2,084	32,472	

0	0	60	0	0		247	23	296	19	
6	3	0	5	0		113	0	2	28	
0	0	60	0	0		1476	51.43	2080	21888	
6	1	0	1800	0		2004	0	4	10584	
		0.2				0.407	1.12	2.1	0.455	
0.5	6.67		0.77			1.616	N/A	0.75	3.18	
12	150	25	41.54			127	454	433	83	
8000	15000	6,800	11,597			11149	11164	11056	10,844	
5.5	5	4.5	4.5			4.038	6.174	4.7	4.5	
2.375	2.375	2.375	2.375			1.997	1.92	2.375	2.375	
6	3	60	5			360	23	298	47	

50	200	110	476			250	290	250	198	

34,759	65,227		76,746,923		42,212,132			95,677	262,702,911
5,793	21,742		15,349,385		373,559			47,839	9,382,247
6	3		5		113			2	28
		106,183			6,427,381	841,788	72,746,777		105,363,947
		1,770			26,022	36,599	245,766		5,545,471
		60			247	23	296		19
Southwest									**Rocky**
112,548									**389,504**

Rocky	Rocky	Rocky	Rocky	Rocky	Rocky
4,958	8,323	107	2,285	2,927	992
4,908	5,323	96	0	2,240	992
12	1302	5	0	438	
793			0	39	67
9,516			-	234	402

793			0		
0			0		
9516			0		
0			0		
0.67					
46					
7,400					
4.5					
2.375					
793					

Calculations

Data sets

43	43,736	Total Wells		
43	43,736	# with plunger info	19851	# w/plunger
39	38,758	# with lift info	3268	# w/lift
40	35,068	# with total wells venting info	4647	# vented
40	35,068	# with total vents info	386,079	# vents
	10,478	Wells with plunger info and with plungers	18,884	Wells with non-plunger info and w/o plungers
37	29,362	Wells with plunger well vent info	2,108	# of plunger wells venting
37	29,362	wells with non-plunger well vent info	1,518	# of non-plunger wells venting
37	29,362	Wells with plunger vent info	331,129	# of vents from plunger wells
37	29,362	Wells with non-plunger vent info	46,941	# of vents from non-plunger wells
19	21,743	Wells with non-zero plunger venting	0.16	Vent weighted average vent time for vents w/plunger
22	15,259	Wells with non-zero non-plunger venting	1.76	Vent weighted average vent time for vents w/o plunger
	137.54	Vent weighted average mcf production for venting plunger wells	76.99	Average mcf production for venting non-plunger wells
	4,422	Vent weighted average depth for venting plunger wells	7,281	Average depth for venting non-plunger wells
	5.54	Vent weighted average casing diameter for venting plunger wells	4.60	Average casing diameter for venting non-plunger wells
	2.37	Vent weighted average tubing diameter for venting plunger wells	2.39	Average tubing diameter for venting non-plunger wells

150					

127	Vent weighted average pressure for venting plunger wells	167	Average pressure for venting non-plunger wells
737,696,856	Non-plunger vent volume scf - gas		
527,815,767	Plunger vent volume scf - gas		

27,245,035
34,357
793

45.39%	% w/plunger
8.43%	% w/lift
13.25%	% vented
83.1	vents/venting well
20.12%	% of plunger wells that vent
8.04%	% of non-plunger wells that vent
157.1	# vents per venting plunger well
30.9	# vents per venting non-plunger well
371	Average daily production for all venting wells
7,888	Average depth for all venting wells

High Level Info

			Conventional	
Data sets				
19	16,144	Total Wells		
18	15,912	# with plunger info	1,649	# w/plunger
17	15,902	# with lift info	4,061	# w/lift
17	14,056	# with total wells venting info	1,815	# vented
17	14,056	# with total vents info	551,584	# vents

			Unconventional	
43	43,736	Total Wells		
43	43,736	# with plunger info	19,851	# w/plunger
39	38,758	# with lift info	3,268	# w/lift
40	35,068	# with total wells venting info	4,647	# vented

40	35,068	# with total vents info	386,079	# vents
			Conventional + Unconventional	
62	59,880	Total Wells		
61	59,648	# with plunger info	21,500	# w/plunger
56	54,660	# with lift info	7,329	# w/lift
57	49,124	# with total wells venting info	6,462	# vented
57	49,124	# with total vents info	937,663	# vents

2010 EPA Inventory Emission Estimates for Liquids Unloading

	# LU Gas Wells	Emission Factor, scfy CH4/LU well	Emissions, Mg CH4
North East	77,931	1,359,535	2,040,606.81
Midcontinent	31,427	703,273	425,674.63
Rocky Mountain	26,620	690,440	353,982.99
Southwest	11,444	864,999	190,650.77
West Coast	638	1,491,925	18,346.91
Gulf Coast	31,331	2,519,264	1,520,228.52
TOTALS	179,391	1,316,750	4,549,491

EPA emission factor

* Uses industry standard conditions of 14,7 psi and 60 F

10.36%	% w/plunger
25.54%	% w/lift
12.91%	% vented
303.9	vents/venting well

Data Sets	1,040	Wells with plunger info and with plungers
17	13,319	Wells with plunger well vent info
17	13,319	wells with non-plunger well vent info
17	13,319	Wells with plunger vent info
17	13,319	Wells with non-plunger vent info
5	7,332	Wells with non-zero plunger venting
7	7,976	Wells with non-zero non-plunger venting
	82.4	Vent weighted average mcf production for venting plunger wells
	4,336	Vent weighted average depth for venting plunger wells
	4.01	Vent weighted average casing diameter for venting plunger wells
	2.00	Vent weighted average tubing diameter for venting plunger wells

45.39%	% w/plunger
8.43%	% w/lift
13.25%	% vented

83.1	vents/venting well
36.04%	% w/plunger
13.41%	% w/lift
13.15%	% vented
145.1	vents/venting well

	67.1	Vent weighted average pressure for venting plunger wells
	144,345,106	Non-plunger vent volume scf - gas
	309,985,712	Plunger vent volume scf - gas

Emissions, scfy CH4	Emissions,* tonnes CH4/yr
105,949,922,085	2,027,235
22,101,760,571	422,893
18,379,512,800	351,672
9,899,048,556	189,407
951,848,150	18,213
78,931,060,384	1,510,259
236,213,152,546	4,519,678

1,316,750 scf CH4/well

Conventional					
12,279	Wells with non-plunger info and w/o plungers	7.81%	% of wells with plunger info and plungers		Data Sets
318	# of plunger wells venting	30.6%	% of plunger wells that vent		37
1,383	# of non-plunger wells venting	11.3%	% of non-plunger wells that vent		37
502,724	# of vents from plunger wells	1,580.9	# vents per venting plunger well		37
47,532	# of vents from non-plunger wells	34.4	# vents per venting non-plunger well		37
0.07	Vent weighted average vent time for vents w/plunger				19
2.04	Vent weighted average vent time for vents w/o plunger				22
15.1	Vent weighted average mcf production for venting non-plunger wells				
3,608	Vent Average depth for venting non-plunger wells				
4.54	Vent weighted average casing diameter for venting non-plunger wells				
2.32	Vent weighted average tubing diameter for venting non-plunger wells				

54.7	Vent weighted average pressure for venting non-plunger wells				

Detail Info				
Unconventional				
10,478	Wells with plunger info and with plungers	18,884	Wells with non-plunger info and w/o plungers	35.69%
29,362	Wells with plunger well vent info	2,108	# of plunger wells venting	20.12%
29,362	wells with non-plunger well vent info	1,518	# of non-plunger wells venting	8.04%
29,362	Wells with plunger vent info	331,129	# of vents from plunger wells	157.1
29,362	Wells with non-plunger vent info	46,941	# of vents from non-plunger wells	30.9
21,743	Wells with non-zero plunger venting	0.16	Vent weighted average vent time for vents w/plunger	
15,259	Wells with non-zero non-plunger venting	1.76	Vent weighted average vent time for vents w/o plunger	
138	Vent weighted average mcf production for venting plunger wells	77.0	Vent weighted average mcf production for venting non-plunger wells	
4,422	Vent weighted average depth for venting plunger wells	7,281	Vent Average depth for venting non-plunger wells	
5.54	Vent weighted average casing diameter for venting plunger wells	4.60	Vent weighted average casing diameter for venting non-plunger wells	
2.37	Vent weighted average tubing diameter for venting plunger wells	2.39	Vent weighted average tubing diameter for venting non-plunger wells	

127.1	Vent weighted average pressure for venting plunger wells	167.5	Vent weighted average pressure for venting non-plunger wells	
737,696,856	Non-plunger vent volume scf - gas			
527,815,767	Plunger vent volume scf - gas			

				Conve
% of wells with plunger info and plungers		Data Sets	11,518	Wells with plunger info and with plungers
% of plunger wells that vent		54	42,681	Wells with plunger well vent info
% of non-plunger wells that vent		54	42,681	wells with non-plunger well vent info
# vents per venting plunger well		54	42,681	Wells with plunger vent info
# vents per venting non-plunger well		54	42,681	Wells with non-plunger vent info
		24	29,075	Wells with non-zero plunger venting info
		29	23,235	Wells with non-zero non-plunger venting info
			104.3	Vent weighted average mcf production for venting plunger wells
			4,370	Vent weighted average depth for venting plunger wells
			4.62	Vent weighted average casing diameter for venting plunger wells
			2.15	Vent weighted average tubing diameter for venting plunger wells

			91.0	Vent weighted average pressure for venting plunger wells
			882,041,962	Non-plunger vent volume scf - gas
			837,801,478	Plunger vent volume scf - gas

345,343	scf gas/venting wells-yr for wells with plungers

304,048	scf gas/venting wells-yr for wells without plungers

1,005	scf gas/vent for wells with plungers

9,336	scf gas/vent for wells without plungers

ntional + Unconventional			
31,163	Wells with non-plunger info and w/o plungers	26.99%	% of wells with plunger info and plungers
2,426	# of plunger wells venting	21.06%	% of plunger wells that vent
2,901	# of non-plunger wells venting	9.31%	% of non-plunger wells that vent
833,853	# of vents from plunger wells	343.7	# vents per venting plunger well
94,473	# of vents from non-plunger wells	32.57	# vents per venting non-plunger well
0.11	Vent weighted average vent time for vents w/plunger		
1.90	Vent weighted average vent time for vents w/o plunger		
45.9	Vent weighted average mcf production for venting non-plunger wells		
5,433.0	Vent Average depth for venting non-plunger wells		
4.57	Vent weighted average casing diameter for venting non-plunger wells		
2.36	Vent weighted average tubing diameter for venting non-plunger wells		

110.8	Vent weighted average pressure for venting non-plunger wells		
		78.80%	Mole % Methane
1,719,843,440	Total volume vented: Plunger and non-plunger wells - scf	**1,355,236,631**	Total methane vented: scf
322,854	Total volume vented per venting well - scf	**254,409**	Methane vented per venting well - scf

Table 5: Liquids Unloading High Level Summary Data		
High Level Survey Data		
Total gas wells in liquid unloading data sets	59,880	
Total # of AAPG Basins represented by the data sets	18	
Gas wells with plunger lifts (59,648 in sample)	21,500	36.0%
Gas wells with artificial lift (54,660 in sample)	7,329	13.4%
Gas Wells Vented to the atm. for Liquids Unloading (49,124 in sample)	6,462	13.2%
# Vents per vented well	145.10	
Total # gas well vents represented by the data sets (49,124 in sample)	937,663	
National Well Characterization		
National # of wells from 2010 Inventory	484,795	Wells
Calculated national # wells with plunger lift	174,743	Wells
Calculated national # wells w/o plunger lift	310,052	Wells
Calculated national # wells with artifical lift (subset of wells w/o plunger lift)	65,003	Wells
Methane mole percentage from EPA 2010 national inventory	78.8%	

Table 6. Liquids Unloading Emission Estimation Based on Survey Data		
Survey Mid-Level Data		
Total number of wells with plunger lift (42,681 in sample)	11,518	Wells
Total number of wells without plunger lift (42,681 in sample)	31,163	Wells
Number of plunger equipped wells that vent (42,681 in sample)	2,426	Wells
Number of non-plunger equipped wells that vent (42,681 in sample)	2,901	Wells
Percentage of plunger equipped wells that vent	21.1%	
Percentage of non-plunger equippped wells that vent	9.3%	
Total annual volume gas vented for venting wells	1,719,843,440	scf gas/year
Calculated volume venting gas per venting well	322,854	scfy gas/well
Calculated methane volume venting per venting well	**254,409**	scfy CH4/well
Calculated National Well Data		
Calculated national # wells w/plunger lift that vent for unloading	36,806	Wells
Calculated national # wells w/o plunger lift that vent for unloading	28,863	Wells
National Volume & Emission Calculations		
Total gas venting for liquids unloading volume (scaled for national wells)	21,201,408,698	scf/yr
Total methane venting for liquids unloading (scaled for national wells)	16,706,710,054	scf CH4/yr
Total liquid unloading vent methane (scaled for national wells)	319,664	Metric Tonnes CH4/yr
Comparison to 2010 National Inventory Liquids Unloading		
2010 National Inventory Methane Tonnes from Liquids Unloading	4,501,465	Metric Tonnes CH4/yr
Survey predicted methane as % of 2010 National Inventory methane from Liquids Unloading	7.1%	
% difference between survey and national data	-92.9%	
National Inventory Overestimation of methane from Liquids Unloading	1408%	

Table 7. Detailed Survey Data Compared to EPA Assumptions	Survey Data		EPA Assumptions	
Total national number of wells that vent for liquids unloading	65,669	wells	179,391	wells
Average number of vents per venting plunger well (weighted by # vents)	343.72	vents/well	38.7	vents/well
Average number of vents per venting non-plunger well (weighted by # vents)	32.57	vents/well		
Average time per vent - plunger equipped wells (weighted by # vents)	0.11	hours	3	hours
Average time per vent - non-plunger equipped wells (weighted by # vents)	1.90	hours		
Average depth - plunger equipped wells (weighted by # vents)	4,370	feet	6,000	feet
Average depth - non-plunger equipped wells (weighted by # vents)	5,433	feet		
Average tubing diameter - plunger equipped wells (weighted by # vents)	2.15	inches	2	inches
Average casing diameter - non-plunger equipped wells (weighted by # vents)	4.57	inches	5	inches
Average production rate - plunger equipped wells (weighted by # vents)	104.3	mcfd		
Average production rate - non-plunger equipped wells (weighted by # vents)	45.9	mcfd		
Average pressure - plunger equipped wells (weighted by # vents)	91.0	psig	100	psig sales line pressure
Average pressure - non-plunger equipped wells (weighted by # vents)	110.8	psig	(200 - 1000)	(psig shut-in pressure)
Calculated methane volume venting per venting well	**254,409**	scfy CH4/well	1,316,750	scfy CH4/well

EPA Assumptions are taken from "Proposed Inventory Improvement: Emission Reductions of Gas Well Liquids Unloading by Plunger Lifts", Draft, EPA US Oil and Gas GHG Inventory, July 14, 2011 Webcast.

Data to support updates to EPA national inventory

Calculated national # wells w/plunger lift that vent for unloading	36,806
Calculated national # wells w/o plunger lift that vent for unloading	28,863
Calculated # vents for wells w/plunger lift	344
Calculated # vents for wells w/o plunger lift	33

Emission Factor per vent

Calculated EF: gas emissions per unloading vent for wells w/plunger lift	1,005
Calculated EF: gas emissions per unloading vent for wells w/o plunger lift	9,336

Emission Factor per well

Calculated EF: gas emissions per well for wells w/plunger lift	345,343
Calculated EF: gas emissions per well for wells w/o plunger lift	304,048

Wells
Wells
vents/well-yr
vents/well-yr

scf gas/unloading vent
scf gas/unloading vent

scf gas/venting well-yr
scf gas/venting well-yr

Re: 2013 GHG Inventory - NG & Petroleum Systems - weekly call with EPA/ERG

Marty Wolf to: Melissa Weitz, Paula Fields 10/11/2012 10:40 AM

History: This message has been forwarded.

Not a problem here...

>>> Paula Fields 10/11/2012 7:20 AM >>>
Hi Melissa - 2 pm ET on Friday is fine with me...Marty, how about you?

I'm working at home today, so call my cell when you want to talk.

Thanks,
Paula

****
Paula G. Fields
Principal Air Quality Engineer
Eastern Research Group, Inc. (ERG)
10860 Gold Center Dr., Suite #275
Rancho Cordova, CA 95670
office: 916-635-6593
cell: 916-835-0341
fax: 916-859-0185

>>> Melissa Weitz 10/11/12 7:05 AM >>>

Can we move the call to 2 tomorrow actually? I'll call you later today to check in on API/ANGA/URS.

"Paula Fields" ---10/11/2012 09:48:00 AM---Hi Melissa - Just checking to see that you can make this call at 2 pm ET today.

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Marty Wolf" <Marty.Wolf@erg.com>, "Paula Fields" <Paula.Fields@erg.com>
Date: 10/11/2012 09:48 AM
Subject: Re: 2013 GHG Inventory - NG & Petroleum Systems - weekly call with EPA/ERG

Hi Melissa -

Just checking to see that you can make this call at 2 pm ET today.

These agenda items seem appropriate:
(b)(5) deliberative

[redacted]

Thanks,
Paula

****
Paula G. Fields
Principal Air Quality Engineer
Eastern Research Group, Inc. (ERG)
10860 Gold Center Dr., Suite #275
Rancho Cordova, CA 95670
office: 916-635-6593
cell: 916-835-0341
fax: 916-859-0185

>>> Paula Fields 10/11/12 11:00 AM >>>
Agenda to be discussed at the beginning of the call.

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185

Re: Fw: updated API/ANGA report
Bill Irving to: Melissa Weitz 10/11/2012 11:22 AM

History: This message has been forwarded.

It is interesting. Do they have enough documentation to support [redacted] (b)(5) deliberative [redacted]

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Melissa Weitz	You may be interested in this-- [redacted]	10/10/2012 03:00:53 PM

From: Melissa Weitz/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA
Date: 10/10/2012 03:00 PM
Subject: Fw: updated API/ANGA report

You may be interested in this--

[redacted] (b)(5) deliberative [redacted]

[redacted]

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/10/2012 02:42 PM -----

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/10/2012 12:19 PM
Subject: RE: updated API/ANGA report

Melissa,

Attached please find a memo addressing [redacted] (b)(5) deliberative [redacted]
Please let us know if you have any questions or comments on the attached, or would like us to perform any further analyses in these or other areas. As I will be off this Thursday and Friday (my usual days off), please include Tim in any requests for further work--he should be able to help you during my absence.

Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Fri 10/5/2012 1:51 PM

To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

Thank you!

GHG Inventory LU factor spreadsheet: *(See attached file: Liquids Unloading EF Calculation (2010Inv).xlsx)*

My calculations of factors from API data: *(See attached file: PL.xlsx)*

Thanks! Let me know if you have questions on either of these.

Melissa

"Kidman, Timothy M." ---10/05/2012 12:20:45 PM---Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/05/2012 12:20 PM
Subject: RE: updated API/ANGA report

Melissa,

I'd be happy to help with 1 and 2, but Chris may be a better resource for 3, so I'll defer to him on that one. Please send me the spreadsheets and I'll take a look.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, October 05, 2012 7:47 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

This is great. Thanks so much!!

Is SAIC able to do some related follow-on work?

(b)(5) deliberative

Let me know if you'll be able to do these tasks, and I'll send you the spreadsheets. We'd want this information by mid-next week. Earlier the better though.

Melissa

"Kidman, Timothy M." ---10/04/2012 08:22:40 PM---Hi Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/04/2012 08:22 PM
Subject: RE: updated API/ANGA report

Hi Melissa,

I've taken a look at the liquids unloading section and put together the attached little memo. In short, they've

(b)(5) deliberative

Please let me know if you have any questions on this. Hope it's helpful. I'll be turning back to the Processing crosswalks in the morning, and will get those to you as soon as I can.

Best,
Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 12:09 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: updated API/ANGA report

Thank you! This will be very helpful. Tim--please call me if you have any questions. We only need review of the liquids unloading piece. The same review you guys did last time. Thanks!

(See attached file: Task 2 API ANGA Survey Report Final 21Sept12 clean ae.pdf)

"Minnucci, Chris A." ---10/03/2012 03:05:33 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/03/2012 03:05 PM
Subject: RE: updated API/ANGA report

Melissa,

I'm actually going to be out Thursday and Friday, but I've talked to Tim and he believes he can get this done by Friday AM. He'll also be working to finish up the processing sector crosswalk and get that to you by COB Friday. Please just send the report to myself and Tim; we will not distribute it further.

thanks,
Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/3/2012 1:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: updated API/ANGA report

API/ANGA have provided EPA with an advance copy of their updated report on methane emissions. They [redacted] (b)(5) deliberative [redacted]

Is SAIC able to do this review? We'd like your analysis by Friday AM if that is feasible. The report is not for distribution outside of EPA and its technical contractors, so if I send you a copy, do not distribute it outside of the group performing the review.

Melissa [attachment "Analysis of Changes to API ANGA LU calcs.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Bill Irving/DC/USEPA/US] [attachment "LU Memorandum October_final.docx" deleted by Bill Irving/DC/USEPA/US]

RE: updated API/ANGA report
Kidman, Timothy M. to: Melissa Weitz 10/11/2012 01:31 PM
Cc: "Minnucci, Chris A."

History: This message has been forwarded.

Great question. We'll look into that and get back to you.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, October 11, 2012 6:54 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

This is great, thank you!

New question: [redacted] (b)(5) deliberative [redacted] I'll forward that to you if I haven't already.

Thanks!

"Kidman, Timothy M." ---10/10/2012 08:22:19 PM---Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/10/2012 08:22 PM
Subject: RE: updated API/ANGA report

Melissa,

Attached please find the memo with the addition of a new Table 2, which [redacted] (b)(5) deliberative [redacted]
Please let us know if you have any further questions or comments, or if there

is anything else we can help with.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 10, 2012 11:42 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: updated API/ANGA report

[redacted] (b)(5) deliberative [redacted]

"Minnucci, Chris A." ---10/10/2012 12:19:06 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/10/2012 12:19 PM
Subject: RE: updated API/ANGA report

Melissa,

Attached please find a memo addressing [redacted] (b)(5) deliberative [redacted] Please let us know if you have any questions or comments on the attached, or would like us to perform any further analyses in these or other areas. As I will be off this Thursday and Friday (my usual days off), please include Tim in any requests for further work--he should be able to help you during my absence.

Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Fri 10/5/2012 1:51 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

Thank you!

GHG Inventory LU factor spreadsheet: (See attached file: Liquids Unloading EF Calculation (2010Inv).xlsx)

My calculations of factors from API data: (See attached file: PL.xlsx)

Thanks! Let me know if you have questions on either of these.

Melissa

"Kidman, Timothy M." ---10/05/2012 12:20:45 PM---Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/05/2012 12:20 PM
Subject: RE: updated API/ANGA report

Melissa,

I'd be happy to help with 1 and 2, but Chris may be a better resource for 3, so I'll defer to him on that one. Please send me the spreadsheets and I'll take a look.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, October 05, 2012 7:47 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

This is great. Thanks so much!!

Is SAIC able to do some related follow-on work?

(b)(5) deliberative

Let me know if you'll be able to do these tasks, and I'll send you the spreadsheets. We'd want this information by mid-next week. Earlier the better though.

Melissa

"Kidman, Timothy M." ---10/04/2012 08:22:40 PM---Hi Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/04/2012 08:22 PM
Subject: RE: updated API/ANGA report

Hi Melissa,

I've taken a look at the liquids unloading section and put together the attached little memo. In short, they've (b)(5) deliberative

(b)(5) deliberative

(b)(5) deliberative

Please let me know if you have any questions on this. Hope it's helpful. I'll be turning back to the Processing crosswalks in the morning, and will get those to you as soon as I can.

Best,
Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 12:09 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: updated API/ANGA report

Thank you! This will be very helpful. Tim--please call me if you have any questions. We only need review of the liquids unloading piece. The same review you guys did last time. Thanks!

(See attached file: Task 2 API ANGA Survey Report Final 21Sept12 clean ae.pdf)

"Minnucci, Chris A." ---10/03/2012 03:05:33 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/03/2012 03:05 PM
Subject: RE: updated API/ANGA report

Melissa,

I'm actually going to be out Thursday and Friday, but I've talked to Tim and he believes he can get this done by Friday AM. He'll also be working to finish up the processing sector crosswalk and get that to you by COB Friday. Please just send the report to myself and Tim; we will not distribute it further.

thanks,
Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/3/2012 1:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: updated API/ANGA report

API/ANGA have provided EPA with an advance copy of their updated report on methane emissions. [redacted] (b)(5) deliberative [redacted]

Is SAIC able to do this review? We'd like your analysis by Friday AM if that is feasible. The report is not for distribution outside of EPA and its technical contractors, so if I send you a copy, do not distribute it outside of the group performing the review.

Melissa [attachment "Analysis of Changes to API ANGA LU calcs.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "LU Memorandum October_final.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "LU Memorandum October_final.docx" deleted by Melissa Weitz/DC/USEPA/US]

Hide Details

liquids unloading

Thu 10/11/2012 2:30 PM - 3:00 PM

Rooms: 1310L Room 857/DC-1310L-OAR@EPA

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Suzanne Waltzer/DC/USEPA/US@EPA

Description

Follow-up call with API/ANGA

Fri 10/12/2012 11:00 AM - 12:30 PM

Rooms: 1310L Room 757/DC-1310L-OAR@EPA

Hide Details

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required:	Suzanne Waltzer/DC/USEPA/US@EPA
Optional:	Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA

Description

A call has been scheduled for Friday, October 12th at 11am ET (1.5-hour duration).

To access the call, dial (toll-free) (b)(6) personal privacy OR International (b)(6) personal privacy When prompted, then dial conference code: (b)(6) personal privacy followed by #.

Call Purpose:
Continued EPA/API discussion of liquids unloading.

q's for api

Melissa Weitz to: Melissa Weitz 10/11/2012 06:38 PM

Q's for API/ANGA

(b)(5) deliberative

[redacted]

[redacted]

RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Kidman, Timothy M. to: Melissa Weitz 10/11/2012 08:35 PM
Cc: "Minnucci, Chris A."

History: This message has been replied to and forwarded.

Melissa,

I don't have any burning questions at this time. The data was helpful, and helped to clarify a few outstanding questions I had. In particular, [redacted] (b)(5) deliberative [redacted]

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, October 11, 2012 3:30 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Re: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Hello,

I'm going to have a chance to talk to API tomorrow a.m. If before tomorrow a.m., you notice anything interesting in the spreadsheets or in [redacted] (b)(5) deliberative [redacted], please let me know.

Also, if there are any key questions you would have, based on your earlier analyses, it'd be good to see them as well.

Thanks!
Melissa

Melissa Weitz---10/11/2012 09:55:07 AM---Melissa M. Weitz U.S. Environmental Protection Agency

From: Melissa Weitz/DC/USEPA/US
To: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/11/2012 09:55 AM
Subject: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/11/2012 09:54 AM -----

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/09/2012 01:56 PM
Subject: RE: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa,

Attached is the background information/data you requested.

The raw data set is located under the tabs entitled: "Liquid Unloading Conventional" and "Liquid Unloading Unconventional". These tabs contain the raw data and calculations behind our analysis that is in Appendix C of the API/ANGA report. All identifying information for the data sets has been removed.

You also requested that we provide separated liquids unloading emission factors: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent. The tab entitled: "EPA Data" provides the # of wells that vent for liquids unloading, the # vents per year, and the emission factors - for wells with and without plunger lift.

We can discuss the spreadsheets during our call this Friday.

Karin

From: Karin Ritter
Sent: Thursday, October 04, 2012 11:14 AM
To: 'Melissa Weitz'
Subject: RE: API/ANGA Report (Updated)

Hi Melissa,

We are still working on getting you the background information you will need. I think that Tuesday October 9th is doable. At least we will work towards that date in order to keep you on schedule.
That would also provide enough time before our call on October 12th should you have any questions.

Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 3:45 PM
To: Karin Ritter
Cc: Suzanne Waltzer
Subject: Re: API/ANGA Report (Updated)

Hello Karin,

Thank you again for sharing an advance copy of the updated report with us.

I wanted to follow up with you on an item from our conference call last week. You had mentioned the possibility of providing EPA with the separated emission factors, calculated in the development of the report, for wells with liquids unloading: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent.

The separate factors are critical to our analysis as we try to determine how this information could be applied to the time-series of the GHG Inventory. As we are current working to develop the expert review draft GHG Inventory estimates, we'd like this information by early next week (by October 9, if possible) so that we can stay on schedule. Please let me know if you will be able to provide us with the separate factors.

We are currently reviewing the updated API/ANGA report and we look forward to our follow up conversation next Friday.

Thank you,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---09/28/2012 04:01:33 PM---Melissa, Please find attached the updated API/ANGA report for your review. As discussed, we will ke

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA

Date: 09/28/2012 04:01 PM
Subject: API/ANGA Report (Updated)

Melissa,

Please find attached the updated API/ANGA report for your review. As discussed, we will keep you posted on plans for its release on API's website – in the meantime please do not publicize, cite, or share outside your organization.

As always please let me know if you have any questions.

Much appreciated,
Karin

Karin Ritter
Regulatory and Scientific Affairs
+1 (202) 682- 8472
www.api.org

********** ATTACHMENT NOT DELIVERED **********

This Email message contained an attachment named image001.jpg
which may be a computer program. This attached computer program could
contain a computer virus which could cause harm to EPA's computers,
network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced
into the EPA network. EPA is deleting all computer program attachments
sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you
should contact the sender and request that they rename the file name
extension and resend the Email with the renamed attachment. After
receiving the revised Email, containing the renamed attachment, you can
rename the file extension to its correct name.

For further information, please contact the EPA Call Center at

(866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

[attachment "Task 2 API ANGA Survey Report Final 21Sept12 clean ae.pdf" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Data Final Shared w EPA 9Oct12.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Re: update on API, URS, ANGA, and BP

Mark DeFigueiredo to: Melissa Weitz 10/12/2012 06:28 PM

History: This message has been forwarded.

Thanks! Could you send me those spreadsheets?

Melissa Weitz	Suzie W. and I had a follow-on call on liqui...	10/12/2012 06:15 PM EDT

From: Melissa Weitz
To: Bill Irving; Suzanne Waltzer; Suzanne Kocchi; Mark DeFigueiredo
Cc:
Date: 10/12/2012 06:15 PM EDT
Subject: update on API, URS, ANGA, and BP

Suzie W. and I had a follow-on call on liquids unloading data with API (Karin Ritter, David Chan), URS (Chris Lagrin), ANGA (Erica Bowman) and BP (Reid Smith) today.

- [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

(b)(5) deliberative

RE: updated API/ANGA report
Minnucci, Chris A. to: Melissa Weitz, Kidman, Timothy M. 10/15/2012 11:10 AM
Cc: "Richards, Richard Y."

History: This message has been forwarded.

Melissa,

[redacted] (b)(5) deliberative [redacted]

[redacted]

Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 10/11/2012 9:54 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

This is great, thank you!

New question: [redacted] (b)(5) deliberative [redacted]

Thanks!

"Kidman, Timothy M." ---10/10/2012 08:22:19 PM---Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/10/2012 08:22 PM
Subject: RE: updated API/ANGA report

Melissa,

Attached please find the memo with the addition of a new Table 2, which
(b)(5) deliberative
Please let us know if you have any further questions or comments, or if there is anything else we can help with.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 10, 2012 11:42 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: updated API/ANGA report

(b)(5) deliberative

"Minnucci, Chris A." ---10/10/2012 12:19:06 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/10/2012 12:19 PM
Subject: RE: updated API/ANGA report

Melissa,

Attached please find a memo addressing [redacted] (b)(5) deliberative [redacted] Please let us know if you have any questions or comments on the attached, or would like us to perform any further analyses in these or other areas. As I will be off this Thursday and Friday (my usual days off), please include Tim in any requests for further work--he should be able to help you during my absence.

Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Fri 10/5/2012 1:51 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

Thank you!

GHG Inventory LU factor spreadsheet: (See attached file: Liquids Unloading EF Calculation (2010Inv).xlsx)

My calculations of factors from API data: (See attached file: PL.xlsx)

Thanks! Let me know if you have questions on either of these.

Melissa

"Kidman, Timothy M." ---10/05/2012 12:20:45 PM---Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/05/2012 12:20 PM
Subject: RE: updated API/ANGA report

Melissa,

I'd be happy to help with 1 and 2, but Chris may be a better resource for 3, so I'll defer to him on that one. Please send me the spreadsheets and I'll take a look.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, October 05, 2012 7:47 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: updated API/ANGA report

This is great. Thanks so much!!

Is SAIC able to do some related follow-on work?

(b)(5) deliberative

Let me know if you'll be able to do these tasks, and I'll send you the spreadsheets. We'd want this information by mid-next week. Earlier the better though.

Melissa

"Kidman, Timothy M." ---10/04/2012 08:22:40 PM---Hi Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/04/2012 08:22 PM
Subject: RE: updated API/ANGA report

Hi Melissa,

I've taken a look at the liquids unloading section and put together the attached little memo. In short, [redacted] (b)(5) deliberative [redacted]

[redacted]

Please let me know if you have any questions on this. Hope it's helpful. I'll be turning back to the Processing crosswalks in the morning, and will get those to you as soon as I can.

Best,
Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 12:09 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: updated API/ANGA report

Thank you! This will be very helpful. Tim--please call me if you have any questions. We only need review of the liquids unloading piece. The same review you guys did last time. Thanks!

(See attached file: Task 2 API ANGA Survey Report Final 21Sept12 clean ae.pdf)

"Minnucci, Chris A." ---10/03/2012 03:05:33 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/03/2012 03:05 PM
Subject: RE: updated API/ANGA report

Melissa,

I'm actually going to be out Thursday and Friday, but I've talked to Tim and he believes he can get this done by Friday AM. He'll also be working to finish up the processing sector crosswalk and get that to you by COB Friday. Please just send the report to myself and Tim; we will not distribute it further.

thanks,
Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/3/2012 1:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: updated API/ANGA report

API/ANGA have provided EPA with an advance copy of their updated report on methane emissions. [redacted] (b)(5) deliberative [redacted]

Is SAIC able to do this review? We'd like your analysis by Friday AM if that is feasible. The report is not for distribution outside of EPA and its technical contractors, so if I send you a copy, do not distribute it outside of the group performing the review.

Melissa [attachment "Analysis of Changes to API ANGA LU calcs.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "LU Memorandum October_final.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "LU Memorandum October_final.docx" deleted by Melissa Weitz/DC/USEPA/US]

graycol.gif

RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Minnucci, Chris A. to: Melissa Weitz, Kidman, Timothy M. 10/15/2012 11:36 AM
Cc: "Richards, Richard Y."

History: This message has been replied to and forwarded.

Melissa,

Yes no problem, we can do these analyses. Do you have a timeframe for when you'd like to see the results?

thanks,
Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/15/2012 10:34 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Another request on liquids unloading...

Would you be able to, using the spreadsheet API sent over most recently:

[redacted] (b)(5) deliberative [redacted]

[redacted]

Let me know if this makes sense. I'm around all day today.

Melissa

"Kidman, Timothy M." ---10/11/2012 08:35:58 PM---Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>

To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/11/2012 08:35 PM
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Melissa,

I don't have any burning questions at this time. The data was helpful, and helped to clarify a few outstanding questions I had. In particular, there were

(b)(5) deliberative

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, October 11, 2012 3:30 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Re: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Hello,

I'm going to have a chance to talk to API tomorrow a.m. If before tomorrow a.m., you notice anything interesting in the spreadsheets or in

(b)(5) deliberative

, please let me know.

Also, if there are any key questions you would have, based on your earlier analyses, it'd be good to see them as well.

Thanks!
Melissa

Melissa Weitz---10/11/2012 09:55:07 AM---Melissa M. Weitz U.S. Environmental Protection Agency

From: Melissa Weitz/DC/USEPA/US
To: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/11/2012 09:55 AM
Subject: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov
----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/11/2012 09:54 AM -----

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/09/2012 01:56 PM
Subject: RE: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa,

Attached is the background information/data you requested.

The raw data set is located under the tabs entitled: "Liquid Unloading Conventional" and "Liquid Unloading Unconventional". These tabs contain the raw data and calculations behind our analysis that is in Appendix C of the API/ANGA report. All identifying information for the data sets has been removed.

You also requested that we provide separated liquids unloading emission factors: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent. The tab entitled: "EPA Data" provides the # of wells that vent for liquids unloading, the # vents per year, and the emission factors - for wells with and without plunger lift.

We can discuss the spreadsheets during our call this Friday.

Karin

From: Karin Ritter
Sent: Thursday, October 04, 2012 11:14 AM
To: 'Melissa Weitz'
Subject: RE: API/ANGA Report (Updated)

Hi Melissa,

We are still working on getting you the background information you will need.
I think that Tuesday October 9th is doable. At least we will work towards that date in order to keep you on schedule.
That would also provide enough time before our call on October 12th should you have any questions.

Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 3:45 PM
To: Karin Ritter
Cc: Suzanne Waltzer
Subject: Re: API/ANGA Report (Updated)

Hello Karin,

Thank you again for sharing an advance copy of the updated report with us.

I wanted to follow up with you on an item from our conference call last week. You had mentioned the possibility of providing EPA with the separated emission factors, calculated in the development of the report, for wells with liquids unloading: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent.

The separate factors are critical to our analysis as we try to determine how this information could be applied to the time-series of the GHG Inventory. As we are current working to develop the expert review draft GHG Inventory estimates, we'd like this information by early next week (by October 9, if possible) so that we can stay on schedule. Please let me know if you will be able to provide us with the separate factors.

We are currently reviewing the updated API/ANGA report and we look forward to our follow up conversation next Friday.

Thank you,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---09/28/2012 04:01:33 PM---Melissa, Please find attached the updated API/ANGA report for your review. As discussed, we will ke

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 09/28/2012 04:01 PM
Subject: API/ANGA Report (Updated)

Melissa,

Please find attached the updated API/ANGA report for your review. As discussed, we will keep you posted on plans for its release on API's website – in the meantime please do not publicize, cite, or share outside your organization.

As always please let me know if you have any questions.

Much appreciated,
Karin

Karin Ritter
Regulatory and Scientific Affairs
+1 (202) 682- 8472
www.api.org

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(866) 411-4EPA (4372). The TDD number is (866) 489-4900.

Re: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Paula Fields to: Melissa Weitz 10/15/2012 12:18 PM

Cc: "Wolf, Marty"

History: This message has been forwarded.

Melissa -
I have a call from 2-3, but I can call you after that...at 3:15 or so. If not, then we can catch up tomorrow.

-Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: "Paula Fields" <Paula.Fields@erg.com>
CC: "Wolf, Marty" <Marty.Wolf@erg.com>
Date: 10/15/2012 8:32 AM
Subject: Re: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Hi Paula,

Yes, let's try to talk at 2. I will likely be around, but if not, I'll let you know.

[redacted] (b)(5) deliberative [redacted]

Melissa

"Paula Fields" ---10/15/2012 11:24:10 AM---Hi Melissa - I just talked to Marty about this, and we're not clear on why a statistician is needed,

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Wolf, Marty" <Marty.Wolf@erg.com>
Date: 10/15/2012 11:24 AM
Subject: Re: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Hi Melissa -

I just talked to Marty about this, and we're not clear on why a statistician is needed, exactly. We have that capability to

(b)(5) deliberative

When would you like to talk? I have a call from 11-12 (2-3 pm ET) today, otherwise I'm open.

Thanks,
Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Melissa Weitz <Weitz.Melissa@epamail.epa.gov>
To: Paula Fields <Paula.Fields@erg.com>
Date: 10/15/2012 7:45 AM
Subject: Re: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Hi Paula,

I'm thinking it's time to bring in the statisticians.

We should have them review the API data set and determine if

(b)(5) deliberative

The options, as I see them, are listed below. There may be others. Let's schedule a call with the statistician asap.

Thank you!!
Melissa

(b)(5) deliberative

Melissa Weitz---10/12/2012 03:19:31 PM---So sorry--I thought I had sent it earlier. ----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/12/201

From: Melissa Weitz/DC/USEPA/US
To: Paula Fields <Paula.Fields@erg.com>, Marty Wolf <Marty.Wolf@erg.com>
Date: 10/12/2012 03:19 PM
Subject: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

So sorry--I thought I had sent it earlier.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/12/2012 03:18 PM -----

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/09/2012 01:56 PM
Subject: RE: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Melissa,

Attached is the background information/data you requested.

The raw data set is located under the tabs entitled: "Liquid Unloading Conventional" and "Liquid Unloading Unconventional". These tabs contain the raw data and calculations behind our analysis that is in Appendix C of the API/ANGA report. All identifying information for the data sets

has been removed.

You also requested that we provide separated liquids unloading emission factors: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent. The tab entitled: “EPA Data” provides the # of wells that vent for liquids unloading, the # vents per year, and the emission factors - for wells with and without plunger lift.

We can discuss the spreadsheets during our call this Friday.

Karin

From: Karin Ritter
Sent: Thursday, October 04, 2012 11:14 AM
To: 'Melissa Weitz'
Subject: RE: API/ANGA Report (Updated)

Hi Melissa,

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Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 3:45 PM
To: Karin Ritter
Cc: Suzanne Waltzer
Subject: Re: API/ANGA Report (Updated)

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We are currently reviewing the updated API/ANGA report and

we look forward to our follow up conversation next Friday.

Thank you,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---09/28/2012 04:01:33 PM---Melissa, Please find attached the updated API/ANGA report for your review. As discussed, we will ke

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 09/28/2012 04:01 PM
Subject: API/ANGA Report (Updated)

Melissa,

Please find attached the updated API/ANGA report for your review. As discussed, we will keep you posted on plans for its release on API's website - in the meantime please do not publicize, cite, or share outside your organization.

As always please let me know if you have any questions.

Much appreciated,
Karin

Karin Ritter
Regulatory and Scientific Affairs
+1 (202) 682- 8472
www.api.org

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rename the file extension to its correct name.

For further information, please contact the EPA Call Center at (866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

[attachment "Task 2 API ANGA Survey Report Final 21Sept12 clean ae.pdf" deleted by Melissa Weitz/DC/USEPA/US]
[attachment "Liquids Unloading Data Final Shared w EPA 9Oct12.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Fw: Plunger Lift Control Effectiveness

Suzanne Waltzer to: Melissa Weitz 10/15/2012 03:52 PM

History: This message has been forwarded.

Did you see this?

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 10/15/2012 03:51 PM -----

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, "Robinson, Donald" <Donald.Robinson@icfi.com>
Date: 10/04/2012 03:53 PM
Subject: Plunger Lift Control Effectiveness

Suzie,

Below is a summary of all the references that have plunger lift data or estimate the control effectiveness for plunger lift:

(b)(5) deliberative

(b)(5) deliberative

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

APIs Pre-proposal Comments on Liquids Unloading

Suzanne Waltzer to: Melissa Weitz, Mark DeFigueiredo 10/16/2012 11:57 AM
Cc: Suzanne Kocchi

History: This message has been forwarded.

As follow-up to yesterday's discussion, attached are API's pre-proposal comments from February 2011 which includes a discussion on liquids unloading.

API Comments 02-23-11 Attachments.pdf

I took a look and did not see anything new that we have not already received but just wanted to send along FYI.

Melissa, note that they cite the Oil and Gas Reporter article that discusses the minimum flow rate threshold from the Marathon data. They do not specifically mention the threshold that but they note that study and they reference the Artificial Lift Research and Development Council.

THE AMERICAN OIL & GAS REPORTER

Content Updated Thursday, January 6 2011

Click here to go back to menu.

June 2009 Cover Story

Artificial Lift Advances Address Challenges, Trends In Gas Well Deliquification

By James F. Lea and Cleon L. Dunham

AUSTIN, TX.–The technologies for addressing problems with natural gas well liquid loading continue to advance, and these advancements have been pursued to address many of the trends and new challenges that face the gas production industry in 2009.

Based on the most recent available data, there are more than 450,000 natural gas wells in the United States, up from 300,000 wells a decade ago. In total, these wells produce ±50 billion cubic feet a day, and the average production output per well is 110 Mcf a day. That means the typical U.S. gas well produces well below the "critical rate" that is needed to keep wells unloaded, which averages about 300 Mcf a day at a wellhead pressure of 100 psi. Consequently, 90 percent of all gas wells now on production experience liquid loading problems. For effective gas production without the hindrance of liquid loading, these wells need to be deliquified by some form of artificial lift.

In addition to the general challenge of needing to remove liquids from 400,000-plus gas wells, operators are encountering a number of other trends and challenges associated with gas well deliquification/artificial lift. These include:

- Economics;
- Deep wells;
- Long perforated intervals;
- Horizontal completions;
- Tight reservoirs;
- Coalbed methane wells;
- Wells with subsurface safety valves;
- Wells with tubing corrosion problems; and
- Automation systems.

Economic Pressures

Foremost among the challenges are new economic realities driven by gas prices that have essentially been halved on the New York Mercantile Exchange since late last summer. Although prices had recovered to the $4.30 range by mid-May, the general downward pressure on gas prices throughout the winter heating season has placed pressures on capital investments for artificial lift systems as well as on operating costs.

With operating companies working to reduce both capital and operating costs, the service and supply companies also are working to reduce costs to meet their customers' needs. An example of such initiatives includes combining pumping systems with wellhead compression to try to make the best of both worlds. While this can be an effective method of deliquification, it may not always be the most economical.

Continuous plungers are commonly used early in the life of loaded wells, followed by conventional plungers. However, once conventional plungers are no longer effective, there are a number of ways to continue to utilize plunger lift before moving to a more expensive pumping or gas-lift system. These include progressive or staged plungers, plunger-enhanced chamber lift (a method of intermittently lifting a plunger above a standing valve), and using compression to lower wellhead pressure and/or to inject gas into the casing annulus.

A new hydraulic reciprocating pump has been introduced that can fit into 4½-inch casing and is being operated at progressively deeper depths. Gas lifting of gas wells is also becoming more common. Gas-lift systems can handle sand and well bore deviation, and lower liquid production rates that cause trouble with pumping systems. Methods include gas-lift with valves and a packer above the perforations (the conventional approach), designs to allow injection below the packer and into the perforated interval, and gas circulation where liquids are removed from the well first and then lower-pressure gas is injected down the casing annulus and around the end of the tubing.

In addition, there is a method for using a dead string to increase the velocity in the perforations, while simultaneously using surfactants to lower the required critical velocity. It has variations for flowing wells, and for plunger lift. Many more approaches to improve the economics of gas well deliquification are highlighted in Table 1 (See bottom of page).

Deep Wells, Long Intervals

While the average depth of gas wells in the Unites States is about 5,500 feet–with more than half (approximately 265,000 wells) shallower than 6,000 feet–there are some 65,000 wells that are more than 9,000 feet deep. These deep wells offer special challenges to lift often relatively low liquid rates from at or below the perforations. Another challenge is that many of these wells are in remote locations where there is no electrical power infrastructure.

Many of these wells are "late" in their life cycles and reservoir pressures are often low. While inflow performance may have decreased and remaining reserves are limited, there are usually enough remaining reserves to justify methods to recover them. Plungers and other "conventional" means of artificial lift may no longer be viable, and new methods are needed to lift relatively small volumes of liquid from deep wells, often without available electrical power.

Methods are being explored to use pumps of various designs to address this problem. For very deep wells, pumps (other than some conventional hydraulic systems) may lose effectiveness. Gas-lift and gas circulation may sometimes be used. Also, plungers sometimes can be used in deep wells as long as the well has few solids and is not deviated more than ±60 degrees.

FIGURE 1

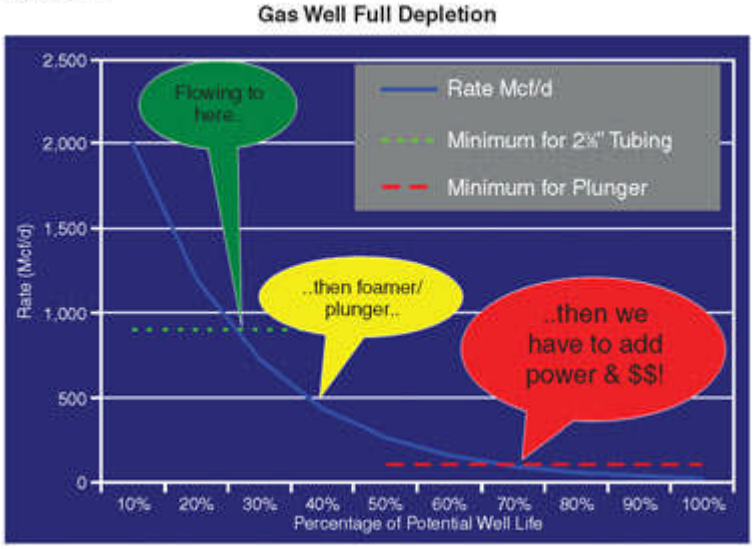


Figure 1 shows an example production curve for achieving greater depletion potential and extending well life by adding artificial lift.

Many gas wells are completed with long perforated intervals. This presents challenges on where to land the end of the tubing, and how to deliquify the lower zones without placing back pressure on, or risking back flow into, the upper zones.

Some perforated intervals may be thousands of feet long, often encompassing multiple reservoirs with varying pressures, porosities, permeabilities, liquid contents and gas compositions.

In general, the best approach is to land the tubing as deep as possible, below most or all of the perforated intervals. If the end of the tubing is high in the perforated interval, liquid can accumulate below the tubing but above many of the perforations, thereby inhibiting gas inflow from these lower zones.

Another common approach is to place the end of the tubing below the most productive gas zone, as determined by a production logging tool. The idea here is to maximize production from the “good” zone(s) while realizing that the poorer zone(s) will not produce much gas anyway.

Success in lifting these wells has been achieved with pumps, if they can be landed deep in the well and keep the well “pumped off,” and with gas-lift, where the gas is injected deep in the zone and at a rate sufficient to keep the overall gas flow rate above the critical velocity.

Success has been reported by Schlumberger with its PerfLift™ system, Weatherford with its XtraLift™ system, and Marathon with its “below packer” gas-lift system. These are designed to provide gas lift from deep in a zone, below a packer if necessary, and in or below the perforated interval.

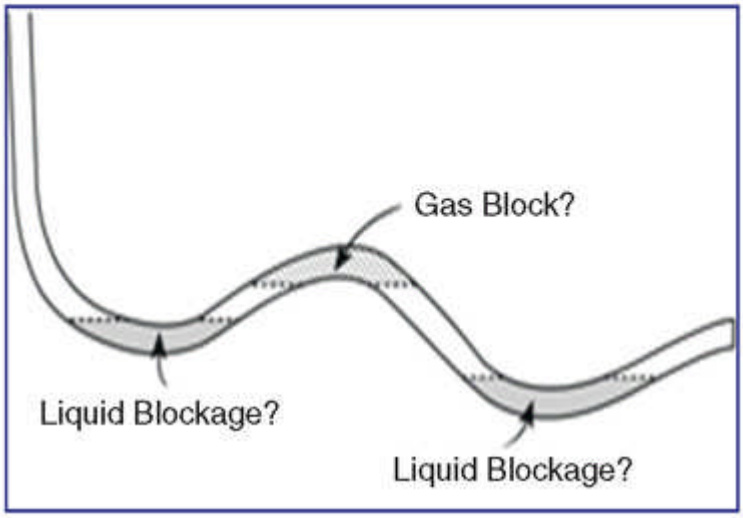
Another method uses a dead string and surfactants to create flow above the critical rate in the perforated interval. Even with conventional plungers, it is sometimes possible to set the end of tubing 75 percent of the way down in the perforated interval.

Horizontal Completions

Many gas wells have horizontal completions, with the goal being to contact more of the reservoir than with a vertical well. In fact, operators now are drilling almost exclusively horizontally in many shale gas plays, including 4,000-foot and longer laterals in the Barnett, Fayetteville, Marcellus and Haynesville shales.

FIGURE 2

Example Horizontal Well
Gas/Liquid Blockages



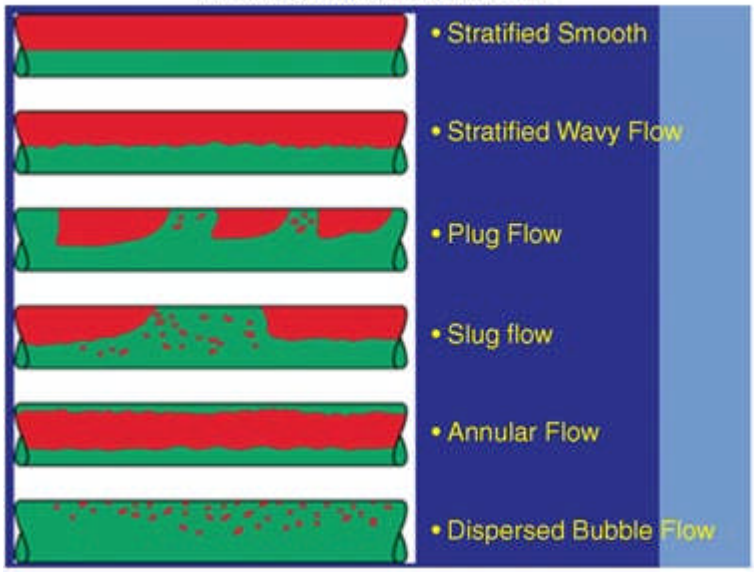
However, horizontal wells present challenges in installing artificial lift equipment in the lateral sections and operating the wells to avoid serious gas/liquid slugging in the horizontal sections.

Horizontal, of course, does not mean that the well bore in the “horizontal” section is straight or constant. The inclination and azimuth may vary considerably along the horizontal path. The liquid/gas gravities can vary accordingly (Figure 2), which may affect flow velocities, fluid collection and flow regimes.

There may be fracture ports, liners, and other internal diameter changes, all of which can introduce friction, turbulence and flow restrictions.
Wells can have either cased or open-hole completions, with further issues of friction, corrosion and further flow restrictions. In addition, there may be sand production and accumulation that also can introduce friction, turbulence and flow restrictions.

FIGURE 3

Flow Regimes in Horizontal Wells



Flow regimes in horizontal wells can be very complicated (Figure 3). Flow is affected by multiple variables and changes with angle, rate, gas/fluid densities, and temperature. Multiple flow patterns or regimes exist across all parts of the well (horizontal, inclined or deviated, and vertical).

Plungers may not run to the end of the well bore, thereby leaving some liquid in the bore hole unlifted. There has been some success in horizontals with gas-lift and low-rate electrical submersible pumps. Both can be installed below the "knee" of the well and into the horizontal section. Gas-lift is commonly used in horizontal wells because of gas separation problems with pumps and because the technique can handle hot and sandy wells.

There have been successful applications of electrical submersible pumps using an upturned shroud over the intake. There is also a focus on using sucker rod pumping in horizontal wells as long as the pump can be landed in a relatively vertical section and care is taken to achieve gas separation. Setting above the kickoff point is similar to using sucker rod systems in vertical wells. There is evidence that setting in the horizontal may reduce run life by 40 percent and setting in the curved section may reduce lift capacity by 70 percent. Also, horizontal wells present special problems for pumps since they cannot be set below the perforations to separate gas.

Tight, CBM Reservoirs

Many gas wells are being completed in tight (ultralow-permeability) sand and shale reservoirs, spurring growth in horizontal drilling activity as well as hydraulic fracturing services. Most shale and tight sand reservoirs must be fractured to obtain economic gas inflow from the rock formation. This often takes the form of massive multistage frac jobs that pump large volumes of proppant down hole. To achieve optimal flow rates and avoid problems after a well is placed on production, the frac sand that does not lodge in the formation must be recovered.

The flow back and recovery of fracture proppants causes difficult problems when using pumps. If properly designed, pumps can produce some solids. However, the production rate has to be high enough to flush the solids out of the well and keep them from settling back into the pump. Therefore, gas-lift or some other lift method such as jet pumping may be required if solids production is significant.

The other major focal point of unconventional gas activity is coalbed methane. Although CBM wells generally do not have the reserves or high production rates associated with shale and tight sands reservoirs, many wells continue to be drilled into coal formations to recover the methane trapped within the coal matrix. There are special challenges to recover coal fines and to address liquid recovery rates that may range from large early in the well's life as a coal seam dewaters to minimal later in life.

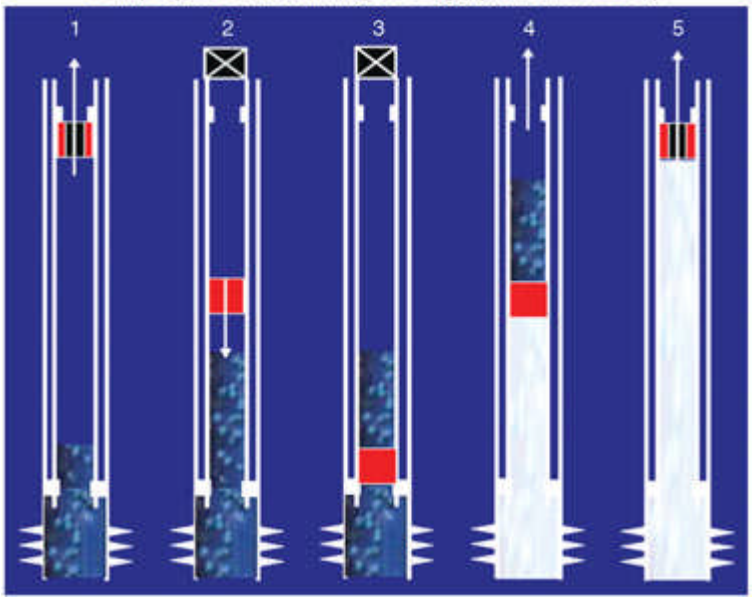
Even with the existence of coalbed fines, sucker rod pumps are still frequently used. If solids are more prolific, progressing cavity pumps often are applied. As in shale and tight sands wells, the flow back of frac can be a significant issue. In fact, proppant flow back often causes more problems than the coal fines themselves. And, of course, the usual gas separation problems remain for CBM pumped wells.

Gas-lift is usually not as attractive for CBM wells as it is for wells with larger liquid flow rates, since it may not achieve lower bottom-hole pressures. However, gas-lift may be required for some problematic wells.

Subsurface Safety Valves

Governmental regulations require most offshore and more and more onshore wells to use subsurface safety valves. Advancements are being made in using plungers and chemical systems for producing below an SSSV.

FIGURE 4
Pump Cycles of New Plunger Design (Wells with SSSV)



A new plunger design travels from below the SSSV to the bottom of the well and returns. A complete pump cycle (Figure 4) includes five distinct stages:

- Cycle 1, liquid loading (the plunger hangs in open position under the SSSV, liquid in the liner and tubing builds up, and the flow rate declines);
- Cycle 2, shut-in (the well automatically shuts in and the plunger falls);
- Cycle 3, Shut-in build-up (the plunger reaches bottom and closes, followed by a short build-up time);
- Cycle 4, unloading/plunger travel (the well automatically opens and delta pressure lifts the plunger and the liquids in a closed position); and
- Cycle 5, flowing well (the plunger hangs in the open position under the SSSV).

Another new method permits chemical injection below an SSSV while maintaining the safety valve's integrity by using a capillary string and a special tool to bypass the SSSV.

Tubing Corrosion

A surprising number of wells have existing or pending holes in the tubing caused by corrosion. The first task is to detect the corrosion and existing or pending holes so the problem can be addressed.

Internal tubing corrosion, which can lead to holes, is difficult to detect, but can have significant economic implications. If there is a hole, the tubing will most likely need to be replaced. If there is corrosion but no hole has developed, it may be possible to prevent further damage by taking the appropriate corrective action.

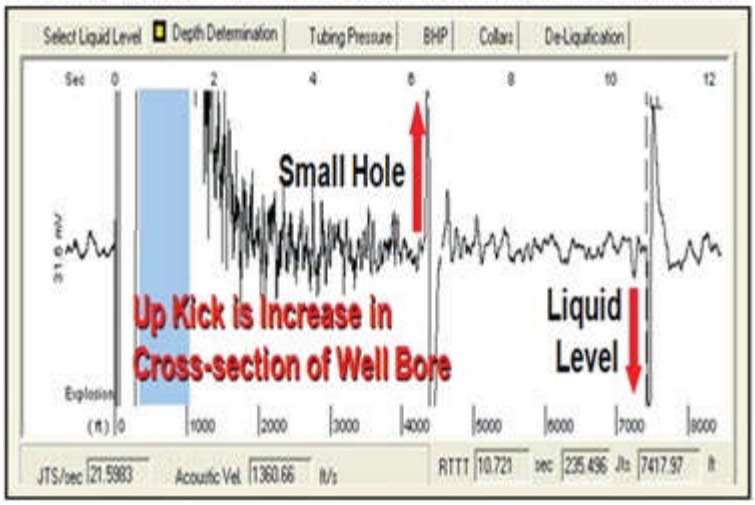
Corrosion in the tubing strings of flowing or artificially lifted gas wells is a common problem, yet well problems caused by a hole or corrosion in the tubing string often are misdiagnosed or overlooked. Problems occur slowly, as corrosion gradually creates a hole, which increases in size over time.

The relatively high cost of using wireline to set a standing valve and pressure test the tubing may be avoided. Also, many operators are reluctant to use wireline tools since it requires that the well be shut in. And there is always some risk when running wireline tools in a well. If there is corrosion, they may become stuck.

An alternative to detect corrosion or a hole in the tubing wall is to use an acoustic fluid level instrument. It provides a quick, low-cost method to troubleshoot a gas well to identify potential problems (Figure 5).

FIGURE 5

Detecting Tubing Corrosion/Hole with Acoustic Fluid Level Instrument



The well still needs to be shut in for a short time, but no equipment needs to be run in the well. The acoustic survey detects changes in the cross-section of the tubing, which can be interpreted to detect the build up of corrosion products and/or holes in the tubing string.

Production Automation

A final major trend impacting gas well deliquification and production is automated operations. With pressures on staffing resources and costs, more and more focus is being placed on automation to augment gas well operation, control, maintenance and optimization.

Many wells are being drilled horizontally from multiwell pads, particularly in environmentally sensitive regions such as the Rocky Mountains. This has obvious advantages for reducing the “footprint” of wells and equipment, allowing combinations and economies of scale of surface equipment as well as the use of automation systems that can address several wells with one set of automation hardware and software.

There is much interest in automation as a means to improve gas well operation, control, surveillance, problem detection and diagnosis, design, and optimization. It also can be a significant contributor to reducing operating costs. Some highly compelling benefits can arise from applying automation to gas well deliquification operations, economic and otherwise.

One evolving approach for automating gas wells and associated facilities is using wireless communications to transmit information between the instruments, remote terminal units, and the host automation systems. This has the obvious advantages of reducing installation costs (no trenching for communication cables) and lowering maintenance costs (no cables being cut).

With at least 15 methods of artificial lift now being used to deliquify gas wells, and several more combinations and permutations, operators are often in a quandary concerning exactly what method or system to use. To this end, the Artificial Lift Research & Development Council, a nonprofit organization that promotes the development and sharing of recommended practices and information in all aspects of artificial lift, is coordinating a team of industry experts to develop a set of recommended practices to assist operators in selecting the most appropriate artificial lift technique for their gas well deliquification applications. For more information, see the "Recommended Practices, Gas Well Deliquification" section at http://www.alrdc.com.

Editor's Note: Some of the information in the preceding article was adapted from technical presentations at the 2009 Gas Well Deliquification Workshop, held Feb. 23-26 in Denver. The co-authors acknowledge the following presenters for their topical contributions:

- Combining a new downhole tool and wellhead compression to dewater gas wells, by Larry Perry and David Lewis, Cyclone Production Tools; and Ted Garner, COMPRESSCO Field Services;
- Using pressure-activated chamber technology as an artificial lift system for CBM wells, by Leslie Lam, Black Hills Exploration; Ryan Davis, Merrion Oil & Gas; Mark Turland, ProActive Pumping Solutions; and Jim Wetzel, Nojak Pumping Solutions;
- Deviated plungers in low-rate horizontal wells, by Alex Rodriguez, BP;
- Sucker rod lifting horizontal and highly deviated gas wells, by Norm Hein Jr., Oil & Gas Optimization Specialists;
- Plunger lift SCSSSV applications by William Hearn, Weatherford; and Stathis Kitsios, Sachin Shinde, Dick Klompsma and Ewout Biezen, Shell NAM;
- Completion techniques to minimize liquid loading, by Jeff Bolding, BJ Services;
- Corrosion in gas well tubing, by Rick Nadkrynechny, T-Ram, Canada; and Lynn Rowlan, Echometer;
- Automating plunger lift pad sites, by John Green, ABB Totalflow; and Lee Sargent, Anadarko Petroleum; and
- Wireless communication to plunger lifted wells, by Jim Gardner, FreeWave Technologies.

For more detailed information on workshop presentations, visit http://www.alrdc.com.

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CLEON DUNHAM is president of Oilfield Automation Consulting, providing consulting in oil and gas field automation and artificial lift. He is also president and chief executive officer of the Artificial Lift Research & Development Council. Dunham retired in 2000 after 36 years of service with Shell Oil Company, where he focused primarily on production automation and artificial lift. Much of his automation experience was directed at monitoring, controlling and optimizing artificial lift operations. He spent his last five years at Shell International Exploration & Production, where he was production automation coordinator for Shell's worldwide producing operations. Dunham has written extensively and has taught numerous industry courses on artificial lift and automation.

TABLE 1

Types of Artificial Lift used for Gas Well Deliquification

Artificial Lift Systems	New Developments/Enhancements
PUMPING SYSTEMS	
Pumps in general	Pumping is being augmented with surface compressors to reduce casinghead pressure.
Sucker rod pumping	Linear rod pumps reduce surface equipment. A new pump is designed to be more efficient at very slow pumping speeds.
Progressing cavity pumping	New stator technologies are being pursued to extend depth range of PCPs pumping. Metal-to-metal PCPs are being developed for high-temperature applications.
Electrical submersible pumping	Special multistage pump sections are being used to improve gas handling. An upturned shroud is a simple, but effective method of gas separation for many horizontal wells. For setting below the perforations, a shroud can be used if clearance is sufficient. A recirculation pump can be used for motor cooling if less clearance is available. High-temperature trim may also be required.
Hydraulic pumping	Hydraulically-powered jet pumps can be installed and used in tubing without pulling tubing. However, they suffer from low efficiency and the required intake pressure is high. A new reciprocating hydraulic pump is available for moderate to deeper wells and rates. It can fit into 4½-inch casing if required. It is connected to a three-tube umbilical.
PLUNGERS	
Plungers in general	Automation is being used to optimize plunger operations. Plungers can be run in deviated and horizontal wells. They can be run up to 60 degrees from vertical. Continuous plungers should be applied early in the life of a well; conventional plunger lift can usually last for a significant period. Progressive plunger lift is becoming more common when conventional plunger lift begins to perform poorly later in a well's life.
Tubing plungers	Several types of plungers are being offered: Continuous plungers. Two-stage plungers (sleeve and ball are separate). Progressive plungers. Gas-assisted plungers. Plunger-assisted chamber lift. Large-diameter plungers (4½ inch). Small-diameter plungers (1½ inch).
Casing plungers	Used when there is no tubing in the well. They use elastomers to create a seal so differential pressure can lift the plunger and liquid. Applicable to low-rate and low-pressure wells. Seal improvements are being pursued.
CHEMICAL SYSTEMS	
Chemicals in general	More testing is available to assure compatibility between chemicals, water and condensate. Surface and downhole modeling is used to predict required chemicals to achieve critical velocity. Methods include soap sticks, cap string injection, backside injection, and batch injection forced down the tubing.
Soap sticks	New pressure drop predictions are available for foam flow.
Batch chemical	Chemicals can be squeezed into the formation for better recovery as foam forms in the formation.
Continuous chemical	Nozzles improve chemical injection.
GAS-LIFT	
Continuous gas-lift	There are a number of gas-lift advancements: PerfLift and XtraLift (gas-lift below perforations). Open-ended gas-lift, with or without unloading gas-lift valves (also known as "continuous gas circulation"). Pressure-activated chamber technology (PACT, no moving parts). Gas-lift used to clean wells after a fracture treatment. Downhole sensors used to monitor and control gas-lift operations.
Intermittent gas-lift	Gas-assisted plunger lift. Plunger-enhanced chamber lift, or essentially, chamber lift assisted by a plunger (concentric tubing strings and a standing valve are required).
OTHER METHODS	
Surface compression	Surface compressors are being used in conjunction with several types of artificial lift to reduce back pressure, or used as a stand-alone deliquification method to allow wells to continue to produce above the critical rate.
Velocity strings	Smaller tubing strings are used to increase flow velocity. They may be used to deliver chemicals or gas-lift injection gas.
Heaters	Downhole heaters are used to prevent condensation in the well bore.
Cycling, stop cocking, intermitting	These can be controlled by production automation. They are usually a stop-gap measure before installing a more efficient artificial lift method.
COMBINATIONS	
Plungers and chemical	Plungers can be used to deliver chemicals to the bottom of the well. Also, surfactants and the "dead string" system can be used in conjunction with plunger lift.

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COVER

Small pump jacks, such as shown on the cover on a BP America Inc. coalbed methane well in the San Juan basin, can work well for removing liquids from low-pressure gas wells. This is one of several methods available for deliquifying these types of wells, as discussed in the first article in the special report, p. 41, on downhole technologies. The second article in the report covers some new surface, subsea, and downhole technologies that tied together allow operators to increase hydrocarbon recoveries from subsea completed wells. Photo by David Simpson, MuleShoe Engineering, Flora Vista, NM.

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Low-pressure gas well deliquification requires different approaches

David Simpson
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Deliquification of a low-pressure gas well requires a different approach, tools, and staffing than artificially lifting an oil well.

There is no "silver bullet" that will solve all deliquification problems in all fields or even in all wells within a field. The energy available to lift reservoir fluids at low pressures requires application of considerable subtlety to the process and demands that the well operator understand that a few pounds of pressure drop could easily be the difference between success and failure.

Deliquification

Wells originally drilled and equipped with a 500-psig expected abandonment pressure can still produce economic quantities of gas at current US gas prices. Operators now frequently ask the question "What do I have to do differently to change abandonment assumptions by 300-400 psig?"

The primary difference between high-pressure operations and low-pressure operations is deliquification. With high bottomhole pressure, gas has considerable density and consequently good ability to move liquid up the wellbore without assistance. As pressures decrease, this ability lessens and the well often needs some form of mechanical deliquification equipment.

Deliquification is a different concept from artificial lift. Artificial lift applies an external energy to lift a commercial product from reservoir depths to the surface, whereas deliquification applies energy to remove an interfering liquid to enhance gas production.

While the industry originally developed many deliquification tools for artificial lift, the application of these tools is significantly different in gas wells.

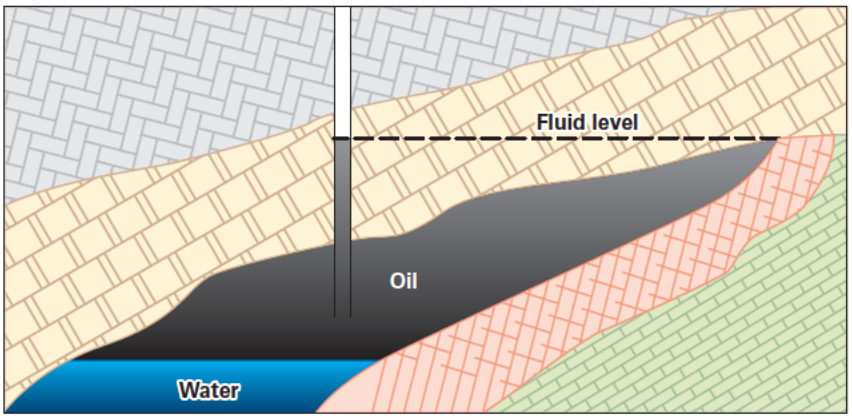
Most obviously, artificial lift requires getting the product to the surface, while deliquification only requires getting it out of the way. Evaporation is an effective deliquification technique but would be unacceptable for artificial lift.

Another significant difference is net positive suction-head (NPSH) requirements. An oil well can have a liquid level in the wellbore as high as the hydraulic gradient within the formation. For a well located downdip from the reservoir's hydraulic surface, having several hundred feet of oil in the casing above the pump has no effect on flow from the reservoir while it does provide the NPSH to fill the pump (Fig. 1).

A low-pressure gas well does not have a measurable hydraulic gradient across the formation so that any liquid

FLUID LEVELS

Fig. 1



Note: In an oil field, fluid level in well approximates height of fluid in reservoir.

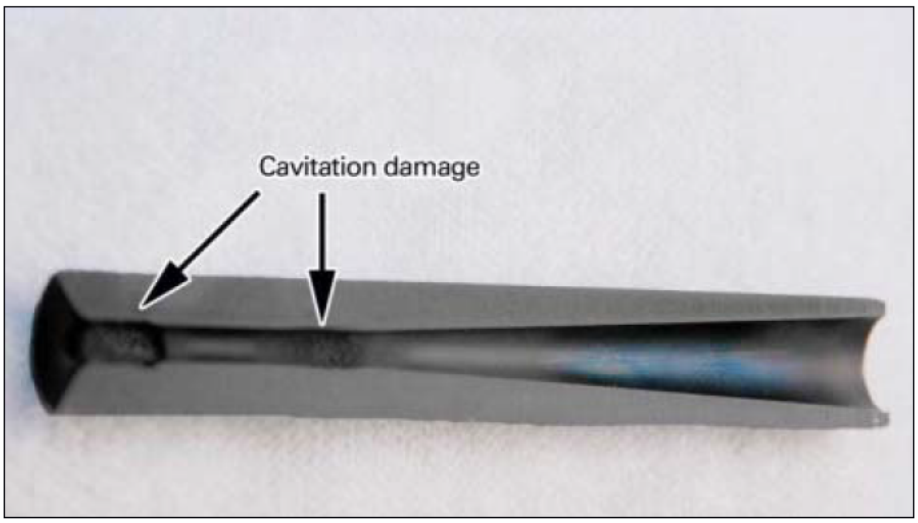
above a pump-intake is applying "unnecessary" backpressure on the formation. Operators of mechanical pumps need to understand both the required NPSH (NPSH-r) and the available NPSH (NPSH-a).

NPSH-r is the pressure at the pump inlet that will prevent cavitation in a rotating or jet pump or ensure adequate fill of a stroking pump.

Cavitation is the formation and subsequent collapse of vapor bubbles in a flow stream. This means that when the pressure in the flow becomes too low, the liquid can boil and develop steam pockets. As the liquid moves through the pump, pressure will increase to the point where the steam must condense. The condensation creates a void in the liquid that is filled by high-velocity liquid moving to fill the void. The momentum of this rushing liquid can tear metal from the control surfaces of the pump (Fig. 2).

A stroking pump with inadequate NPSH will see partial filling, such as the standing valve not having enough differential pressure across it to open, and the pump can gas lock.

NPSH-a is simply the pressure at the pump inlet that is available from either hydrostatic or pressure sources.



Rushing liquid has caused cavitation damage on the throat of a coiled-tubing jet pump from a coalbed methane well in the San Juan basin (Fig. 2).

For a pump to operate on its pump curve, NPSH-a must be greater than the NPSH-r.

Many operators will extend the wellbore casing a considerable distance below the formation to create a rat hole. Placing a pump in the rat hole is a common method to try to increase the NPSH-a without imposing an artificial backpressure on the well. This sometimes works well. At other times, the liquid volume in the rat hole is so small that, while it may provide adequate pressure (which is only a function of liquid properties and height, not volume), it does not provide enough reserve.

When liquid inflow stops, such as when one shuts in the well with the pump running, a pump can pull the fluid level to below the NPSH-r in a few seconds, damaging a pump.

The well with a rat hole may require more attention and instrumentation instead of less as commonly believed. In the author's experience, a rat hole often improves steady-state pumping conditions while significantly increasing the potential for damage in an upset condition.

Derived techniques

The deliquification techniques that have evolved from artificial lift all require either subtle or major changes for gas well operations.

For example, if a reciprocating pump requires 100 ft of NPSH, then one has to accept 44 psi of extra backpressure on the formation, an important factor in calculating abandonment pressure.

For any artificial-lift pump to work in deliquification, one has to carefully balance NPSH needs, liquid inflow, and pump capacity.

For example, a well produces 5 bw/d and has a 1½-in. rod pump inside 2⅜-in. tubing in 5½-in. casing. If the pump runs at 4 spm with a 40-in. stroke, the pump capacity is about 44 b/d. If the NPSH is 100 ft (1.8 bbl) and the pump runs continuously, the pump will have lifted all of the daily inflow in about 4 hr, leaving it moving up and

down without pumping for the remainder of the day.

In reality, this configuration will tend to pump liquid for 5-10 min followed by 2-3 hr of gas lock throughout the day. Sometimes the best option is to reduce the size of everything.

An operator could install a 1-in. pump running 2 spm with a stroke length of 25-in. to reduce the capacity to 6 b/d, and then the well would probably only gas lock 2 or 3 times/day instead of 12-14, but the results are the same. It is very difficult to match pump performance to inflow.

The following sections describe the derived deliquification techniques including pump-off control, stroking pumps, progressing cavity pumps (PCPs), electric submersible pumps (ESPs), gas lift, jet pumps, and surfactant injection,

An adequate support corrects the large, vibrating, cantilevered load on this top-drive PCP in the Piceance basin (Fig. 3).

Pump-off control

Operators have a wide range of artificial-lift pump-off control schemes that range from a simple stop-clock to elaborate algorithms. All these schemes help protect against the NPSH-a approaching the NPSH-r. But for deliquification, none of the schemes works well.

Typically in a compressible-flow regime, surface indication to stop pumping arrives too late.

In the previous example, the pump can move 44 b/d and the inflow is 5 b/d so that the pump should run 11% of the time or 30 min on and 4.5 hr off. The problem is that against an increasing hydrostatic head the well may flow 2 or 9 b/d.

While the pump is off, leakage and cooling certainly will break a gas lock, but one has no idea what the transient behavior of the reservoir is between inflow and outflow.

An operator in Central Texas recently ran his 125 b/d pump for 30 min on and 8 hr off with a stop clock. In this case, he expected the well to produce 1 b/d. His question was: Why does the 10-Mcfd well sometimes produce at more than 200 Mcfd for up to 1 hr after the pump starts and then produces nothing?

The answer was that the inflow during the soak period while the pump was off led to too much head in the casing. When the pump started, it quickly pumped off the head and allowed the gas to flow at flush production rates probably followed by a gas lock of the pump for part of the 30-min run time.

Modern technology allows surface equipment automatically to obtain a fluid level in the tubing-casing annulus with an acoustic signal. For reasonably quiet fluids, these devices see through the typical froth on the top of the water and measure a true fluid level. But the devices seem delicate, and it is yet unknown whether they can deal with the 100-500 ft of froth and foam common in gas wells.

Pump-off control schemes or equipment is not effective universally and some never may be effective for deliquification.

Because of the nature of transient flow in the near-wellbore region of a gas well, it is always better to match outflow with inflow in a continuous operation than to turn a pump all the way off. For a given total pumped-volume per day, schemes that reduce pumping-rates during low-liquid-flow periods will generally out-perform a start-stop scheme on a gas well.

Stroking pumps

Stroking pumps are also known as rod pumps, beam pumps, pump jacks, or plunger pumps. The pumps operate by moving a chamber up and down within a column of liquid.

On the downstroke, liquid within the pump forces a traveling valve open and the liquid is shifted to the piping above the pump. On the upstroke, the traveling valve closes (isolating the plunger from the hydrostatic head outside the pump) and a standing valve is opened by the differential pressure between the formation and the pump barrel, allowing reservoir fluids to flow into the pump.

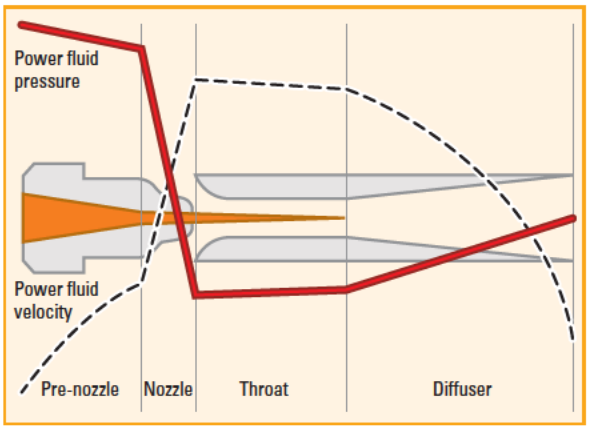
In a liquid-full scenario, these pumps are efficient and effective. A liquid-full

Operating principles

Fig. 4

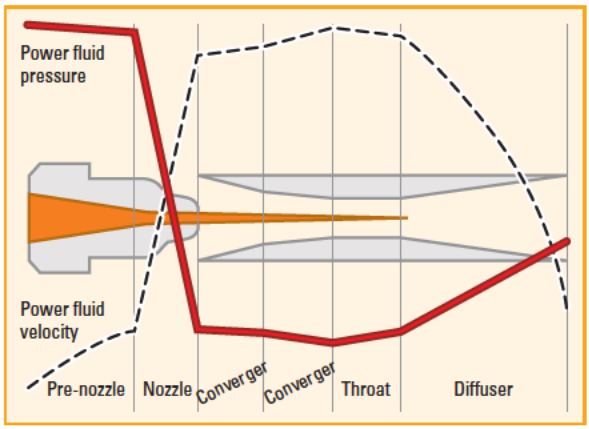
Jet pump

Fig. 4a



Eductor

Fig. 4b



pump reaches high pressures quickly on the downstroke that opens the traveling valve near the top of the pump. If the unswept pump volume is full of liquid then the plunger requires little travel to lower the pressure in the barrel enough to open the standing valve to refill the pump.

Oil has a significant capability to dissolve gas so that as long as the pumping rate is consistent with inflow and the pump has an adequate NPSH, a stroking pump will usually stay full of liquid and be very efficient.

In a deliquification application, on the other hand, the pump is rarely completely full of liquid. Water has limited gas absorption properties so that any gas at the pump intake will enter the pump in a gas phase.

When free gas is in the pump, the traveling valve acts as a compressor piston until the gas is compressed enough to overcome hydrostatic pressure above the traveling valve. In a 3,000-ft gas well with 50 psig flowing bottomhole pressure and 100° F. reservoir temperature, the first gas-locked stroke must compress the gas 20 compression ratios. In this process, the heat of compression will raise the gas temperature to more than 600° F., which can boil any residual liquid on the upstroke.

On the upstroke the plunger must uncompress the gas enough to allow the standing valve to open. When either valve cannot open, the pump gas locks.

As the pump strokes, leakage past the plunger tends to add enough fluid-mass to the chamber to open the traveling valve eventually and break the gas lock. The leakage rate is a function of pump clearance and the differential pressure across the plunger seals.

Pump clearance is a two-edged sword: Too loose, and the process will have problems opening the standing valve with an otherwise reasonable amount of gas; too tight, and the pump will never break a gas lock.

Differential pressure across the plunger also has trade-offs. In a 3,000-ft well, if one has pulled the separator pressure down to near atmospheric and then put 1 Mcfd through the pump, the hydrostatic pressure on the traveling valve will decrease from nearly 1,300 psig to less than 50 psig because of the space that the gas occupies in the tubing. With 50 psig across a normal-clearance plunger, the leakage is adequate to break a gas lock every 5-6 days at four 60-in. spm.

Adding a backpressure valve on the pump discharge set at 100 psig will raise the pressure above the traveling valve to more than 1,200 psig with 1 Mcfd going through the pump and increase the leakage on a standard-clearance pump high enough to break a gas lock in 3-4 hr.

Vendors sell many pump configurations or devices to help minimize or break gas locks. None is universally applicable. Some work well in specific wells while others do not work at all. But most have a niche where they are the best device for the task.

PCPs

Progressing cavity pumps (PCPs) are good artificial-lift pumps. They are positive-displacement pumps with flexible speed and can handle solids. But the pumps cannot compress gas.

If the pump becomes full of gas at 50 psig, the PCP will compress the gas up to the pump discharge pressure (1,300 psi in a 3,000-ft well) and the heat of compression will coke the elastomer in the stator within seconds. PCPs, however, can handle a significant amount gas if enough liquid flows through the pump to carry away the heat of compression.

Many operators have had problems with start-stop pump-off control with PCPs. Sand, coal fines, corrosion products, and other solids will tend to settle on the top of the pump during the off cycle and can prevent the pump from starting.

PCPs have successfully deliquified gas wells if equipped with variable-speed drives and the inflow rate was well

understood. Some operators have had problems with the motor on a top-drive PCP putting a large, vibrating, cantilevered load on the wellhead pumping tee, but that can be corrected with an adequate support (Fig. 3).

ESPs

Electric submersible pumps (ESPs) are dynamic pumps that use multiple stages to raise the liquid pressure high enough to overcome static head of the discharge column. Historically these pumps were installed in high-volume artificial-lift applications that are seldom appropriate for deliquifying gas wells.

Several manufacturers sell lower-capacity ESPs for deliquification applications. Again, if one knows the inflow rate, pump capacity, and NPSH-a then the pumps can be effective. If the operators allow the NPSH to fall below the NPSH-r (in either gas or oil wells), then the pumps will cavitate and experience the tearing of metal off the pump's control surfaces.

Gas lift

Gas lift is an effective artificial-lift technique. About 80% of the benefit of gas lift comes from dissolving the lift gas into the oil column and improving the gas-transport characteristics. The remaining 20% of the benefit is simply velocity effects of the gas dragging the oil along with the gas flow.

The ability of oil to absorb gas depends on the crude characteristics, but certain crudes can absorb enough gas to lower their specific gravity by up to 0.1 (15% reduction of the crude's density).

If the crude has a 55° API gravity (SG = 0.759 relative to water) in a 3,000-ft well, then the hydrostatic head of the column is 980 psig. If the lift gas lowers the gravity by 0.1 (to the equivalent of 84° API), then the column would exert 850 psig.

This 13% reduction in the backpressure is important, but a bigger benefit comes from the undissolved gas creating void spaces that further lower the pressure on the standing valve. The largest benefit comes from the increased gas ability to transport the lower-density liquid.

Water has little ability to absorb natural gas so that one loses that benefit. A water column saturated with gas at 1,300 psig and 70 F. can absorb 0.15% of its mass, reducing the specific gravity only insignificantly.

The second benefit is that void spaces are greater with water than with crude because more free gas is in the column at the same injection rate. But the major benefit of needing to move a lighter liquid is unavailable.

Because absorption is unavailable for deliquification, one only receives 20% of lift gas benefit.

The author's review of gas-lift applications in several fields determined that gas lift uses five times the power of the other deliquification methods and lift gas is unable to lower bottomhole pressure as much as other methods.

Operators in the Black Warrior basin have reported good success with gas lift in shallow coalbed-methane wells, but the author has not verified those data. Coalbed operators commonly have used some form of gas lift at one time or another. It is one process that everyone has to try. But most often operators use "poor-boy" gas lift in which they inject gas into the tubing-casing annulus without a packer or gas-lift valves.

The author has never found an instance where such gas lift has sustained increases in production, nor has removal of it failed to increase net production.

Jet pumps

Jet pumps have been a niche product in crude production for more than 50 years. These pumps use a high-velocity-liquid flow through a downhole nozzle to draw a suction stream into a throat that opens onto a divergent nozzle to convert the intermediate velocity of the mixed stream to an increased pressure (Fig. 4a).

Oil wells with jet pumps typically have a packer between the tubing and casing so that the power-liquid is pumped down the tubing (for some pump models the liquid is pumped down the annulus) and the combined stream returns up the annulus (or tubing). This means that the entire well production must flow through the pump.

Jet pumps have a lower efficiency than several other methods because they require more input horsepower per barrel of liquid.

Gas-well operators see the lack of moving parts downhole as a significant advantage in deliquification. The problem with this is that the NPSH-r of a jet pump is the highest of any of the artificial-lift devices.

If the NPSH-a falls slightly below the NPSH-r the pump will cavitate (Fig. 2) at the entrance to the throat and the increased roughness of the throat will quickly create enough perturbations in the flow to prevent any suction fluid from moving.

Traditional jet pumps, installed with a packer, are never effective for deliquification because the space required within the pump for commercial gas production requires velocities that ensure the pump will quickly cavitate.

During the last 20 years, manufacturers have developed coiled-tubing jet pumps. These pumps use smaller tubing within the production tubing. These systems pump the power liquid down the small string and through the pump. The pump discharges the combined power-liquid and produced fluids into the tubing-tubing annulus. Produced gas goes up the tubing-casing annulus.

Coiled-tubing jet pumps operate effectively as long as the design matches closely the inflow and pump capacity and the operator maintains the power-fluid pressure within a very narrow range.

The work done by the pump is a function of the power-fluid flow rate and the pump's discharge pressure. When gas passes through the jet pump, the discharge pressure decreases and the jet pump wants to accept a higher flow rate.

If the jet pump increases the flow rate, indicated on surface by the sur-

face-pump's discharge pressure decreasing, the risk of cavitation damage increases rapidly. A constant-pressure valve on the surface will reduce the flow rate in this scenario, thereby extending pump life.

Operators can retrieve coiled-tubing pumps from the wellbore by reversing the flow to allow the surface-pump's discharge pressure to transport the pump to surface. This needs to be done frequently to ensure the maintenance of integrity of the pump internals.

Surfactant injection

Both batch and continuous surfactant injection can effectively increase oil production in some wells.

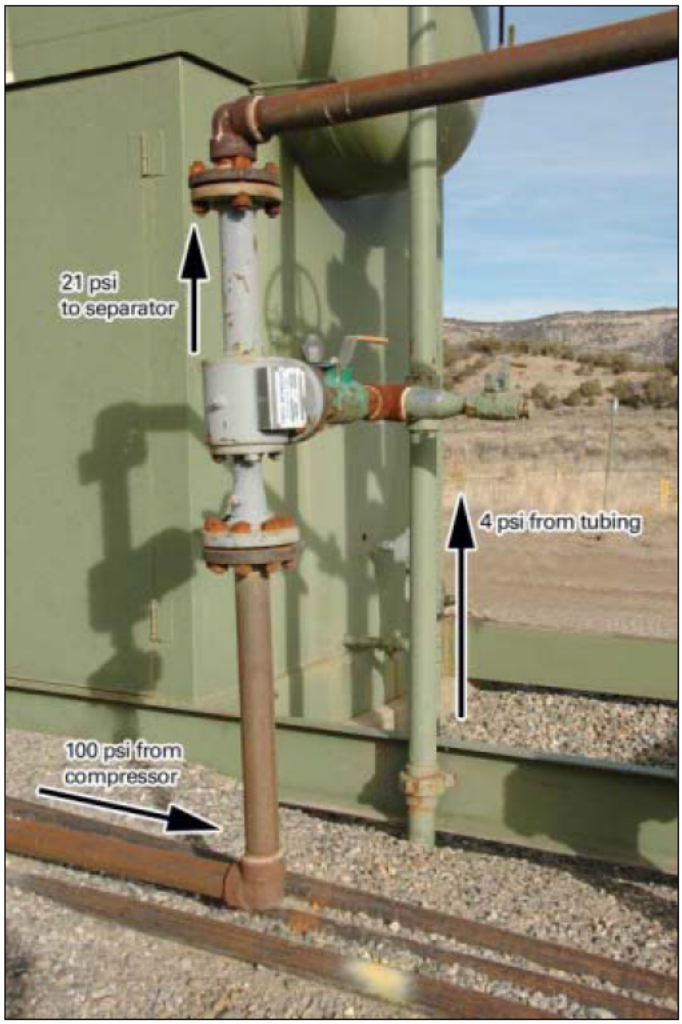
Activated soap and foamers reduce the hydrostatic head on the formation. Weatherford Corp. has shown that properly constituted foam in appropriate wells can reduce the critical velocity by as much as two-thirds.

Success is rarer in gas wells. One frequent cause of failure is that the soap does not activate.

The turbulence of the multiphase flow generally should cause the soap to activate or foam, but frequently the flow rate at the bottom of the tubing is not strong enough to churn the soap into foam. When this happens, the highly viscous liquid lies on top of the water and restricts flow.

Deliquification technologies

With about 400,000 gas wells in the US and with about 80% experiencing some liquid-loading problems, deliquification is a very active area of research and development. Much of this work involves the adaptation of artificial-lift equipment to deliquification and on techniques that would not be effective for crude-oil production.



This ejector is on a gas well in the San Juan basin (Fig. 5).

Many researchers have evaluated the concept of critical flow and every year a few published papers contain new correlations that refine previous work. This research mostly revisits the data sets from previous authors and it often contains very little new data to support the papers' conclusions.

Because most work on determining the gas-velocity required to move water as mist successfully has been done at higher pressures than encountered in low-pressure gas wells, none of the correlations is universally reliable for predicting low-pressure well performance and one should be skeptical about the results of these calculations.

None of the techniques and equipment developed specifically for deliquification has an NPSH-r. Each technique discussed in the following sections works with no liquid accumulation in the casing, but several will fail if the liquid-level is too high.

Velocity strings

A smaller flow-conduit allows for higher velocity flow for the same mass flow rate. Higher velocity flow has a better chance of dragging entrained liquid up the wellbore, but higher velocity flow also has a higher pressure drop due to friction.

Replacing a production string with a smaller diameter string can lower flowing bottomhole pressure by removing a hydrostatic head or raise it by increasing friction drop. Operators commonly unload a well with a velocity string and limit the production increases because of the friction drop consideration. Further, small strings are hard to kick off and almost impossible to swab or run downhole tools in.

Wellbore fluids will flow to the path that provides the lowest total pressure drop. Operators frequently look at the pressure differential between the tubing and casing and open the annulus. But it is never a good idea to fully open the annulus on a well that has a velocity string.

For example, assume the well flows above its critical rate in 2⅜-in. tubing inside 7-in. casing and the tubing-casing differential is 100 psi. Without a fluid column in the well, fluid friction in the tubing causes the entire pressure difference. Because the annulus flow area is 10 times larger than the tubing flow area, the flowing bottomhole pressure will decrease by almost 100 psi (that is, the new friction in the annulus will approach zero).

This will result in a very low velocity in the tubing, which is equal to the

mass flow rate that yields a friction drop of nearly zero. In this case, unloading will stop and the well will start to load.

Plungers

A plunger eliminates interfacial slip by separating the liquid from the gas. Plungers can work effectively in lifting small amounts of liquid from wells that have enough energy for lifting the weight of the plunger and liquid.

A plunger will stop working usually because too much liquid accumulates above it, corrosion or scale have blocked the plunger's path, or the differential pressure between the flowing bottomhole and the tubinghead pressures is too low for the gas to lift the plunger.

With analysis, operators can correct these problems but a plunger is never a set-and-forget type of deliquification method.

Common trends include progressive plungers, two-piece plungers, and setting velocity low-limits for the higher leakage plungers.

Plungers are a staple deliquification technique most onshore gas fields and operators in continue to improve their understanding of effective plunger use.

Ejectors

Like jet pumps, ejectors are thermocompressors that transfer momentum from a high-velocity stream to a low-velocity stream and then convert the intermediate velocity to pressure in a divergent nozzle (Fig. 4b).

Jet pumps are eductors designed for incompressible fluids. Ejectors have a set of convergent-divergent nozzles to accommodate compressible fluids both for power-fluid and on the suction side.

An ejector in deliquification uses a high-pressure gas, either from a wellsite compressor or a nearby high-pressure well, to lower the tubing pressure on a well. The ejector is at a convenient surface location (Fig. 5) and the technology requires no downhole equipment.

An ejector designed for a suction-flow above a critical velocity on a tubing string will keep a well unloaded, while the well produces most of the flow, at much lower velocities, up the tubing-casing annulus.

Wells with this configuration can exhibit liquid levels at or below the end of the tubing for years of stable production.

This nahcolite ($NaHCO_3$) accumulation due to evaporation is on the end of a half-muleshoe that was at 3,000 ft in a San Juan basin gas well (Fig. 6).

Vortex tools

Vortex tools are downhole devices to force a rotating flow profile that tends to sling liquid water to the outside of the tubing, allowing nearly single-phase flow within a rotating liquid.

These tools have lowered the critical rate by as much as 30%.

Evaporation

Fig. 20-4 in the GPSA Engineering Data Book shows clearly that as pressure decreases, water evaporation increases, thereby dramatically increasing water vapor.

Because a reservoir's temperature is generally constant, lowering the pressure from 200 psig to 25 psig at a constant 150 F. will increase water content of the gas flow from 800 lbm/MMcf to 8,000 lbm/MMcf.

The 8,000 lbm is more than 20 bbl/MMcf of water, so that as wellhead pressure decreases the well will produce water as water vapor. Water vapor is a gas and not a two-phase mist; therefore no interfacial inefficiencies exist and deliquification does not have to consider the velocity of the vapor.

Any low-pressure operation needs to consider evaporation as a major, often a primary, means of deliquification.

Produced water is not pure. The flow will not transport the dissolved solids with the water vapor. For a well that produces 10,000 mg/l. total dissolved solids (TDS), every barrel of water that evaporates will deposit 3.5 lb of solids (Fig. 6). This phase-change scale may cause a major problem with plugging in wellbore tubulars, perforations, or within the reservoir.

A program that relies on evaporation for deliquification needs to include a plan for evaluation and mitigation of phase-change scale.

Phase-change scale (or salt) in gas operations is a difficult problem. The industry has faced salt problems in oil wells for decades and has effective treatments to prevent the accumulation of phase-change scale. All these treatments react with common salts and the continuous-phase liquids can remove and carry away the soft products of these reactions.

A stream that is predominantly gas rarely has a continuous-phase liquid; therefore, addition of salt-mitigation chemicals to a gas stream frequently results in an accumulation of immobile sludge instead of solids.

With no preventive treatment for phase-change scale in gas wells, the next-best approach is to closely monitor calibrated and appropriate instruments to determine blockages.

Hot water or acid flushes, as well as salt-mitigation chemicals in these flushes, can remove salt blocks from a pipe or vessel.

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Tubing-flow controller

The problems with velocity strings are not insurmountable. One effective technique puts a control valve on the tubing-casing annulus and a flow-measurement device on the tubing. A programmable-logic controller (PLC) can throttle the casing valve to maintain the velocity in the tubing high enough to ensure continuous lifting of water.

Operators have had mixed success with tubing-flow controllers.

These devices typically use square-edged orifice or v-cone flow-measurement and pneumatic-operated control valves. The flow measurement devices translate a differential pressure across a known restriction into a volume flow rate and the differential pressure increases when flow increases.

Many wells with this technique may load up because of the imprecision in the positioning of the control valve (a very small change in valve position is a very large change in casing flow) and the imposed backpressure from the flow-restriction acting together to impart a positive feedback loop.

Recently one company has replaced the differential-pressure, flow-measurement device with a pitot tube that imparts a smaller backpressure on the well. They also replaced the pneumatic control-valve with an electric-driven control valve with precise control and a linear flow-response to valve-position. Early results indicate a consistent, repeatable, and predictable performance for the device. ✦

The author

David Simpson (zdas04@ muleshoe-eng.com) is the proprietor and principal engineer of MuleShoe Engineering, Fora Vista, NM. He primarily is involved in coalbed methane, low-pressure operations, gas compression, gas measurement, oil field construction, gas well deliquification, and project management. Simpson has a BS is industrial management from the University of Arkansas, Fayetteville, and an MS in mechanical engineering from the University of Colorado, Denver. He is an SPE member.

Liquids Unloading Plunger Lift Video

Suzanne Waltzer to: Melissa Weitz, Suzanne Kocchi, Mark DeFigueiredo 10/16/2012 01:00 PM

History: This message has been forwarded.

FYI - this is a really good video on liquids unloading and plunger lifts. It is short so if you have time, I would definitely recommend watching it.

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 10/16/2012 12:55 PM -----

From: Roger Fernandez/DC/USEPA/US
To: Carey Bylin/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Jerome Blackman/DC/USEPA/US@EPA, Margo Eaddy/DC/USEPA/US@EPA, Scott Bartos/DC/USEPA/US@EPA
Date: 10/12/2012 03:15 PM
Subject: Fw: Oct. 2,3 Washington DC: GMI Middle East Workshop- ConocoPhillips

FYI - very good video - demonstrates plunger lifts well - good for future presentations

Roger Fernandez
U.S. Natural Gas STAR Program
Global Methane Initiative

Phone: +1-202-343-9386
Fax: +1-202-343-2202
Website: epa.gov/gasstar

Visiting and Private Mail Carrier (DHL/FedEx etc) Address
1310 L St., NW (846)
Washington, DC 20005
USA

Postal Address
1200 Pennsylvania Ave., NW (6207J)
Washington DC 20460
USA

----- Forwarded by Roger Fernandez/DC/USEPA/US on 10/12/2012 03:14 PM -----

From: "Seastream, Sandra" <Sandra.Seastream@icfi.com>
To: Roger Fernandez/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>, "Kane, Drew" <Drew.Kane@icfi.com>, "Shartzer, Andy" <Andy.SharFtzer@icfi.com>
Date: 10/04/2012 09:54 AM
Subject: FW: Oct. 2,3 Washington DC: GMI Middle East Workshop- ConocoPhillips

Hi Roger,

Alena Jonas has said we can share the plunger lift video she presented at the meeting this week.

Regards,

SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com | icfi.com

ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Jonas, Alena [mailto:Alena.Jonas@conocophillips.com]
Sent: Wednesday, October 03, 2012 9:13 AM
To: Seastream, Sandra
Subject: FW: Oct. 2,3 Washington DC: GMI Middle East Workshop- ConocoPhillips
Importance: High

Sandy, you can share the plunger video with the meeting attendees. I was told this is on the Ferguson Beauregard website for public use.

See the link here, in the upper right is the video.

http://www.fergusonbeauregard.com/products/plungerlift.html

Thank you

Alena

Alena Jonas
Principal Environmental Consultant - Upstream, L48
ConocoPhillips

Phone: 832.486.2727
Cell: 832.766.7766
Fax: 832.486.3921 - plunger-lift.mpg

Re: LU data for API

Suzanne Waltzer to: Melissa Weitz 10/16/2012 01:48 PM

History: This message has been forwarded.

I can talk quickly now or tomorrow morning is fine.

I'll take a look at the spreadsheet and get back to you on your questions below. On ICF, why don't we set up 30 minutes with Eric tomorrow to walk through it and make sure we are comfortable with all the info. Then we can ask him the question about identifying info and sharing it.

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

Melissa Weitz	What are your thoughts on the LU EF spread...	10/16/2012 01:38:40 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/16/2012 01:38 PM
Subject: LU data for API

What are your thoughts on the LU EF spreadsheet that ICF sent, and whether we can send it over to API or make edits first/present summary information?

[redacted] (b)(5) deliberative [redacted]

[redacted] This is not clear, I know, sorry.

I am here for another 30 and then I need to leave for a few hours. Let me know if you want to check in now or maybe tomorrow a.m.?

Re: LU data for API

Suzanne Waltzer to: Melissa Weitz 10/17/2012 09:53 AM

History: This message has been forwarded.

(b)(5) deliberative Did oyu want me to set something up with Eric for today or tomorrow? I could do this afternoon if he is free. I was thinking a half hour to talk through it with him and ask him if there is anything sensitive. Just let me know or if we do not get a chance to talk before my meeting, feel free to send him an email directly to set up a time and cc me. I can respond when I get out of my meeting to let him know he can do it under TO 99.

Thanks,

Suzie

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

Melissa Weitz	What are your thoughts on the LU EF spread...	10/16/2012 01:38:40 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/16/2012 01:38 PM
Subject: LU data for API

What are your thoughts on the LU EF spreadsheet that ICF sent, and whether we can send it over to API or make edits first/present summary information?

(b)(5) deliberative

[redacted] This is not clear, I know, sorry.

I am here for another 30 and then I need to leave for a few hours. Let me know if you want to check in now or maybe tomorrow a.m.?

Hide Details

liquids unloading

Wed 10/17/2012 1:00 PM - 2:00 PM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Suzanne Waltzer/DC/USEPA/US@EPA

Description

Hide Details

natural gas Q

Wed 10/17/2012 3:00 PM - 3:30 PM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Bill Irving/DC/USEPA/US@EPA

Description

(b)(5) deliberative [redacted]

Liquids Unloading EF Calculation (2010Inv).xlsx

API/ANGA/BP requested the spreadsheet that we used to develop the emission factors for liquids unloading. We actually just received the spreadsheet a few weeks ago from ICF.

(b)(5) deliberative [redacted]

Melissa

Re: Fw: liquids unloading

Melissa Weitz to: Suzanne Waltzer 10/17/2012 12:37 PM

Let's go out--unless you've already grabbed something.

Suzanne Waltzer	Did you want to have this discussion in or ou...	10/17/2012 12:28:04 PM

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/17/2012 12:28 PM
Subject: Fw: liquids unloading

Did you want to have this discussion in or out of the office? If out, I can wait to grab lunch at 1. If in, III run out now. Just let me know.

Thanks!

----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 10/17/2012 12:26 PM -----

liquids unloading

Wed 10/17/2012 1:00 PM - 2:00 PM

Attendance is for Suzanne Waltzer

Chair: **Melissa Weitz/DC/USEPA/US**

No Location Information

Required: Suzanne Waltzer/DC/USEPA/US@EPA

Description

Re: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation . Deadline -- checking, but not today.

Erin Birgfeld to: Allison Dennis 10/17/2012 02:37 PM

Cc: Isabel DeLuca, Suzanne Waltzer, Mark DeFigueiredo, Melissa Weitz, Suzanne Kocchi

From: Erin Birgfeld/DC/USEPA/US

To: Allison Dennis/DC/USEPA/US@EPA,

Cc: Isabel DeLuca/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA

History: This message has been forwarded.

Hi Allison,

Here are our responses to the Inside EPA request. Let us know if you have any edits. Thanks.

-Erin

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

(b)(5) deliberative

[redacted]

Nat Gas Inventory Questions from INside EPA.docx

Allison Dennis Yeah, can you send me the URLs? Also did you want a backgrounder on this tp... 10/16/2012 09:42:57 AM

From: Allison Dennis/DC/USEPA/US
To: Isabel DeLuca/DC/USEPA/US@EPA
Cc: "Erin Birgfeld" <Birgfeld.Erin@epamail.epa.gov>
Date: 10/16/2012 09:42 AM
Subject: Re: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation. Deadline -- checking, but not today.

Yeah, can you send me the URLs? Also did you want a backgrounder on this tp or would you rather send written responses?

Allison Dennis
U.S. Environmental Protection Agency
Office of Air and Radiation Communications

Phone: 202-564-1985
Send mail to:
U.S. Environmental Protection Agency
MC: 6101A
1200 Pennsylvania Ave., NW
Washington, DC 20460

Isabel DeLuca | We do know which presentations he's talking about. I'm on bb but can send thr... | 10/15/2012 05:29:23 PM

From: Isabel DeLuca/DC/USEPA/US
To: Allison Dennis/DC/USEPA/US@EPA, "Erin Birgfeld" <Birgfeld.Erin@epamail.epa.gov>
Date: 10/15/2012 05:29 PM
Subject: Re: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation. Deadline -- checking, but not today.

We do know which presentations he's talking about. I'm on bb but can send thr urls in the morning, if you're interested.

Allison Dennis | Let me know if you rather go with written responses. Also do you know what... | 10/15/2012 05:13 PM EDT

From: Allison Dennis
To: Erin Birgfeld; Isabel DeLuca
Cc:
Date: 10/15/2012 05:13 PM EDT
Subject: Fw: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation. Deadline -- checking, but not today.

Let me know if you rather go with written responses. Also do you know what presentation/slides he is referring to or should we ask Julia to follow up? FYI: Cathy is out till Wednesday so Julia is backing her up.

Allison Dennis
U.S. Environmental Protection Agency
Office of Air and Radiation Communications

Phone: 202-564-1985
Send mail to:
U.S. Environmental Protection Agency
MC: 6101A

1200 Pennsylvania Ave., NW
Washington, DC 20460
----- Forwarded by Allison Dennis/DC/USEPA/US on 10/15/2012 05:11 PM -----

From: Julia Valentine/DC/USEPA/US
To: Allison Dennis/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Isabel DeLuca/DC/USEPA/US@EPA
Cc: Cathy Milbourn/DC/USEPA/US@EPA, David Cohen/DC/USEPA/US@EPA
Date: 10/15/2012 05:09 PM
Subject: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation. Deadline -- checking, but not today.

From reporter:
I was looking to understand some of the references in the liquids unloading power point presentation on EPA's website, so I had assumed that Suzanne Waltzer, who presented, might be the best person to talk to on background. Would it be possible to arrange that?

1. It appears that portions of the presentation discuss updates that EPA will definitely include in the new GHG inventory being released in early 2013, as well as other "updates under consideration" that may or may not be included. I need some background explanation to help me understand what is being said in a couple of these slides.
2. What are"plunger lifts" mentioned in the slides (as in what impact do these have on emissions)?
3. Are any of the possible updates mentioned here derived from the new GHG reporting rule for natural gas operations? Or is that a separate issue?

Thanks!

Re: Inside EPA questions - Draft Response to #2
Erin Birgfeld to: Suzanne Waltzer 10/17/2012 02:38 PM
Cc: Mark DeFigueiredo, Melissa Weitz, Suzanne Kocchi

History: This message has been forwarded.

Thanks Mark and Suzie,

I made that change and sent up for review.

-Erin

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

Suzanne Waltzer	Hi Mark,	10/17/2012 02:25:20 PM

From: Suzanne Waltzer/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 10/17/2012 02:25 PM
Subject: Re: Inside EPA questions - Draft Response to #2

Hi Mark,

You are correct. It should be [redacted] (b)(5) deliberative [redacted]

Thanks!

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

-----Mark DeFigueiredo/DC/USEPA/US@EPA wrote: -----

==========
To: Suzanne Kocchi/DC/USEPA/US@EPA
From: Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 10/17/2012 02:20PM

Cc: Erin Birgfeld/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Subject: Re: Inside EPA questions - Draft Response to #2
==========

Suzie W - could you check the title of the rule in Quesiton 1? It doesn't sound correct to me. It currently reads [redacted] (b)(5) deliberative [redacted]

From: Suzanne Kocchi/DC/USEPA/US
To: Erin Birgfeld/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/17/2012 01:24 PM
Subject: Re: Inside EPA questions - Draft Response to #2

i don't have any comments.

From: Erin Birgfeld/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/17/2012 01:16 PM
Subject: Re: Inside EPA questions - Draft Response to #2

Hi all,

Thanks for providing this language. I cleaned up and put together in a doc for one final review. I made some minor edits that are now in redline. Let me know if you have any additional changes.

thanks again,
Erin

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

From: Mark DeFigueiredo/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA
Date: 10/17/2012 12:15 PM
Subject: Re: Inside EPA questions - Draft Response to #2

Some wordsmithing on #3 - nothing substantive

. (b)(5) deliberative [redacted]

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA
Date: 10/17/2012 11:17 AM
Subject: Re: Inside EPA questions - Draft Response to #2

looks good to me.

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA
Date: 10/17/2012 11:15 AM
Subject: Re: Inside EPA questions - Draft Response to #2

#1:

(b)(5) deliberative

(b)(5) deliberative

From: Suzanne Kocchi/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 10/17/2012 10:09 AM
Subject: Re: Inside EPA questions - Draft Response to #2

A couple of suggestions on #3 in bold to make the point we just got the GHGRP data. I think #2 looks ok. Do we have #1?

From: Mark DeFigueiredo/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Erin Birgfeld/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA
Date: 10/17/2012 09:59 AM
Subject: Re: Inside EPA questions - Draft Response to #2

Here's my draft response to question 3. Let me know what you all think (particularly Melissa). Also cc'ing Suzie K.

3. Are any of the possible updates mentioned here derived from the new GHG reporting rule for natural gas operations? Or is that a separate issue?

(b)(5) deliberative [redacted]

From: Suzanne Waltzer/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Cc: Erin Birgfeld/DC/USEPA/US@EPA
Date: 10/17/2012 09:46 AM
Subject: Inside EPA questions - Draft Response to #2

Hi Mark and Melissa,

Please see draft language for #2. Melissa, can you take a quick look and make sure you are comfortable with this language from an inventory perspective? Also, please cc Erin as you send your pieces as I will be in a Gas STAR team meeting from 10:30 to 12:30. Feel free to come by 857 if anything urgent comes up.

Thanks,

Suzie

#2. (b)(5) deliberative [redacted]

More details on liquids unloading and plunger lifts can be found at -
http://www.epa.gov/gasstar/documents/ll_options.pdf
----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 10/17/2012 09:02 AM -----

From: Erin Birgfeld/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 10/16/2012 12:29 PM
Subject: Re: Fw: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation. Deadline -- checking, but not today.

I haven't heard anything from the press office so we can assume that tomorrow is fine. Thanks for the update.

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

From: Suzanne Waltzer/DC/USEPA/US
To: Erin Birgfeld/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 10/16/2012 12:23 PM
Subject: Re: Fw: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation. Deadline -- checking, but not today.

Hi Erin,

If it is possible to have until tomorrow morning, that would be really helpful. It is a pretty busy day of meetings for all of us so that would give us time to pull together our individual info today and then do a quick review/edit of the complete response tomorrow am before sending on. Just let us know.

Thanks!

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

From: Erin Birgfeld/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA

Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 10/16/2012 09:59 AM
Subject: Re: Fw: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation. Deadline -- checking, but not today.

Hi all,

The reporter has not provided a deadline yet,and the press officer is asking again. If we could get this to them by COB today, I think that would be fine. Let me know if that is not feasible and we can propose other timing.

Thanks all.

-Erin

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

From: Suzanne Waltzer/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Cc: Erin Birgfeld/DC/USEPA/US@EPA
Date: 10/16/2012 09:56 AM
Subject: Fw: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation. Deadline -- checking, but not today.

Hi Mark and Melissa,

Please see questions below from Inside EPA. Erin and I discussed providing a brief write-up in response to the reporters questions (b)(5) deliberative [redacted]

data. Please let me know if this plan sounds ok or if you want to discuss further.

Erin, what is the timeline for providing draft responses to the press office?

Thanks,

Suzie

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 10/16/2012 09:37 AM -----

From: Erin Birgfeld/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Cc: Isabel DeLuca/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 10/15/2012 05:14 PM
Subject: Fw: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation. Deadline -- checking, but not today.

Hi Suzie and Melissa,

Here are the specific questions that Inside EPA had. Would you be able to provide written responses to these?

Let me know if you need clarification.

Thanks,
Erin

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

----- Forwarded by Erin Birgfeld/DC/USEPA/US on 10/15/2012 05:12 PM -----

From: Julia Valentine/DC/USEPA/US
To: Allison Dennis/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Isabel DeLuca/DC/USEPA/US@EPA
Cc: Cathy Milbourn/DC/USEPA/US@EPA, David Cohen/DC/USEPA/US@EPA
Date: 10/15/2012 05:09 PM
Subject: ACTION: Inside EPA re: EPA workshop on liquids unloading presentation. Deadline -- checking, but not today.

From reporter:
I was looking to understand some of the references in the liquids unloading power point presentation on EPA's website, so I had assumed that Suzanne Waltzer, who presented, might be the best person to talk to on background. Would it be possible to arrange that?

1. It appears that portions of the presentation discuss updates that EPA will definitely include in the new GHG inventory being released in early 2013, as well as other "updates under consideration" that may or may not be included. I need some background explanation to help me understand what is being said in a couple of these slides.
2. What are"plunger lifts" mentioned in the slides (as in what impact do these have on emissions)?
3. Are any of the possible updates mentioned here derived from the new GHG reporting rule for natural gas operations? Or is that a separate issue?

Thanks!

[attachment(s) Nat Gas Inventory Questions from INside EPA.docx removed by Suzanne Waltzer/DC/USEPA/US]

RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Minnucci, Chris A. to: Melissa Weitz 10/17/2012 05:40 PM

Cc: "Richards, Richard Y.", "Kidman, Timothy M.", "Aberant, Matthew C."

History: This message has been forwarded.

Thanks Melissa, we will try for Friday but definitely by Monday COB.

We are looking into finding a statistician now. Will try to get one lined up for a call tomorrow, but I also want to make sure whoever we get will be qualified to address the issues (which may be tricky because the available number of observations for a statistical test quickly declines as you go to greater levels of disaggregation), and will also have the availability necessary for quick turn-around requests. I'll let you know more tomorrow.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/17/2012 4:31 PM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

The sooner, the better, but if you can't have it ready until Monday, I think that should be okay.

We'd also like to get a statistician to review the API data. Does SAIC have access to a statistician who would be able to review the data? As

(b)(5) deliberative

If there is a statistician available, we'd like to set up a time to talk with him/her tomorrow. Please let me know.

Thank you!!
Melissa

"Minnucci, Chris A." ---10/17/2012 02:37:22 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA

Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/17/2012 02:37 PM
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa,

We will try to finish and get this to you by COB Friday; however, we are short-handed this week and might need a little more time--if we can't finish this week would COB Monday be ok?

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/17/2012 1:02 PM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

By the end of this week?

"Minnucci, Chris A." ---10/15/2012 11:36:28 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 10/15/2012 11:36 AM
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa,

Yes no problem, we can do these analyses. Do you have a timeframe for when you'd like to see the results?

thanks,
Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/15/2012 10:34 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Another request on liquids unloading...

Would you be able to, using the spreadsheet API sent over most recently:

(b)(5) deliberative

.

Let me know if this makes sense. I'm around all day today.

Melissa

"Kidman, Timothy M." ---10/11/2012 08:35:58 PM---Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/11/2012 08:35 PM
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa,

I don't have any burning questions at this time. The data was helpful, and helped to clarify a few outstanding questions I had. In particular, there were

(b)(5) deliberative

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, October 11, 2012 3:30 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Re: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Hello,

I'm going to have a chance to talk to API tomorrow a.m. If before tomorrow a.m., you notice anything interesting in the spreadsheets or in [redacted] (b)(5) deliberative [redacted], please let me know.

Also, if there are any key questions you would have, based on your earlier analyses, it'd be good to see them as well.

Thanks!
Melissa

Melissa Weitz---10/11/2012 09:55:07 AM---Melissa M. Weitz U.S. Environmental Protection Agency

From: Melissa Weitz/DC/USEPA/US
To: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/11/2012 09:55 AM
Subject: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov
----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/11/2012 09:54 AM -----

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/09/2012 01:56 PM
Subject: RE: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa,

Attached is the background information/data you requested.

The raw data set is located under the tabs entitled: "Liquid Unloading Conventional" and "Liquid Unloading Unconventional". These tabs contain the raw data and calculations behind our analysis that is in Appendix C of the API/ANGA report. All identifying information for the data sets has been removed.

You also requested that we provide separated liquids unloading emission factors: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent. The tab entitled: "EPA Data" provides the # of wells that vent for liquids unloading, the # vents per year, and the emission factors - for wells with and without plunger lift.

We can discuss the spreadsheets during our call this Friday.

Karin

From: Karin Ritter
Sent: Thursday, October 04, 2012 11:14 AM
To: 'Melissa Weitz'
Subject: RE: API/ANGA Report (Updated)

Hi Melissa,

We are still working on getting you the background information you will need. I think that Tuesday October 9th is doable. At least we will work towards that date in order to keep you on schedule.
That would also provide enough time before our call on October 12th should you have any questions.

Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 3:45 PM
To: Karin Ritter
Cc: Suzanne Waltzer
Subject: Re: API/ANGA Report (Updated)

Hello Karin,

Thank you again for sharing an advance copy of the updated report with us.

I wanted to follow up with you on an item from our conference call last week. You had mentioned the possibility of providing EPA with the separated emission factors, calculated in the development of the report, for wells with liquids unloading: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent.

The separate factors are critical to our analysis as we try to determine how this information could be applied to the time-series of the GHG Inventory. As we are current working to develop the expert review draft GHG Inventory estimates, we'd like this information by early next week

(by October 9, if possible) so that we can stay on schedule. Please let me know if you will be able to provide us with the separate factors.

We are currently reviewing the updated API/ANGA report and we look forward to our follow up conversation next Friday.

Thank you,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---09/28/2012 04:01:33 PM---Melissa, Please find attached the updated API/ANGA report for your review. As discussed, we will ke

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 09/28/2012 04:01 PM
Subject: API/ANGA Report (Updated)

Melissa,

Please find attached the updated API/ANGA report for your review. As discussed, we will keep you posted on plans for its release on API's website – in the meantime please do not publicize, cite, or share outside your organization.

As always please let me know if you have any questions.

Much appreciated,
Karin

Karin Ritter
Regulatory and Scientific Affairs
+1 (202) 682- 8472
www.api.org

********** ATTACHMENT NOT DELIVERED **********

This Email message contained an attachment named
image001.jpg
which may be a computer program. This attached
computer program could

contain a computer virus which could cause harm to EPA's computers,
network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced
into the EPA network. EPA is deleting all computer program attachments
sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you
should contact the sender and request that they rename the file name
extension and resend the Email with the renamed attachment. After
receiving the revised Email, containing the renamed attachment, you can
rename the file extension to its correct name.

For further information, please contact the EPA Call Center at
(866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

[attachment "Task 2 API ANGA Survey Report Final 21Sept12 clean ae.pdf" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Data Final Shared w EPA 9Oct12.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US]

graycol.gif

Hide Details

Discuss Liquids Unloading Spreadsheet

Thu 10/18/2012 3:00 PM - 4:00 PM

Attendance is **required** for Melissa Weitz

Chair: **Suzanne Waltzer/DC/USEPA/US**

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: DRobinson@icfi.com, eStricklin@icfi.com, Melissa Weitz/DC/USEPA/US@EPA

Description

(b)(5) deliberative [redacted]

Liquids Unloading EF Calculation (2010Inv).xlsx

Don and Eric, Please let us know if this time does not work.

Including a conference line so we can call from our desks and have the spreadsheet in front of us.

(b)(6) personal privacy [redacted]

Personal Notes

Re: call with ICF on liquids unloading spreadsheet

Suzanne Waltzer to: Melissa Weitz 10/18/2012 09:09 AM

History: This message has been forwarded.

Just left Eric a message and sent out an invite. We have an all hands at 2 so I scheduled it for 3. I told them to let me know if this time does not work. I will let you know when I hear back.

Thanks,

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

Melissa Weitz	Hi Suzie, For our call with ICF, I'm free anyti...	10/17/2012 04:41:44 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/17/2012 04:41 PM
Subject: call with ICF on liquids unloading spreadsheet

Hi Suzie,

For our call with ICF, I'm free anytime tomorrow other than 1:30-3.

I can set it up with Eric, but it seems that you have better luck interacting with ICF than I do. Let me know if I should just contact Eric.

Melissa

Re: Fw: GHGRP Inventory Integration

Melissa Weitz to: Mausami Desai 10/18/2012 11:15 AM

From: Melissa Weitz/DC/USEPA/US
To: Mausami Desai/DC/USEPA/US@EPA,

Is this what you had in mind?

Natural Gas Systems

EPA has committed to stakeholders that it will prioritize review of GHGRP data for key Inventory sources in this category Review of data is underway for liquids unloading and well completions with hydraulic fracturing For liquids unloading, EPA might use some emission factors and activity data directly (e.g. % of wells with plunger lifts), or may use the GHGRP data to corroborate other data received. For hydraulic fracturing, EPA will use the data as a check on number of well completions with hydraulic fracturing

Mausami Desai FYI - I am not finished with this but updated since I gave you copy yesterday. I... 10/18/2012 09:43:51 AM

From: Mausami Desai/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/18/2012 09:43 AM
Subject: Fw: GHGRP Inventory Integration

FYI - I am not finished with this but updated since I gave you copy yesterday.

I need to get your input by mid-afternoon if possible (4:00? if possible)

----- Forwarded by Mausami Desai/DC/USEPA/US on 10/18/2012 09:42 AM -----

From: Mausami Desai/DC/USEPA/US
To: Leif Hockstad/DC/USEPA/US@EPA
Date: 10/18/2012 09:42 AM
Subject: Re: Fw: GHGRP Inventory Integration

Not done with it yet - but I did some further work yesterday afternoon to start cleaning it up...

[attachment "IP-GHGRP and Inventory Integration and Workplan (DRAFT).docx" deleted by Melissa Weitz/DC/USEPA/US]

Best - Mausami

Mausami Desai
Climate Change Division
U.S. Environmental Protection Agency
desai.mausami@epa.gov
ph: (202) 343-9381
fax: (202) 343-2359
http://www.epa.gov/climatechange

Any communication on the mandatory GHG reporting rule is intended to provide general and administrative information about the Rule. This communication does not provide legal advice, and responses to questions received do not have legally binding effect or expressly or implicitly create, expand, or limit any legal rights, obligations, responsibilities, expectations, or benefits in regard to any person. Facility owners or operators and suppliers are responsible for determining how they would be affected by the requirements of the rule.

Leif Hockstad | Do you mind forwarding me the "workplan" that you drafted up? Bill seemed to... | 10/18/2012 09:39:12 AM

From: Leif Hockstad/DC/USEPA/US
To: Mausami Desai/DC/USEPA/US@EPA
Date: 10/18/2012 09:39 AM
Subject: Fw: GHGRP Inventory Integration

Do you mind forwarding me the "workplan" that you drafted up? Bill seemed to like it enough that I plan to copy it for "subpart C".

- Leif

Re: Fw: GHGRP Inventory Integration

Mausami Desai to: Melissa Weitz 10/18/2012 11:27 AM

History: This message has been forwarded.

Yep we may have to say something about timing - but assuming you can clarify this in next draft (you will be in on Monday?) I think our meeting is Tuesday.

Melissa Weitz	Is this what you had in mind? Natural Gas S...	10/18/2012 11:15:19 AM

From: Melissa Weitz/DC/USEPA/US
To: Mausami Desai/DC/USEPA/US@EPA
Date: 10/18/2012 11:15 AM
Subject: Re: Fw: GHGRP Inventory Integration

Is this what you had in mind?

Natural Gas Systems

EPA has committed to stakeholders that it will prioritize review of GHGRP data for key Inventory sources in this category. Review of data is underway for liquids unloading and well completions with hydraulic fracturing. For liquids unloading, EPA might use some emission factors and activity data directly (e.g. % of wells with plunger lifts), or may use the GHGRP data to corroborate other data received. For hydraulic fracturing, EPA will use the data as a check on number of well completions with hydraulic fracturing.

Mausami Desai	FYI - I am not finished with this but updated...	10/18/2012 09:43:51 AM

Leif Hockstad	Do you mind forwarding me the "workplan" t...	10/18/2012 09:39:12 AM

RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Minnucci, Chris A. to: Melissa Weitz 10/18/2012 11:31 AM
Cc: "Beddingfield, Erin N."

History: This message has been forwarded.

Melissa,

Yes 4:30 will work. Dr. Travis will be able to join the call as well.

talk to you then,
Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 10/18/2012 11:19 AM
To: Minnucci, Chris A.
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Hi Chris,

I think we're leaning towards Dr. Travis. We have received a lot of criticism on the statistical analysis we did on hydraulic fracturing for the NSPS, and we'd like this statistical review to be really solid.

We can discuss this afternoon though. Would 4:30 work for your team?

Melissa

"Minnucci, Chris A." ---10/18/2012 10:14:30 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, "Beddingfield, Erin N." <ERIN.N.BEDDINGFIELD@saic.com>
Date: 10/18/2012 10:14 AM
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Melissa,

I'd like to set up a call with you and Erin Beddingfield for this afternoon if that will work for you. Erin's degree is in economics, but she has a

strong background in statistics, and we believe she will be able to do the work. If, however, upon further discussion with you it appears that the analysis will be highly complex we have a Ph. D. statistician who we will be able to call on to help direct and/or perform this work as needed. However, because he is not currently on our project team and is not immediately available it will take a few days before we could get Dr. Travis involved. Since I understand this work is quick turn-around, and since I believe we will probably not need Dr. Travis' (more expensive) help anyway, I'm recommending that we proceed with a call with Erin this afternoon.

If this sounds ok to you, what times would you have available for a call this PM?

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/17/2012 4:31 PM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

The sooner, the better, but if you can't have it ready until Monday, I think that should be okay.

We'd also like to get a statistician to review the API data. Does SAIC have access to a statistician who would be able to review the data? As

(b)(5) deliberative

If there is a statistician available, we'd like to set up a time to talk with him/her tomorrow. Please let me know.

Thank you!!
Melissa

"Minnucci, Chris A." ---10/17/2012 02:37:22 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/17/2012 02:37 PM
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa,

We will try to finish and get this to you by COB Friday; however, we are short-handed this week and might need a little more time--if we can't finish this week would COB Monday be ok?

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/17/2012 1:02 PM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

By the end of this week?

"Minnucci, Chris A." ---10/15/2012 11:36:28 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 10/15/2012 11:36 AM
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa,

Yes no problem, we can do these analyses. Do you have a timeframe for when you'd like to see the results?

thanks,
Chris

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/15/2012 10:34 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Another request on liquids unloading...

Would you be able to, using the spreadsheet API sent over most recently:

(b)(5) deliberative

Let me know if this makes sense. I'm around all day today.

Melissa

"Kidman, Timothy M." ---10/11/2012 08:35:58 PM---Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/11/2012 08:35 PM
Subject: RE: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa,

I don't have any burning questions at this time. The data was helpful, and helped to clarify a few outstanding questions I had. In particular, there were

(b)(5) deliberative

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, October 11, 2012 3:30 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.

Subject: Re: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

Hello,

I'm going to have a chance to talk to API tomorrow a.m. If before tomorrow a.m., you notice anything interesting in the spreadsheets or in [redacted] please let me know.

Also, if there are any key questions you would have, based on your earlier analyses, it'd be good to see them as well.

Thanks!
Melissa

Melissa Weitz---10/11/2012 09:55:07 AM---Melissa M. Weitz U.S. Environmental Protection Agency

From: Melissa Weitz/DC/USEPA/US
To: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/11/2012 09:55 AM

Subject: Fw: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/11/2012 09:54 AM -----

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/09/2012 01:56 PM

Subject: RE: Transmitting Data behind API/ANGA Report (Updated): Liquids Unloading

---

Melissa,

Attached is the background information/data you requested.

The raw data set is located under the tabs entitled: "Liquid Unloading Conventional" and "Liquid Unloading Unconventional". These tabs contain the raw data and calculations behind our analysis that is in Appendix C of the API/ANGA report. All identifying information for the data sets has been removed.

You also requested that we provide separated liquids unloading emission factors: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent. The tab entitled: "EPA Data" provides the # of wells that vent for liquids unloading, the # vents per year, and the emission factors - for wells with and without plunger lift.

We can discuss the spreadsheets during our call this Friday.

Karin

From: Karin Ritter
Sent: Thursday, October 04, 2012 11:14 AM
To: 'Melissa Weitz'
Subject: RE: API/ANGA Report (Updated)

Hi Melissa,

We are still working on getting you the background information you will need. I think that Tuesday October 9th is doable. At least we will work towards that date in order to keep you on schedule.
That would also provide enough time before our call on October 12th should you have any questions.

Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 03, 2012 3:45 PM
To: Karin Ritter
Cc: Suzanne Waltzer
Subject: Re: API/ANGA Report (Updated)

Hello Karin,

Thank you again for sharing an advance copy of the updated report with us.

I wanted to follow up with you on an item from our conference call last week. You had mentioned the possibility of providing EPA with the separated emission factors, calculated in the development of the report, for wells with liquids unloading: a factor for wells with plunger lifts that vent, and a factor for wells without plunger lifts that vent.

The separate factors are critical to our analysis as we try to determine how this information could be applied to the time-series of the GHG Inventory. As we are current working to develop the expert review draft GHG Inventory estimates, we'd like this information by early next week (by October 9, if possible) so that we can stay on schedule. Please let me know if you will be able to provide us with the separate factors.

We are currently reviewing the updated API/ANGA report and we look forward to our follow up conversation next Friday.

Thank you,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---09/28/2012 04:01:33 PM---Melissa, Please find attached the updated API/ANGA report for your review. As discussed, we will ke

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 09/28/2012 04:01 PM
Subject: API/ANGA Report (Updated)

Melissa,

Please find attached the updated API/ANGA report for your review. As discussed, we will keep you posted on plans for its release on API's website – in the meantime please do not publicize, cite, or share outside your organization.

As always please let me know if you have any questions.

Much appreciated,
Karin

Karin Ritter
Regulatory and Scientific Affairs
+1 (202) 682- 8472
www.api.org

********** ATTACHMENT NOT DELIVERED **********

This Email message contained an attachment named
image001.jpg
which may be a computer program. This attached
computer program could
contain a computer virus which could cause harm to
EPA's computers,
network, and data. The attachment has been deleted.

This was done to limit the distribution of computer
viruses introduced

into the EPA network. EPA is deleting all computer program attachments
sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you
should contact the sender and request that they rename the file name
extension and resend the Email with the renamed attachment. After
receiving the revised Email, containing the renamed attachment, you can
rename the file extension to its correct name.

For further information, please contact the EPA Call Center at
(866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

[attachment "Task 2 API ANGA Survey Report Final 21Sept12 clean ae.pdf" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Data Final Shared w EPA 9Oct12.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] graycol.gif

Hide Details

Liq Unloading Stats Call

Thu 10/18/2012 4:30 PM - 5:30 PM

Attendance is **required** for Melissa Weitz

Chair: **ERIN.N.BEDDINGFIELD@saic.com**

Location: [redacted] passcode [redacted]

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: traviscc@icx.net, CHRIS.A.MINNUCCI@saic.com, Melissa Weitz/DC/USEPA/US

Description

To discuss statistical review of emission factors for liquids unloading.

Personal Notes

Re: Fw: LU statistical analysis call with SAIC

Melissa Weitz to: Mark DeFigueiredo 10/18/2012 12:45 PM

Sounds good

Mark DeFigueiredo	Can we talk about EDF after the call? Tha...	10/18/2012 12:35:42 PM

From: Mark DeFigueiredo/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/18/2012 12:35 PM
Subject: Fw: LU statistical analysis call with SAIC

Can we talk about EDF after the call? Thanks!

----- Forwarded by Mark DeFigueiredo/DC/USEPA/US on 10/18/2012 12:35 PM -----

LU statistical analysis call with SAIC

Thu 10/18/2012 4:30 PM - 5:00 PM

Attendance is for Mark DeFigueiredo

Chair: **Melissa Weitz/DC/USEPA/US**

Rooms: 1310L Room 757/DC-1310L-OAR@EPA

This entry has an alarm. The alarm will go off before the entry starts.

Required: Mark DeFigueiredo/DC/USEPA/US@EPA

Description

Suzie--this is the only time that worked today. I can fill you in on how it went afterwards, or I can reschedule if you want to be on the call, but I think it would have to be until early next week.

Fw: LU statistical analysis call with SAIC

Suzanne Waltzer to: Melissa Weitz, Mark DeFigueiredo 10/18/2012 01:07 PM

History: This message has been forwarded.

Hi Melissa and Mark,

Glad to see SAIC could meet today. I will not be able to meet at this time but definitely proceed without me. I'll catch up with you Monday. Reminder that I am out Friday.

Thanks!

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 10/18/2012 01:06 PM -----

LU statistical analysis call with SAIC

Thu 10/18/2012 4:30 PM - 5:00 PM

Attendance is for Suzanne Waltzer

Chair: **Melissa Weitz/DC/USEPA/US**

Rooms: 1310L Room 757/DC-1310L-OAR@EPA

Required: Mark DeFigueiredo/DC/USEPA/US@EPA

Description

Suzie--this is the only time that worked today. I can fill you in on how it went afterwards, or I can reschedule if you want to be on the call, but I think it would have to be until early next week.

RE: A couple quick questions
Lindstrom, Perry to: Melissa Weitz 10/18/2012 01:07 PM
Cc: Alex Macpherson

History: This message has been forwarded.

Here is a little graphic I put together to help myself (and my bosses) understand the data. And yes I knew [redacted] (b)(5) deliberative [redacted]

Perry

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, October 18, 2012 11:06 AM
To: Lindstrom, Perry
Cc: Macpherson.Alex@epamail.epa.gov
Subject: RE: A couple quick questions

All correct. Impressive!

[redacted] (b)(5) deliberative [redacted]

"Lindstrom, Perry" ---10/18/2012 08:51:37 AM---Hey Melissa,

From: "Lindstrom, Perry" <Perry.Lindstrom@eia.gov>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Alex Macpherson/RTP/USEPA/US@EPA
Date: 10/18/2012 08:51 AM
Subject: RE: A couple quick questions

Hey Melissa,

Here is my current understanding:

[redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Let me know if I have gotten any of this wrong and sorry it is taking so long for this to sink in as I'm working on multiple projects and have to relearn this every time I come back to it.

Thanks for your help on this.

Perry

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, October 16, 2012 6:19 PM
To: Lindstrom, Perry
Cc: Alex Macpherson
Subject: RE: A couple quick questions

Hi Perry,

That value was developed from data received through GasStar and data provided to EPA by Industry outside of GasStar. It represents methane release in the absence of control technologies. In the most recent Inventory, control technologies (including flaring) reduce a very large fraction of these emissions.

There is a discussion of the development of the emission factor in the TSD for the NSPS (page 7 of the PDF).
http://www.epa.gov/airquality/oilandgas/pdfs/20120418tsd.pdf

We haven't decided how we will reflect NSPS in the GHG Inventory yet--that'll be a question we'll be working on around this time next year. It won't show up until the Inventory that we release in 2014, as that Inventory will cover 1990-2012 emissions. (b)(5) deliberative

Let us know if you have other questions.

Melissa

"Lindstrom, Perry" ---10/16/2012 04:07:36 PM---Hi Melissa,

From: "Lindstrom, Perry" <Perry.Lindstrom@eia.gov>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Alex Macpherson/RTP/USEPA/US@EPA
Date: 10/16/2012 04:07 PM
Subject: RE: A couple quick questions

Hi Melissa,

So I guess there is a whole bunch of flaring going on starting today. The [redacted]

Perry

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, September 18, 2012 4:26 PM
To: Lindstrom, Perry
Cc: Alex Macpherson
Subject: Re: A couple quick questions

Hi Perry,

Thank you for participating in the stakeholder workshop on natural gas emissions.

I'll take a stab at your questions on NSPS. I've cc'd Alex MacPherson who can correct me and/or add information.

The NSPS was finalized April 17, 2012, and was published in the Federal Register August 16, 2012.

The final rule becomes effective 60 days after its publication--October 16, 2012.

Under the rule, all completions with hydraulic fracturing are required to flare the gas released from completion starting October 16, 2012. The requirement for RECs (reduced emissions completions, gas capture technology) begins January 2015 (this is a delay from the proposed rule, which would have required RECs 60 days after publication), and applies to most completions with hydraulic fracturing. There are exceptions for low pressure wells, and wildcat and delineation wells, all of which will still be required to control gas with flaring, but not required to use RECs.

For the purposes of the GHG Inventory, the delay in RECs requirements does not really impact emissions estimates since flaring and RECS reduce methane by around the same percentage.

[redacted]. Alex?

Thanks, and let us know if you have questions.
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

"Lindstrom, Perry" ---08/29/2012 01:44:29 PM---Hi Melissa,

From: "Lindstrom, Perry" <Perry.Lindstrom@eia.gov>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 08/29/2012 01:44 PM
Subject: A couple quick questions

Hi Melissa,

I was just talking to Sam Napolitano – who used to work with you all. He was asking about the NSPS for fracing, etc. Am I correct that the rule went final in April? It would apply to completions in 2015 and beyond – meaning January 2015? [redacted] (b)(5) deliberative [redacted]?

I am looking forward to the stakeholders workshop as I'm still on the interesting part of the learning curve – i.e. I haven't heard everything before.

Cheers,

[redacted] (b)(5) deliberative

Perry Potential_V_net.xlsx

checks on API data

Melissa Weitz to: Melissa Weitz 10/18/2012 01:13 PM

(b)(5) deliberative

FW: Liquids Unloading Spreadsheet

Minnucci, Chris A. to: Melissa Weitz 10/18/2012 05:03 PM

History: This message has been replied to and forwarded.

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

- (b)(5) deliberative [redacted]
- [redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out (b)(5) deliberative [redacted] In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC
Senior Environmental Scientist | Climate Change Services
Energy, Environment & Infrastructure Solutions
office: 202.488.6606 | mobile: 703.424.5027

Please consider the environment before printing this email.

(b)(5) deliberative

Liquids Unloading Recalculations_v2.xlsx

(b)(5) deliberative

Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx

Fw: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Paul Gunning to: kocchi.suzanne 10/19/2012 10:19 AM

Cc: Melissa Weitz

History: This message has been forwarded.

FYI.....

----- Forwarded by Paul Gunning/DC/USEPA/US on 10/19/2012 10:17 AM -----

From: "Lacey, Pam" <PLacey@aga.org>
To: GHGInventory@EPA
Cc: Paul Gunning/DC/USEPA/US@EPA
Date: 10/18/2012 04:57 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa – I'm sorry to be late with my input. I saw Paul Gunning at the EDF-WRI workshop this week, and in a side conversation at the break, he confirmed that yes, as he said in response to my question at the EPA workshop, EPA will **prioritize verifying at least the 2011 liquids unloading data from Subpart W reports** (and related liquids unloading information from the API survey) in an effort to include this key data in the draft Inventory for emissions in 1990-2011. The idea is that since you have to start somewhere in that mountain of Subpart W data – you might as well start with the couple of data points that stand to have the most effect on the carbon footprint for the natural gas value chain as reported in the Inventory. In light of that confirmation, could you please add a reference in the following paragraph in the EPA Workshop Summary? (See my suggested insert in red font.)

Thanks! – Pam

In response to stakeholder questions, EPA noted that the subpart W activity data that will be available in future years may be used to improve or replace the current Inventory method of scaling the number of compressors from the single 1992 point estimate. EPA noted that it will not be possible to complete the verification of the voluminous Subpart W 2011 emissions data until January 2013, which would be too late to include it in the January 2013 draft Inventory. However, in response to a stakeholder question, EPA agreed to prioritize verifying certain key data first, including liquids unloading data, in an effort to include that key data in the upcoming draft Inventory. Stakeholders also pointed out that future activity in energy could increase exports, and asked whether EPA has a plan to account for potential change in the count of terminals. EPA stated that every year the Inventory is updated with new activity data for this source. Some stakeholders expect emissions estimates for the distribution sector to decrease

dramatically when new emission factors for piping are developed and used. Stakeholders also noted that gate station emissions are much lower than currently calculated in the Inventory. In response, EPA asked, if new factors were to be developed from industry data from this source, would these factors be applicable to only the newer stations, or might they be used across the entire time series. Stakeholders responded that factors should be applied across the entire time series.

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov] **On Behalf Of** GHGInventory
Sent: Wednesday, October 10, 2012 3:12 PM
Subject: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Natural Gas Stakeholder Workshop Participant,

A draft summary report for the Stakeholder Workshop on Natural Gas in the GHG Inventory is attached below, for your review.

The report summarizes the presentations and discussions from the workshop, highlights next steps for natural gas emissions calculations, and provides a list of attendees.

We request any comments on the report by Monday, October 15, as we plan to post the final report to the Stakeholder Workshop website next week.

For more information on the Stakeholder Workshop, including agenda and presentations, please visit http://www.epa.gov/climatechange/ghgemissions/Sept2012stakeholderworkshop.html.

Please continue to contact us with any questions or new information relevant to the Inventory at GHGInventory@epa.gov.

Thank you,
Melissa

(See attached file: Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.10.docx)

update version for website
Suzanne Kocchi to: Isabel DeLuca 10/19/2012 10:38 AM
Cc: Melissa Weitz

History: This message has been forwarded.

Here it is with a sentence added on page 4.

(b)(5) deliberative [redacted]

Stakeholder Workshop on NG in the GHG Inventory Report to post on websitev2.docx

Melissa - FYR - here is the sentence (it is version of Pam's sentence): (b)(5) deliberative [redacted]

Re: Fw: oil and gas sector emissions

Mark DeFigueiredo to: Bill Irving 10/19/2012 02:17 PM

Cc: Suzanne Kocchi, Anhar Karimjee, Melissa Weitz, Pamela Franklin, Suzanne Waltzer

History: This message has been forwarded.

I called my staff contact at EDF in Austin - David Lyon - but didn't get much information that we didn't know already (though I wasn't expecting much).

The production module will have 9 companies (listed in the press release - Anadarko, BG Group, Chevron, Encana, Pioneer, Shell, Southwestern, Talisman, and XTO). Emission sources will be liquids unloading, completions/workovers, and components - all direct measurement. They're planning to release as much data publicly as possible (company blinded due to CBI issues). I asked, but he didn't speak to the details of what was being published (e.g. # of data points, geologic characteristics, how data would be aggregated, etc.). I think part of the issue is that he hasn't even seen the underlying data.

David gave me a timeframe of February/March (which is different than Drew's timeframe of January 24). I suspect Drew's timing is more reliable. He also mentioned that they were planning to caveat that the results of the study aren't necessarily representative of the industry as a whole.

Bill Irving	I have left a message with Drew and will try t...	10/18/2012 06:24:26 PM

From: Bill Irving/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Anhar Karimjee/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Pamela Franklin/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/18/2012 06:24 PM
Subject: Re: Fw: oil and gas sector emissions

I have left a message with Drew and will try to set up a call for next week.

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Suzanne Kocchi	FYI. Melissa, Mark - here is the higher level...	10/18/2012 05:12:33 PM

From: Suzanne Kocchi/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Cc: Anhar Karimjee/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Pamela Franklin/DC/USEPA/US@EPA
Date: 10/18/2012 05:12 PM
Subject: Fw: oil and gas sector emissions

FYI.

Melissa, Mark - here is the higher level emails about EDF. As we discussed Paul wants us to have a call with EDF next week and rely the specific details we need to know about the data (e.g., methodology, # of data points, etc) so when we brief Sarah on 10/31 we can tell her we told them and assure her there is ongoing conversations at our level.

In addition, per a conversation Sarah had with Bill Whitsit, when we brief Sarah on 10/31, Paul told Sarah that she would see the actual proposed text we plan to include in the expert review draft that 1) [redacted] (b)(5) deliberative [redacted]

We can discuss further next week in our various briefings with Paul but for the Thur mtg on the Inventory we should have drafts.

----- Forwarded by Suzanne Kocchi/DC/USEPA/US on 10/18/2012 05:06 PM -----

From: Paul Gunning/DC/USEPA/US
To: kocchi.suzanne@epa.gov, irving.bill@epa.gov, Anhar Karimjee/DC/USEPA/US@EPA
Date: 10/18/2012 03:59 PM
Subject: Fw: oil and gas sector emissions

FYI.....

----- Forwarded by Paul Gunning/DC/USEPA/US on 10/18/2012 03:59 PM -----

From: Sarah Dunham/DC/USEPA/US
To: Gina McCarthy/DC/USEPA/US
Cc: Joseph Goffman/DC/USEPA/US@EPA, Paul Gunning/DC/USEPA/US@EPA
Date: 10/18/2012 03:11 PM
Subject: oil and gas sector emissions

Gina-
I wanted to do a quick follow-up on the EDF study--it sounds like EDF is doing this study through the University of Texas, who in turn has hired URS (a major oil and gas industry contractor--they did the API/ANGAA study, as well as the separate study Devon supplied in comments to the NSPS) to work with industry to collect data. We will continue to engage with EDF, but at this point it is not clear how the data is being collected, at least to some extent because the work is being done between URS and the companies they are working with, not so much directly by EDF. I wanted to see whether in addition to the engagement we are having with EDF, you would be willing to ask Fred Krupp for a briefing on their study, perhaps in early November when you get back in the office. We can work with your office to get it on the calendar if this makes sense to you.

Separately, I wanted to let you know that we have prepared a technical summary of the natural gas workshop we held last month, have incorporated comments form the participants in the workshop, and now plan to post the summary on our website--I do not expect adverse reaction from this (although this topic continues to get attention) but wanted to make sure you were aware we were moving forward with making the summary publically available. [redacted] (b)(5) deliberative [redacted]

Thanks
Sarah

Fw: Updated liquids unloadings

Mark DeFigueiredo to: Melissa Weitz 10/19/2012 05:33 PM

History: This message has been forwarded.

Here's the unverified liquids unloading data.

----- Forwarded by Mark DeFigueiredo/DC/USEPA/US on 10/17/2012 12:57 PM -----

From: David Jacobson/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 10/17/2012 12:55 PM
Subject: Updated liquids unloadings

(b)(5) deliberative [redacted]

MV_NONCBI_W_WELLVENT_CALC_ONE_10-17-12.xls

(b)(5) deliberative

MV_NONCBI_W_WELLVENT_CALC_THREE_10-17-12.xls

(b)(5) deliberative

MV_NONCBI_W_WELLVENT_CALC_TWO_10-17-12.xls

spreadsheet for liquids unloading calculations

Melissa Weitz to: Stricklin, Eric, Suzanne Waltzer 10/19/2012 05:46 PM

Hi,

I took a stab at adding some labels and notes to the spreadsheet, and reorganizing the emission factor calculation.

Eric, could you please review my labels/notes/questions?

Would it be at all possible to have this back to us by Monday afternoon?

Melissa

(b)(5) deliberative [redacted]

Liquids Unloading EF Calculation (2010Inv) mw.xlsx

RE: spreadsheet for liquids unloading calculations

Stricklin, Eric to: Melissa Weitz, Suzanne Waltzer 10/22/2012 09:23 AM
Cc: "Robinson, Donald"

History: This message has been forwarded.

Melissa,

Yes. I will review your notes and questions. I will aim to have this back to you by 2pm.

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, October 19, 2012 5:46 PM
To: Stricklin, Eric; Waltzer.Suzanne@epamail.epa.gov
Subject: spreadsheet for liquids unloading calculations

Hi,

I took a stab at adding some labels and notes to the spreadsheet, and reorganizing the emission factor calculation.

Eric, could you please review my labels/notes/questions?

Would it be at all possible to have this back to us by Monday afternoon?

Melissa

(See attached file: Liquids Unloading EF Calculation (2010Inv) mw.xlsx)

RE: FW: Liquids Unloading Spreadsheet

Minnucci, Chris A. to: Melissa Weitz 10/22/2012 11:44 AM

Cc: "Kidman, Timothy M.", "Richards, Richard Y.", "Beddingfield, Erin N.", traviscc

History: This message has been forwarded.

Melissa,

Attached please find our memo on the emission factors, with our recommendations. Please note that we discovered an error in the emission factors after I sent you the spreadsheets last week; this memo corrects the error. [redacted] (b)(5) deliberative [redacted]. We'll revise the memo once we have the results of this additional analysis; however I did not want to delay getting you the results and memo as we have it thus far.

Curtis, Erin and I have been discussing the possibility of a statistical analysis, [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

- (b)(5) deliberative

Please let me know your thoughts, or if you would like to have a conference call to discuss this further with Curtis and Erin.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]

Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

(b)(5) deliberative

? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

- (b)(5) deliberative

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out [redacted] (b)(5) deliberative [redacted] In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: 703.424.5027

Please consider the environment before printing this email.

[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US]
[attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US]
[redacted] (b)(5) deliberative [redacted]
API-ANGA EFs Memo_v4.docx

NEMS and basins mapping

Melissa Weitz to: Mark DeFigueiredo, Suzanne Waltzer 10/22/2012 01:38 PM

I just realized we have this in the liquids unloading emission factor development spreadsheet.

[redacted]

[redacted]

NEMS-basins.xlsx

Hide Details

Liquids Unloading W data (meetin Mark's office-- 210)

Tue 10/23/2012 4:00 PM - 5:00 PM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: David Jacobson/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA

Description

Final Well Counts
Marty Wolf to: Melissa Weitz 10/22/2012 02:29 PM
Cc: "Casey MacQueen", "Jessica Gray", "Paula Fields", "Robyn Reid"

History: This message has been replied to and forwarded.

Melissa,

Attached is the spreadsheet containing the final well counts. Data

(b)(5) deliberative

Please let us know if you have an questions regarding these.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)

(b)(5) deliberative

marty.wolf@erg.comGHG Inventory Final Well Counts_101912.xlsx

Fw: RE: spreadsheet for liquids unloading calculations

Melissa Weitz to: Suzanne Waltzer 10/22/2012 02:35 PM

Hi Suzie,

I think this is nearly ready for sharing. Let me know if you're free at some point today to look at this with me and figure out if there are other edits needed.

Melissa

-----Forwarded by Melissa Weitz/DC/USEPA/US on 10/22/2012 02:34PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
Date: 10/22/2012 02:19PM
Cc: Suzanne Waltzer/DC/USEPA/US@EPA, "Robinson, Donald" <Donald.Robinson@icfi.com>
Subject: RE: spreadsheet for liquids unloading calculations

(See attached file: Emissions from Well Cleanups 4-4-2011 Docket DRAFT_sms.doc)

Melissa,

Attached is the spreadsheet for liquids unloading calculations. I reviewed your comments and made some changes. The most significant change was [redacted] (b)(5) deliberative [redacted]

Let me know if you have any questions,

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com

ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, October 19, 2012 5:46 PM
To: Stricklin, Eric; Waltzer.Suzanne@epamail.epa.gov
Subject: spreadsheet for liquids unloading calculations

Hi,

I took a stab at adding some labels and notes to the spreadsheet, and reorganizing the emission factor calculation.

Eric, could you please review my labels/notes/questions?

Would it be at all possible to have this back to us by Monday afternoon?

Melissa

(See attached file: Liquids Unloading EF Calculation (2010Inv) [redacted] mw.xlsx)Emissions from Well Cleanups 4-4-2011 Docket DRAFT_sms.doc [redacted]

Liquids Unloading EF Calculation (2010Inv) mw.xlsx

Re: Fw: RE: spreadsheet for liquids unloading calculations

Suzanne Waltzer to: Melissa Weitz 10/22/2012 02:49 PM

History: This message has been forwarded.

Sounds good.

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

Melissa Weitz	Yes--want me to come up there and we can l...	10/22/2012 02:47:39 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/22/2012 02:47 PM
Subject: Re: Fw: RE: spreadsheet for liquids unloading calculations

Yes--want me to come up there and we can look at the spreadsheet together?

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Suzanne Waltzer/DC/USEPA/US wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: Suzanne Waltzer/DC/USEPA/US
Date: 10/22/2012 02:38PM
Subject: Re: Fw: RE: spreadsheet for liquids unloading calculations

Sure I am free now until 3:30 then in a meeting from 3:30 to 4:30. Can you talk now?

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

Melissa Weitz---10/22/2012 02:35:53 PM---From: Melissa Weitz/DC/USEPA/US To: Suzanne Waltzer/DC/USEPA/US@EPA

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/22/2012 02:35 PM
Subject: Fw: RE: spreadsheet for liquids unloading calculations

---

Hi Suzie,

I think this is nearly ready for sharing. Let me know if you're free at some point today to look at this with me and figure out if there are other edits needed.

Melissa

-----Forwarded by Melissa Weitz/DC/USEPA/US on 10/22/2012 02:34PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
Date: 10/22/2012 02:19PM
Cc: Suzanne Waltzer/DC/USEPA/US@EPA, "Robinson, Donald" <Donald.Robinson@icfi.com>
Subject: RE: spreadsheet for liquids unloading calculations

(See attached file: Emissions from Well Cleanups 4-4-2011 Docket DRAFT_sms.doc)

Melissa,

Attached is the spreadsheet for liquids unloading calculations. I reviewed your comments and made some changes. The most significant change was [redacted] (b)(5) deliberative [redacted]

Let me know if you have any questions,

Eric

Eric Stricklin | Analyst | 703.218.2505 | eric.stricklin@icfi.com

ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, October 19, 2012 5:46 PM
To: Stricklin, Eric; Waltzer.Suzanne@epamail.epa.gov
Subject: spreadsheet for liquids unloading calculations

Hi,

I took a stab at adding some labels and notes to the spreadsheet, and reorganizing the emission factor calculation.

Eric, could you please review my labels/notes/questions?

Would it be at all possible to have this back to us by Monday afternoon?

Melissa

(See attached file: Liquids Unloading EF Calculation (2010Inv) mw.xlsx)[attachment "Emissions from Well Cleanups 4-4-2011 Docket DRAFT_sms.doc" deleted by Suzanne Waltzer/DC/USEPA/US] [attachment "Liquids Unloading EF Calculation (2010Inv) mw.xlsx" deleted by Suzanne Waltzer/DC/USEPA/US]

Hide Details

call on liquids unloading factor spreadsheet

Tue 10/23/2012 11:00 AM - 11:30 AM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: eric.strickln@icfi.com, Suzanne Waltzer/DC/USEPA/US@EPA

Description

To walk through a few remaining questions on the spreadsheet

(b)(6) personal privacy

[redacted]

Re: Update Requested: Liquids Unloading W data

Melissa Weitz to: Mark DeFigueiredo 10/23/2012 09:14 AM

Sounds good--thanks!

Mark DeFigueiredo	Update Requested: Liquids Unloading W data	10/23/2012 08:24:26 AM

Update Requested: Liquids Unloading W data

Tue 10/23/2012 4:00 PM - 5:00 PM

Rooms: 1310L Room 856/DC-1310L-OAR@EPA

Mark DeFigueiredo Update Requested

Can we meet in my office (210) instead? The projector in 856 isn't very good, and I think it will be easier to go through the spreadsheets on my monitor.

Required: David Jacobson/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA

Description

Re: natural gas and petroleum
Paula Fields to: Melissa Weitz 10/23/2012 01:00 PM

History: This message has been forwarded.

Sure.

Remember that we are trying to deliver the results for petroleum systems this week, so you will know what we know by week's end.

Thanks,
Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: <Weitz.Melissa@epamail.epa.gov>
To: "Paula Fields" <Paula.Fields@erg.com>
Date: 10/22/2012 1:40 PM
Subject: natural gas and petroleum

Hi Paula,

As you are updating the activity data for petroleum sector emissions and natural gas systems (other than LU and HF at this point), could you let me know if there are any interesting trends you are seeing? Are emissions likely to increase or decrease for 2011 for these other sources?

Melissa

Fw: Liquids Unloading Spreadsheet

Melissa Weitz to: Suzanne Waltzer, Mark DeFigueiredo 10/23/2012 01:41 PM

SAIC analysis/recommendations on API/ANGA liquids unloading, and also thoughts on statistical analysis (in email below).

The memo concludes that [redacted] (b)(5) deliberative [redacted]

Let's check in on this tomorrow a.m., or this afternoon.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/23/2012 01:36 PM -----

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/22/2012 08:25 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Attached please find a revised version of the memo that Chris sent this morning. We identified a small calculation error and have fixed the numbers and figures in the attached version. The calculation error was not significant enough to in any way change the findings or discussion, but we wanted to make sure we got the corrected figures to you.

Best,
Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Monday, October 22, 2012 8:44 AM
To: Weitz.Melissa@epamail.epa.gov
Cc: Kidman, Timothy M.; Richards, Richard Y.; Beddingfield, Erin N.; traviscc@icx.net
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Attached please find our memo on the emission factors, with our recommendations. Please note that we discovered an error in the emission factors after I sent you the spreadsheets last week; this memo corrects the error. We will now look into [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative We'll revise the memo once we have the results of this additional analysis; however I did not want to delay getting you the results and memo as we have it thus far.

Curtis, Erin and I have been discussing the possibility of a statistical analysis, and based on the discussions I am recommending (b)(5) deliberative

(b)(5) deliberative

Please let me know your thoughts, or if you would like to have a conference call to discuss this further with Curtis and Erin.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet
Thanks very much for sending these over.

Would it be possible to also (b)(5) deliberative ? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet
Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet
Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

- (b)(5) deliberative

[redacted] (b)(5) deliberative [redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out [redacted] (b)(5) deliberative [redacted] In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC
Senior Environmental Scientist | Climate Change Services
Energy, Environment & Infrastructure Solutions
office: 202.488.6606 | mobile: 703.424.5027

Please consider the environment before printing this email.

[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US]
[attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US]API-ANGA EFs Memo_v5.docx

(b)(5) deliberative

Revised Well Completions
Marty Wolf to: Melissa Weitz 10/23/2012 04:26 PM
Cc: "Casey MacQueen", "Jessica Gray", "Paula Fields"

History: This message has been forwarded.

Melissa,

I have attached the revised well count file and added (b)(5) deliberative [redacted]

[redacted]

[redacted]

Please let us know if you have any questions.

Thanks,
Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> Paula Fields 10/23/12 10:57 □□ >>>
Hi Melissa -
We'll get you the revised # for completions by sometime tomorrow. Sorry for the mistake. Our confusion was the Jessica was looking at a previous (not final) version of the slides to confirm the method, and [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

We just wanted to point this out.

Thanks,
Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Paula Fields
To: Weitz.Melissa@epamail.epa.gov
Date: 10/23/2012 9:44 AM
Subject: Fw: Re: Final Well Counts

Hi Melissa -
I understand and will consult with them to revise the #s for completions.

Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: <Weitz.Melissa@epamail.epa.gov>
To: "Paula Fields" <Paula.Fields@erg.com>
Date: 10/22/2012 2:48 PM
Subject: Fw: Re: Final Well Counts

I'm a bit confused about this because I don't think we ever talked about using this method for completions. (b)(5) deliberative [redacted]

[redacted]

(b)(5) deliberative

I still need to arrange the call with EIA on the NEMS data, and I'll let you know when EIA is available for the call.

-----Forwarded by Melissa Weitz/DC/USEPA/US on 10/22/2012 05:41PM -----
To: Melissa Weitz/DC/USEPA/US@EPA, "Jessica Gray" <Jessica.Gray@erg.com>
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 10/22/2012 05:36PM
Cc: "Casey MacQueen" <Casey.MacQueen@erg.com>, "Paula Fields" <Paula.Fields@erg.com>, "Robyn Reid" <Robyn.Reid@erg.com>
Subject: Re: Final Well Counts

Melissa,

I spoke with Jessica earlier today and she provided some clarification regarding the completions.

(b)(5) deliberative

Thanks,
Marty

>>> <Weitz.Melissa@epamail.epa.gov> 10/22/2012 12:39 PM >>>
I thought that (b)(5) deliberative

(b)(5) deliberative

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Jessica Gray" <Jessica.Gray@erg.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Jessica Gray" <Jessica.Gray@erg.com>
Date: 10/22/2012 02:53PM
Cc: "Casey MacQueen" <Casey.MacQueen@erg.com>, "Marty Wolf" <Marty.Wolf@erg.com>, "Paula Fields" <Paula.Fields@erg.com>, "Robyn Reid" <Robyn.Reid@erg.com>
Subject: Re: Final Well Counts

Melissa,

(b)(5) deliberative

Let us know if you have any other questions/comments.

Thanks,
Jess

Jessica Gray, P.E.
Eastern Research Group, Inc. (ERG)
14555 Avion Parkway Suite 200
Chantilly, VA 20151
703-633-1681
703-263-7280 (fax)
jessica.gray@erg.com

>>> <Weitz.Melissa@epamail.epa.gov> 10/22/2012 2:46 PM >>>
Thanks!

Quick question- (b)(5) deliberative ?

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Marty Wolf" <Marty.Wolf@erg.com> (mailto:Marty.Wolf@erg.com) wrote: -----To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com> (mailto:Marty.Wolf@erg.com)
Date: 10/22/2012 02:29PM
Cc: "Casey MacQueen" <Casey.MacQueen@erg.com> (mailto:Casey.MacQueen@erg.com), "Jessica Gray"

<Jessica.Gray@erg.com> (mailto:Jessica.Gray@erg.com), "Paula Fields" <Paula.Fields@erg.com> (mailto:Paula.Fields@erg.com), "Robyn Reid" <Robyn.Reid@erg.com> (mailto:Robyn.Reid@erg.com)
Subject: Final Well Counts

Melissa,

Attached is the spreadsheet containing the final well counts. Data

(b)(5) deliberative

However, even though there have been some adjustments, the methodology follows that outlined in the memos.

Please let us know if you have an questions regarding these.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

[attachment "GHG Inventory Final Well Counts_101912.xlsx" removed by Melissa Weitz/DC/USEPA/US]

(b)(5) deliberative

GHG Inventory Final Revised Well Counts_102312.xlsx

Stéphanie Saunier

Consultant

Tel: +47 913 84 611

Skype: stephanie.saunier

Mail: stephanie.saunier@carbonlimits.no

[attachment "FORROGER.pdf" deleted by Melissa Weitz/DC/USEPA/US]

RE: FW: Liquids Unloading Spreadsheet
Minnucci, Chris A. to: Melissa Weitz 10/24/2012 10:04 AM
Cc: "Kidman, Timothy M."

History: This message has been replied to and forwarded.

Melissa,

Attached please find the revised memo, with a new section added to
[redacted] (b)(5) deliberative [redacted]

I'm also attaching the two sets of spreadsheets used to develop the emission estimates. "Liquids Unloading Recalculations v5" was used to develop Table 2, and "Liquids Unloading Recalculations regional AF correct" was used for Tables 5 and 6.

Please let us know if you have any questions on the attached or would like us to do any further analyses. As I will be out of the office tomorrow and Friday, please include Tim on any questions/requests you might have and he will be able to help you in my absence.

much thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

Would it be possible to also [redacted] (b)(5) deliberative [redacted]? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

- [redacted] (b)(5) deliberative [redacted]

- [redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to [redacted] (b)(5) deliberative [redacted]. In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: 703.424.5027

Please consider the environment before printing this email.

[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US]
[attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US]

(b)(5) deliberative

Liquids Unloading Recalculations_v5.xlsx

(b)(5) deliberative

Liquids Unloading Recalculations_regional AF_correct.xlsx

(b)(5) deliberative

API-ANGA EFs Memo_v5.docx

Liquids Unloading emission factor calculation spreadsheet requested by API/ANGA

Melissa Weitz to: Bill Irving, Suzanne Waltzer, Suzanne Kocchi, Mark DeFigueiredo 10/24/2012 11:15 AM

On our most recent call, API/ANGA requested to see the spreadsheet we used to calculate emission factors for liquids unloading.

Suzie W, ICF, and I have been working to make the spreadsheet we use a bit easier to follow.

Attached below is the most recent version of the spreadsheet. It contains an overview and labeling which attempt to clarify the calculations.

I'd like to send this over to API/ANGA by the end of this week. We had promised it much earlier, but the spreadsheet was in no shape to be sent over.

Let me know if you have any thoughts on whether it is appropriate to share this with API/ANGA, or if it needs more work to make it clearer. My preference would be to not put more work into it since we are unlikely to use it again, and we can just walk API/ANGA through it over the phone if we need to.

Melissa

(b)(5) deliberative [redacted]

Copy of Liquids Unloading EF Calculation (2010Inv) 10.24.xlsx

Re: Liquids Unloading emission factor calculation spreadsheet requested by API/ANGA

Suzanne Kocchi to: Melissa Weitz 10/24/2012 12:43 PM

Cc: Bill Irving, Mark DeFigueiredo, Suzanne Waltzer

History: This message has been forwarded.

is this something they can get from the inventory? or something that we would be comfortable making public?

Melissa Weitz	On our most recent call, API/ANGA requeste...	10/24/2012 11:15:41 AM

From: Melissa Weitz/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 10/24/2012 11:15 AM
Subject: Liquids Unloading emission factor calculation spreadsheet requested by API/ANGA

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Melissa

[attachment "Copy of Liquids Unloading EF Calculation (2010Inv) 10.24.xlsx" deleted by Suzanne Kocchi/DC/USEPA/US]

Re: Liquids Unloading emission factor calculation spreadsheet requested by API/ANGA

Suzanne Kocchi to: Melissa Weitz 10/24/2012 12:45 PM

History: This message has been forwarded.

in one of the comments on the spreadsheet there is a contractor's name, definitely delete it before sending anything to API.

Melissa Weitz	On our most recent call, API/ANGA requeste...	10/24/2012 11:15:41 AM

From: Melissa Weitz/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA
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Melissa

[attachment "Copy of Liquids Unloading EF Calculation (2010Inv) 10.24.xlsx" deleted by Suzanne Kocchi/DC/USEPA/US]

RE: FW: Liquids Unloading Spreadsheet
Melissa Weitz to: Minnucci, Chris A. 10/24/2012 02:22 PM
Cc: "Kidman, Timothy M."

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

[redacted]

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A."	Melissa,	10/24/2012 10:04:15 AM

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
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Please let us know if you have any questions on the attached or would like us to do any further analyses. As I will be out of the office tomorrow and Friday, please include Tim on any questions/requests you might have and he will be able to help you in my absence.

much thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

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The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

- [redacted] (b)(5) deliberative [redacted]

- [redacted]

[redacted] (b)(5) deliberative [redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to [redacted] (b)(5) deliberative [redacted]. In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: 703.424.5027

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Re: Fw: petitions for reconsideration
Suzanne Kocchi to: Suzanne Waltzer 10/25/2012 08:16 AM
Cc: Melissa Weitz

History: This message has been forwarded.

ok thanks.

Suzanne Waltzer	Thanks so much Melissa! I am doing the sa...	10/24/2012 03:58:13 PM

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA
Date: 10/24/2012 03:58 PM
Subject: Fw: petitions for reconsideration

Thanks so much Melissa! I am doing the same and we can compare notes when we are done.

Just ccing Suzie as FYI -

Suzie note that Melissa has found that the completions estimates are cited in the comments from Associations (IPAA and several state agencies) and Western Energy Alliance (main doc and attachment) in comments that EPA did not have great data/overestimated revenue from recapture.

We are working on a summary now.

----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 10/24/2012 03:55 PM -----

From: Melissa Weitz (b)(6) personal privacy
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/24/2012 03:34 PM
Subject: petitions for reconsideration

(Neither my lotus notes nor my webmail are working right now...)

Hi Suzie,

It looks like the completions estimates were cited in the comments from Associations (IPAA and several state agenci that EPA did not have great data/overestimated revenue from recapture.

We also received extensive liquids unloading comments from Earth Justice (in the NSPS document).

I'll read through these in more detail and provide a summary.

Melissa

RE: FW: Liquids Unloading Spreadsheet
Melissa Weitz to: Minnucci, Chris A. 10/25/2012 11:26 AM
Cc: "Kidman, Timothy M."

Hi Tim,

I'm free most of the rest of today. Let me know when you are free to talk. Thank you!!

Melissa

"Minnucci, Chris A."	Melissa,	10/24/2012 04:55:18 PM

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 04:55 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Sorry I missed you today, and since I'm going to be out tomorrow I've asked Tim to give you a call. Tim is also going to put together a table with the percentages you requested below.

As to the other questions you raised: [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]

Sent: Wed 10/24/2012 2:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

[redacted]

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A." ---10/24/2012 10:04:15 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
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[redacted]

[redacted] (b)(5) deliberative [redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out the effects of using the various emission factors has on the emissions estimates. In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: 703.424.5027

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Liquids Unloading Emission Factor Calculation Spreadsheet

Melissa Weitz to: Suzanne Waltzer 10/25/2012 12:53 PM

Hi Suzie--Would you be able to give this draft note to Karin a quick review. I know you had some good points on this yesterday, and I don't think I've captured them all. Thanks! Melissa

(b)(5) deliberative

[redacted]

[redacted]

[redacted]

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Re: Fw: Re: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates - PRESS REQUEST

Suzanne Kocchi to: Isabel DeLuca 10/25/2012 02:33 PM

Cc: Erin Birgfeld, Mark DeFigueiredo, Melissa Weitz, Suzanne Waltzer

i agree with erin, before you send, add the link to the workshop website.

Isabel DeLuca Ok, I'll send this on to OAR Comm. 10/25/2012 02:31:46 PM

From: Isabel DeLuca/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/25/2012 02:31 PM
Subject: Re: Fw: Re: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates - PRESS REQUEST

Ok, I'll send this on to OAR Comm.

Suzanne Kocchi it seems fine to me. From: Melissa Weitz/DC/... 10/25/2012 02:28 PM EDT

From: Suzanne Kocchi
To: Melissa Weitz
Cc: Isabel DeLuca; Mark DeFigueiredo; Erin Birgfeld; Suzanne Waltzer
Date: 10/25/2012 02:28 PM EDT
Subject: Re: Fw: Re: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates - PRESS REQUEST

it seems fine to me.

Melissa Weitz This looks good to me. If we do want to say mo... 10/25/2012 02:25:39 PM

From: Melissa Weitz/DC/USEPA/US
To: Isabel DeLuca/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/25/2012 02:25 PM
Subject: Re: Fw: Re: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates - PRESS REQUEST

This looks good to me.

[redacted] (b)(5) deliberative [redacted]

Isabel DeLuca [redacted] (b)(5) deliberative [redacted] 10/25/2012 02:10:38 PM

From: Isabel DeLuca/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/25/2012 02:10 PM
Subject: Re: Fw: Re: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates - PRESS REQUEST

(b)(5) deliberative

[redacted]

Suzanne Kocchi	I just talked to Isabel. She was going to suggest...	10/25/2012 01:40:00 PM

From: Suzanne Kocchi/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Cc: Erin Birgfeld/DC/USEPA/US@EPA, Isabel DeLuca/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/25/2012 01:40 PM
Subject: Re: Fw: Re: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates - PRESS REQUEST

I just talked to Isabel. She was going to suggest a few additional updates and then circulate it for review.

Mark DeFigueiredo	Looping in Suzie K From: Erin Birgfeld/DC/USE...	10/25/2012 01:38:15 PM

From: Mark DeFigueiredo/DC/USEPA/US
To: Erin Birgfeld/DC/USEPA/US@EPA
Cc: Isabel DeLuca/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA
Date: 10/25/2012 01:38 PM
Subject: Re: Fw: Re: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates - PRESS REQUEST

Looping in Suzie K

Erin Birgfeld	Dear Suzie and Melissa, Looks like ANGA/API r...	10/25/2012 01:36:42 PM

From: Erin Birgfeld/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Cc: Isabel DeLuca/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 10/25/2012 01:36 PM
Subject: Fw: Re: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates - PRESS REQUEST

Dear Suzie and Melissa,

Looks like ANGA/API released an updated study on methane emissions from the oil and gas industry today. See all info below. Do we want to provide a statement to Platts?

Here is a suggestion based on what we have said in the past:

(b)(5) deliberative

[redacted]

Let me know what you think. The reporter is asking for something ASAP but let's take the time to make sure it is the correct response.
thanks,
Erin

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

-----Forwarded by Erin Birgfeld/DC/USEPA/US on 10/25/2012 01:29PM -----
To: Andrea Drinkard/DC/USEPA/US@EPA
From: Allison Dennis/DC/USEPA/US
Date: 10/25/2012 01:28PM
Cc: "Erin Birgfeld" <Birgfeld.Erin@epamail.epa.gov>, "Alison Davis" <Davis.Alison@epamail.epa.gov>, Isabel DeLuca/DC/USEPA/US@EPA
Subject: Re: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates

+ Isabel

Erin and Isabel: Here's what we said before (on 6/4/12):

EPA will review and consider the recently released API report. The agency is confident that the methane emissions estimates are based on the best data available and our NSPS is based on technology that will allow producers to capture these emissions and bring them to market.

I think Ben wanted to make the following last minute changes (which I don't think OPA took due to timing)

(b)(5) deliberative

Allison Dennis
U.S. Environmental Protection Agency
Office of Air and Radiation Communications

Phone: 202-564-1985
Send mail to:
U.S. Environmental Protection Agency
MC: 6101A
1200 Pennsylvania Ave., NW
Washington, DC 20460

Andrea Drinkard---10/25/2012 01:07:50 PM---I'm pretty sure we wouldn't have anything to say at this point, except for maybe reiterating previou

From: Andrea Drinkard/DC/USEPA/US
To: "Alison Davis" <Davis.Alison@epamail.epa.gov>, "Allison Dennis" <Dennis.Allison@epamail.epa.gov>, "Erin Birgfeld" <Birgfeld.Erin@epamail.epa.gov>
Date: 10/25/2012 01:07 PM

Subject: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates

---

I'm pretty sure we wouldn't have anything to say at this point, except for maybe reiterating previous statements, but wanted to check with both oaqps and ccd.

Let me know your thoughts.

AD
Cathy Milbourn

----- Original Message -----
From: Cathy Milbourn
Sent: 10/25/2012 01:04 PM EDT
To: Andrea Drinkard
Subject: Fw: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates

From: "Magill, Jim" <Jim_Magill@platts.com>
To: Cathy Milbourn/DC/USEPA/US@EPA
Cc: "Magill, Jim" <Jim_Magill@platts.com>
Date: 10/25/2012 01:00 PM
Subject: FW: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates

---

Cathy:

I enjoyed speaking to you on the phone this morning. As I told you on the phone, I'm doing a story on a study released by API and ANGA on methane emissions from natural gas production, which is critical of EPA's research in this area. I'm forwarding the ANGA press release email, which contains links to the study and a fact sheet and hope that you could comment on this issue.

As I'm writing for our real time news service (as well as for our daily publications) I'd appreciated it if you could send me your comments as soon as possible.

I can be reached by phone at 713-658-3229 or by responding to this email.

Thanks for your response to this inquiry. I look forward to hearing back from you soon.

Jim Magill
Editor
Platts Gas Daily

From: ANGA Info [mailto:info@anga.us]
Sent: Thursday, October 25, 2012 11:01 AM

To: ANGA Info
Subject: ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates

October 26, 2012
Contact: Daniel Whitten
Phone: (202) 789-8490
E-Mail: dwhitten@anga.us

ANGA-API Study Shows Methane Emissions 53 Percent Below EPA Estimates

WASHINGTON – An updated survey by URS prepared for America's Natural Gas Alliance (ANGA) and the American Petroleum Institute (API) has found further reductions in greenhouse gas emissions from natural gas production.

The survey is an updated version of data first released in June. It shows that venting of methane into the atmosphere during liquids unloading is 93 percent lower than Environmental Protection Agency (EPA) estimates and that methane emissions from well re-fracturing are 72 percent lower. Taken as a whole, methane emissions from natural gas production are at least 53 percent below EPA's estimates. This is the most comprehensive look to date at the issue, analyzing data from nearly 20 percent of all U.S. natural gas-producing wells—a sample size more than 10 times larger than EPA's.

"This report reinforces the importance of sound science and accurate data in our public dialogue about our energy choices as a nation," said Tom Amontree, Executive Vice President of America's Natural Gas Alliance. "Natural gas is an increasingly important component of America's clean energy future, economy and national security. The industry's commitment to safe and responsible development means people don't need to trade protection of air, land and water for economic advancement."

The survey is based on emissions from 91,000 wells operated by 20 companies distributed over a broad area of the United States. By contrast, EPA's data was derived from only 8,800 wells confined to specific areas not representative of the entire country. Recently the U.S. Energy Information Administration concluded that use of more natural gas in power generation has helped lead to the lowest level of greenhouse gas emissions since 1992.

The full study can be found here. Download the fact sheet here.

# # #

America's Natural Gas Alliance (ANGA) *represents 29 of the nation's leading independent natural gas exploration and production companies. ANGA members are dedicated to increasing the appreciation of the environmental, economic and national security benefits of clean, abundant, American natural gas. Learn more about ANGA at* ***www.anga.us***

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RE: FW: Liquids Unloading Spreadsheet
Kidman, Timothy M. to: Melissa Weitz (b)(5) deliberative

History: This message has been forwarded.

(b)(5) deliberative

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 24, 2012 11:22 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A." ---10/24/2012 10:04:15 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Attached please find the revised memo, with a new section added to [redacted] (b)(5) deliberative [redacted]

I'm also attaching the two sets of spreadsheets used to develop the emission estimates. "Liquids Unloading Recalculations v5" was used to develop Table 2, and "Liquids Unloading Recalculations regional AF correct" was used for Tables 5 and 6.

Please let us know if you have any questions on the attached or would like us to do any further analyses. As I will be out of the office tomorrow and Friday, please include Tim on any questions/requests you might have and he will be able to help you in my absence.

much thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

Would it be possible to also use API/ANGA data to determine for each region the fraction of wells conducting liquids unloading, using plunger lifts, etc., and calculate emissions regionally that way? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is

contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

[redacted] (b)(5) deliberative [redacted]

[redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out the effects of using the various emission factors has on the emissions estimates. In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: 703.424.5027

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[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US][attachment "Liquids Unloading Recalculations_v5.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Recalculations_regional AF_correct.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v5.docx" deleted by Melissa Weitz/DC/USEPA/US]

still in today?

Melissa Weitz to: Suzanne Waltzer 10/25/2012 03:55 PM

Hi Suzie,

Let me know if you have any free time left today. I wanted to get your thoughts on SAIC's recommended approach for liquids unloading. If you're already gone for the day, I'll send you more info and maybe we can talk tomorrow if you're working.

Melissa

FW: Updated study: methane emissions from natural gas production are half EPA estimate

Amy Emmert to: Melissa Weitz, Bill Irving 10/25/2012 04:34 PM
Cc: "Karin C. Ritter"

History: This message has been forwarded.

Bill, Melissa –

Karin Ritter is out of the office today and asked me to send you a copy of API's updated methane report, which we released this afternoon.

The official version (identical to what we had shared with you previously) is attached and our accompanying press release is forwarded in the email below.

Please do not hesitate to contact us if you have any questions or concerns. We value our discussions with you and appreciate the consideration you are giving to this recent work.

Sincerely,

Amy

Amy Emmert
Policy Advisor
Upstream & Industry Operations
American Petroleum Institute
1220 L Street, NW
Washington, DC 20005
Ph: (202) 682-8372
emmerta@api.org

From: Carlton Carroll
Sent: Thursday, October 25, 2012 12:29 PM
To: Carlton Carroll
Subject: Updated study: methane emissions from natural gas production are half EPA estimate

□□□□

□□□ □□□□□□□□□□ □□□□□□□□

Carlton Carroll |
carrollc@api.org | 202.682.8114

Updated study: methane emissions from natural gas production are half EPA estimate

WASHINGTON, October 25, 2012 – Methane emissions from natural gas production were less than half what had been estimated by the Environmental Protection Agency (EPA), according to an updated survey by URS prepared for The American Petroleum Institute (API) and America's Natural Gas Alliance (ANGA).

"Industry has led efforts to reduce emissions of methane by developing new technologies and equipment, and these efforts are paying off," said Howard Feldman, API director of regulatory and scientific affairs. "This report provides the best and most comprehensive estimate of methane emissions from U.S. natural gas production. It's based on data from ten times as many wells as the estimates used by the EPA."

The new emissions survey, which shows that actual methane emissions from natural gas production is 53 percent below EPA's estimate, is based on emissions from 91,000 wells operated by 20 companies distributed over a broad geographic area. EPA's data were derived from only 8,800 wells confined to specific areas not representative of the entire country. The report also estimates that venting of methane into the atmosphere during liquids unloading -- a technique to remove water and other liquids from the wellbore to improve the flow of natural gas – is 93 percent lower than EPA's estimates and that methane emissions from well re-fracturing are 72 percent lower.

The survey is an updated version of the survey first released in June and uses the most recent company data.

API is a national trade association that represents all segments of America's technology-driven oil and natural gas industry. Its more than 500 members – including large integrated companies, exploration and production, refining, marketing, pipeline, and

marine businesses, and service and supply firms – provide most of the nation's energy. The industry also supports 9.2 million U.S. jobs and 7.7 percent of the U.S. economy, delivers $86 million a day in revenue to our government, and, since 2000, has invested over $2 trillion in U.S. capital projects to advance all forms of energy, including alternatives.

# # #

Carlton Carroll
Media Relations Representative

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Washington, DC 20005
202.682.8127 (desk)
202.682.8114 (office)
carrollc@api.org

image001.png Task 2 API ANGA Survey Report Final.pdf

Characterizing Pivotal Sources of Methane Emissions from Natural Gas Production

Summary and Analysis of API and ANGA Survey Responses

Terri Shires and Miriam Lev-On
URS Corporation and The LEVON Group

FINAL REPORT (Updated September, 2012)
September 21, 2012

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Executive Summary

This document presents the updated results from a collaborative effort among members of the American Petroleum Institute (API) and America's Natural Gas Alliance (ANGA) to gather data on key natural gas production activities and equipment emission sources that are essential to developing estimates of methane emissions from upstream natural gas production.

API and ANGA members undertook this effort as part of an overall priority to develop new and better data about natural gas production and make this information available to the public. This information acquired added importance in 2011, when the EPA released an inventory of U.S. greenhouse gases (GHG) emissions that substantially increased estimates of methane emissions from Petroleum and Natural Gas Systems. Public comments submitted by both trade associations reflected a number of concerns – most notably that EPA's estimates were based on a small set of data submitted by a limited number of companies in a different context (i.e., data not developed for the purpose of estimating nationwide emissions).

The API/ANGA data set (also referred to as ANGA/API) provides data on 91,000 wells distributed over a broad geographic area and operated by over 20 companies. This represents nearly one-fifth (18.8%) of the estimated number of total wells used in EPA's 2010 emissions inventory.[1] The ANGA/API data set is also more than 10 times larger than the set of wells in one of EPA's key data sources taken from an older Natural Gas Star sample that was never intended for developing nationwide emissions estimates. ***Although more and better data efforts will still be needed, API/ANGA members believe this current collaborative effort is the most comprehensive data set compiled for natural gas operations.***

As Table ES-1 demonstrates, survey results in two source categories – liquids unloading and unconventional gas well re-fracture rates - substantially lower EPA's estimated emissions from natural gas production. The right-hand column of this table shows the impact of ANGA/API data on the estimated emissions for each source category. Gas well liquids unloading and the rate at which unconventional gas wells are re-fractured are key contributors to the overall GHG emissions estimated by EPA in the national emissions inventory. For example, methane emissions from liquids unloading and unconventional well re-fracturing accounted for 59% of EPA's estimate for overall natural gas production sector methane emissions. Overall, API/ANGA activity data for these two source categories indicate that EPA estimates of potential emissions from the production sector of "Natural Gas Systems" would be 53% lower if EPA were to use ANGA/API's larger and more recent survey results.

[1] EPA's 2010 national inventory indicates a total of 484,795 gas wells (EPA, 2012).

TABLE ES-1. EMISSION COMPARISON BETWEEN EPA AND INDUSTRY DATA

Source Category	EPA		API/ANGA		Impact on Source Category Emissions
	Metric tons of CH4	% of EPA Emissions Total	Metric tons of CH4	% of Revised Emissions Total	API & ANGA - EPA / EPA % Difference
Gas Wells Liquids Unloading	4,501,465 *	51%	319,664	8%	-93%
Unconventional Well Re-fracture Rates	712,605 *	8%	197,311	5%	-72%
Other Production Sector Emissions**	3,585,600	41%	3,585,600	87%	
Total Production Sector Emissions	8,799,670		4,102,575		-53%

* EPA's estimates are adjusted to industry standard conditions of 60 degrees F and 14.7 psia for comparison to the ANGA/API emission estimates.

**The "Other Production Sector Emissions" are comprised of over 30 different source categories detailed in Table A-129 in the Annex of the EPA's 2012 national inventory. The "Other Production Sector Emissions" are the same values for this comparison between the EPA national inventory and the API/ANGA survey to focus the comparison on quantified differences in emission estimates for gas well liquids unloading and unconventional well re-fracture rates.

As mentioned above, the differences between EPA and ANGA/API estimates hinge on the following key differences in activity data and thus considerably impact overall emissions from Natural Gas Systems:

- ***Liquids unloading and venting.*** API/ANGA data showed lower average vent times, a significantly lower percentage of wells venting for liquids unloading, and a higher number of vents per vented well than EPA assumed in their inventory calculation. The API/ANGA survey also found a slightly larger percentage of wells with plunger lifts than EPA assumed, but a significant percentage of wells with artificial lift which EPA had not considered. These findings are particularly significant because liquids unloading accounted for 51% of EPA's total "Natural Gas Systems" methane emissions in the 2010 inventory. Applying emission factors based on ANGA/API data reduces the calculated emissions for this source by 93% (from 4,501,465 metric tons of CH_4 to 319,664 metric tons of CH_4 when compared on an equivalent basis) from EPA's 2010 national GHG inventory.
- ***Re-fracture rates for unconventional wells***. API/ANGA members collected data on re-fracture rates for unconventional wells in two phases. The first phase collected data for all well types (conventional and unconventional), while the second phase targeted unconventional gas wells. Both phases of the survey data show significantly lower rates of well re-fracturing than the 10% assumption used by EPA. As discussed in detail in

this report, the re-fracture rate varied from 0.7% to 2.3%. The second phase of the survey gathered data from only unconventional well activity and using the re-fracture rate data from this second phase of the ANGA/API survey reduces the national emission estimate for this source category by 72%, - from 712,605 metric tons of CH_4 to 197,311 metric tons of CH_4 when compared on an equivalent basis.

This report also discusses an important related concern that the government lacks a single coordinated and cohesive estimate of well completions and well counts. Although the 2010 national GHG inventory appears to under-represent the number of well completions according to the numbers reported through both the API/ANGA data and IHS CERA, differences in national well data reporting systems make it difficult to accurately investigate well completion differences with any certainty. The EPA inventory, which uses data from the Energy Information Administration, various state governments and privately sourced data, such as HPDI, does not consistently distinguish between conventional and unconventional wells.

The concept of conventional and unconventional wells is used differently by different stakeholders, is not particularly helpful from an emissions standpoint, and should be abandoned in favor of classifications more relevant to the emission source categories being evaluated. For instance, the scale of emissions from well completions is primarily associated with whether the wells are hydraulically fracture stimulated, the size/stages of the hydraulic fracture stimulation, and practices for handling the well clean-up/flow-back post fracture stimulation.

Without a consistent measure for the quantity and type of wells, it is difficult to be confident of the accuracy of the number of wells that are completed annually, let alone the amount of emissions from them. Natural gas producers strongly believe that the effects of any possible under-representation of well completions will be offset by a more realistic emission factor for the rate of emissions per well. Analysis of the data reported under Subpart W of the GHG reporting rule should be used to inform a more realistic emission factor for well completions.

This survey also collected data on centrifugal compressors and pneumatic controllers. While the sample sizes are too small to make strong conclusions, the results discussed in the body of the report indicate that further research is necessary to accurately account for the different types of equipment in this area (e.g., wet vs. dry seal centrifugal compressors and "high bleed," "low bleed," and "intermittent bleed" pneumatic controllers).

As government and industry move forward in addressing emissions from unconventional gas operations, three key points are worth noting:

- ***In addition to the voluntary measures undertaken by industry, more data will become available in the future.*** Emission reporting requirements under Subpart W of the national Greenhouse Gas Reporting Program (GHGRP) went into effect January 1, 2011 with the first reporting due in the fall of 2012. As implementation of the GHGRP progresses from year to year, the natural gas industry will report more complete and more accurate data. If EPA makes use of the data submitted and transparently communicates their analyses, ANGA/API members believe this will increase public confidence in the emissions estimated for key emission source categories of the Natural Gas Systems sector.

- ***Industry has a continuous commitment to improvement.*** It is clear that companies are not waiting for regulatory mandates or incentives to upgrade equipment, or to alter practices like venting and flaring in favor of capturing methane where practical. Instead, operators are seizing opportunities to reduce the potential environmental impacts of their operations. Industry is therefore confident that additional, systematic collection of production sector activity data will not only help target areas for future reductions but also demonstrate significant voluntary progress toward continually 'greener' operations.
- ***Members of industry participating in this survey are committed to providing information about the new and fast-changing area of unconventional oil and gas operations. API and ANGA members look forward to working with the EPA to revise current assessment methodologies as well as promote the accurate and defensible uses of existing data sources.***

1. Overview

The accuracy of GHG emission estimates from natural gas production has become a matter of increasing public debate due in part to limited data, variability in the complex calculation methodologies, and assumptions used to approximate emissions where measurements in large part are sparse to date. Virtually all operators have comprehensive methane mitigation strategies; however, beyond the requirements of the Environmental Protection Agency's (EPA) Mandatory Reporting Rule or incentives of programs like the EPA's Natural Gas Star program, data is often not gathered in a unified way that facilitates comparison among companies.

In an attempt to provide additional data and identify uncertainty in existing data sets, the American Petroleum Institute (API) and America's Natural Gas Alliance (ANGA) began a joint study on methane (CH_4) emissions from natural gas production operations in July 2011. The first part of this section offers context to the decision to conduct this survey, while the second offers a brief introduction to the survey itself.

1.1 Context

Onshore gas resources, including shale, will undoubtedly play a key role in America's energy future, and additional information must be collected to better quantify the methane emissions from natural gas production. Meaningful, publicly available data is a priority, especially in light of EPA's 2011 revision of its calculation methodology for Natural Gas Systems in the 2009 national inventory (EPA, 2011c). (EPA added two new sources for unconventional gas well completions and workovers, and also significantly revised its estimates for liquids unloading and made adjustments to other source categories.) These changes substantially increased EPA's estimated GHG emissions for the production sector of the Natural Gas Systems by 204%. Equally problematic is the methodology used by EPA to credit voluntary and regulatory reductions from the emissions reported in Table A-128 in the 2010 inventory. These reductions are taken as a "lump sum" reduction at the segment (e.g. production) level with no transparency of what source categories the reductions are applied towards. Presentation of the pre-reduction values in Table A-129 (over a 300% increase) coupled with lack of source specific transparency has led many stakeholders to use the emissions in Table A-129 directly in their various advocacy actions. API recommends that the EPA change their methodology of crediting reductions to be transparent down to the source type/category and that the post-reduction emissions be reported in the future analogues to Table A-129.

Industry was alarmed by the upward adjustment, especially since previous EPA estimates had been based on a 1996 report prepared by the EPA and GRI – and did not take into account the considerable improvements in equipment and industry practice that have occurred in the fifteen years between 1996 and 2011 (GRI, 1996).

An EPA technical note to the 2009 inventory attributed the changes to adjustments in calculation methods for existing sources, including gas well liquids unloading, condensate storage tanks, and centrifugal compressor seals. EPA also added two new sources not previously included in its inventories, namely unconventional gas well completions and workovers (re-completions) (EPA, 2011f).

Industry did not have an adequate opportunity to examine EPA's rationale for the new emissions factor prior to its initial release due to the structure of the inventory process and the lack of formal opportunity for meaningful input. Unlike changes in regulatory requirements, EPA is not required to initiate a formal comment process for changes in methodologies like emission factors and calculations methods in the national GHG inventory. As such, EPA is not compelled to incorporate or consider input provided by stakeholders and experts. Indeed, changes to methodologies are often made without the benefit of dialogue or expert review. Although EPA further acknowledged in the 2010 inventory (released in 2012), that their natural gas calculations needed work, their practice is to continue using the same numbers until adjusted estimates have been made. It is important to note that EPA has indicated a willingness to engage and discuss this matter with some members of industry. API and ANGA look forward to working collaboratively with EPA to improve the national GHG inventory.

Under the best of circumstances, EPA had remarkably little information to draw on in determining their new emission estimates. Input from industry on this topic was not directly solicited, specific guidance or information did not exist on the international level, nor was it available from other national regulators. A review of the Intergovernmental Panel on Climate Change (IPCC) and other inventories submitted to the United Nations Framework Convention on Climate Change (UNFCCC) indicate that the U.S. is currently the only country to date to differentiate between conventional and unconventional natural gas production. As discussed above, the distinction between conventional and unconventional natural gas production is not particularly useful from an emission estimation standpoint and should be abandoned. Regulators, academics, and environmentalists around the world therefore considered the new estimated emission factor as an unprecedented development in a controversial issue.

Widespread criticism of the figures and analysis of the assumptions and methodologies revealed problematic methodology and less justification for the underlying numbers than originally anticipated. In a paper entitled *Mismeasuring Methane*, the well-respected energy consultancy IHS CERA succinctly detailed several concerns about the revisions – most notably that EPA's new estimate was based on only four (4) data points that natural gas well operators had submitted voluntarily under the Natural Gas Star Program, which highlights emissions reductions. Together, the four data points cover approximately 8,880 wells – or roughly 2% of those wells covered in the EPA's national greenhouse gas inventory. Those numbers, which were submitted in the context of showcasing achieved emissions reductions and not to estimate emissions, were then extrapolated to over 488,000 wells in the 2009 emissions inventory (IHS CERA, 2011).

With an emerging topic like shale energy development, however, the impact of EPA's revised estimates was, and continues to be, enormous. Emission estimates from production using EPA's figures were used to question the overall environmental benefits of natural gas and have led to speculation of the role natural gas can play in a clean energy future.. They were cited widely by unconventional gas opponents - many of whom used the new figures selectively, inappropriately using the pre-reduction (voluntary and regulatory) figures, and without caveats like "estimated" to argue against further development of shale energy resources. For example, an article published by ProPublica cited the revised EPA emission factors as "new research" which "casts doubt" on whether natural gas contributes lower GHG emissions than other fossil fuels (Lustgarten, 2011). Many of these studies – e.g., the work of Howarth *et al.* were widely

reported in the popular press (Zellers, 2011) with little attention to the quality of analysis behind their conclusions.

Notably, other authors using more robust and defensible scientific methodologies argued that - even with undoubtedly high emissions estimates - natural gas still possessed a lifecycle advantage when its comparative efficiency in electricity generation was taken into account. For example, a study by Argonne National Laboratory utilizing the same EPA data sources concluded that taking into account power plant efficiencies, electricity from natural gas shows significant life-cycle GHG benefits over coal power plants (Burnham, 2011). Unfortunately, the complex technical arguments in these studies generated considerably less media and public attention.

It is important to understand that the ongoing debate about the accuracy of EPA's adjusted emission factor as contained in the 2009 inventory did not keep these numbers from being used in a series of rules that have wide ranging ramifications on national natural gas policies both in the United States and globally. Many countries considering shale energy development remain bound by the emissions reduction targets in the Kyoto Protocol and their regulatory discussions reflect greenhouse gas concerns. In addition to the very real risk that other countries could adopt the emission factor before the EPA can refine its calculations, the possibility of higher emissions (even if only on paper) might deter other nations from developing their own unconventional energy resources.

By the summer of 2011, it was clear to ANGA/API members (also referred to as API/ANGA members) that gathering additional data about actual emissions and points of uncertainty during unconventional gas production was essential to improve GHG life cycle analysis (LCA) of natural gas for the following reasons: 1) to focus the discussion of emissions from natural gas production around real data; 2) to promote future measurement and mitigation of emissions from natural gas production; and 3) to contribute to improving the emission estimation methods used by EPA for the natural gas sector in their annual national GHG inventory and its use globally.

1.2 Introduction to the API/ANGA Survey

API and ANGA members uniformly believed that EPA's current GHG emissions estimates for the natural gas production sector were overstated due to erroneous activity data in several key areas - including liquids unloading, well re-fracturing, centrifugal compressors, and pneumatic controllers. Members worked cooperatively to gather information through two data requests tailored to focus on these areas and collect reasonably accessible information about industry activities and practices. Specifically, information was requested on gas well types, gas well venting/flaring from completions, workovers, and liquids unloading, and the use of centrifugal compressor and pneumatic controllers.

The actual data requests sent to members can be found in Appendix A, and Appendix B provides more detailed data from the ANGA/API well survey information**.**

Survey results and summaries of observations, including comparisons to EPA's emission estimation methods, are provided in the following sections.

2. Well Data

This section examines well data gathered by API and ANGA members. Overall, ANGA/API's survey effort gathered activity data from over 20 companies covering nearly 91,000 wells and 19 of the 21 American Association of Petroleum Geologists (AAPG) basins[2] containing over 1% of the total well count in EPA's database of gas wells. Members believe that the API/ANGA survey represents the most comprehensive data set compiled for natural gas operations and, as such, provides a much more accurate picture of operations and emissions than the information EPA has relied on for its emission estimates.

Information to characterize natural gas producing wells was collected by survey in two parts:

- The first part of the survey requested high-level information on the total number of operating gas wells, the number of gas well completions, and the number of gas well workovers with hydraulic fracturing. Data on over 91,000 wells was collected primarily for 2010, with some information provided for the first half of 2011.
- The second part of the survey requested more detailed well information about key activities. The well information collected through the two surveys is provided in Appendix B.

Section 2.1 looks at overall natural gas well counts, Section 2.2 examines completion data from ANGA/API members, and Section 2.3 briefly identifies several unresolved issues concerning well counts and classifications that could benefit from future analysis for examination. For the purposes of this report, unconventional wells are considered to be shale gas wells, coal bed wells, and tight sand wells which must be fractured to produce economically.

2.1 National Gas Well Counts

To provide context for the information collected by API and ANGA, comparisons were made to information about national gas wells from EPA and the U.S. Energy Information Administration (EIA). Unfortunately, the government lacks a single coordinated and cohesive set of estimates for gas wells.

Industry grew concerned when it became apparent that significant discrepancies existed among different sources of national gas well data. The EPA inventory, the EIA, and IHS data EPA published in conjunction with the GHGRP all reported different well counts that do not consistently distinguish between key areas used by the inventory like conventional and unconventional wells. Furthermore, there does not appear to be a single technical description for classifying wells that is widely accepted. Without consistent measures and definitions for the

[2] Basins are defined by the American Association of Petroleum Geologists (AAPG) AAPG–CSD Geologic Provinces Code Map: AAPG Bulletin, Prepared by Richard F. Meyer, Laure G. Wallace, and Fred J. Wagner, Jr., Volume 75, Number 10 (October 1991) and the Alaska Geological Province Boundary Map, Compiled by the American Association of Petroleum Geologists Committee on Statistics of Drilling in Cooperation with the USGS, 1978.

quantity and type of wells, it is difficult to reach agreement on the number of hydraulically fractured and unfractured natural gas wells completed annually - let alone their emissions.

Both the EIA data and the EPA data accompanying the national GHG inventory lack sufficient detail for well classifications to provide a basis for helpful comparison with the survey data reported here. Instead, national well data developed as part of mandatory emissions reporting is used for comparison because it has the most appropriate level of detail in well categories (EPA, 2011e).

In EPA's database gas well count (EPA, 2011e), 21 of the AAPG basins each have more than 1% of the total well count. The API/ANGA survey has wells from 19 of those 21 basins. In terms of wells represented by these basins, 92% of the total EPA database well count is accounted for by wells in those 21 basins, while 95% of the ANGA/API surveyed gas wells are accounted for by those 21 basins. These results are summarized in Table 1 and illustrated in Figure 1. This indicates that the API/ANGA survey results have good representation for the basins with the largest numbers of wells nationally.

TABLE 1. COMPARISON OF GAS WELL COUNT DATA BY AAPG BASIN: SUMMARY STATISTICS

	EPA Database Gas Well Count*	API/ANGA Survey Data	ANGA/API as a % of EPA
Total number of U.S. gas wells	355,082 gas wells	91,028 gas wells	26%
Number of significant AAPG basins**	21 basins	Data on wells in 19 of those 21 basins	90%
Number of wells in significant AAPG basins	325,338 wells	86,759 wells	27%
% of total wells in significant AAPG basins	92%	95%	

* EPA's database gas well count (EPA, 2011e) differs from the well count provided in EPA's 2010 national inventory, but provides more detail on the types of wells. Additional details are provided in Appendix B.

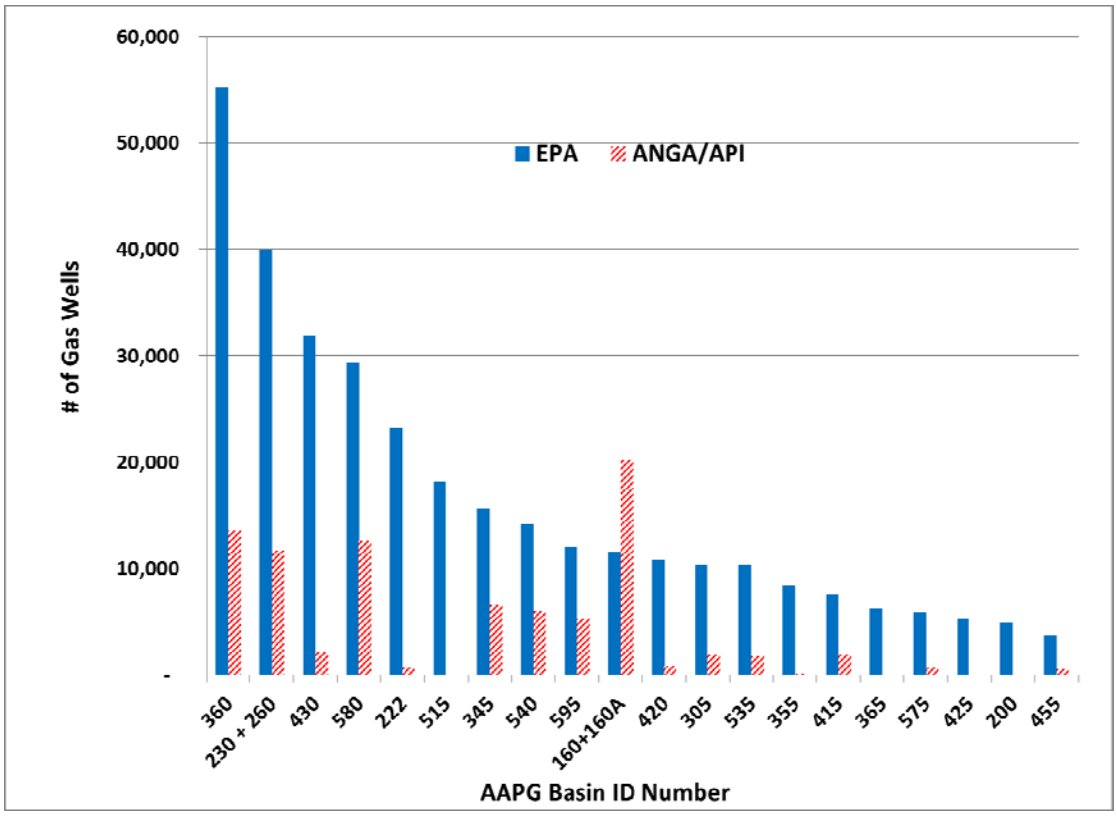
** Significant basins are defined as basins with more than 1% of the total national gas wells.

As shown in Figure 1, the API/ANGA survey results more heavily represent gas wells in specific AAPG basins when compared to EPA's basin-level well counts (EPA, 2011d). Unlike the EPA data, the ANGA/API data is more heavily influenced by AAPG 160 and 160A. AAPG basins 360, 230, and 580 are important for both data sets.

The smaller data set provided by EPA (2011e) may not include all of the Marcellus shale wells (particularly in Pennsylvania), and the well classification system used in this smaller data set could probably be made more rigorous. Although this comparison may not show a perfect distributional match for the basin by basin distribution of the API/ANGA survey data presented here, it does not change the fundamental conclusion that the ANGA/API survey information is the largest and most representative data set yet collected for onshore U.S. gas production, since this data set does cover 90% of the basins and 27% of the national gas well count for the significant basins as reported by EPA (EPA, 2011e). The data discussed in this report provides substantial new information for understanding the emissions from Natural Gas Systems and offers a compelling justification for re-examining the current emission estimates for unconventional gas wells.

Appendix B contains more detail about the industry well data sample compared to the overall data maintained by the government. Unless otherwise noted, further statistical comparisons of well data throughout this paper are done with reference to the EPA data furnished with the Subpart W sub-basin categorization because it was the only one which effectively parsed the data by well type (EPA, 2011e).

FIGURE 1. COMPARISON OF EPA TO API/ANGA GAS WELL COUNT DATA BY AAPG BASIN



2.2 Gas Well Completions

Acknowledging the somewhat different time periods covered, the API/ANGA survey data represents 57.5% of the national data for tight gas well completions and 44.5% of shale gas well completions, but only 7.5% of the national conventional well completions and 1.5% of coal-bed methane well completions. About one-third of the surveyed well completions (2,205) were not classified into the well types requested (i.e., tight, shale, or coal-bed methane) by the respondents. The survey results for well completions are provided in Table 2 and compared to national data provided to ANGA by IHS.[3]

[3] Data provided in e-mail from Mary Barcella (IHS) to Sara Banaszak (ANGA) on August 29,2011. Data were pulled from current IHS well database and represent calendar year 2010.

EPA's 2010 inventory showed 4,169 gas well completions with hydraulic fracturing (EPA, 2012, Table A-122); however, EPA does not provide a breakout of completions by well type (shale gas, tight gas or coal-bed methane). In comparing the EPA 2010 count of gas well completions with hydraulic fracturing (4,169 completions) to both the survey results and data provided by IHS, it seems that EPA's national GHG inventory underestimates the number of well completions. Even accounting for the difference in time periods (2010 for EPA compared to 2010/2011 data from the ANGA/API survey), the national inventory appears to under-represent the number of well completions.

TABLE 2. API/ANGA SURVEY – SUMMARY OF GAS WELL COMPLETIONS BY NEMS REGION AND WELL TYPE*
(FIRST SURVEY DATA REQUEST PHASE)

NEMS Region	Conventional Wells	Shale	Coal-bed Methane	Tight	Unspecified	Regional Total
API/ANGA Survey Data Gas Well Completions						
Northeast	2	291	3	67	126	489
Gulf Coast	81	588	-	763	374	1,806
Mid-Continent	22	734	-	375	270	1,401
Southwest	425	442	-	346	310	1,523
Rocky Mountain	10		30	977		1,017
Unspecified	-	-	-	-	1,125	1,125
Survey TOTAL	540	2,055	33	2,528	2,205	7,361
% of Survey Total	7.3%	27.9%	0.4%	34.3%	30.0%	
2010 IHS Gas Well Completions						IHS Total
2010 National Well Completions (from IHS)[1]	7,178	4,620	2,254	4,400		18,452
	38.9%	25.0%	12.2%	23.8%		
API/ANGA as % of IHS National Well Counts	7.5%	44.5%	1.5%	57.5%		

* ANGA/API survey data represents well counts current for calendar year 2010 or the first half of 2011.

** EPA's national GHG inventory does not designate gas wells by classifications of "shale", "coal bed methane" or "tight".

As shown in Table 3, the ANGA/API survey noted 7,361 gas well completions for 2010 and the first half of 2011. This is equivalent to approximately 40% of the gas well completions reported by IHS for 2010. Although EPA's 2010 national GHG inventory appears to under-represent the number of gas well completions according to the numbers reported through both the API/ANGA data and the IHS, differences in national well data reporting systems make it difficult to accurately investigate well completion differences with certainty. Data used in the EPA inventory, which includes information from the Energy Information Administration, various state governments, and privately sourced data, such as HPDI, does not consistently distinguish between conventional and unconventional wells. Without a consistent measure for the quantity and type of wells, it is difficult to be confident of the accuracy of how many wells

are completed annually, let alone to estimate their emissions. Industry strongly believes that the effects of any current under-representation of well completions will be offset by a more realistic emission factor for the rate of emissions per well.

TABLE 3. SUMMARY OF GAS WELL COMPLETIONS DATA (FIRST SURVEY DATA REQUEST PHASE)

	# Completions for Gas Wells without hydraulic fracturing	# Completions for Gas Wells with hydraulic fracturing	Total Completions
2010 National Well Completions (from EPA; EPA 2012)	702	4,169	4,871
% of National Total	14%	86%	
API/ANGA Survey Well Completions	540	6,821	7,361
% of Survey Total	7%	93%	
Well Completions from IHS	7,178	11,274	18,452
% of National Total	39%	61%	

Table 4 provides detailed data for well completions from the ANGA/API survey. From the survey, 94% of gas well completions in 2010 and the first half of 2011, were conducted on wells with hydraulic fracturing. About one-half of all gas well completions for this time period were for tight wells, and about one-half of all gas well completions were for vertical wells with hydraulic fracturing. Any differences in totals between Tables 2, 3 and 4 are because these tables were derived from the two different data requests sent to member companies as described previously in the introduction to Section 2.

TABLE 4. API/ANGA SURVEY – ADDITIONAL DETAILS ON GAS WELL COMPLETIONS (SECOND SURVEY DATA REQUEST PHASE)

	# Completions for Gas Wells with hydraulic fracturing (HF)				Gas Wells without hydraulic fracturing		Total Completions
	# Vertical wells completions	# Horizontal well completions	Total Wells with HF	% of Wells with HF	# Completions	% of Wells without HF	
TOTAL Conventional	315	57	372	69%	164	31%	536
TOTAL Shale	317	1,863	2,180	99%	30	1%	2,210
TOTAL Tight	2,054	368	2,422	96%	106	4%	2,528
TOTAL Coal Bed Methane	27	3	30	91%	3	9%	33
TOTAL OVERALL	**2,713**	**2,291**	**5,004**	**94%**	**303**	**6%**	**5,307**

The following points summarize survey information provided in Tables 2, 3 and 4. These tables represent a snapshot of well activity data during this time.

- Overall, the survey showed 94% of the 5,307 wells reported in the API/ANGA data set as completed in 2010 and the first half of 2011 used hydraulic fracturing.
- *536 conventional gas wells were completed in 2010 and the first half 2011.*
  - 59% were vertical wells with hydraulic fracturing,
  - 11% were horizontal wells with hydraulic fracturing, and
  - 31% were wells without hydraulic fracturing.
- *2,210 shale gas wells were completed in 2010 and the first half 2011.*
  - 14% were vertical wells with hydraulic fracturing,
  - 84% were horizontal wells with hydraulic fracturing, and
  - 1% were wells without hydraulic fracturing.
- *2,528 tight gas wells were completed in 2010 and the first half 2011.*
  - 81% were vertical wells with hydraulic fracturing,
  - 15% were horizontal wells with hydraulic fracturing, and
  - 4% were wells without hydraulic fracturing.
- *33 coal-bed methane wells were completed in 2010 and the first half 2011.*
  - 82% were vertical wells with hydraulic fracturing,
  - 9% were horizontal wells with hydraulic fracturing, and
  - 9% were wells without hydraulic fracturing.

2.3 Data Limitations Concerning Wells

In response to follow-up questions on well data, EPA indicated that they classified gas well formations into four types (conventional, tight, shale, and coal-bed) (EPA, 2011e). When developing the gas well classifications, EPA applied their judgment where data were not available in the database. ANGA and API are interested in using the well database compiled by IHS or a similar database, to more completely classify gas wells at some point in the future. The API/ANGA survey did not specifically define conventional wells for collecting the well data presented in this section, leaving the respondents to determine the classification of wells based on their knowledge of the well characteristics or state classifications. As such, this well classification may vary somewhat according to the respondent's classification of wells.

It should be noted that there is not a generally accepted definition for "gas wells." Producers might be producing from several zones in the same formation, and different states define "gas" or "oil" wells differently due to the historical structure of royalties and revenues. There is also no commonly used definition of "conventional" gas wells. Thus, different

definitions of these terms may have produced inconsistency in the classification of wells between gas and oil, and conventional and unconventional for the surveyed results, as well as for the EPA and EIA national data. For the purposes of this report, unconventional wells are considered to be shale gas wells, coal bed wells, and tight sand wells which must be fractured to produce economically. Given the counts of wells in the 2010 inventory versus the API/ANGA survey it is clear that the definition of conventional versus unconventional wells is not uniform and that the definition used by the individual companies responding to the survey likely differs from whatever distinction EPA uses.

3. Gas Well Liquids Unloading

Gas well clean ups, also known as liquids unloading, account for 51% of total CH_4 emissions from the natural gas production sector in EPA's national GHG inventory (EPA, 2012).[4] Methane emissions from well venting for liquids unloading in the 2010 inventory represent a dramatic increase from the 6% of CH_4 emissions that liquids unloading represented in the 2008 inventory. The magnitude of the increase, the accuracy of the underlying assumptions, and the methodology used in estimating emissions from well venting for liquids unloading became major concerns to API/ANGA members.

As the name indicates, 'Venting Wells for Liquids Unloading' is a technique to remove water and other liquids from wellbores to improve the flow of natural gas in gas wells.

In EPA's national inventory, emissions from gas well liquids unloading are based on the following assumptions (EPA, 2011a and Hanle, 2011):

- 41.3% of conventional wells require liquids unloading.
- 150,000 plunger lifts are in service, which equates to 31% of the gas wells in the national inventory.
- The average gas well is blown down to the atmosphere 38.73 times per year.
- The average casing diameter is 5 inches.
- A gas well is vented to the atmosphere for 3 hours.

Due to the dramatic increase in EPA's estimated emissions from this source and ANGA/API's concern, a survey of member companies was conducted to gather data on current operating practices from a large and broad cross-section of the industry regarding well venting for liquids unloading. The survey was structured to gather activity information along with data required for estimating emissions using the methodologies from the GHGRP Subpart W. Sixty-one data sets with information relevant to liquids unloading covering 59,880 wells and 18 AAPG basins were received.

The following information was requested:

- Geographic area represented by the information provided;
- Time period – data were annualized to 12 months if the information was provided for a partial year;
- Number of operated gas wells represented by the information provided;
- Number of gas wells with plunger lift installed;
- Number of gas wells with other artificial lift (beam pump; ESP; etc.);
- Total number of gas well vents;
- Number of wells with and without plunger lifts that vent to the atmosphere;

[4] See EPA Table A-129, of Annex 3 of the 2010 inventory report.

- Total count of gas well vents for time period with and without plunger lifts;
- Average venting time for wells with and without plunger lifts;
- Average daily production of venting gas wells (Mcf/day);
- Average depth of venting wells (feet);
- Average casing diameter of venting gas wells (inches);
- Average tubing diameter of venting gas wells with plunger lift (inches); and
- Average surface pressure of venting gas wells (psig).

Not all respondents reported information for each parameter requested in the survey. Hence, the subsequent analysis determining the sample size and other factors used the well counts and other information from only those data sets which included information for the parameter being determined or analyzed. As a result, the analysis of the survey data reflects three levels of information:

1. High-level data were used to relate the survey information to national well counts. This survey data set provided the broadest representation of wells, totaling 59,880 total gas wells in the liquids unloading data sets.
2. Mid-level data consisted of survey information used to determine the fraction of both plunger equipped and non-plunger equipped gas wells that vent gas due to liquids unloading. The mid-level survey data represented a total of 49,124 wells.
3. Detailed survey data were used to calculate emissions using the methodologies in the GHGRP Subpart W and to compare the survey data to assumptions EPA used in deriving the emissions for the 2010 national inventory. Detailed survey information was provided for a total of 42,681 wells.

Although the survey was split into "conventional" and "unconventional" categories, this specific distinction was not carried forward into the liquids unloading analysis. Liquid loading of well-bores is a function of the physics of flow up the well-bore and the fluids' properties; the type of producing formation is not relevant when the conditions for liquid loading occur.

Table 5 summarizes the high-level results from the API/ANGA survey and characterizes the national well population in EPA's 2010 inventory using the survey derived information. Based on the survey results, 36% of gas wells are equipped with plunger lift. Applying this percentage to the national gas well count results in 174,743 wells nationally with plunger lift.

TABLE 5. LIQUIDS UNLOADING HIGH LEVEL DATA SUMMARY

High Level Survey Data		
Gas wells with plunger lifts (59,648 in sample)	21,500	wells (36.0%)
Gas wells with artificial lift (54,660 in sample)	7,329	wells (13.4%)
Gas Wells Vented to the atmosphere for Liquids Unloading (49,124 in sample)	6,462	wells (13.2%)
# Vents per vented well	145.1	vents/vented well
Total gas well vents represented by the data sets	937,663	vents
National Well Characterization		
National # of wells from 2010 Inventory	484,795	wells
Calculated national # wells with plunger lift	174,743	wells
Calculated national # wells without plunger lift	310,052	wells
Calculated national # wells with artificial lift (subset of wells without plunger lift	65,003	wells
Methane mole percentage from EPA 2010 national inventory	78.8%	

The survey also collected information on gas wells with artificial lift. A key distinction is that wells with artificial lift do not build up liquid columns in the well bore and hence are not vented for liquids unloading. The ANGA/API survey results indicated that 13.4% of wells use artificial lift which yields approximately 65,000 wells with artificial lift when extrapolated on a national basis. EPA has acknowledged that their current emission estimation method for liquids unloading does not account for activities used to reduce CH_4 emissions by many different artificial lift methods used in industry.

Table 6 summarizes the mid-level API/ANGA survey results, which characterizes the national **venting** well population, and applies the survey derived annual emissions per venting well to calculate national emissions. Based on the mid-level survey data, 21.1% of plunger equipped wells vent gas for liquids unloading, and 9.3% of wells without plunger lift vent gas for liquids unloading. These percentages were applied to the calculated national gas well counts with and without plunger lift (shown in Table 5) and are used to estimate the number of wells with and without plunger lift that vent for liquids unloading (36,806 and 28,863 wells, respectively, shown in Table 6).

Emissions were calculated for the survey data by applying Equation W-8 or W-9 from the EPA GHG reporting rule in 40 CFR 98 Subpart W, where Equation W-8 applies to gas wells without plunger lifts, and Equation W-9 applies to gas wells with plunger lifts. Appendix C summarizes the survey data used to estimate the emissions shown in Table 6. The total volume of gas emitted based on the survey data was converted to methane emissions by applying the methane content used in the national inventory (78.8%). When the total volume is divided by the number of venting wells represented by the survey data, it results in an emission factor of approximately 254 Mscfy CH_4/well.

TABLE 6. LIQUIDS UNLOADING EMISSION ESTIMATION BASED ON SURVEY DATA

Mid-Level Survey Data		
Total number of wells with plunger lift (42,681 in sample)	11,518	wells
Total number of wells without plunger lift (42,681 in sample)	31,163	wells
Number of plunger equipped wells that vent (42,681 in sample)	2,426	wells (21.1%)
Number of non-plunger equipped wells that vent (42,681 in sample)	2,901	wells (9.3%)
Total annual volume gas vented for venting wells	1,719,843,596	scf gas/year
Calculated volume vented gas per venting well	322,854	scfy gas/well
Calculated methane volume vented per venting well	**254,409**	scfy ch4/well
Calculated National Well Data		
Calculated national # wells with plunger lift that vent for unloading	36,806	wells
Calculated national # wells without plunger lift that vent for unloading	28,863	wells
National Emission Calculations		
Total gas venting for liquids unloading volume (scaled for national wells)	21,201,410,618	scf gas/yr
Total methane venting for liquids unloading (scaled for national wells)	16,706,711,567	scf CH_4/yr
Total liquid unloading vented methane (scaled for national wells)	319,664	metric tons CH_4/yr
Comparison to 2010 National Inventory Liquids Unloading		
2010 National Inventory CH_4 emissions from Liquids Unloading	4,501,465	metric tons CH_4/yr
% difference between survey and national data	-92.9%	

For comparison to EPA's estimated emissions from liquids unloading, the survey calculated emission factor was applied to the calculated national number of gas wells with and without plunger lift. When extrapolated to a national basis, as shown above, the survey data estimates that 319,664 tonnes of CH_4 are emitted from liquids unloading, compared to EPA's national emissions of 4,501,465 tonnes CH_4 (based on industry standard conditions of 60 °F and 14.7 psia) – for the same activities. Hence, the results of the ANGA/API survey would predict emissions that are a factor of 14 times lower than the emissions reported in the 2010 national GHG inventory for liquids unloading.

Table 7 summarizes the detailed API/ANGA survey results for relevant individual parameters used in the emission calculation. These are compared to EPA's assumptions to demonstrate why the survey results produce a much lower emissions than EPA's assumptions. It should be noted, the ANGA/API parameters from each data set were weighted by the number of vents in that particular data set, where appropriate.

TABLE 7. DETAILED SURVEY DATA COMPARED TO EPA ASSUMPTIONS

Detailed Survey Data		Survey Data		EPA Assumptions	
Total national number of wells that vent for liquids unloading		65,669	wells	179,391	wells
Average number of vents	per venting plunger well	343.72	vents/well	38.7	vents/well
	per venting non-plunger well	32.57	vents/well		
Average time per vent	plunger equipped wells	0.11	hour	3	Hours
	non-plunger equipped wells	1.90	hours		
Average depth	plunger equipped wells	4,370	feet	6,000	Feet
	non-plunger equipped wells	5,433	feet		
Average tubing diameter - plunger equipped wells		2.15	inches	2	inches
Average casing diameter - non-plunger equipped wells		4.57	inches	5	inches
Average production rate	plunger equipped wells	104.3	Mcfd gas		
	non-plunger equipped wells	45.9	Mcfd gas		
Average pressure	plunger equipped wells	91.0	psig	100 psig sales line pressure (200-1000 psig shut-in pressure)	
	non-plunger equipped wells	110.8	psig		
Calculated methane volume venting per venting wells		254,409 scf CH4/well		1,316,750 scf CH4/well	

As noted previously, the data sets used to derive the liquids unloading emission estimates are summarized in Appendix C. When examining Appendix C, it is important to note the presence of several data responses that can be viewed as outliers. Two data responses for operations with conventional wells reported very high frequencies of vents to the atmosphere. These data sets represent 174 gas wells with plunger lifts that vent to the atmosphere and are located in the Mid-Continent region (out of a total 1,140 conventional gas wells represented by the two data sets). The wells represented by these data points have plunger lifts that vent to the atmosphere for each plunger cycle. The information was confirmed by the two data respondents and is an artifact of the plunger control for these wells which results in very short venting durations (between 4 and 5 minutes) for each plunger cycle, which is not the operating practice assumed by the EPA in the equations that are used to estimate emissions associated with liquids unloading. Accounting for the high frequency of plunger lift cycles for these wells results in a high average vent frequency, but still leads to the derivation of a lower emission factor than the one derived by EPA in accordance with their assumptions about liquids unloading operations. The survey derived factor is likely somewhat high due to the calculation assumption that the entire tubing string is de-pressured in each venting event which is not likely for the two "outlier" data sets discussed above.

These variances among operators in the ANGA/API data demonstrate the challenge of applying national emissions estimates to conditions in which there can be considerable variation in wells and operating techniques, among and even within various regions. As member companies have noted in various comments to regulators, oil and natural gas production operations vary considerably according to factors such as local geology, hydrology, and state law.

As production companies continue to collect and report information for EPA's mandatory GHG reporting program, better information on liquids unloading frequency and emissions will be available. One area that would benefit from additional information is an investigation of

regional differences, or plunger lift control practices, in view of the high frequency of vents observed for two data sets containing conventional gas wells with plunger lifts in the Mid-Continent region.

Key findings of the API/ANGA survey on liquids unloading are:

- ***Overall, the change in emission factors based on data collected from the ANGA/API survey reduces estimated methane emissions for this source by 93% from the methane emissions reported in EPA's 2010 national GHG inventory. This is a factor of 14 times lower than EPA's reported methane emissions.***
- ***When compared to EPA's assumptions used to derive the national GHG emission estimates for liquids unloading, the API/ANGA survey data indicated a lower percent of gas wells that vent for liquids unloading and a much shorter vent duration. The difference in these two parameters from EPA's assumptions more than offset the higher number of vents observed from the survey data.***

4. Hydraulic Fracturing and Re-fracturing (Workovers)

A well workover refers to remedial operations on producing natural gas wells to try to increase production. Starting with the 2009 inventory, EPA split the estimation of emissions from producing gas wells into conventional (i.e., without hydraulic fracturing) and unconventional (i.e., with hydraulic fracturing). For workovers of wells without hydraulic fracturing, the 2009 and 2010 national inventories used emission factors of the same order of magnitude as the 2008 inventory (2,454 scf of CH_4/workover). In contrast, the unconventional (with hydraulic fracturing) well workover emission factor increased by a factor of three thousand (3,000).

EPA did acknowledge that the new emission factor for well workovers was based on limited information (EPA, 2011b). Moreover, several publications including *Mismeasuring Methane* by IHS CERA underscored the perils of extrapolating estimates using only four (4) data points representing approximately two percent (2%) of wells – particularly when the data was submitted in the context of the Natural Gas Star program, which was designed to highlight emissions reduction options (IHS CERA, 2011). Unfortunately, even if the EPA's workover factor is high, it must be used in estimated emissions calculations until it is officially changed.

EPA's new emission factor is 9.175 MMscf of natural gas per re-fracture (equivalent to 7.623 MMscf CH_4/re-fracture). Additionally, EPA used this new emission factor in conjunction with an assumed re-fracture rate of 10% for unconventional gas well workovers each year to arrive at their GHG emission estimate for this particular category.

4.1 API/ANGA Survey

The ANGA/API survey requested counts for gas well workovers or re-fractures in two separate phases of the survey, covering 91,028 total gas wells (Table 8 covering 2010 and first half of 2011 data) and 69,034 unconventional gas wells (Table 9, 2010 data only), respectively.

The first phase of the survey was part of the general well data request. Counts of workovers by well type (conventional, tight, shale, and coal bed methane) and by AAPG basin were requested. The frequency of workovers was calculated by dividing the reported workover rates by the reported total number of each type of gas well. These results are summarized in Table 8, which includes a comparison to national workover data from EPA's annual GHG inventory. The high number of workovers in the Rocky Mountain region is discussed further below.

Table 8 indicates that even for the high workover rates associated with unconventional tight gas wells in the Rocky Mountain region, the workover rate is much less than EPA's assumed 10% of gas wells re-fractured each year. Based on this first phase of the survey,

- The overall workover rate involving hydraulic fracturing was 1.6%.
- However, many of these workovers were in a single area, AAPG-540, where workovers are known to be conducted more routinely than in the rest of the country (as described in more detail below Table 9). Excluding AAPG 540, the overall workover rate involving hydraulic fracturing was 0.7% which is a more likely range for a national re-fracture rate.

- For shale, coal-bed methane, and tight formation wells in Table 8, the overall workover rate involving hydraulic fracturing was 2.2%. Excluding AAPG 540, the overall workover rate involving hydraulic fracturing was 0.5%.

TABLE 8. API/ANGA SURVEY – SUMMARY OF GAS WELL WORKOVERS WITH HYDRAULIC FRACTURING IN 2010 AND FIRST HALF OF 2011 BY NEMS REGION AND WELL TYPE (FIRST PHASE DATA SURVEY)

NEMS Region	Conventional Wells	Unconventional Wells			Unspecified
		Shale	Coal-bed Methane	Tight	
Northeast	-	-	-	-	-
Gulf Coast	-	5	-	38	73
Mid-Continent	8	1	-	73	33
Southwest	60	25	-	8	7
Rocky Mountain	4	-	25	901	-
West Coast	-	-	-	-	-
Unspecified	-	-	-	-	200
Survey TOTAL	72	31	25	1,020	313
		1,076			
% of national	0.3%	21.3%			
Overall Survey Total % of national	1,461 5.6%				

National Workover Counts (from EPA's 2010 national inventory)	Conventional Wells	Unconventional Wells
	21,088	5,044
	80.7%	19.3%
	26,132	

	Conventional Wells	Unconventional Wells			Unspecified
		Shale	Coal-bed Methane	Tight	
% Workover Rate with Hydraulic Fracturing (from ANGA/API Survey)	0.3%	0.3%	0.5%	3.0%	2.4%
Tight w/out AAPG 540				0.5%	
Unconventional Wells		2.2%			
W/out AAPG 540		0.5%			
All Wells	1.6%				
All Wells w/out AAPG 540	0.7%				

A second phase of the survey was conducted which targeted collecting gas well re-fracture information for 2010 to provide a comparator for EPA's assumption that 10% of wells are re-fractured each year. This portion of the ANGA/API survey requested information just for "unconventional" gas wells (i.e., those located on shale, coal-bed methane, and tight formation reservoirs), where the formations require fracture stimulation to economically produce gas. A re-fracture or workover was defined for this second phase of the survey as a re-completion to a different zone in an existing well or a re-stimulation of the same zone in an existing well. These results are summarized in Table 9.

While there likely is significant overlap of unconventional well data reported in the first and second phases of the survey (which covered over 62,500 unconventional wells and 69,000 unconventional wells respectively), combined these data indicate an unconventional well re-fracture rate of 1.6% to 2.3% including AAPG 540 and 0.7% to 1.15% excluding AAPG 540.

AAPG Basin 540 (i.e. DJ Basin) which is part of the Rocky Mountain Region stands out in Tables 8 and 9. After four (4) to eight (8) years of normal production decline, the gas wells in this basin can be re-fractured in the same formation and returned to near original production. Success of the re-fracture program in the DJ Basin is uniquely related to the geology of the formation, fracture reorientation, fracture extension and the ability to increase fracture complexity. Also, most DJ Basin gas wells are vertical or directional, which facilitates the ability to execute re-fracture operations successfully and economically. These characteristics result in a high re-fracture or workover rate specific to this basin/formation.

ANGA and API believe the high re-fracture rate observed in the DJ Basin is unique and not replicated in other parts of the country. This was a limited program that was occurring during the data survey activities and has currently stopped. There may be a few other formations in the world that have similar performance, but the successful re-fracture rate in the DJ Basin is not going to be applicable to every asset/formation and there is no evidence of the high re-fracture rate in any of the other 22 AAPGs covered in the API/ANGA survey. It is highly dependent on the type of rock, depositional systems, permeability, etc. For these reasons, re-fracture rates for tight gas wells and all gas wells with and without AAPG Basin 540 are summarized in Tables 8 and 9.

4.2 WRAP Survey

Other information on re-fracture rates is available in a survey conducted by the Western Regional Air Partnership (WRAP). WRAP conducted a survey of production operators in the Rocky Mountain Region (Henderer, 2011) as part of the initiative to develop GHG reporting guidelines for a regional GHG cap and trade program.

TABLE 9. API/ANGA SURVEY – SUMMARY OF 2010 GAS WELL WORKOVERS ON UNCONVENTIONAL WELLS BY AAPG BASIN AND NEMS REGION (SECOND PHASE SURVEY DATA)

NEMS Region	AAPG Basin	Number of Unconventional Operating Gas Wells	Number of Hydraulic Fracture Workovers on Previously Fracture Stimulated Wells	% Wells re-fractured per year	Regional % Wells re-fractured per year
Northeast	160	1,976	0	0.00%	0%
	160A	760	0	0.00%	
Gulf Coast	200	2	0	0.00%	0.91%
	220	649	2	0.31%	
	222	629	3	0.48%	
	230	820	4	0.49%	
	250	13	0	0.00%	
	260	2,830	36	1.27%	
Mid-Continent	345	3,296	11	0.33%	0.95%
	350	213	3	1.41%	
	355	282	8	2.84%	
	360	7,870	89	1.13%	
	375	12	0	0.00%	
	385	1	0	0.00%	
	400	64	0	0.00%	
Southwest	415	1,834	0	0.00%	1.04%
	420	838	8	0.95%	
	430	1,548	36	2.33%	
	435	2	0	0.00%	
Rocky Mountain	515	1	0	0.00%	4.7%
	540	5,950	866	14.55%	
	580	8,197	8	0.10%	
	595	5,222	32	0.61%	
Not specified		26,025	487	1.87%	1.87%
Unconventional TOTAL (all wells)		**69,034**	**1,593**	**2.31%**	
Unconventional Median		790	3		
Rocky Mountain Region Unconventional Total		19,370	906	4.68%	
Unconventional TOTAL (Without AAPG 540)		63,084	727	1.15%	

Within each basin in this region, the top oil and gas producers were identified and invited to participate in the survey. The goal was to have operator participation that represented 80% of the production for the region. The spreadsheet survey requested information on the completions, workovers, and emissions associated with these activities. An emission factor and frequency of re-fracturing was developed for each basin as a weighted average of the operator responses.

The re-fracture rates from the WRAP survey are shown in Table 10 (Henderer, 2011).

TABLE 10. WRAP SURVEY – SUMMARY OF GAS WELL WORKOVERS BY AAPG BASIN FOR THE ROCKY MOUNTAIN REGION, 2006 DATA

AAPG Basin	# Wells represented by survey	# Wells Recompleted	% Recompleted
515	4,484	121	2.70%
530	731	5	0.68%
535	4,982	201	4.03%
540	8,247	636	7.71%
580	3,475	14	0.40%
595	4,733	275	5.81%
Total	26,652	1,252	
Weighted average			4.70%

AAPG Basin 540 results in the highest re-fracture rate for this data set, consistent with the ANGA/API survey as noted above. It is noteworthy that, while there are differences among individual AAPG Basin results, the weighted average re-fracture rate from the WRAP survey in 2006 is the same as the Rocky Mountain regional 4.7% re-fracture rate from the API/ANGA survey shown in Table 9.

4.3 Impact of Completions and Re-fracture Rate Assumptions

Table 11 compares the considerable reduction in the national GHG inventory that would result from applying a lower re-fracture rate.

EPA indicated that the national inventory assumes 10% of unconventional gas wells are re-fractured each year. Table 11 replaces this value with results from the ANGA/API survey. A re-fracture rate of 1.15% is applied to unconventional gas wells in the Mid-Continent and Southwest regions (No unconventional gas wells were assigned to the Northeast and Gulf Coast regions. The West Coast region is not shown since the API/ANGA survey did not include any responses for gas well operations in this region.) A re-fracture rate of 4.7% is applied to unconventional gas wells in the Rocky Mountain region.

With these adjustments to the re-fracture rate for unconventional gas wells, the national emission estimate is reduced by 72% for this emission source category, from 712,605 metric tons of CH_4 to 197,311 metric tons of CH_4 when compared on a consistent basis.

TABLE 11. API/ANGA SURVEY –GAS WELL WORKOVER EMISSIONS COMPARISON

NEMS Region	Well type	2010 EPA National Inventory # workover	Adjusted # workovers (based on API/ANGA survey)	2010 EPA National Inventory		Revised Emissions, tonnes CH_4 (based on ANGA/API survey)	API & ANGA - EPA / EPA % Difference
				Emission Factor, scf CH_4/workover	Estimated Emissions, tonnes CH_4*		
Northeast	Wells without Hydraulic Fracturing	8,208	8,208	2,607	409	409	
	Wells with Hydraulic Fracturing	0	0	7,694,435	0	0	
Mid Continent	Wells without Hydraulic Fracturing	3,888	3,888	2,574	191	191	
	Wells with Hydraulic Fracturing	1,328	153	7,672,247	194,950	22,462**	-89%
Rocky Mountain	Wells without Hydraulic Fracturing	3,822	3,822	2,373	174	174	
	Wells with Hydraulic Fracturing	2,342	1,100	7,194,624	322,402	151,432**	-53%
Southwest	Wells without Hydraulic Fracturing	1,803	1,803	2,508	87	87	
	Wells with Hydraulic Fracturing	1,374	158	7,387,499	194,217	22,382**	-89%
Gulf Coast	Wells without Hydraulic Fracturing	3,300	3,300	2,755	174	174	
	Wells with Hydraulic Fracturing	0	0	8,127,942	0	0	
TOTAL					712,605	197,311	-72%

* EPA Estimated emissions = 2010 # Workovers x EPA 2010 Emission Factor, converted to mass emissions based on 60°F and 14.7 psia.

** Revised emissions = Adjusted # Workovers x Emission Factor, converted to mass emissions based on 60°F and 14.7 psia.

4.4 Completion and Re-fracture Emission Factor

In the 2009 GHG national inventory, EPA applies an emission factor of 2,454 scf CH_4/event for conventional gas well workovers, while the emission factor for unconventional gas well completions and workovers was increased to 7,623,000 scf CH_4/event (EPA, 2011c). Similarly, for the 2010 national GHG inventory, EPA maintained the emission factor of 2,454 scf CH_4/event for gas well workovers without hydraulic fracturing, but applied an average emission factor of 7,372,914 to gas well workovers with hydraulic fracturing (EPA, 2012). (EPA applies slightly different emission factors for each NEMS region based on differing gas compositions.)

The ANGA/API survey focused on activity data and did not collect data to revise the emission factor for unconventional gas well completions and workovers.

Emissions Data from WRAP Study

The WRAP study discussed in Section 4.2 also gathered data on emissions from completions. This information supports a revised emission factor but was reported by sources outside the ANGA/API data survey. The results are summarized in Table 12. The WRAP emission factor is 78% lower than EPA's emission factor (9.175 MMscf gas/event). The WRAP survey did not provide a methodology for determining emissions data.

TABLE 12. WRAP SURVEY – SUMMARY OF COMPLETION EMISSIONS FOR THE ROCKY MOUNTAIN REGION, 2006 DATA

AAPG Basin	Weighted average gas emissions from completion, Mcf gas/well	# completions represented
515	167	207
530	268	54
535	76	642
540	59	608
580	6,559	283
595	4,053	819
Total		2,613
Weighted average	2,032 Mcf/well	

4.5 Data Limitations for Completion and Re-fracture Emissions

Although the data sets are limited, it appears that EPA's assumed re-fracture rate of 10% is a significant overestimate. Information from the API/ANGA survey indicates that even including what appears to be unique activity in AAPG-540, the re-fracture rate is much less frequent, ranging from 1.6% to 2.3% based on two sets of survey information (Tables 8 and 9, respectively). The re-fracture rate for AAPG Basin 540 appears to be higher than other areas in the U.S. due to unique geologic characteristics in that region (4.7% based on a weighted average

of data reported for that region). Without AAPG Basin 540, the national rate of re-fracturing is between 0.7% and 1.15% of all gas wells annually.

Additionally, limited information on the emissions from completions and workovers with hydraulic fracturing indicate that EPA's GHG emission factor for these activities is significantly overestimated. It is expected that better emissions data will develop as companies begin to collect information for EPA's mandatory GHG reporting program (EPA, 2011d).

5. Other Surveyed Information

EPA had indicated that activity data for centrifugal compressor wet seals and pneumatic devices used in the national inventory is lacking. Note that the need for better equipment data persists throughout the majority of the U.S. inventory and is not unique to the oil and natural gas industry. The ANGA/API survey requested the following information related to centrifugal compressors and pneumatic devices:

- The number of centrifugal compressors, reported separately for production/gathering versus processing;
- The number of centrifugal compressors with wet versus dry seals, reported separately for production/gathering versus processing;
- The number of pneumatic controllers, classified as "high-bleed," "low-bleed," and "intermittent," reported separately for well sites, gathering/compressor sites, and gas processing plants; and
- The corresponding number of well sites, gathering/compressor sites, and gas processing plants, associated with the pneumatic controller count.

5.1 Centrifugal Compressors

Processing Facilities

The API/ANGA survey collected the equivalent of 5% of the national centrifugal compressor count for gas processing operations (38 centrifugal compressors from the survey, compared to 811 from EPA's 2010 national GHG inventory). For the gas processing centrifugal compressors reported through the survey, 79% were dry seal compressors and 21% were wet seals. EPA's 2010 national inventory reported 20% of centrifugal compressors at gas processing plants were dry seal, and 80% were wet seal. EPA's emission factor for wet seals (51,370 scfd CH_4/compressor) is higher than the emission factor for dry seals (25,189 scfd CH_4/compressor).[5]

Based on the ANGA/API survey, EPA appears to be overestimating emissions from centrifugal compressors. If the small sample size from the API/ANGA survey is representative, non-combustion emissions from centrifugal compressors would be 173,887 metric tons of methane compared to 261,334 metric tons of methane from the 2010 national inventory (when applying industry standard conditions of 60 °F and 14.7 psia to convert volumetric emissions to mass emissions). Although based on very limited data, if the ANGA/API survey results reflect the population of wet seal versus dry seal centrifugal compressors, the emissions from this source would be reduced by 34% from EPA's emission estimate in the national inventory. Better data on the number of centrifugal compressors and seal types will be available from companies reporting to EPA under the mandatory GHG reporting program.

[5] EPA Table A-123, of Annex 3 of the 2010 inventory report.

Production and Gathering Facilities

Very few of the data sets reported through the API/ANGA survey indicate counts of centrifugal compressors associated with production/gathering operations - only 550 centrifugal compressors from 21 participating companies. EPA's 2010 GHG inventory did not include centrifugal compressors in production/gathering operations. On a well basis, the survey responses equate to 0.07 centrifugal compressors per gas well, with 81% dry seal centrifugal compressors and the remaining wet seal compressors. Information reported through EPA's mandatory GHG reporting program will provide additional information to account for GHG emissions from centrifugal compressors in production operations.

5.2 Pneumatic Controllers

Table 13 summarizes the survey responses for pneumatic controllers. For each type of location – gas well sites, gathering compressor sites, and gas processing plants – the count of the number of sites represented by the survey data is shown. Table 13 also shows the percent of each pneumatic controller type for each type of location.

TABLE 13. ANGA/API SURVEY –PNEUMATIC CONTROLLER COUNTS

	Gas Well Sites		Gathering/ Compressor Sites		Gas Processing Plants	
# wells, sites or plants	48,046 wells		1,988 sites		21 plants	
# controllers/well, site or plant	0.99 per well		8.6 per site		7.8 per plant	
# Low Bleed Controllers	12,850	27%	5,596	33%	117	71%
# High Bleed Controllers	11,188	24%	1,183	7%	47	29%
# Intermittent Controllers	23,501	49%	10,368	60%	0	0%

The survey requested that the responses designate pneumatic controllers as either "high bleed", "low bleed", or "intermittent" following the approach each company is using for Subpart W reporting. For example, Subpart W defines high-bleed pneumatic devices as automated, continuous bleed flow control devices powered by pressurized natural gas where part of the gas power stream that is regulated by the process condition flows to a valve actuator controller where it vents continuously (bleeds) to the atmosphere at a rate in excess of 6 standard cubic feet per hour (EPA, 2011d).

EPA does not currently track pneumatic controllers by controller type in the national inventory. This information will be collected under 40 CFR 98 Subpart W starting in September 2012. From the API/ANGA survey, intermittent bleed controllers are the more prevalent type at gas well sites and gathering/compressor sites, while gas plants predominately use low-bleed controllers. No intermittent controllers were reported for gas plants by the survey respondents.

Table 14 compares emission results based on applying the emission factors from the EPA's GHG reporting rule to emissions presented in the 2010 national GHG inventory, using the counts of pneumatic controller from the ANGA/API survey for production operations.

For production, the EPA national inventory combines pneumatic controller counts associated with large compressor stations with pneumatic controllers in production. An emission factor for each NEMS region is applied to the count of total controllers in each NEMS region. For this comparison, a weighted average emission factor of 359 scfd CH_4/device was applied to the count of pneumatic controllers located at well sites and gathering/compressor sites.

Under the EPA mandatory reporting rule (40 CFR 98 Subpart W), separate emission factors are applied to pneumatic controllers based on the controller type and whether the controller is located in the Eastern or Western region of the United States, as specified in the rule (EPA, 2011d). For this comparison, an average of the eastern and western emission factors is applied to each device type in computing the emission estimates resulting from the EPA GHG reporting rule.

TABLE 14. PNEUMATIC CONTROLLER EMISSION COMPARISON – PRODUCTION OPERATIONS

	API/ANGA Survey Count of Controllers			EPA GHG Reporting Rule (Subpart W)		2010 National GHG Inventory	
	Gas Well Sites	Gathering/ Compressor Sites	Total	Emission Factor,* scfh CH_4/device	Emissions, tonnes CH_4/yr	Emission Factor, scfd CH_4/device	Emissions, tonnes CH_4/yr
# Low Bleed Controllers	12,850	5,596	18,446	1.58	4,885	359	46,286
# High Bleed Controllers	11,188	1,183	12,371	42.35	87,814		31,042
# Intermittent Controllers	23,501	10,368	33,869	15.3	86,856		84,987
Total			64,686		179,556		162,315

* Emission factors shown are the average of the eastern and western emission factors from Table W-1A (EPA, 2011d).

Based on the types of pneumatic controllers reported in the ANGA/API survey, EPA's mandatory GHG reporting rule could increase CH_4 emissions 11% over the pneumatic controller portion of the 2010 national GHG inventory. To put this in context, in EPA's inventory report for 2010, emissions from pneumatic controllers accounted for approximately 13% of CH_4 emissions from the natural gas field production stage. Any increase from that initially reported data, however, will likely represent a worst case scenario. It is important to remember that pneumatic controllers operate only intermittently, so variability such as the frequency and duration of the activations will be important information to consider when defining an accurate and effective reporting regime for these sources.

EPA's mandatory GHG reporting rule does not require reporting emissions from pneumatic controllers at gas processing plants, so no emission factors are specified. The GHG national inventory applies an emission factor of 164,721 scfy CH_4 per gas plant for pneumatic controllers. For the national inventory, this results in 1,856 tonnes CH_4 emissions - a very small contribution to CH_4 emissions from onshore oil and gas operations.

6. Conclusions

API and ANGA members believe this to be the most comprehensive set of natural gas data to date and are pleased to share these results with both regulators and the public.

Based on the information gathered from member companies during this project, it appears that EPA has overstated several aspects of GHG emissions from unconventional natural gas production. As summarized in Table 15, the ANGA/API survey data results in significantly lower emission estimates for liquids unloading and unconventional gas well refracturing when compared to EPA's emission estimates in the national inventory. Using the combined emission estimates from the survey for these two key emission sources would indicate a 53% reduction in calculated natural gas production sector emissions compared to EPA's estimates.

TABLE 15. EMISSION COMPARISON BETWEEN EPA AND INDUSTRY DATA

Source Category	EPA National Inventory		API/ANGA Survey		Impact on Source Category Emissions
	Metric tons of CH4	% of EPA Production Total	Metric tons of CH4	% of Revised Production Total	API & ANGA - EPA / EPA % Difference in Emissions
Liquids Unloading	4,501,465 *	51%	319,664	8%	-93%
Unconventional Well Re-fracture Rates	712,605 *	8%	197,311	5%	-72%
Other Production Sector Emissions**	3,585,600	41%	3,585,600	87%	
Total Production Sector Emissions	8,799,670		4,102,575		-53%

* EPA's estimates are adjusted to industry standard conditions of 60 degrees F and 14.7 psia for comparison to the ANGA/API emission estimates.

**The "Other Production Sector Emissions" are comprised of over 30 different source categories detailed in Table A-129 in the Annex of the EPA's 2012 national inventory. The "Other Production Sector Emissions" are the same values for this comparison between the EPA national inventory and the API/ANGA survey to focus the comparison on quantified differences in emission estimates for gas well liquids unloading and unconventional well re-fracture rates.

This project was directed toward gathering more robust information on workovers, completions, liquids unloading, centrifugal compressors, and pneumatic controllers with the intent of supporting revisions to the activity factors used in EPA's national inventory and cited by many media publications. Although limited information was collected on centrifugal compressors and pneumatic controllers, the survey results indicated potential additional differences, which are not included in the Table 15 comparison, when comparing total emissions

from all sources to the national inventory. Additional future data collection efforts, including more detailed reporting under Subpart W of the GHGRP will likely resolve these differences and continue to inform the overall natural gas emissions data.

While API and ANGA recognize that the data collected for this report represents a sample of the universe of natural gas wells operating in the U.S., we believe that the conclusions drawn from the data analysis are relevant and representative of natural gas production as whole. In EPA's gas well count, 21 of the AAPG basins each have more that 1% of the total well count. The ANGA/API survey has wells from 19 of those 21 basins. In terms of wells represented by these basins, 92% of the total EPA well count is accounted for by wells in those 21 basins, while 95% of the API/ANGA surveyed gas wells are accounted for by those 21 basins. This indicates that the ANGA/API survey results have good representation for the basins with the largest numbers of wells nationally.

Moreover, the API/ANGA survey results are based on a large number of wells - at least an order of magnitude or more - higher than the number of wells used by EPA to develop their revised emission factors that purport to be representative of U.S. industry operations nationwide. Such a richer data set allows for improved granularity of emission characteristics for various operations. A case in point is the information on liquids unloading where the ANGA/API survey results were obtained from over 59,000 gas wells and which indicate that 21% of wells equipped with plunger lift and 9.3% of wells without plunger lift vent for liquids unloading. In comparison, EPA's approach is based on the assumption that the survey of 25 well sites conducted by GRI (1996) for the base year 1992 continues to provide representative data for the fraction of conventional wells requiring unloading, which EPA set at 41.3%. Industry also believes that the systematic approach in which the API/ANGA data were collected and vetted by natural gas experts is an improvement over the *ad hoc* way in which EPA collected some of their data. This study indicates that EPA should reconsider their inventory methodologies for natural gas production particularly in light of more comprehensive and emerging data from the industry. ANGA and API members look forward to working with the agency to continue to educate and evaluate the latest data as it develops about the new and fast-changing area of unconventional well operations.

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Appendix A. API/ANGA Survey Forms

The following provides the survey forms used to gather data presented in this report.

FIGURE A-1. SURVEY INSTRUCTIONS

The attached worksheets request data to support both the API/ANGA Natural Gas Life Cycle Analysis Project, as well as updates to EPA's National GHG Inventory. Portions of this information are consistent with data required for Subpart W, in which case data collected for Subpart W can be provided.

EPA's most recent national inventory significantly increased the emission estimates for gas well completions and workovers with hydraulic fracturing and gas well liquids unloading. These increases prompted public criticism of unconventional natural gas production.
While acknowledging their unconventional well workover activity factors were based on limited data, EPA has also indicated that activity data for centrifugal compressor wet seals and pneumatic devices used in the national inventory is lacking.

API and ANGA are requesting this information to develop more rigorous emission estimates for these important emission sources. This spreadsheet primarily focuses on activity factor information. A second data request will be developed later this year to collect information to support improved emission factors.

Company confidential information will be protected.

Please do not send information responsive to the data request to API or ANGA. Neither API nor ANGA will review member data sent in response to this request. Any submission to API or ANGA that appears to contain information responsive to EPA's data request will be returned to the sender unopened.

Please send the completed spreadsheets to:
Terri_Shires@URScorp.com
Questions may be directed to the same address, or by phone: 512-419-5466

Respondents are asked to complete as much information as possible. Some worksheets request data in varying levels of detail, with guidance on the minimum level of information needed. Some worksheets request data for more than one year or more than one production basin, if available. Gaps in the data are OK if the information is not available.

Additional instructions and guidance are provided on each worksheet.

Schedule:

Data indicated in blue font and shading is requested by August 15

Data indicated in green font is requested by September 16, if this level of information available. This more detailed information will help develop more rigorous emissions estimates for these sources.

FIGURE A-2. GAS WELL SURVEY DATA

Table 1. Producing Gas Wells - Activity Data

Please provide the following information for gas producing wells

		Conventional Wells	Unconventional Wells			Year	Geographic Area Represented	Comments
			Shale	Coal-bed Methane	Tight			
A	Total # of Operating Gas wells							Total of rows A(1) and A(2)
A(1)	# Wells w/out hydraulic fracturing (anytime in their history)							
A(2)	# Wells with hydraulic fracturing (any time in their history)							If counts are not available by vertical and horizontal, please complete this row
A(2)(a)	# Vertical wells with hydraulic fracturing (anytime in their history)							Please provide this level of detail, if available for wells with hydraulic fracturing
A(2)(b)	# Horizontal wells with hydraulic fracturing (anytime in their history)							
B	# Gas well Completions							Total of rows B(1), B(2) and B(3)
B(1)	# Completions for Vertical wells with hydraulic fracturing							
B(2)	# Completions for Horizontal wells with hydraulic fracturing							Please provide this level of detail, if available
B(3)	# Completions for wells without hydraulic fracturing							
C	# Gas well Workovers with hydraulic fracturing (refracs)							Total of rows C(1) and C(2)
C(1)	# Workovers for Vertical wells with hydraulic fracturing							
C(2)	# Workovers for Horizontal wells with hydraulic fracturing							Please provide this level of detail, if available
C(3)	# Workovers for wells without hydraulic fracturing							

Guidance:
2010 data is preferred, with U.S. geographic coverage as broad as possible.

Please duplicate the table to provide data for additional calendar years (if available) or additional geographic areas (if needed).

Note that some of this information overlaps with the data requested under the "Re-frac" worksheet.

Please provide information that you have available.

Blue rows are the minimum level of detail needed

Green rows provide more detailed information and have a longer response time

Geographic area:

Please indicate whether the information provided is for all of your operations in the U.S., or just a sub-part (single basin or multiple basins)

FIGURE A-3. GAS WELL WORKOVER SURVEY DATA

Table 2. Gas Well Workover Activity Data: Frequency of Re-fractures

	Year	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
A	*Geographic area*										
B	*Number of Unconventional Operating Gas Wells*										
C	*Number of Fracture Stimulation Wells Completed each year (New Completions)*										
D	*Number of Fracture Stimulation Jobs conducted each year on Previously Fracture Stimulated Wells (i.e., # of Workovers or re-fracs)*										

Guidance

Please provide information that you have available.

Please provide data that are available for any or all of the years listed. Gaps in the data are OK.

Copy the table to provide data for additional geographic areas

A Geographic Area: Please indicate whether the information provided is for all of your operations in the U.S., or just a sub-part (single basin or multiple basins)

B Provide the number of Unconventional Operating Wells. This refers to wells located on shale, coal-bed Methane, and Tight Formations reservoirs. Unconventional reservoirs are reservoirs that require fracture stimulation to economically produce.

C Provide the number of new completions conducted in the year. This may be the same value provided in the "Well data" worksheet, Item B.

D Provide the number of re-fractures (workovers). A re-frac or workover is defined as a re-completion to a different zone in an existing well or re-stimulation of the same zone in an existing well. This may be the same value provided in the "Well data" worksheet, Item C. Hydraulic Fracture jobs conducted more than 30 days from the end of one stimulation job to the beginning of another stimulation job in the same well-bore is a new re-frac.

Notes

The EPA uses an assumption that 10% of wells are refractured each year to determine the number of re-frac's per year and then multiplies this by 9.175 MMSCF methane per re-frac to arrive at their inventory for this particular category.

For the year reported in Table 1, this table requests redundant information. The purpose of this table is to collect refracture information over a ten-year time period to provide a better estimate to EPA's assumption that 10% of wells are refractured each year.

FIGURE A-4. GAS WELL LIQUIDS UNLOADING SURVEY DATA

Table 3. Gas Well Venting for Liquids Unloading (Well Clean-ups)

A Please indicate if the information provided in Table 3 follows the Subpart W methodologies (yes or no)

		Conventional	Unconventional	Total	Comments
B	Geographic Area				
C	Time Period - Months				
D	Number of Operated Gas Wells Represented by the information provided				Unconventional wells are: Shale, coal-bed methane, and tight formation (sand, carbonate, etc.) that must be fracture stimulated to produce economic quantities of gas
E	Number of Gas Wells with Plunger Lift Installed				
F	Number of Gas Wells with Other Artificial Lift (Beam Pump; ESP; etc.)				
G	Number of Gas Wells Vented to the atmosphere for Liquids Unloading				EPA assumes that 41.3% of conventional gas wells (437,800) are vented for liquids unloading
H	Total number of Gas Well Vents for Time Period				EPA assumes that each venting well vents 38.7 times per year
I	Average Venting Time per Vent				EPA assumes that each venting event is 3 hours duration
J	*Number of Wells with Plunger Lifts that vent to the atmosphere*				This is a sub-category of data item #5. Please indicate here the number of wells that vent to the atmosphere
K	*Total Count of Gas Well Vents for Time Period - w/plunger*				
L	*Total Count of Gas Well Vents for Time Period - w-o/plunger*				
M	*Average Venting Time - w/plunger*				Hours per Vent - fractional hours if appropriate
N	*Average Venting Time - w-o/plunger*				Hours per Vent - fractional hours if appropriate
O	*Average Daily Production of Venting Gas Wells*				mcf/day
P	*Average Depth of Venting Wells*				feet
Q	*Average Casing Diameter of Venting Gas Wells*				inches
R	*Average Tubing Diameter of Venting Gas Wells w/plunger Lift*				inches
S	*Average Surface Pressure - Venting Gas Wells*				psig

Guidance:

This table represents data from a sampling of wells (as opposed to data for all of your wells).

If information is not available by conventional or unconventional wells, just provide data in the "total" column.

A If you do not have data based on Subpart W, please indicate this in data item A by typing yes or no in the shaded box

Copy the table to provide data for additional geographic areas

Please provide information that you have available.

Blue rows are the minimum level of detail needed

Green rows provide more detailed information

B Geographic Area: Please indicate whether the information provided is for all of your operations in the U.S., or just a sub-part (single basin or multiple basins).

C Time period: Indicate the number of months represented by the information provided. Ideally this is based on some portion of 2011 data collected for Subpart W reporting.

J This data line is a sub-category if data item E. From the difference between these two items, we are trying to determine the fraction of plunger equipped wells that do not vent.

K,L Please enter the number of liquids unloading events where gas is released to the atmosphere.

Notes:

Many companies have likely been tracking well venting for liquids unloading for several months due to Subpart W. API is soliciting information from members to correct/confirm EPA's assumptions regarding well un-loading. If you do not have the wells split out into Conventional and Unconventional categories then simply report the total counts and information in the Conventional categories.

FIGURE A-5. OTHER SURVEY DATA

Table 4. Other Activity Data

A

Centrifugal Compressors			
	Production/ gathering	Processing	
Year			2010 data is preferred, but available information from any recent year is OK
Number of Centrifugal Compressors			Include both engine/turbine driven and electric driven
Number with Dry Seals			
Number with Wet Seals			

B

Pneumatic Devices (Controllers)				
	Well Sites	Gathering/ Compressor Sites	Gas Processing Plants	
Year				2010 data is preferred, but available information from any recent year is OK
Number of Sites/Plants Covered				The total number of wells sites, gathering compressor sites, of gas processing plants represented by the inventory of devices below
Number of Low Bleed				EPA defines low bleed as <6 scfh
Number of High Bleed				EPA defines high bleed as >6 scfh
Number of Intermittent				

Guidance

For pneumatic devices: Do not include counts of devices operated on compressed air. Designate pneumatic devices between "high bleed", "low bleed", or "intermittent" following the approach your company is using for Subpart W reporting.

Appendix B. ANGA/API Well Survey Information

Responses from the second part of the API/ANGA survey, which focused on more detailed well information, covered more than 60,000 wells and provided data on:

- # of gas wells without hydraulic fracturing (anytime in their history)
- # of gas wells with hydraulic fracturing (any time in their history);
  - # of vertical gas wells with hydraulic fracturing (anytime in their history);
  - # of horizontal gas wells with hydraulic fracturing (anytime in their history);
- # of completions for vertical gas wells with hydraulic fracturing;
- # of completions for horizontal gas wells with hydraulic fracturing;
- # of completions for gas wells without hydraulic fracturing;
- # of workovers for vertical wells with hydraulic fracturing;
- # of workovers for horizontal wells with hydraulic fracturing; and
- # of workovers for wells without hydraulic fracturing.

Table B-1 summarizes the well data collected by the ANGA/API survey and presents its distribution by formation type and region. The regional distribution follows the National Energy Modeling System (NEMS) regions defined by the EIA. The data are compared to EPA's national well counts classified by type as provided in the August 2011 database file (EPA, 2011d).

TABLE B-1. API/ANGA SURVEY – SUMMARY OF GAS WELL COUNTS BY TYPE AND NEMS REGION*

NEMS Region	Conventional Wells	Shale	Coal-bed Methane	Tight	Unspecified
Northeast	12,144	3,541	9	3,874	2,563
Gulf Coast	2,870	1,990	-	7,968	1,521
Mid-Continent	9,081	2,333	-	3,747	5,579
Southwest	646	1,208	-	726	2,326
Rocky Mountain	3,707	366	5,458	18,053	11
West Coast	-	-	-	-	-
Unspecified					1,307
Survey TOTAL	28,448	9,438	5,467	34,368	13,307
% of EPA 2010 Well Counts (from database file)	14.2%	30.1%	11.5%	45.6%	
Overall Survey Total	91,028				
EPA Well Counts (2010, from database file)	200,921	31,381	47,371	75,409	
	56.6%	8.8%	13.3%	21.2%	
	355,082				
EPA National Inventory (2010)	484,795				
EIA National Well Count (2010)	487,627				

* ANGA/API survey data represents well counts current for calendar year 2010 or the first half of 2011.

As shown in Table B-1, data from the API/ANGA survey represent approximately 26% of the national gas wells reported by EPA's database (or 18.7% of the EIA well count data). This includes almost 46% of all tight gas wells and 30% of shale gas wells. This may indicate that the ANGA/API information has an uneven representation of unconventional gas wells, and in particular shale and tight gas wells, but it also appears that EPA's data may mis-categorize these types of wells. For example, the EPA/HPDI data set contains few wells from Pennsylvania and West Virginia while the API/ANGA survey includes 9,422 wells from that area (AAPG 160A).

Table B-2 summarizes additional details on the natural gas wells information collected through the second data collection effort by the ANGA/API survey which covered 60,710 wells.

TABLE B-2. ANGA/API SURVEY – ADDITIONAL DETAILS ON GAS WELL COUNTS*

	# Wells w/out hydraulic fracturing (anytime in their history)	# Wells with hydraulic fracturing (any time in their history)		
		Total	# Vertical wells	# Horizontal wells
TOTAL Conventional	1,498	16,678	14,844	1,834
TOTAL Coal Bed Methane	42	3,475	3,424	42
TOTAL Shale	1,931	9,084	2,012	7,072
TOTAL Tight	122	27,880	24,045	3,835
TOTAL OVERALL	**3,593**	**57,117**	**44,325**	**12,783**

* API/ANGA survey data represents well counts current for calendar year 2010 or the first half of 2011.

Additional information on natural gas wells with and without hydraulic fracturing was provided for approximately two-thirds (60,710 natural gas wells) of the total well data collected by the ANGA/API survey. For this subset of the well data, 94% of the gas wells have been hydraulically fractured at some point in their operating history, including almost 92% of the conventional wells. EPA's 2010 national inventory reported 50,434 gas wells with hydraulic fracturing. This is very similar to the number of unconventional gas wells that EPA reported in the 2009 national inventory. ***Based on the API/ANGA survey results, it appears that EPA has underestimated the number of gas wells with hydraulic fracturing.***

Of the ANGA/API survey responses for wells that have been hydraulically fractured, most (77.6%) are vertical wells. Vertical wells are predominately conventional gas wells, coal-bed methane and tight gas wells; while the majority of shale gas wells are horizontal. EPA does not currently distinguish between vertical and horizontal gas wells.

A Short Note About EPA and EIA's Well Counts

There is a discrepancy of over 132,000 natural gas wells between the EPA database information (EPA, 2011d) and the EIA national gas well counts (EIA, 2012), and a difference of almost 130,000 gas wells between the two EPA data sources (EPA, 2011d and EPA, 2012). This difference needs to be understood since ultimately both the IHS (EIA) and HPDI (EPA) data originate from the same state-level sources of information.

The EIA provides a gas well count of 487,627 for 2010 based on Form EIA-895A[6], the Bureau of Ocean Energy Management, Regulation and Enforcement (formerly the Minerals

[6] Form EIA-895, Annual Quantity And Value Of Natural Gas Production Report; http://www.eia.gov/survey/form/eia_895/form.pdf

Management Service) data, and World Oil Magazine (EIA, 2010). However, the EIA does not classify gas wells by conventional and unconventional, or by formation types, precluding more detailed comparison against the EIA data. For some parameters the classifications were based on qualitative descriptions of the formations' physical properties (e.g. permeability) rather than on actual measurements (i.e. permeability data in millidarcy readings).[7]

EPA provides a similar well count in the 2010 national inventory: 434,361 non-associated gas wells + 50,434 gas wells with hydraulic fracturing, resulting in a total of 484,795 gas wells (EPA, 2012). Further classification of gas wells or description on what constitutes a "non-associated" gas well versus a "gas well with hydraulic fracturing" is not provided in EPA's national inventory.

Small differences in the HPDI and IHS original data may arise from definitional differences as HPDI and IHS compile the raw data. In addition, each state may have a different interpretation of well definitions of gas versus oil wells that introduces differences among states for the wells reported. EPA had indicated in discussions with the API/ANGA group that their database well count information may not include all of the wells in the Marcellus basin. EIA indicates 44,500 gas wells in Pennsylvania in 2010. However, even in accounting for these wells, there is still a large difference (almost 88,000 wells) between EPA's total gas well number from their database source and EIA's well data.

Nevertheless, these discrepancies among the well counts need to be understood since these data all originate from the same state-level sources of information. Differences could arise, for example, from different interpretations of well definitions.

Since the EIA data is the *de facto* benchmark in the energy industry, the difference between the EIA and EPA well count data needs to be understood before any meaningful conclusions can be made from the EPA data.

Since EPA's well count from HPDI was much lower than the EIA, this report does not attempt to come up with a national gas well count but chose to use the 355,082 number from the EPA HPDI database because it was the only available database which parsed the wells into conventional and unconventional categories (EPA, 2011d).

[7] Information provided by Don Robinson of ICF (EPA's contractor).

Appendix C. Emission Estimates for Gas Well Liquids Unloading

Tables C-1 through C-4 summarize the liquids unloading emissions data collected through the API/ANGA survey and the resulting emission estimates. The emission factors reported in Table 4 are based on a regional weighted average of the conventional and unconventional gas wells, with and without plunger lifts. This provided a consistent comparison against the EPA emission factors which are reported only on a regional basis and do not differentiate between conventional and unconventional wells or wells with and without plunger lifts.

TABLE C-1. LIQUIDS UNLOADING FOR CONVENTIONAL GAS WELLS WITHOUT PLUNGER LIFTS

NEMS Region	Northeast		Gulf Coast		Mid-Continent		Southwest
# venting gas wells	190	916	12	6	1	38	220
Total # gas well vents	4,335	39,668	144	60	1	2,444	880
Average casing diameter, inches	5	4.5	5.5	3.65	4.83	4	5.5
Average well depth, feet	3,375	3,448	10,000	19,334	7,033	4,269	8,000
Average surface pressure, psig (for venting wells)	85	50	(Weighted average applied) 65.2	224	25.5	60.8	100
Average venting time, hours	1	2	1	2.5	.25	4.95	1
Average daily production rate, Mscfd	12.83	7.21	300	664	58.43	84	100
Total emissions, scf gas/yr	13,492,728	78,217,933	1,287,782	3,854,938	2,440	38,451,629	9,037,809
Emissions per well, scfy gas/well	71,014	85,391	107,315	642,490	2,440	1,011,885	41,081

Table C-2. Liquids unloading for Conventional gas wells with plunger lifts

NEMS Region	Northeast		Mid-Continent		
# venting gas wells	33	109	164	2	10
Total # gas well vents	1,272	4,217	489,912	23	7,300
Average tubing diameter, inches	2	2.375	1.995	2	2.375
Average well depth, feet	3,375	3,448	4,269	7,033	9,500
Average surface pressure, psig (for venting wells)	85	50	60.8	25.5	500
Average venting time, hours	1	0.3	0.067	0.75	0.08
Average daily production rate, Mscfd	12.83	7.21	84	58.43	30
Total emissions, scf gas/yr	973,442	1,963,379	232,529,848	23,623	74,495,422
Emissions per well, scfy gas/well	29,498	18,013	1,417,865	11,811	7,449,542

TABLE C-3. LIQUIDS UNLOADING FOR UNCONVENTIONAL GAS WELLS WITHOUT PLUNGER LIFTS

NEMS Region	Northeast	Gulf Coast				
# venting gas wells	337	6	8	27	11	15
Total # gas well vents	27,720	6	104	207	572	15
Average casing diameter, inches	4.5	5.5	5.5	4.5	5.5	10.75
Average well depth, feet	4,845	6,000	11,000	9,000	13,752	16,000
Average surface pressure, psig (for venting wells)	121.6	400	200	50	450	540
Average venting time, hours	1.36	3	1	5.3	2	2
Average daily production rate, Mscfd	26	200	25	130	353	8,500
Total emissions, scf gas/yr	148,079,273	267,095	2,749,066	5,736,344	49,326,199	11,004,804
Emissions per well, scfy gas/well	439,404	44,516	343,633	212,457	4,484,200	733,654

Table C-3. Liquids unloading for Unconventional gas wells without plunger lifts, continued

NEMS Region	Gulf Coast				Mid-Continent			
# venting gas wells	146	2	10	40	177	3	136	215
Total # gas well vents	146	12	120	40	400	7.2	391.2	2,580
Average casing diameter, inches	4.5	5.5	5.5	8.625	5.5	4.92	5.02	5.5
Average well depth, feet	8,500	11,647	11,000	12,500	3,911	10,293	7,888	11,000
Average surface pressure, psig (for venting wells)	15	25	94	530	80	90.04	98.75	200
Average venting time, hours	0.6875	1.5	4	1	2.5	1.58	1.925	0.5
Average daily production rate, Mscfd	99	83	92	6,500	250	727	875	100
Total emissions, scf gas/yr	276,156	82,853	2,985,945	7,496,306	7,908,154	196,019	16,457,032	68,197,984
Emissions per well, scfy gas/well	1,891	41,427	298,594	187,408	44,679	65,340	121,008	317,200

Table C-3. Liquids unloading for Unconventional gas wells without plunger lifts, continued

NEMS Region	Southwest			Rocky Mountain			
# venting gas wells	228	6	3	5	113	2	28
Total # gas well vents	221	6	1	1800	2,004	4	10,584
Average casing diameter, inches	9.625	5.5	5	2.375	4.038	4.7	4.5
Average well depth, feet	8,725	8,000	15,000	11,597	11,149	11,056	10,844
Average surface pressure, psig (for venting wells)	516	50	200	476	250	250	198
Average venting time, hours	1	0.5	6.67	0.77	1.616	0.75	3.18
Average daily production rate, Mscfd	1,500	12	150	41.54	127	433	83
Total emissions, scf gas/yr	35,075,995	34,759	65,227	76,746,923	42,212,132	95,677	262,702,911
Emissions per well, scfy gas/well	153,842	5,793	21,742	15,349,385	373,559	47,839	9,382,247

Table C-4. Liquids unloading for Unconventional gas wells with plunger lifts

NEMS Region	Northeast			Gulf Coast				
# venting gas wells	308	103	5	3	2	22	59	5
Total # gas well vents	63,840	75,190	194	156	2	22	354	5
Average tubing diameter, inches	2.375	2.375	2.375	2.375	2.375	2.375	2.375	2.375
Average well depth, feet	4,845	2,500	7,000	13,752	16,000	8,500	11,647	12,500
Average surface pressure, psig (for venting wells)	121.6	200	130	450	540	15	25	530
Average venting time, hours	0.221	0.05	0.1	2	1	0.875	0.3	0.5
Average daily production rate, Mscfd	26	15	628	353	8,500	99	83	6,500
Total emissions, scf gas/yr	87,985,573	84,228,892	410,107	5,522,367	391,212	45,622	341,615	71,050
Emissions per well, scfy gas/well	285,667	817,756	82,021	1,840,789	195,606	2,074	5,790	14,210

TABLE C-4. LIQUIDS UNLOADING FOR UNCONVENTIONAL GAS WELLS WITH PLUNGER LIFTS, CONTINUED

NEMS Region	Mid-Continent				Southwest	
# venting gas wells	48	4	64	29	18	60
Total # gas well vents	155,742	9.6	170.4	348	25	60
Average tubing diameter, inches	2.375	3.88	4.11	2.4	1.995	2.375
Average well depth, feet	3,911	10,293	7,888	(Average Applied) 7,888	8,725	6,800
Average surface pressure, psig (for venting wells)	80	90.04	98.75	74.69	516	110
Average venting time, hours	0.0833	2.99	2.6	0.5425	0.5	0.2
Average daily production rate, Mscfd	250	727	875	(Weighted average Applied) 371	1500	25
Total emissions, scf gas/yr	120,385,033	781,741	13,999,323	751,651	170,468	106,183
Emissions per well, scfy gas/well	2,508,022	195,435	218,739	25,919	9,470	1,770

TABLE C-4. LIQUIDS UNLOADING FOR UNCONVENTIONAL GAS WELLS WITH PLUNGER LIFTS, CONTINUED

NEMS Region	Rocky Mountain				
# venting gas wells	247	23	296	19	793
Total # gas well vents	1,476	51.43	2,080	21,888	9,516
Average tubing diameter, inches	1.997	1.92	2.375	2.375	2.375
Average well depth, feet	11,149	11,164	11,056	10,844	7,400
Average surface pressure, psig (for venting wells)	250	290	250	198	150
Average venting time, hours	0.407	1.12	2.1	0.455	0.67
Average daily production rate, Mscfd	127	454	433	83	46
Total emissions, scf gas/yr	6,427,381	841,788	72,746,777	105,363,947	27,245,035
Emissions per well, scfy gas/well	26,022	36,599	245,766	5,545,471	34,357

The calculated emissions shown in Tables C-1 through C-4 are based on applying Equation W-8 from 40 CFR 98 Subpart W to gas well liquid unloading without plunger lifts and Equation W-9 to gas well liquid unloading with plunger lifts. The equations and the terms are provided below.

98.233(f)(2) *Calculation Methodology 2.* Calculate the total emissions for well venting for liquids unloading using Equation W–8 of this section.

$$E_{s,n} = \sum_{p=1}^{W}\left[V_p \times \left(\left(0.37\times10^{-3}\right)\times CD_p^2 \times WD_p \times SP_p\right) + \sum_{q=1}^{V_p}\left(SFR_q \times \left(HR_{p,q} - 1.0\right)\times Z_{p,q}\right)\right] \quad \text{(Eq. W-8)}$$

Where:

$E_{s,n}$= Annual natural gas emissions at standard conditions, in cubic feet/year.
W = Total number of wells with well venting for liquids unloading for each sub-basin.
0.37×10^{-3}= {3.14 (pi)/4}/{14.7*144} (psia converted to pounds per square feet).
CD_p= Casing internal diameter for each well, p, in inches.
WD_p= Well depth from either the top of the well or the lowest packer to the bottom of the well, for each well, p, in feet.
SP_p= Shut-in pressure or surface pressure for wells with tubing production and no packers or casing pressure for each well, p, in pounds per square inch absolute (psia) or casing-to-tubing pressure of one well from the same sub-basin multiplied by the tubing pressure of each well, p, in the sub-basin, in pounds per square inch absolute (psia).
V_p= Number of vents per year per well, p.
SFR_p= Average flow-line rate of gas for well, p, at standard conditions in cubic feet per hour. Use Equation W–33 to calculate the average flow-line rate at standard conditions.
$HR_{p,q}$= Hours that each well, p, was left open to the atmosphere during unloading, q.
1.0 = Hours for average well to blowdown casing volume at shut-in pressure.
$Z_{p,q}$= If $HR_{p,q}$ is less than 1.0 then $Z_{p,q}$ is equal to 0. If $HR_{p,q}$ is greater than or equal to 1.0 then $Z_{p,q}$ is equal to 1.

98.233(f)(3) *Calculation Methodology 3.* Calculate emissions from each well venting to the atmosphere for liquids unloading with plunger lift assist using Equation W–9 of this section.

$$E_{s,n} = \sum_{p=1}^{W}\left[V_p \times \left(\left(0.37\times10^{-3}\right)\times TD_p^2 \times WD_p \times SP_p\right) + \sum_{q=1}^{V_p}\left(SFR_q \times \left(HR_{p,q} - 0.5\right)\times Z_{p,q}\right)\right] \quad \text{(Eq. W-9)}$$

Where:

$E_{s,n}$= Annual natural gas emissions at standard conditions, in cubic feet/year.
W = Total number of wells with well venting for liquids unloading for each sub-basin.
0.37×10^{-3}= {3.14 (pi)/4}/{14.7*144} (psia converted to pounds per square feet).
TD_p= Tubing internal diameter for each well, p, in inches.
WD_p= Tubing depth to plunger bumper for each well, p, in feet.
SP_p= Flow-line pressure for each well, p, in pounds per square inch absolute (psia), using engineering estimate based on best available data.
V_p= Number of vents per year for each well, p.
SFR_p= Average flow-line rate of gas for well, p, at standard conditions in cubic feet per hour. Use Equation W–33 to calculate the average flow-line rate at standard conditions.
$HR_{p,q}$= Hours that each well, p, was left open to the atmosphere during each unloading, q.
0.5 = Hours for average well to blowdown tubing volume at flow-line pressure.

$Z_{p,q}$= If $HR_{p,q}$ is less than 0.5 then $Z_{p,q}$ is equal to 0. If $HR_{p,q}$ is greater than or equal to 0.5 then $Z_{p,q}$ is equal to 1.

RE: FW: Liquids Unloading Spreadsheet
Kidman, Timothy M. to: Melissa Weitz, Minnucci, Chris A. 10/25/2012 08:53 PM
Cc: "Richards, Richard Y."

History: This message has been forwarded.

Melissa,

I've updated the memo based on our conversation earlier today. In [redacted].

I have not had the opportunity to have a second set of eyes on any of this yet, but I am asking Dick to review the calculations, additions and new recommendations first thing tomorrow. However, I wanted get it into your hands with these new analyses as I know you're up against a tight timeline.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, October 25, 2012 8:27 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Tim,

I'm free most of the rest of today. Let me know when you are free to talk. Thank you!!

Melissa

"Minnucci, Chris A." ---10/24/2012 04:55:18 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 04:55 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Sorry I missed you today, and since I'm going to be out tomorrow I've asked Tim to give you a call. Tim is also going to put together a table with the percentages you requested below.

As to the other questions you raised: [redacted] (b)(5) deliberative [redacted]

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/24/2012 2:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

[redacted]

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A." ---10/24/2012 10:04:15 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

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From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

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-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

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Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

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Sent: Thu 10/18/2012 11:40 AM
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Cc: Minnucci, Chris A.

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Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: 703.424.5027

Please consider the environment before printing this email.

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(b)(5) deliberative

(b)(5) deliberative

Liquids Unloading Recalculations_regional AF_with interpolation.xlsx

Re: Question about voluntary reductions for liquid unloading

Suzanne Waltzer to: Tichenor, James C 10/26/2012 01:57 PM
Cc: Melissa Weitz

History: This message has been forwarded.

Hi James,

As follow-up, sides 10 and 11 of the Inventory workshop presentation (see link below) outlines the current Inventory estimates for voluntary emission reductions and activities reported to Gas STAR for liquids unloading.

Please let me know me if you have additional questions.

Thanks,

http://www.epa.gov/climatechange/Downloads/ghgemissions/2012Workshop/EPA-Liquids_Unloading.pdf

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

"Tichenor, James C" ---10/18/2012 05:31:58 PM---Hi Suzanne, Thanks for the information about the storage tanks. I found what I was looking for in r

From: "Tichenor, James C" <jtichenor@blm.gov>
To: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/18/2012 05:31 PM
Subject: Question about voluntary reductions for liquid unloading

---

Hi Suzanne,
Thanks for the information about the storage tanks. I found what I was looking for in regards to estimates for voluntary installations of VRUs at various levels of tank throughputs. However, since Liquid Unloading isn't covered by the NSPS, I was having a difficult time finding voluntary installations of artificial lifts. Is that information published somewhere in the Gas Star literature, in any previous iteration of the NSPS, or the GHG Inventory? (b)(5) deliberative
[redacted]

(b)(5) deliberative

[redacted]. If you might provide any assistance, I will be available tomorrow to discuss as I am trying to pull some preliminary figures for our management. Thank you.

James Tichenor
Economist
WS-4204
Minerals and Realty Management (WO-300)
Bureau of Land Management
jtichenor@blm.gov
202-912-7543 office
202-258-7108 blackberry

Hide Details

liquids unloading--check in on time series questions

Mon 10/29/2012 11:00 AM - 11:30 AM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Suzanne Waltzer/DC/USEPA/US@EPA

Description

Fw: RE: FW: Liquids Unloading Spreadsheet

Melissa Weitz to: Suzanne Waltzer 10/29/2012 03:20 PM

FYI. We will discuss whenever this megastorm ends!

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 10/29/2012 03:20PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/29/2012 11:24AM
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Subject: RE: FW: Liquids Unloading Spreadsheet

(See attached file: API-ANGA EFs Memo_v8.docx)

Melissa,

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[redacted]

[redacted]

Again, I apologize for the confusion. Please give me a call if you'd like to discuss this further, or let me know if you have any questions or further requests.

thanks,
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mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 10/25/2012 11:26 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Tim,

I'm free most of the rest of today. Let me know when you are free to talk. Thank you!!

Melissa

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(b)(5) deliberative

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office: 202.488.6606 | mobile: 703.424.5027

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(b)(5) deliberative

[redacted]

API-ANGA EFs Memo_v8.docx

Hide Details

Liquids Unloading

Wed 10/31/2012 11:00 AM - 11:30 AM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Description

Re: paul pre-brief 1 pm today, sarah brief at 3:30 pm
Melissa Weitz to: Bill Irving 10/31/2012 10:17 AM
Cc: Anhar Karimjee, Mark DeFigueiredo, Suzanne Kocchi, Suzanne Waltzer

I will try to do this before the 1PM, but there are a number of items I need to look into related to the liquids unloading numbers first.

Bill Irving	All - some comments on the inventory slides....	10/31/2012 09:54:27 AM

From: Bill Irving/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Anhar Karimjee/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/31/2012 09:54 AM
Subject: paul pre-brief 1 pm today, sarah brief at 3:30 pm

All - some comments on the inventory slides. These changes might not be feasible in the time we have, so please let me know.

Slides 5 & 6

[redacted] (b)(5) deliberative [redacted]

Bill

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

-----Suzanne Kocchi/DC/USEPA/US wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: Suzanne Kocchi/DC/USEPA/US
Date: 10/31/2012 09:11AM
Cc: Anhar Karimjee/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Subject: paul pre-brief 1 pm today, sarah brief at 3:30 pm

this looks good to me. i don't have any other comments. make sure to delete the comment bubbles. anhar and others might have comments so check with everyone before you print.

please bring copies to the paul pre-brief at 1 pm. the sarah briefing is staying at 3:30 pm today.

Melissa Weitz---10/29/2012 04:07:45 PM---From: Melissa Weitz/DC/USEPA/US To: Suzanne Kocchi/DC/USEPA/US@EPA

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Anhar Karimjee/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 10/29/2012 04:07 PM
Subject: Re: Slides for Paul briefing for review

Hi,

I updated the slides with your edits, and left the notes in so that we'll remember to bring the other materials (e.g. updated Inventory text, OIG report) when we get back to work.

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Suzanne Kocchi/DC/USEPA/US wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: Suzanne Kocchi/DC/USEPA/US
Date: 10/28/2012 09:53AM
Cc: Anhar Karimjee/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Subject: Re: Slides for Paul briefing for review

here are my comments in red and in comment bubbles. i also played with the spacing throughout.
good job!
 thanks!!

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Anhar Karimjee/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 10/26/2012 02:23PM
Subject: Slides for Paul briefing for review

Below are the compiled slides for Monday's briefing with Paul, and Wednesday's briefing with Sarah.

I need to leave the office soon, but can make edits on Monday/later this weekend. I may be able to

provide updated Inventory numbers on Monday as we continue to finalize our analyses.

Melissa

(See attached file: 10-31_Dunham slides.pptx)

[attachment "10-31_Dunham slides.pptx" removed by Suzanne Kocchi/DC/USEPA/US]

[attachment "10-31_Dunham slides_sk.pptx" removed by Melissa Weitz/DC/USEPA/US][attachment "10-31_Dunham slides_sk mw.pptx" deleted by Suzanne Kocchi/DC/USEPA/US]

Invitation: Discuss Liquids Unloading

Wed 10/31/2012 11:30 AM - 12:00 PM

Attendance is **required** for Melissa Weitz

Chair: **Suzanne Waltzer/DC/USEPA/US**

Location: 814

Suzanne Waltzer has invited you to a meeting. You have not yet responded.

Required: Melissa Weitz/DC/USEPA/US@EPA

Description

I need to run out and grab some quick lunch to bring back. Can we meet at 11:30? Or I can meet anytime up until 1 if later works better.

RE: FW: Liquids Unloading Spreadsheet

Minnucci, Chris A. to: Melissa Weitz 10/31/2012 11:28 AM

History: This message has been forwarded.

Melissa,

Here's the spreadsheet with the the numbers for the new section (Table 6 and Figure 4).

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 10:47 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Also, can you please send me the spreadsheets with these updated numbers?

Thanks!
Melissa

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To: Melissa Weitz/DC/USEPA/US@EPA
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[redacted]

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Hi Tim,

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(b)(5) deliberative

Liquids Unloading Interpolation.xlsx

Fw: Liquids Unloading Spreadsheet

Melissa Weitz to: Suzanne Waltzer 10/31/2012 11:59 AM

I'm going to ignore this [redacted] (b)(5) deliberative [redacted]) for the next few hours and then turn back to it later today.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 10/31/2012 11:58 AM -----

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 10/31/2012 11:39 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

We had another idea for [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

(b)(5) deliberative

(b)(5) deliberative

But if it's not too late for this type of analysis and you'd like us to try it, please let us know. Please reply all; I have Dick, who at this point is the keeper of the spreadsheet and the calculator for us, standing by to begin work on this immediately on your word go if you'd like us to proceed.

thanks,
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(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/24/2012 2:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A." ---10/24/2012 10:04:15 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
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To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

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Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

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Cc: Minnucci, Chris A.
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Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: [redacted]

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RE: FW: Liquids Unloading Spreadsheet

Minnucci, Chris A. to: Melissa Weitz 10/31/2012 01:29 PM

Cc: "Kidman, Timothy M."

History: This message has been forwarded.

Melissa,

(b)(5) deliberative

(b)(5) deliberative

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From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 12:02 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Okay, so your current analysis therefore assumes (b)(5) deliberative

?

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From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
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Sent: Wed 10/31/2012 10:45 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

(b)(5) deliberative

Melissa

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office: 202.488.6606 | mobile: 703.424.5027

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RE: FW: Liquids Unloading Spreadsheet

Minnucci, Chris A. to: Melissa Weitz 10/31/2012 02:21 PM
Cc: "Kidman, Timothy M."

History: This message has been forwarded.

Melissa,

I just got an e-mail from Tim which I think may be getting at the point you were trying to raise here but I wasn't following. Tim had this suggestion:

[redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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Liquids Unloading

Melissa Weitz to: Paula Fields 11/01/2012 09:23 AM

Hi Paula,

Below is a memo we had SAIC develop on the API/ANGA liquids unloading analysis and how it might be applied to the GHG Inventory. [redacted] (b)(5) deliberative [redacted]

[redacted]

I'm going to try to arrange a call with SAIC, ERG, and Suzie at GasSTAR today to settle on an approach. Can you let me know your availability? I could schedule it during our 2PM time slot since we're all free then.

Also, I need to set up a time today or tomorrow to talk with EIA on well completions counts. You'll get an email on that shortly.

Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/01/2012 09:19 AM -----

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
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As to the other questions you raised: actually, we did not use (b)(5) deliberative

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office: 202.488.6606 | mobile: (b)(6) personal privacy

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(b)(5) deliberative

graycol.gif API-ANGA EFs Memo_v8.docx

RE: FW: Liquids Unloading Spreadsheet
Melissa Weitz to: Minnucci, Chris A. 11/01/2012 12:26 PM
Cc: "Richards, Richard Y.", Suzanne Waltzer, "Kidman, Timothy M."

Thank you!!

At 2, please call into: [redacted] (b)(6) [redacted]

Thanks,

Melissa

"Minnucci, Chris A."	Melissa,	11/01/2012 12:17:16 PM

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
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Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, Suzanne Waltzer/DC/USEPA/US@EPA, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/01/2012 12:17 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, 2 PM works for us. Would you like us to set up the conference call?

Also I just finished adding a new subsection to the temporal section of the memo. Before doing this I accepted all the previous track changes, and added the new material in track changes so the latest additions would be clear. The new version is attached.

Looking forward to discussing all this at 2.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 12:01 PM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

Are you and your team available to speak at 2PM today? I'd like to include our GHG Inventory contractor ERG on the call and they are available then as well.

Melissa

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Fw: Liquids Unloading Spreadsheet

Melissa Weitz to: Paula Fields 11/01/2012 12:26 PM

Updated memo attached.

I sent SAIC and Suzie the call in information.

Melissa

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Re: Fw: Liquids Unloading Spreadsheet

Bill Irving to: Melissa Weitz 11/01/2012 01:15 PM

History: This message has been forwarded.

It would be great to catch up on this, and the Sarah briefing yesterday. I will probably need my time at 2pm to continue catching up on emails, but let's catch up after you get off your call.

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Melissa Weitz	If you are interested in weighing in or listenin...	11/01/2012 12:32:19 PM

From: Melissa Weitz/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA
Date: 11/01/2012 12:32 PM
Subject: Fw: Liquids Unloading Spreadsheet

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Otherwise, I will stop by after the call to let you know how we're planning to resolve what seems to be our last issue before calculating the Inventory.

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Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Sorry I missed you today, and since I'm going to be out tomorrow I've asked Tim to give you a call. Tim is also going to put together a table with the percentages you requested below.

As to the other questions you raised: [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/24/2012 2:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

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Thank you!

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To: Melissa Weitz/DC/USEPA/US@EPA
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Date: 10/18/2012 05:03PM
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Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

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Sent: Thu 10/18/2012 11:40 AM
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Cc: Minnucci, Chris A.
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Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: (b)(6) personal privacy

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[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US][attachment "Liquids Unloading Recalculations_v5.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Recalculations_regional AF_correct.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v5.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US]

Hide Details

liquids unloading call (your office if you don't mind?)

Thu 11/01/2012 2:00 PM - 3:00 PM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Suzanne Waltzer/DC/USEPA/US@EPA

Description

Fw: plunger lifts
Melissa Weitz to: Suzanne Waltzer 11/01/2012 01:31 PM

Quick note I sent to SAIC when I was a bit confused by their memo.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/01/2012 01:31 PM -----

From: Melissa Weitz/DC/USEPA/US
To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/01/2012 01:21 PM
Subject: plunger lifts

I'm re-reviewing [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted] We'll discuss over the phone at 2.

RE: FW: Liquids Unloading Spreadsheet

Kidman, Timothy M. to: Minnucci, Chris A., Melissa Weitz 11/01/2012 03:49 PM
Cc: "Richards, Richard Y."

History: This message has been replied to and forwarded.

Hi Melissa,

I've run the example in the attached workbook following my understanding of your proposed methodology for interpolating the activity data. Please let me know if this is what you had in mind, or if there is something I'm missing.

Thanks,
Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

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Sent: Thursday, November 01, 2012 9:14 AM
To: Weitz.Melissa@epamail.epa.gov
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
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Looking forward to discussing all this at 2.

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Sent: Thu 11/1/2012 12:01 PM
To: Minnucci, Chris A.

Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

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Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/01/2012 09:57 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

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Melissa,

Ok, your e-mail and Tim's made me realize that (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

(b)(5) deliberative

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Sent: Wed 10/31/2012 10:45 AM
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Melissa

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RE: FW: Liquids Unloading Spreadsheet

Melissa Weitz to: Kidman, Timothy M. 11/01/2012 04:07 PM
Cc: "Minnucci, Chris A.", "Richards, Richard Y."

Thanks Tim,

I made a few edits. Please call if you want to discuss.

Melissa

(b)(5) deliberative

[redacted]

AF Interpolation Sample MW.xlsx

"Kidman, Timothy M."	Hi Melissa,	11/01/2012 03:49:07 PM

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
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office: 202.488.6606 | mobile: (b)(6) personal privacy

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[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US][attachment "Liquids Unloading Recalculations_v5.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Recalculations_regional AF_correct.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v5.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v8.docx"

deleted by Melissa Weitz/DC/USEPA/US] *(See attached file: graycol.gif)* [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "AF Interpolation Sample.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

FW: Liquids Unloading Spreadsheet

Melissa Weitz to: Paula Fields, Marty Wolf 11/02/2012 01:31 PM

Hello,

I've reviewed this and it looks good to me. Please review it also, and let me know if you have any questions. I will also forward you the regional emission factors which do not appear to be in this spreadsheet.

If you do not have any questions and are ready, please go ahead and run the calculations with the updated well counts and let's see how it looks!

I'm working from home today--please email me with any questions you have.

Thanks!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com> wrote:

To: Melissa Weitz/DC/USEPA/US@EPA
From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/02/2012 12:55PM
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: FW: Liquids Unloading Spreadsheet

(See attached file: Interpolated Venting Rates.xlsx)

Hi Melissa,

We've run the calculations you requested in the attached workbook. This workbook has three tabs:

1. [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Please let me know if you have any questions or additional requests.

-Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 1:28 PM
To: Weitz.Melissa@epamail.epa.gov; Kidman, Timothy M.
Cc: Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I just tried your line but you were out. I am a little confused on your edits. [redacted] (b)(5) deliberative [redacted]?

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 4:07 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.; Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Thanks Tim,

I made a few edits. Please call if you want to discuss.

Melissa

(See attached file: AF Interpolation Sample MW.xlsx)

Error! Filename not specified."Kidman, Timothy M." ---11/01/2012 03:49:07 PM---Hi Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 11/01/2012 03:49 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Melissa,

I've run the example in the attached workbook following my understanding of your proposed methodology for interpolating the activity data. Please let me know if this is what you had in mind, or if there is something I'm missing.

Thanks,
Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 9:14 AM
To: Weitz.Melissa@epamail.epa.gov
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, 2 PM works for us. Would you like us to set up the conference call?

Also I just finished adding a new subsection to the temporal section of the memo. Before doing this I accepted all the previous track changes, and added the new material in track changes so the latest additions would be clear. The new version is attached.

Looking forward to discussing all this at 2.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 12:01 PM
To: Minnucci, Chris A.

Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

Are you and your team available to speak at 2PM today? I'd like to include our GHG Inventory contractor ERG on the call and they are available then as well.

Melissa

"Minnucci, Chris A." ---11/01/2012 09:57:34 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/01/2012 09:57 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, I will put this together and get a revised version of the memo out to you ASAP; then we can talk after you've had a chance to review.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 9:17 AM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.; Waltzer.Suzanne@epamail.epa.gov
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

These are all good ideas, thank you!

Could you please write these up into the memo section on time series issues? If you could do this today, that'd be great. Then, we will probably want to have a call this afternoon to talk through these issues.

Thank you!
Melissa

"Minnucci, Chris A." ---10/31/2012 05:09:59 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 10/31/2012 05:09 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Ok, your e-mail and Tim's made me realize that (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 12:02 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Okay, so your current analysis therefore assumes (b)(5) deliberative
?

"Minnucci, Chris A." ---10/31/2012 11:37:30 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/31/2012 11:37 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 10:45 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

(b)(5) deliberative

Melissa

"Minnucci, Chris A." ---10/29/2012 11:24:58 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/29/2012 11:24 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I apologize, but having just completed our review of the emission calculations we found a significant error in the last version of the memorandum. Specifically, (b)(5) deliberative

(b)(5) deliberative

Again, I apologize for the confusion. Please give me a call if you'd like to discuss this further, or let me know if you have any questions or further requests.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 10/25/2012 11:26 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Tim,

I'm free most of the rest of today. Let me know when you are free to talk. Thank you!!

Melissa

"Minnucci, Chris A." ---10/24/2012 04:55:18 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 04:55 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Sorry I missed you today, and since I'm going to be out tomorrow I've asked Tim to give you a call. Tim is also going to put together a table with the percentages you requested below.

As to the other questions you raised: (b)(5) deliberative

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/24/2012 2:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A." ---10/24/2012 10:04:15 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Attached please find the revised memo, with a new section added to

(b)(5) deliberative

Please let us know if you have any questions on the attached or would like us to do any further analyses. As I will be out of the office tomorrow and Friday, please include Tim on any questions/requests you might have and he will be able to help you in my absence.

much thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

Would it be possible to also [redacted] (b)(5) deliberative [redacted]? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

[redacted] (b)(5) deliberative [redacted]

[redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out the effects of using the various emission factors has on the emissions estimates. In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: (b)(6) personal privacy

Please consider the environment before printing this email.

[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US]
[attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US][attachment "Liquids Unloading Recalculations_v5.xlsx" deleted by Melissa Weitz/DC/USEPA/US]
[attachment "Liquids Unloading Recalculations_regional AF_correct.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v5.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v8.docx" deleted by Melissa Weitz/DC/USEPA/US] **(See attached file: graycol.gif) [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "AF Interpolation Sample.xlsx" deleted by Melissa Weitz/DC/USEPA/US]** Interpolated Venting Rates.xlsx

(b)(5) deliberative

Fw: RE: FW: Liquids Unloading Spreadsheet

Melissa Weitz to: Paula Fields, Marty Wolf 11/02/2012 01:39 PM

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 11/02/2012 01:38PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/02/2012 01:38PM
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

[redacted] (b)(5) deliberative [redacted]

- [redacted]
- [redacted]
- [redacted]

Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, November 02, 2012 10:28 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.; Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Thank you for getting this ready so quickly. I think I follow.

One question--[redacted]?

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
wrote: -----

To: Melissa Weitz/DC/USEPA/US@EPA
From: "Kidman, Timothy M."
<TIMOTHY.M.KIDMAN@saic.com>
Date: 11/02/2012 12:55PM
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>,
"Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Melissa,

We've run the calculations you requested in the attached workbook.
This workbook has three tabs:

1. [redacted]

(b)(5) deliberative

Please let me know if you have any questions or additional requests.

-Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

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From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 1:28 PM
To: Weitz.Melissa@epamail.epa.gov; Kidman, Timothy M.
Cc: Richards, Richard Y.
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Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 4:07 PM
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Cc: Minnucci, Chris A.; Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

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I made a few edits. Please call if you want to discuss.

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(See attached file: AF Interpolation Sample MW.xlsx)

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To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
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Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

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From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 9:14 AM
To: Weitz.Melissa@epamail.epa.gov
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, 2 PM works for us. Would you like us to set up the conference call?

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Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 12:01 PM

To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

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Melissa

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To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, Suzanne Waltzer/DC/USEPA/US@EPA
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Hi Chris,

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Thank you!
Melissa

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Date: 10/31/2012 05:09 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Ok, your e-mail and Tim's made me realize that (b)(5) deliberative [redacted]

(b)(5) deliberative

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From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 12:02 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

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Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/31/2012 11:37 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
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Sent: Wed 10/31/2012 10:45 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

(b)(5) deliberative

Melissa

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From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/29/2012 11:24 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

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(b)(5) deliberative

Again, I apologize for the confusion. Please give me a call if you'd like to discuss this further, or let me know if you have any questions or further requests.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 10/25/2012 11:26 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

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Melissa

"Minnucci, Chris A." ---10/24/2012 04:55:18 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 04:55 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

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As to the other questions you raised: (b)(5) deliberative

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/24/2012 2:22 PM
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Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

(b)(5) deliberative

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

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From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Attached please find the revised memo, with a new section added to

(b)(5) deliberative

Please let us know if you have any questions on the attached or would like us to do any further analyses. As I will be out of the office tomorrow and Friday, please include Tim on any questions/requests you might have and he will be able to help you in my absence.

much thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM

To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

Would it be possible to also [redacted] (b)(5) deliberative [redacted]? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

[redacted] (b)(5) deliberative [redacted]

[redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out the effects of using the various

emission factors has on the emissions estimates. In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: (b)(6) personal privacy

Please consider the environment before printing this email.

[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US]
[attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US][attachment "Liquids Unloading Recalculations_v5.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Recalculations_regional AF_correct.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v5.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v8.docx" deleted by Melissa Weitz/DC/USEPA/US] (See attached file: graycol.gif) [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "AF Interpolation Sample.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

[attachment "Interpolated Venting Rates.xlsx" removed by Melissa Weitz/DC/USEPA/US]

Fw: RE: FW: Liquids Unloading Spreadsheet

Melissa Weitz to: Paula Fields, Marty Wolf 11/02/2012 01:53 PM

(b)(5) deliberative

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 11/02/2012 01:52PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/02/2012 01:50PM
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: FW: Liquids Unloading Spreadsheet

(See attached file: API-ANGA EFs Memo_v9.docx)

Melissa,

Please see the bottom two rows of Table 1 in the attached memo. The

(b)(5) deliberative

Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, November 02, 2012 10:33 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.; Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Could you please forward me the spreadsheet that contains the emission factors that should be used in combination with this activity data breakdown? I'm working from home and I'm not 100% sure which file is the most recent.

Thank you!!

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
wrote: -----

To: Melissa Weitz/DC/USEPA/US@EPA
From: "Kidman, Timothy M."
<TIMOTHY.M.KIDMAN@saic.com>
Date: 11/02/2012 12:55PM
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>,
"Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Melissa,

We've run the calculations you requested in the attached workbook. This workbook has three tabs:

1. [redacted] (b)(5) deliberative [redacted]

2. (b)(5) deliberative

Please let me know if you have any questions or additional requests.

-Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 1:28 PM
To: Weitz.Melissa@epamail.epa.gov; Kidman, Timothy M.
Cc: Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I just tried your line but you were out. I am a little confused on your edits. [redacted] (b)(5) deliberative [redacted]

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 4:07 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.; Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Thanks Tim,

I made a few edits. Please call if you want to discuss.

Melissa

(See attached file: AF Interpolation Sample MW.xlsx)

Error! Filename not specified."Kidman, Timothy M." ---11/01/2012 03:49:07 PM---Hi Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>

To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 11/01/2012 03:49 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Melissa,

I've run the example in the attached workbook following my understanding of your proposed methodology for interpolating the activity data. Please let me know if this is what you had in mind, or if there is something I'm missing.

Thanks,
Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 9:14 AM
To: Weitz.Melissa@epamail.epa.gov
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, 2 PM works for us. Would you like us to set up the conference call?

Also I just finished adding a new subsection to the temporal section of the memo. Before doing this I accepted all the previous track changes, and added the new material in track changes so the latest additions would be clear. The new version is attached.

Looking forward to discussing all this at 2.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 12:01 PM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman,

Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

Are you and your team available to speak at 2PM today? I'd like to include our GHG Inventory contractor ERG on the call and they are available then as well.

Melissa

"Minnucci, Chris A." ---11/01/2012 09:57:34 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/01/2012 09:57 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, I will put this together and get a revised version of the memo out to you ASAP; then we can talk after you've had a chance to review.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 9:17 AM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.; Waltzer.Suzanne@epamail.epa.gov
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

These are all good ideas, thank you!

Could you please write these up into the memo section on time series issues? If you could do this today, that'd be great. Then, we will probably want to have a call this afternoon to talk through these issues.

Thank you!
Melissa

"Minnucci, Chris A." ---10/31/2012 05:09:59 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 10/31/2012 05:09 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Ok, your e-mail and Tim's made me realize that (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 12:02 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Okay, so your current analysis therefore assumes (b)(5) deliberative
?

"Minnucci, Chris A." ---10/31/2012 11:37:30 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/31/2012 11:37 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 10:45 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

(b)(5) deliberative

Melissa

"Minnucci, Chris A." ---10/29/2012 11:24:58 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/29/2012 11:24 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I apologize, but having just completed our review of the emission calculations we found a significant error in the last version of the memorandum. Specifically, (b)(5) deliberative

(b)(5) deliberative

Again, I apologize for the confusion. Please give me a call if you'd like to discuss this further, or let me know if you have any questions or further requests.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 10/25/2012 11:26 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Tim,

I'm free most of the rest of today. Let me know when you are free to talk. Thank you!!

Melissa

"Minnucci, Chris A." ---10/24/2012 04:55:18 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 04:55 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Sorry I missed you today, and since I'm going to be out tomorrow I've asked Tim to give you a call. Tim is also going to put together a table with the percentages you requested below.

As to the other questions you raised: (b)(5) deliberative

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/24/2012 2:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

(b)(5) deliberative

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A." ---10/24/2012 10:04:15 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Attached please find the revised memo, with a new section added to

(b)(5) deliberative

Please let us know if you have any questions on the attached or would like us to do any further analyses. As I will be out of the office tomorrow and Friday, please include Tim on any questions/requests you might have and he will be able to help you in my absence.

much thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.

Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

Would it be possible to also [redacted] (b)(5) deliberative [redacted]? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

[redacted] (b)(5) deliberative [redacted]

[redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out the effects of using the various emission factors has on the emissions estimates. In particular, we need

to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: (b)(6) personal privacy

Please consider the environment before printing this email.

[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US]
[attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US][attachment "Liquids Unloading Recalculations_v5.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Recalculations_regional AF_correct.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v5.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v8.docx" deleted by Melissa Weitz/DC/USEPA/US] (See attached file: graycol.gif) [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "AF Interpolation Sample.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

[attachment "Interpolated Venting Rates.xlsx" removed by Melissa Weitz/DC/USEPA/US]API-ANGA EFs Memo_v9.docx (b)(5) deliberative

Re: FW: Liquids Unloading Spreadsheet
Marty Wolf to: Melissa Weitz 11/02/2012 03:18 PM
Cc: "Paula Fields"

History: This message has been forwarded.

Yeah - that's right. Sorry about the confusion on my part.

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 11/2/2012 12:02 PM >>>
Well counts is DI Desktops. The NEMS/DI Desktop question is only for completion #s.

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Marty Wolf" <Marty.Wolf@erg.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/02/2012 02:23PM
Cc: "Paula Fields" <Paula.Fields@erg.com>
Subject: Re: FW: Liquids Unloading Spreadsheet

Melissa,

We will start reviewing this today.

[redacted] (b)(5) deliberative [redacted]? Or something else?

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
11/2/2012 10:31 AM >>>
Hello,

I've reviewed this and it looks good to me. Please review it also, and let me know if you have any questions. I will also forward you the regional emission factors which do not appear to be in this

spreadsheet.

If you do not have any questions and are ready, please go ahead and run the calculations with the updated well counts and let's see how it looks!

I'm working from home today--please email me with any questions you have.

Thanks!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com> wrote:

To: Melissa Weitz/DC/USEPA/US@EPA
From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/02/2012 12:55PM
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: FW: Liquids Unloading Spreadsheet

(See attached file: Interpolated Venting Rates.xlsx)

Hi Melissa,

We've run the calculations you requested in the attached workbook. This workbook has three tabs:

1. (b)(5) deliberative

(b)(5) deliberative

Also note that we have applied the national averages to the West Coast region.

Please let me know if you have any questions or additional requests.

-Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 1:28 PM
To: Weitz.Melissa@epamail.epa.gov; Kidman, Timothy M.
Cc: Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I just tried your line but you were out. I am a little confused on your edits. (b)(5) deliberative

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From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 4:07 PM
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Cc: Minnucci, Chris A.; Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Thanks Tim,

I made a few edits. Please call if you want to discuss.

Melissa

(See attached file: AF Interpolation Sample MW.xlsx)

Error! Filename not specified."Kidman, Timothy M." ---11/01/2012 03:49:07 PM---Hi Melissa,

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To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
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Hi Melissa,

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Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

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Sent: Thursday, November 01, 2012 9:14 AM
To: Weitz.Melissa@epamail.epa.gov
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, 2 PM works for us. Would you like us to set up the conference call?

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Subject: RE: FW: Liquids Unloading Spreadsheet

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Melissa

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To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/01/2012 09:57 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

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mailto:Weitz.Melissa@epamail.epa.gov]
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To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 10/31/2012 05:09 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Ok, your e-mail and Tim's made me realize that (b)(5) deliberative [redacted]

[redacted]

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 12:02 PM
To: Minnucci, Chris A.
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Subject: RE: FW: Liquids Unloading Spreadsheet

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Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/31/2012 11:37 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 10:45 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

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(b)(5) deliberative

Melissa

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From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
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Melissa,

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Again, I apologize for the confusion. Please give me a call if you'd like to discuss this further, or let me know if you have any questions or further requests.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 10/25/2012 11:26 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Tim,

I'm free most of the rest of today. Let me know when you are free to talk. Thank you!!

Melissa

"Minnucci, Chris A." ---10/24/2012 04:55:18 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>

To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 04:55 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Sorry I missed you today, and since I'm going to be out tomorrow I've asked Tim to give you a call. Tim is also going to put together a table with the percentages you requested below.

As to the other questions you raised: [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/24/2012 2:22 PM

To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

[redacted]

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A." ---10/24/2012 10:04:15 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Attached please find the revised memo, with a new section added to (b)(5) deliberative [redacted]

(b)(5) deliberative

Please let us know if you have any questions on the attached or would like us to do any further analyses. As I will be out of the office tomorrow and Friday, please include Tim on any questions/requests you might have and he will be able to help you in my absence.

much thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

Would it be possible to also (b)(5) deliberative ? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

[redacted] (b)(5) deliberative [redacted]

[redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out the effects of using the various emission factors has on the emissions estimates. In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: (b)(6) personal privacy

Please consider the environment before printing this email.

[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US]
[attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US][attachment "Liquids Unloading Recalculations_v5.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Recalculations_regional AF_correct.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v5.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa

Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v8.docx" deleted by Melissa Weitz/DC/USEPA/US] (See attached file: graycol.gif) [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "AF Interpolation Sample.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

=

Re: FW: Liquids Unloading Spreadsheet

Melissa Weitz to: Marty Wolf 11/02/2012 05:55 PM
Cc: "Paula Fields"

Hi Marty--

I'll get the spreadsheet over to you soon.

Yes, I think it makes sense to do the LU calcs outside of the main spreadsheet.

Thanks!

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Marty Wolf" <Marty.Wolf@erg.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/02/2012 05:51PM
Cc: "Paula Fields" <Paula.Fields@erg.com>
Subject: Re: FW: Liquids Unloading Spreadsheet

Melissa,

I reviewed this spreadsheet that you sent out. Overall, it looks fine.

[redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

Thanks,
Marty
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
11/2/2012 10:31 AM >>>
Hello,

I've reviewed this and it looks good to me. Please review it also, and let me know if you have any questions. I will also forward you the regional emission factors which do not appear to be in this spreadsheet.

If you do not have any questions and are ready, please go ahead and run the calculations with the updated well counts and let's see how it looks!

I'm working from home today--please email me with any questions you have.

Thanks!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com> wrote:

To: Melissa Weitz/DC/USEPA/US@EPA
From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/02/2012 12:55PM
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: FW: Liquids Unloading Spreadsheet

(See attached file: Interpolated Venting Rates.xlsx)

Hi Melissa,

We've run the calculations you requested in the attached workbook. This workbook has three tabs:

1. [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Also note that we have applied the national averages to the West Coast region.

Please let me know if you have any questions or additional requests.

-Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 1:28 PM
To: Weitz.Melissa@epamail.epa.gov; Kidman, Timothy M.

Cc: Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I just tried your line but you were out. I am a little confused on your edits. [redacted] (b)(5) deliberative [redacted]?

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 4:07 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.; Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Thanks Tim,

I made a few edits. Please call if you want to discuss.

Melissa

(See attached file: AF Interpolation Sample MW.xlsx)

Error! Filename not specified."Kidman, Timothy M." ---11/01/2012 03:49:07 PM---Hi Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 11/01/2012 03:49 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Melissa,

I've run the example in the attached workbook following my understanding of your proposed methodology for interpolating the activity data. Please let me know if this is what you had in mind, or if there is something I'm missing.

Thanks,
Tim

Tim Kidman | SAIC

Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 9:14 AM
To: Weitz.Melissa@epamail.epa.gov
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, 2 PM works for us. Would you like us to set up the conference call?

Also I just finished adding a new subsection to the temporal section of the memo. Before doing this I accepted all the previous track changes, and added the new material in track changes so the latest additions would be clear. The new version is attached.

Looking forward to discussing all this at 2.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 12:01 PM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

Are you and your team available to speak at 2PM today? I'd like to include our GHG Inventory contractor ERG on the call and they are available then as well.

Melissa

"Minnucci, Chris A." ---11/01/2012 09:57:34 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/01/2012 09:57 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, I will put this together and get a revised version of the memo out to you ASAP; then we can talk after you've had a chance to review.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 9:17 AM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.; Waltzer.Suzanne@epamail.epa.gov
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

These are all good ideas, thank you!

Could you please write these up into the memo section on time series issues? If you could do this today, that'd be great. Then, we will probably want to have a call this afternoon to talk through these issues.

Thank you!
Melissa

"Minnucci, Chris A." ---10/31/2012 05:09:59 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 10/31/2012 05:09 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Ok, your e-mail and Tim's made me realize that (b)(5) deliberative [redacted]

(b)(5) deliberative

[redacted]

[redacted]

[redacted]

[redacted]

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 12:02 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Okay, so your current analysis therefore assumes (b)(5) deliberative [redacted]?

"Minnucci, Chris A." ---10/31/2012 11:37:30 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/31/2012 11:37 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

[redacted] (b)(5) deliberative [redacted]

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 10:45 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

[redacted] (b)(5) deliberative [redacted]

[redacted]

(b)(5) deliberative

Melissa

"Minnucci, Chris A." ---10/29/2012 11:24:58 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/29/2012 11:24 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I apologize, but having just completed our review of the emission calculations we found a significant error in the last version of the memorandum. Specifically, [redacted] (b)(5) deliberative [redacted]

Again, I apologize for the confusion. Please give me a call if you'd like to discuss this further, or let me know if you have any questions or further requests.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 10/25/2012 11:26 AM
To: Minnucci, Chris A.

Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Tim,

I'm free most of the rest of today. Let me know when you are free to talk. Thank you!!

Melissa

"Minnucci, Chris A." ---10/24/2012 04:55:18 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 04:55 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Sorry I missed you today, and since I'm going to be out tomorrow I've asked Tim to give you a call. Tim is also going to put together a table with the percentages you requested below.

As to the other questions you raised: [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/24/2012 2:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A." ---10/24/2012 10:04:15 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Attached please find the revised memo, with a new section added to [redacted] (b)(5) deliberative [redacted]

[redacted]

Please let us know if you have any questions on the attached or would like us to do any further analyses. As I will be out of the office tomorrow and Friday, please include Tim on any questions/requests you might have and he will be able to help you in my absence.

much thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

Would it be possible to also [redacted] (b)(5) deliberative [redacted]? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

[redacted] (b)(5) deliberative [redacted]

[redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out the effects of using the various emission factors has on the emissions estimates. In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: (b)(6) personal privacy

Please consider the environment before printing this email.

Fw: RE: Re: FW: Liquids Unloading Spreadsheet

Melissa Weitz to: Paula Fields, Marty Wolf 11/04/2012 01:23 PM

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 11/04/2012 01:22PM -----
To: Melissa Weitz/DC/USEPA/US@EPA, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 11/03/2012 03:55PM
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: Re: FW: Liquids Unloading Spreadsheet

(See attached file: API-ANGA EFs Memo_v10.docx)
(See attached file: Liquids Unloading Recalculations_v6.xlsx)
(See attached file: Liquids Unloading Interpolation.xlsx)

Melissa,

I believe Marty was looking at an old reference in the memo that had not been updated when he asked for v2 of the spreadsheet. I've removed that reference in the attached version of the memo, along with correcting some table numbering errors and accepting all of the track changes.

The spreadsheets that go along with the memo are also attached. Here is how each spreadsheet relates to the memo:

Table 2 of the memo was developed from Liquids Unloading Recalculations_v6.xslx

Tables 6 and 8 of the memo are from Liquids Unloading Recalculations regional AF correct.xslx

Table 7 of the memo is from Liquids Unloading Interpolation.xslx

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Fri 11/2/2012 5:54 PM
To: Kidman, Timothy M.; Minnucci, Chris A.
Subject: Fw: Re: FW: Liquids Unloading Spreadsheet

Hi,

Can you please send me the "Liquids Unloading Recalculations_v2.xlsx" spreadsheet? Sorry to ask, I just want to be sure I'm giving ERG the correct versions.

Also, could you take a look at the small error Marty describes below and confirm that his understanding is correct?

Thank you very much!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 11/02/2012 05:53PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/02/2012 05:51PM
Cc: "Paula Fields" <Paula.Fields@erg.com>
Subject: Re: FW: Liquids Unloading Spreadsheet

Melissa,

I reviewed this spreadsheet that you sent out. Overall, it looks fine.

(b)(5) deliberative

Thanks,
Marty
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)

10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
11/2/2012 10:31 AM >>>
Hello,

I've reviewed this and it looks good to me. Please review it also, and let me know if you have any questions. I will also forward you the regional emission factors which do not appear to be in this spreadsheet.

If you do not have any questions and are ready, please go ahead and run the calculations with the updated well counts and let's see how it looks!

I'm working from home today--please email me with any questions you have.

Thanks!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com> wrote:

To: Melissa Weitz/DC/USEPA/US@EPA
From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/02/2012 12:55PM
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: FW: Liquids Unloading Spreadsheet

(See attached file: Interpolated Venting Rates.xlsx)

Hi Melissa,

We've run the calculations you requested in the attached workbook. This workbook has three tabs:

1. [redacted] (b)(5) deliberative [redacted]

2. (b)(5) deliberative

(b)(5) deliberative

Please let me know if you have any questions or additional requests.

-Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 1:28 PM
To: Weitz.Melissa@epamail.epa.gov; Kidman, Timothy M.
Cc: Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I just tried your line but you were out. I am a little confused on your edits. [redacted] (b)(5) deliberative [redacted]?

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 4:07 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.; Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Thanks Tim,

I made a few edits. Please call if you want to discuss.

Melissa

(See attached file: AF Interpolation Sample MW.xlsx)

Error! Filename not specified."Kidman, Timothy M." ---11/01/2012 03:49:07 PM---Hi Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 11/01/2012 03:49 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Melissa,

I've run the example in the attached workbook following my understanding of your proposed methodology for interpolating the activity data. Please let me know if this is what you had in mind, or if there is something I'm missing.

Thanks,
Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 9:14 AM
To: Weitz.Melissa@epamail.epa.gov
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, 2 PM works for us. Would you like us to set up the conference call?

Also I just finished adding a new subsection to the temporal section of the memo. Before doing this I accepted all the previous track changes, and added the new material in track changes so the latest additions would be clear. The new version is attached.

Looking forward to discussing all this at 2.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 12:01 PM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

Are you and your team available to speak at 2PM today? I'd like to include our GHG Inventory contractor ERG on the call and they are available then as well.

Melissa

"Minnucci, Chris A." ---11/01/2012 09:57:34 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/01/2012 09:57 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, I will put this together and get a revised version of the memo out to you ASAP; then we can talk after you've had a chance to review.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 9:17 AM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.; Waltzer.Suzanne@epamail.epa.gov
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

These are all good ideas, thank you!

Could you please write these up into the memo section on time series issues? If you could do this today, that'd be great. Then, we will probably want to have a call this afternoon to talk through these issues.

Thank you!
Melissa

"Minnucci, Chris A." ---10/31/2012 05:09:59 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 10/31/2012 05:09 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Ok, your e-mail and Tim's made me realize that (b)(5) deliberative [redacted]

[redacted]

(b)(5) deliberative

[redacted]

[redacted]

[redacted]

[redacted]

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 12:02 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Okay, so your current analysis therefore assumes (b)(5) deliberative [redacted]?

"Minnucci, Chris A." ---10/31/2012 11:37:30 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/31/2012 11:37 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

[redacted] (b)(5) deliberative [redacted]

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 10:45 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

[redacted] (b)(5) deliberative [redacted]

[redacted]

Melissa

"Minnucci, Chris A." ---10/29/2012 11:24:58 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/29/2012 11:24 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I apologize, but having just completed our review of the emission calculations we found a significant error in the last version of the memorandum. Specifically, [redacted] (b)(5) deliberative [redacted]

Again, I apologize for the confusion. Please give me a call if you'd like to discuss this further, or let me know if you have any questions or further requests.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 10/25/2012 11:26 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Tim,

I'm free most of the rest of today. Let me know when you are free to talk.
Thank you!!

Melissa

"Minnucci, Chris A." ---10/24/2012 04:55:18 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 04:55 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Sorry I missed you today, and since I'm going to be out tomorrow I've asked Tim to give you a call. Tim is also going to put together a table with the percentages you requested below.

As to the other questions you raised: (b)(5) deliberative [redacted]

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/24/2012 2:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

[redacted]

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A." ---10/24/2012 10:04:15 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Attached please find the revised memo, with a new section added to

(b)(5) deliberative

Please let us know if you have any questions on the attached or would like us to do any further analyses. As I will be out of the office tomorrow and Friday, please include Tim on any questions/requests you might have and he will be able to help you in my absence.

much thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

Would it be possible to also (b)(5) deliberative ? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

[redacted] (b)(5) deliberative [redacted]

[redacted]

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out the effects of using the various emission factors has on the emissions estimates. In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: (b)(6) personal privacy

Please consider the environment before printing this email.

[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US]

[attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US][attachment "Liquids Unloading Recalculations_v5.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Recalculations_regional AF_correct.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v5.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v8.docx" deleted by Melissa Weitz/DC/USEPA/US] **(See attached file: graycol.gif) [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "AF Interpolation Sample.xlsx" deleted by Melissa Weitz/DC/USEPA/US]**

(b)(5) deliberative

= API-ANGA EFs Memo_v10.docxLiquids Unloading Recalculations_v6.xlsx

(b)(5) deliberative

Liquids Unloading Recalculations_regional AF_correct.xlsx

(b)(5) deliberative

Liquids Unloading Interpolation.xlsx

Fw: Liquids Unloading Spreadsheet

Melissa Weitz to: Paula Fields, Marty Wolf 11/05/2012 12:55 PM

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/05/2012 12:55 PM -----

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
Date: 11/05/2012 11:53 AM
Subject: RE: Re: FW: Liquids Unloading Spreadsheet

Melissa,

I should have deleted that column, it doesn't feed into anything. See attached with that column deleted.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Monday, November 05, 2012 6:16 AM
To: Weitz.Melissa@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: Re: FW: Liquids Unloading Spreadsheet

Melissa,

In looking at the spreadsheet, I think Marty is correct that column N is in error, although I think the correction needs to be (Column B - Column E) rather than (Column C- Column E). When I made this change as a test it did not appear to affect the final results. However, before making a change I need to have Tim take a look at this and confirm it.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Fri 11/2/2012 5:54 PM
To: Kidman, Timothy M.; Minnucci, Chris A.
Subject: Fw: Re: FW: Liquids Unloading Spreadsheet
Hi,

Can you please send me the "Liquids Unloading Recalculations_v2.xlsx" spreadsheet? Sorry to ask, I just want to be sure I'm giving ERG the correct versions.

Also, could you take a look at the small error Marty describes below and confirm that his

understanding is correct?

Thank you very much!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 11/02/2012 05:53PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/02/2012 05:51PM
Cc: "Paula Fields" <Paula.Fields@erg.com>
Subject: Re: FW: Liquids Unloading Spreadsheet
Melissa,

I reviewed this spreadsheet that you sent out. Overall, it looks fine.

(b)(5) deliberative

Thanks,
Marty
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 11/2/2012 10:31 AM >>>

Hello,

I've reviewed this and it looks good to me. Please review it also, and let me know if you have any questions. I will also forward you the regional emission factors which do not appear to be in this spreadsheet.

If you do not have any questions and are ready, please go ahead and run the calculations with the updated well counts and let's see how it looks!

I'm working from home today--please email me with any questions you have.

Thanks!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/02/2012 12:55PM
Cc: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: FW: Liquids Unloading Spreadsheet

(See attached file: Interpolated Venting Rates.xlsx)
Hi Melissa,
We've run the calculations you requested in the attached workbook. This workbook has three tabs:

1. [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted] (b)(5) deliberative [redacted]

Please let me know if you have any questions or additional requests.

-Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872
Energy | Environment | National Security | Health | Critical Infrastructure
Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 1:28 PM
To: Weitz.Melissa@epamail.epa.gov; Kidman, Timothy M.
Cc: Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I just tried your line but you were out. I am a little confused on your edits. (b)(5) deliberative [redacted]?

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 4:07 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.; Richards, Richard Y.
Subject: RE: FW: Liquids Unloading Spreadsheet

Thanks Tim,

I made a few edits. Please call if you want to discuss.

Melissa

(See attached file: AF Interpolation Sample MW.xlsx)

Error! Filename not specified."Kidman, Timothy M." ---11/01/2012 03:49:07 PM---Hi Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 11/01/2012 03:49 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Melissa,

I've run the example in the attached workbook following my understanding of your proposed methodology for interpolating the activity data. Please let me know if this is what you had in mind, or if there is something I'm missing.

Thanks,
Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Minnucci, Chris A.
Sent: Thursday, November 01, 2012 9:14 AM
To: Weitz.Melissa@epamail.epa.gov
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, 2 PM works for us. Would you like us to set up the conference call?

Also I just finished adding a new subsection to the temporal section of the memo. Before doing this I accepted all the previous track changes, and added the new material in track changes so the latest additions would be clear. The new version is attached.

Looking forward to discussing all this at 2.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 12:01 PM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Waltzer.Suzanne@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

Are you and your team available to speak at 2PM today? I'd like to include our GHG Inventory contractor ERG on the call and they are available then as well.

Melissa

"Minnucci, Chris A." ---11/01/2012 09:57:34 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/01/2012 09:57 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Yes, I will put this together and get a revised version of the memo out to you ASAP; then we can talk after you've had a chance to review.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 11/1/2012 9:17 AM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.; Waltzer.Suzanne@epamail.epa.gov
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

These are all good ideas, thank you!

Could you please write these up into the memo section on time series issues? If you could do this today, that'd be great. Then, we will probably want to have a call this afternoon to talk through these issues.

Thank you!
Melissa

"Minnucci, Chris A." ---10/31/2012 05:09:59 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>, "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Date: 10/31/2012 05:09 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Ok, your e-mail and Tim's made me realize that [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 12:02 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Okay, so your current analysis therefore assumes (b)(5) deliberative ?

"Minnucci, Chris A." ---10/31/2012 11:37:30 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/31/2012 11:37 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

(b)(5) deliberative

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/31/2012 10:45 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Chris,

(b)(5) deliberative

Melissa

"Minnucci, Chris A." ---10/29/2012 11:24:58 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/29/2012 11:24 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

I apologize, but having just completed our review of the emission calculations we found a significant error in the last version of the memorandum. Specifically, (b)(5) deliberative

Again, I apologize for the confusion. Please give me a call if you'd like to discuss this further, or let me know if you have any questions or further requests.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thu 10/25/2012 11:26 AM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

Hi Tim,

I'm free most of the rest of today. Let me know when you are free to talk. Thank you!!

Melissa

"Minnucci, Chris A." ---10/24/2012 04:55:18 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 04:55 PM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Sorry I missed you today, and since I'm going to be out tomorrow I've asked Tim to give you a call. Tim is also going to put together a table with the percentages you requested below.

As to the other questions you raised: [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wed 10/24/2012 2:22 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: FW: Liquids Unloading Spreadsheet

(Apologies if I already sent this email, perhaps multiple times...computer issues...)

Thanks so much! This is great.

A few questions on (b)(5) deliberative

[redacted]

Are you free for a quick call? I'm around for about another hour today and then all day tomorrow.

Thank you!

Melissa

"Minnucci, Chris A." ---10/24/2012 10:04:15 AM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 10/24/2012 10:04 AM
Subject: RE: FW: Liquids Unloading Spreadsheet

Melissa,

Attached please find the revised memo, with a new section added to (b)(5) deliberative

[redacted]

(b)(5) deliberative

Please let us know if you have any questions on the attached or would like us to do any further analyses. As I will be out of the office tomorrow and Friday, please include Tim on any questions/requests you might have and he will be able to help you in my absence.

much thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 10/22/2012 10:58 AM
To: Minnucci, Chris A.
Subject: Re: FW: Liquids Unloading Spreadsheet

Thanks very much for sending these over.

Would it be possible to also (b)(5) deliberative ? The spreadsheet may already do this--I'm not sure.

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 10/18/2012 05:03PM
Subject: FW: Liquids Unloading Spreadsheet

Melissa,

Please see attached, along with the e-mail below from Dick to Tim for an explanation of what is contained in each spreadsheet.

Chris

From: Richards, Richard Y.
Sent: Thu 10/18/2012 11:40 AM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: Liquids Unloading Spreadsheet

Tim,

I have attached the following spreadsheets I have developed for the liquids unloading analysis:

(b)(5) deliberative

(b)(5) deliberative

I have started writing the memo that we will submit to Melissa. I have nearly completed the sections that document the calculations conducted in these two spreadsheets. However, we need to do some further analysis on the results to figure out the effects of using the various emission factors has on the emissions estimates. In particular, we need to generate some charts that will illustrate these effects.

I will send you what I have done so far on the memo so you can review the assumptions made in the analyses. Then let's talk about the next steps.

Regards,

Dick Richards | SAIC

Senior Environmental Scientist | Climate Change Services

Energy, Environment & Infrastructure Solutions

office: 202.488.6606 | mobile: (b)(6) personal privacy

Please consider the environment before printing this email.

[attachment "Liquids Unloading Recalculations_v2.xlsx" removed by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Data Final Shared w EPA 9Oct12+SAIC.xlsx" removed by Melissa Weitz/DC/USEPA/US][attachment "Liquids Unloading Recalculations_v5.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Recalculations_regional AF_correct.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v5.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v8.docx" deleted by Melissa Weitz/DC/USEPA/US] *(See attached file: graycol.gif)* [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "graycol.gif" deleted by Melissa Weitz/DC/USEPA/US] [attachment "AF Interpolation Sample.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

(b)(5) deliberative

= Interpolated Venting Rates.xlsx

Re: completions
Melissa Weitz to: Paula Fields 11/05/2012 02:45 PM
Cc: "Wolf, Marty"

Well, I think [redacted] (b)(5) deliberative [redacted] If you send them, I can do a quick back of the envelope look at the numbers.

My top priority is [redacted] (b)(5) deliberative [redacted].

Thanks!
Melissa

"Paula Fields"	Melissa - What you are asking for is possible...	11/05/2012 02:36:11 PM

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Wolf, Marty" <Marty.Wolf@erg.com>
Date: 11/05/2012 02:36 PM
Subject: Re: completions

Melissa -

What you are asking for is possible, but we'll need more time. How much time do we have?

Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: <Weitz.Melissa@epamail.epa.gov>
To: Paula Fields
<Paula.Fields@erg.com>
CC: Marty Wolf
<Marty.Wolf@erg.com>
Date: 11/5/2012 11:21 AM

Subject: Re: completions

Something that might help us figure out which approach makes the most sense would be [redacted] (b)(5) deliberative [redacted]

Let me know if that's possible.

Thanks!
Melissa

Melissa Weitz---11/05/2012 12:06:14 PM---I added a tab for completions to compare the 3 methods.

From: Melissa Weitz/DC/USEPA/US
To: Paula Fields <Paula.Fields@erg.com>, Marty Wolf <Marty.Wolf@erg.com>
Date: 11/05/2012 12:06 PM
Subject: completions

I added a tab for completions to compare the 3 methods.

[attachment "Well counts and completions.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Fw: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa Weitz to: Suzanne Waltzer 11/06/2012 01:31 PM

Hi Suzie,

Karin emailed about rescheduling our tentative call with them (tentatively for tomorrow) to next week.

This seems fine, but I think I will call Karin informally this week to run the completions trend issue by her (to get her thoughts on whether the trend is real and what is causing it...it is showing up in all of the data available, so it certainly seems real), and to ask her if they would consider meeting with us after they submit expert review draft comments to discuss those comments with us.

They still have not given us thoughts on the time series for liquids unloading, and at this point, we don't really have time to get into a back and forth with them over different options, (b)(5) deliberative [redacted]

Thoughts? Are there other areas of discussion I'm not thinking of that would be better handled as a group call? Other thoughts on issues to discuss with Karin?

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/06/2012 01:23 PM -----

From: "Karin C. Ritter" <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/05/2012 12:02 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Melissa,

It looks like we are not going to be ready to talk to you about this data set on November 7th which was the date we tentatively set aside for another joint call. Unless there is something you wanted to cover I believe we should reschedule this call for next week? If so I will get back to you with dates/times for a rescheduled call.

Thank you
Karin

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, October 25, 2012 1:37 PM
To: Karin C. Ritter
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hello Karin,

Attached below please find the spreadsheet that EPA used to calculate emission factors for liquids unloading, for the 1990-2009 and 1990-2010 Inventories.

Please share this with the participants in our recent conversations, but please do not distribute more widely. It was not developed with broad distribution in mind, and would need some reformatting and more detailed background information before being made public.

We can walk through this spreadsheet on our follow-up call. If you have questions on the spreadsheet before our next call, please feel free contact me.

Thank you,
Melissa

(See attached file: Copy of Liquids Unloading EF Calculation (2010Inv) 10.25.xlsx)

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---10/17/2012 04:49:09 PM---Hi Melissa, Just by way of background...

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/17/2012 04:49 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

---

Hi Melissa,
Just by way of background...
I will be out of the office on business travel October 22nd to 26th and then vacation until the 31st.
So our discussions will have to be postponed until early November. We do have the November 7th call scheduled.
Cheers,
Karin

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 17, 2012 4:39 PM
To: Karin Ritter
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Karin,

We're still a bit delayed on the spreadsheet--we're trying to determine if there is any company identifying information we need to remove before sending. I'm now aiming for tomorrow afternoon.

We can cancel tomorrow's call, and check in another time once you've had a chance to review the spreadsheet.

Thank you,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---10/16/2012 06:28:16 PM---Melissa, I also had down a conference call tentatively for Thursday 10/18 @3pm ET. Do you think we'

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/16/2012 06:28 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

---

Melissa,
I also had down a conference call tentatively for Thursday 10/18 @3pm ET. Do you think we'll still need this call?
I believe part of the reason we scheduled it was for us to discuss EPA's unloading factor information after we had a chance to review it. Don't think we'll have had enough time to review your material for a discussion during the call.
Can't recall what the other reason was for the tentative call?

Regards,
Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, October 16, 2012 5:54 PM
To: Karin Ritter
Cc: GHGInventory
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Thank you Karin.

It's not too late. I'm working on the updates now and the final should be posted by the end of the week.

Also, I'm a bit behind on getting the EPA liquids unloading factor information together. Hopefully I'll be able to send you something tomorrow.

Thank you,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency

Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---10/16/2012 02:39:18 PM---Melissa, Attached are just a few API comments. Hopefully these can still be considered even though

From: Karin Ritter <Ritterk@api.org>
To: GHGInventory@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 10/16/2012 02:39 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

---

Melissa,
Attached are just a few API comments. Hopefully these can still be considered even though they are a day late?

Regards,
Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov] **On Behalf Of** GHGInventory
Sent: Wednesday, October 10, 2012 3:12 PM
Subject: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Natural Gas Stakeholder Workshop Participant,

A draft summary report for the Stakeholder Workshop on Natural Gas in the GHG Inventory is attached below, for your review.

The report summarizes the presentations and discussions from the workshop, highlights next steps for natural gas emissions calculations, and provides a list of attendees.

We request any comments on the report by Monday, October 15, as we plan to post the final report to the Stakeholder Workshop website next week.

For more information on the Stakeholder Workshop, including agenda and presentations, please visit http://www.epa.gov/climatechange/ghgemissions/Sept2012stakeholderworkshop.html.

Please continue to contact us with any questions or new information relevant to the Inventory at GHGInventory@epa.gov.

Thank you,
Melissa

(See attached file: Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.10.docx)[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.10 bg.docx" deleted by Melissa Weitz/DC/USEPA/US]

Preliminary Liquids Unloading Estimates
Marty Wolf to: Melissa Weitz 11/06/2012 05:41 PM
Cc: "Paula Fields"

History: This message has been replied to and forwarded.

Melissa,

I just finished up the preliminary liquids unloading estimates.

Just a quick step-by-step description of what I did.

(b)(5) deliberative

(b)(5) deliberative

Please let us know if you have any questions. Also, please let us know if you have any adjustments or tweaks that we need to make with these estimates.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

(b)(5) deliberative

liquids unloading preliminary calc 110612.xlsx

Re: Preliminary Liquids Unloading Estimates

Melissa Weitz to: Marty Wolf 11/07/2012 10:13 AM
Cc: "Paula Fields"

Great! Thank you!!

"Marty Wolf"	After looking at it some more after I e-mailed...	11/07/2012 10:13:01 AM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 10:13 AM
Subject: Re: Preliminary Liquids Unloading Estimates

After looking at it some more after I e-mailed, that was the conclusion that I came to as well. Should have this in 15-20 minutes.

Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/07/12 7:01 ?? >>>
We will want to include non-associated gas wells, both with hydraulic fracturing, and without. I believe that is data set #2.

"Marty Wolf" ---11/07/2012 01:26:12 AM---Melissa, This should be fairly easy, but just so we are totally clear - do we

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 01:26 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

This should be fairly easy, but just so we are totally clear - [redacted] (b)(5) deliberative [redacted]

[redacted]

Thanks,
Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/06/12 2:56 ?? >>>
Hi Marty,

(b)(5) deliberative

Thank you!
Melissa

"Marty Wolf" ---11/06/2012 05:41:53 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/06/2012 05:41 PM
Subject: Preliminary Liquids Unloading Estimates

Melissa,

I just finished up the preliminary liquids unloading estimates.

Just a quick step-by-step description of what I did.

(b)(5) deliberative

(b)(5) deliberative

Please let us know if you have any questions. Also, please let us know if you have any adjustments or tweaks that we need to make with these estimates.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "liquids unloading preliminary calc 110612.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Fw: Preliminary Liquids Unloading Estimates

Melissa Weitz to: Suzanne Waltzer 11/07/2012 12:34 PM

Hi Suzie,

Updated LU #'s, if you want to take a look.

SAIC is reviewing right now.

Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/07/2012 12:33 PM -----

From: Melissa Weitz/DC/USEPA/US
To: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/07/2012 10:58 AM
Subject: Fw: Preliminary Liquids Unloading Estimates

Hello,

Would it be possible to get your review of the preliminary liquids unloading numbers, by today or tomorrow? These adjustments are a really big deal for the Inventory and we'd definitely appreciate another set of eyes on it before it goes out.

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/07/2012 10:56 AM -----

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 10:51 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

Here are the revised preliminary liquids unloading estimates using Data Set #2 (Non-Associated Gas Wells).

Marty

>>> 11/07/12 7:01 ?? >>>
We will want to include non-associated gas wells, both with hydraulic fracturing, and without. I believe that is data set #2.

"Marty Wolf" ---11/07/2012 01:26:12 AM---Melissa, This should be fairly easy, but just so we are totally clear - do we

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>

Date: 11/07/2012 01:26 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

This should be fairly easy, but just so we are totally clear - [redacted] (b)(5) deliberative [redacted]?

[redacted] (b)(5) deliberative [redacted]

Thanks,
Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/06/12 2:56 ?? >>>
Hi Marty,

[redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

Thank you!
Melissa

"Marty Wolf" ---11/06/2012 05:41:53 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/06/2012 05:41 PM
Subject: Preliminary Liquids Unloading Estimates

Melissa,

I just finished up the preliminary liquids unloading estimates.

Just a quick step-by-step description of what I did.

(b)(5) deliberative

Please let us know if you have any questions. Also, please let us know if you have any adjustments or tweaks that we need to make with these estimates.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "liquids unloading preliminary calc 110612.xlsx" deleted

(b)(5) deliberative

[redacted]

by Melissa Weitz/DC/USEPA/US] liquids unloading preliminary calc 110712.xlsx

Re: Preliminary Liquids Unloading Estimates
Marty Wolf to: Melissa Weitz 11/07/2012 04:08 PM
Cc: "Paula Fields"

History: This message has been replied to and forwarded.

Melissa,

If we can hold some pieces until an update between expert and public review draft, then we will try to send inventory #s by the end of Friday.

I will let you know if there are new types of data or methodology that need to be used. If I am simply updating preliminary estimates to final estimates, then I am just going to go ahead and do that.

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
11/7/2012 12:35 PM >>>
Let's see if there is something we can do to get them earlier--We're going to need the totals earlier than that. Please give me a list of the other inventory pieces that need more work (LNG, pipelines, etc.) and we can update those between the expert and public review draft. If we hold off on those moving pieces, when can we get the inventory #s?

Also, if there are areas that seems to need different data or methods than those previously used, please let me know before making any changes. We'll need to discuss them with our group over here, even if they seem minor.

Thank you!!

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Marty Wolf" <Marty.Wolf@erg.com> wrote: -----

==========
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/07/2012 03:15PM
Cc: "Paula Fields" <Paula.Fields@erg.com>
Subject: Re: Preliminary Liquids Unloading Estimates
==========

Melissa,

I am looking to have the well completion count results ready for you mid- to late tomorrow.

Realistically, I am thinking that we could have the total inventory estimates ready by late next Tuesday. There are a lot of "moving parts" in the spreadsheet and we want to make sure that everything is referencing correctly.

(b)(5) deliberative

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
11/7/2012 12:01 PM >>>
If all goes well with the well completion counts, an we select a method early tomorrow, will you be able to produce the total invenory estimates by late on thursday?

Melissa M. Weitz
U.S. Environmental Protection Agency

Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Marty Wolf" <Marty.Wolf@erg.com> wrote: -----

==========
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/07/2012 02:09PM
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Subject: Re: Preliminary Liquids Unloading Estimates
==========

Melissa,

I will go ahead and add these into the inventory spreadsheet - again, there will be some structural changes that will need to be addressed as a result of the different methodology.

I am compiling the Gas STAR data right now. I'm trying to get the well completions analysis to you tomorrow.

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 11/7/2012 10:07 AM >>>

Thank you! These look good. Can we go ahead and slot them into the Inventory spreadsheet yet?

Where are things on the analysis for well completions?

Thanks!
Melissa

"Marty Wolf" ---11/07/2012 10:51:09 AM---Melissa, Here are the revised preliminary liquids unloading estimates using Data Set #2 (Non-Associa

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 10:51 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

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Marty

>>> 11/07/12 7:01 ?? >>>
We will want to include non-associated gas wells, both with hydraulic fracturing, and without. I believe that is data set #2.

"Marty Wolf" ---11/07/2012 01:26:12 AM---Melissa, This should be fairly easy, but just so we are totally clear - do we

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 01:26 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

This should be fairly easy, but just so we are totally clear - (b)(5) deliberati [redacted]

Thanks,
Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/06/12 2:56 ?? >>>
Hi Marty,

(b)(5) deliberative

Thank you!
Melissa

"Marty Wolf" ---11/06/2012 05:41:53 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/06/2012 05:41 PM
Subject: Preliminary Liquids Unloading Estimates

Melissa,

I just finished up the preliminary liquids unloading estimates.

Just a quick step-by-step description of what I did.

(b)(5) deliberative

(b)(5) deliberative

Please let us know if you have any questions. Also, please let us know if you have any adjustments or tweaks that we need to make with these estimates.

Thanks,
Marty

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10860 Gold Center Drive, Suite 275
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USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "liquids unloading preliminary calc 110612.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "liquids unloading preliminary calc 110712.xlsx"

deleted by Melissa Weitz/DC/USEPA/US]

Fw: Preliminary Liquids Unloading Estimates

Melissa Weitz to: Suzanne Waltzer 11/08/2012 09:26 AM

FYI-- LU numbers by region

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/08/2012 09:26 AM -----

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 11/07/2012 05:28 PM
Subject: RE: Preliminary Liquids Unloading Estimates

Hi Melissa,

I've reviewed Marty's estimates, and did not find any errors. I also re-ran the calculations from scratch in a separate workbook and got the same results as Marty.

(b)(5) deliberative

only applied

(b)(5) deliberative

(b)(5) deliberative

As I said, I just wanted to mention this because at first the result surprised me, and I figured you might have a similar reaction.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, November 07, 2012 7:58 AM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: Fw: Preliminary Liquids Unloading Estimates

Hello,

Would it be possible to get your review of the preliminary liquids unloading numbers, by today or tomorrow? These adjustments are a really big deal for the Inventory and we'd definitely appreciate another set of eyes on it before it goes out.

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/07/2012 10:56 AM -----

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 10:51 AM
Subject: Re: Preliminary Liquids Unloading Estimates

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From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 01:26 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

This should be fairly easy, but just so we are totally clear - (b)(5) deliberative [redacted]

Thanks,
Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/06/12 2:56 ?? >>>
Hi Marty,

(b)(5) deliberative [redacted]

Thank you!
Melissa

"Marty Wolf" ---11/06/2012 05:41:53 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/06/2012 05:41 PM
Subject: Preliminary Liquids Unloading Estimates

Melissa,

I just finished up the preliminary liquids unloading estimates.

Just a quick step-by-step description of what I did.

(b)(5) deliberative

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Thanks,
Marty

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Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "liquids unloading preliminary calc 110612.xlsx" deleted by Melissa Weitz/DC/USEPA/US] *(See attached file: liquids unloading preliminary calc 110712.xlsx)*

Re: Preliminary Completions/Workovers #s
Marty Wolf to: Melissa Weitz 11/08/2012 12:21 PM
Cc: "Fields, Paula"

History: This message has been forwarded.

Melissa,

I have the GasSTAR data excel file that I received from Allison Berkowitz - I think this was extracted from the GasSTAR database on 9/20.

However, there have never been any GasSTAR reductions that have been specifically called out for completions and workovers with HF. We do have reductions that have been specifically called out for liquids unloading.

A fair amount of the reductions in the GasSTAR are not assigned to specific sources and just have to be treated as "general" (production, etc.).

We will break out what we can.

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 11/8/2012 9:05 AM >>>
I believe you received the GasSTAR data excel files a few weeks ago. They contain all of the data, and we need to use the updated data for each year of the Inventory.

For the expert review draft our top priorities should be (b)(5) deliberative [redacted]

Before the public review draft definitely (or possibly after the numbers for expert review are ready, but before we finalize the text), we'll need separate numbers for the GasSTAR reductions for as many sources as possible (at a minimum the ones for which we provided these numbers at the workshop, as this was promised to stakeholders at the workshop.

"Marty Wolf" ---11/08/2012 11:52:24 AM---Melissa, #1 - just changed

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Date: 11/08/2012 11:52 AM
Subject: Re: Preliminary Completions/Workovers #s

Melissa,

#1 - just changed
#2 - currently calculating this
#3 - just changed
(b)(5) deliberative

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>>
<Weitz.Melissa@epamail.epa.gov> 11/8/2012 8:04 AM
>>>
Ok, there are some changes that need to be made once we select a method for determining the activity data. Hopefully they can be quick.

(b)(5) deliberative

(b)(5) deliberative

Let me know if you have questions.

Thanks!
Melissa

"Marty Wolf" ---11/08/2012 10:53:14 AM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/08/2012 10:53 AM
Subject: Preliminary Completions/Workovers #s

Melissa,

Here are the preliminary completions and workover #s.

(b)(5) deliberative

So at the bottom of the spreadsheet, you have emissions for the three sets of well counts consisting of completions + workovers - regulatory reductions.

Let me know what you think.

I'll be working on the overall inventory spreadsheet in the meanwhile.

Thanks,
Marty[attachment "Well counts and completions_110812.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Re: Preliminary Completions/Workovers #s
Marty Wolf to: Melissa Weitz 11/08/2012 02:33 PM
Cc: "Fields, Paula"

History: This message has been forwarded.

Melissa,

Here is a revised table for the completions and workovers.

(b)(5) deliberative [redacted]

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
11/8/2012 8:04 AM >>>
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(b)(5) deliberative [redacted]

(b)(5) deliberative

Let me know if you have questions.

Thanks!
Melissa

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From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/08/2012 10:53 AM
Subject: Preliminary Completions/Workovers #s

Melissa,

Here are the preliminary completions and workover #s.

I started out with the spreadsheet that you sent over earlier with well counts from NEMS, DI year-to-year difference, and DI direct.

(b)(5) deliberative

(b)(5) deliberative

So at the bottom of the spreadsheet, you have emissions for the three sets of well counts consisting of completions + workovers - regulatory reductions.

Let me know what you think.

I'll be working on the overall inventory spreadsheet in the meanwhile.

Thanks,
Marty[attachment "Well counts and completions_110812.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

(b)(5) deliberative

Well counts and completions_110812_v2.xlsx

Fw: Preliminary Liquids Unloading Estimates
Melissa Weitz to: Mark DeFigueiredo, David Jacobson 11/08/2012 06:49 PM

So....we have a wacky outlier too. [redacted] (b)(5) deliberative [redacted] We are still trying to sort out why it is so weird.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/08/2012 06:47 PM -----

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 11/07/2012 05:28 PM
Subject: RE: Preliminary Liquids Unloading Estimates

Hi Melissa,

I've reviewed Marty's estimates, and did not find any errors. I also re-ran the calculations from scratch in a separate workbook and got the same results as Marty.

[redacted] (b)(5) deliberative [redacted]

only applied [redacted]

[redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

As I said, I just wanted to mention this because at first the result surprised me, and I figured you might have a similar reaction.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, November 07, 2012 7:58 AM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: Fw: Preliminary Liquids Unloading Estimates

Hello,

Would it be possible to get your review of the preliminary liquids unloading numbers, by today or tomorrow? These adjustments are a really big deal for the Inventory and we'd definitely appreciate another set of eyes on it before it goes out.

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/07/2012 10:56 AM -----

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 10:51 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

Here are the revised preliminary liquids unloading estimates using Data Set #2 (Non-Associated Gas Wells).

Marty

>>> 11/07/12 7:01 ?? >>>
We will want to include non-associated gas wells, both with hydraulic fracturing, and without. I believe that is data set #2.

"Marty Wolf" ---11/07/2012 01:26:12 AM---Melissa, This should be fairly easy, but just so we are totally clear - do we

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 01:26 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

This should be fairly easy, but just so we are totally clear - (b)(5) deliberative [redacted]

Thanks,
Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/06/12 2:56 ?? >>>
Hi Marty,

(b)(5) deliberative [redacted]

Thank you!
Melissa

"Marty Wolf" ---11/06/2012 05:41:53 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/06/2012 05:41 PM
Subject: Preliminary Liquids Unloading Estimates

Melissa,

I just finished up the preliminary liquids unloading estimates.

Just a quick step-by-step description of what I did.

(b)(5) deliberative

Please let us know if you have any questions. Also, please let us know if you have any adjustments or tweaks that we need to make with these estimates.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "liquids unloading preliminary calc 110612.xlsx" deleted by Melissa Weitz/DC/USEPA/US] *(See attached file: liquids unloading preliminary calc 110712.xlsx)*

RE: Preliminary Liquids Unloading Estimates

Kidman, Timothy M. to: Melissa Weitz 11/09/2012 08:00 PM
Cc: "Minnucci, Chris A."

History: This message has been forwarded.

Hi Melissa,

Are you referring to the entire natural gas inventory or just the liquids unloading portions?

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, November 09, 2012 2:39 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: Preliminary Liquids Unloading Estimates

Hello,

Do you think you'd have time to review the Inventory spreadsheets? I should be getting them in the next hour or so hopefully. We'd like any feedback you can provide by Monday COB. We're planning to send along the numbers to be incorporated into the rest of the Inventory Monday night/Tuesday morning.

Let me know. If not, a later review would also be helpful, since we can make changes in between the expert review and public review drafts.

Thanks,
Melissa

"Kidman, Timothy M." ---11/08/2012 07:07:14 PM---Melissa,

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 11/08/2012 07:07 PM
Subject: RE: Preliminary Liquids Unloading Estimates

Melissa,

(b)(5) deliberative

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, November 08, 2012 3:44 PM
To: Kidman, Timothy M.; Minnucci, Chris A.
Subject: Fw: Preliminary Liquids Unloading Estimates

Thank you!!

(b)(5) deliberative

(b)(5) deliberative

(b)(5) deliberative

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/08/2012 06:20 PM -----

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 11/07/2012 05:28 PM
Subject: RE: Preliminary Liquids Unloading Estimates

Hi Melissa,

I've reviewed Marty's estimates, and did not find any errors. I also re-ran the calculations from scratch in a separate workbook and got the same results as Marty.

(b)(5) deliberative

(b)(5) deliberative

(b)(5) deliberative

As I said, I just wanted to mention this because at first the result surprised me, and I figured you might have a similar reaction.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, November 07, 2012 7:58 AM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: Fw: Preliminary Liquids Unloading Estimates

Hello,

Would it be possible to get your review of the preliminary liquids unloading numbers, by today or tomorrow? These adjustments are a really big deal for the Inventory and we'd definitely appreciate another set of eyes on it before it goes out.

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/07/2012 10:56 AM -----

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 10:51 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

Here are the revised preliminary liquids unloading estimates using Data Set #2 (Non-Associated Gas Wells).

Marty

>>> 11/07/12 7:01 ?? >>>
We will want to include non-associated gas wells, both with hydraulic fracturing, and without. I believe that is data set #2.

"Marty Wolf" ---11/07/2012 01:26:12 AM---Melissa, This should be fairly easy, but just so we are totally clear - do we

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 01:26 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

This should be fairly easy, but just so we are totally clear - (b)(5) deliberative [redacted]

[redacted]

(b)(5) deliberative

Thanks,
Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/06/12 2:56 ?? >>>
Hi Marty,

(b)(5) deliberative

Thank you!
Melissa

"Marty Wolf" ---11/06/2012 05:41:53 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/06/2012 05:41 PM
Subject: Preliminary Liquids Unloading Estimates

Melissa,

I just finished up the preliminary liquids unloading estimates.

Just a quick step-by-step description of what I did.

(b)(5) deliberative

(b)(5) deliberative

Please let us know if you have any questions. Also, please let us know if you have any adjustments or tweaks that we need to make with these estimates.

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Marty

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Rancho Cordova, CA 95670

USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "liquids unloading preliminary calc 110612.xlsx" deleted by Melissa Weitz/DC/USEPA/US] (See attached file: liquids unloading preliminary calc 110712.xlsx)

RE: Preliminary Liquids Unloading Estimates
Minnucci, Chris A. to: Melissa Weitz, Kidman, Timothy M. 11/10/2012 02:35 PM
Cc: "Richards, Richard Y."

History: This message has been forwarded.

Melissa,

Yes, we can review them, just send them along when you're ready and let us know which numbers you'd like us to review.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Fri 11/9/2012 5:38 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: Preliminary Liquids Unloading Estimates

Hello,

Do you think you'd have time to review the Inventory spreadsheets? I should be getting them in the next hour or so hopefully. We'd like any feedback you can provide by Monday COB. We're planning to send along the numbers to be incorporated into the rest of the Inventory Monday night/Tuesday morning.

Let me know. If not, a later review would also be helpful, since we can make changes in between the expert review and public review drafts.

Thanks,
Melissa

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From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 11/08/2012 07:07 PM
Subject: RE: Preliminary Liquids Unloading Estimates

Melissa,

[redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, November 08, 2012 3:44 PM
To: Kidman, Timothy M.; Minnucci, Chris A.
Subject: Fw: Preliminary Liquids Unloading Estimates

Thank you!!

(b)(5) deliberative

(b)(5) deliberative

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/08/2012 06:20 PM -----

From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 11/07/2012 05:28 PM

Subject: RE: Preliminary Liquids Unloading Estimates

Hi Melissa,

I've reviewed Marty's estimates, and did not find any errors. I also re-ran the calculations from scratch in a separate workbook and got the same results as Marty.

(b)(5) deliberative

(b)(5) deliberative

As I said, I just wanted to mention this because at first the result surprised me, and I figured you might have a similar reaction.

Tim

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Climate Change Analyst
Energy, Environment & Infrastructure Solutions
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Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, November 07, 2012 7:58 AM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: Fw: Preliminary Liquids Unloading Estimates

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Date: 11/07/2012 10:51 AM
Subject: Re: Preliminary Liquids Unloading Estimates

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Marty

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To: Melissa Weitz/DC/USEPA/US@EPA
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Date: 11/07/2012 01:26 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

This should be fairly easy, but just so we are totally clear - (b)(5) deliberative [redacted]

Thanks,
Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/06/12 2:56 ?? >>>
Hi Marty,

(b)(5) deliberative

Thank you!
Melissa

"Marty Wolf" ---11/06/2012 05:41:53 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/06/2012 05:41 PM
Subject: Preliminary Liquids Unloading Estimates

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Just a quick step-by-step description of what I did.

(b)(5) deliberative

(b)(5) deliberative

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Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)

Fw: Natural Gas Systems Spreadsheet

Melissa Weitz to: Minnucci Chris A., Kidman Timothy M. 11/11/2012 08:17 PM

Hello,

The natural gas numbers are below. The "carriedforward" spreadsheet is the one we're going with. Please review the liquids unloading and fracking numbers, and if anything else jumps out at you as odd, let me know please.

Thank you!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 11/11/2012 08:15PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/09/2012 05:43PM
Cc: "Gopi Manne" <Gopi.Manne@erg.com>, "Paula Fields" <Paula.Fields@erg.com>
Subject: Natural Gas Systems Spreadsheet

(See attached file: NaturalGasSystems_1990-2011_110912_carriedforward2010GasSTAR.xlsx)
(See attached file: NaturalGasSystems_1990-2011_110912_actual2011GasSTAR.xlsx)

Melissa,

Attached are two versions of the Natural Gas Systems spreadsheet.

As we discussed a few minutes ago, the first version has the reductions as reported to date to GasSTAR for 2011, while the second version has the 2010 reductions carried forward to 2011. Any reductions reported to GasSTAR prior to July 15, 2012 are in the database, but nothing after that date.

The only difference between the two files are the reductions which can be found in the Data Input tab in cells Y40 through Y56.

We will be available on Monday (not a holiday for us) to resolve any last minute questions. Because of a somewhat reduced amount of QA on our part due to time constraints, we will also be reviewing the file on Monday morning to make sure that there are not any major issues that we have overlooked.

Thanks,

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

(b)(5) deliberative

[redacted]

NaturalGasSystems_1990-2011_110912_carriedforward2010GasSTAR.xlsx

(b)(5) deliberative

NaturalGasSystems_1990-2011_110912_actual2011GasSTAR.xlsx

RE: Natural Gas Systems Spreadsheet

Minnucci, Chris A. to: Melissa Weitz, Kidman, Timothy M. 11/12/2012 04:51 PM

Cc: "Richards, Richard Y."

History: This message has been replied to and forwarded.

Melissa,

We completed a review of the draft Inventory. With two exceptions (discussed below), nothing major jumped out at us. (b)(5) deliberative

[redacted]

[redacted]

[redacted]

(b)(5) deliberative

Please let me know if you have any questions on this.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Sun 11/11/2012 8:17 PM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: Fw: Natural Gas Systems Spreadsheet

Hello,

The natural gas numbers are below. The "carriedforward" spreadsheet is the one we're going with. Please review the liquids unloading and fracking numbers, and if anything else jumps out at you as odd, let me know please.

Thank you!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 11/11/2012
08:15PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com>

Date: 11/09/2012 05:43PM
Cc: "Gopi Manne" <Gopi.Manne@erg.com>, "Paula Fields" <Paula.Fields@erg.com>
Subject: Natural Gas Systems Spreadsheet

(See attached file: NaturalGasSystems_1990-2011_110912_carriedforward2010GasSTAR.xlsx)
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USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com
(b)(5) deliberative [redacted]

=OtherSources_v16.docx

Re: Re: Gas Star reductions?
Marty Wolf to: Melissa Weitz 11/13/2012 12:51 AM
Cc: "Paula Fields"

History: This message has been forwarded.

Will look at first thing tomorrow morning. Should be in around 6:30 am Pacific.

Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/12/12 4:54 □□ >>>
Hi Marty,

[redacted] (b)(5) deliberative [redacted]

[redacted]

Thanks!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Marty Wolf" <Marty.Wolf@erg.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/12/2012 12:40AM
Cc: "Paula Fields" <Paula.Fields@erg.com>
Subject: Re: Gas Star reductions?

Melissa,

[redacted] (b)(6) personal privacy [redacted], so it looks like I will be staying home from work tomorrow (Monday). However, I will be working a bit from home and looking into the issues that you have been bringing up.

For these, I don't think [redacted] (b)(5) deliberative [redacted]
However, I could be wrong because I am responding without opening the spreadsheet. Specifically, what sheet and cells are you referring to?

Thanks,
Marty

>>> 11/09/12 4:19 ?? >>>
[redacted] (b)(5) deliberative [redacted]

Melissa Weitz---11/09/2012 06:52:05 PM---It appears that the Gas Star Reductions were not copied from 2010. In the GasStar tab, they are dif

From: Melissa Weitz/DC/USEPA/US
To: Marty Wolf <Marty.Wolf@erg.com>, Paula Fields <Paula.Fields@erg.com>
Date: 11/09/2012 06:52 PM
Subject: Gas Star reductions?

It appears that the Gas Star Reductions were not copied from 2010. In the GasStar tab, they are different.

Re: Revised Natural Gas Systems Spreadsheets
Melissa Weitz to: Marty Wolf 11/13/2012 11:01 AM
Cc: "Paula Fields"

Thanks Marty,

[redacted] (b)(5) deliberative [redacted]

If I could get this in the next hour, that'd be great. My division director is presenting this information to our assistant administrator in a few hours. I won't be there, so I won't be able to provide further explanation.

Thanks!

[redacted] (b)(5) deliberative [redacted]

"Marty Wolf"	Melissa,	11/13/2012 10:30:05 AM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/13/2012 10:30 AM
Subject: Revised Natural Gas Systems Spreadsheets

Melissa,

Here are the revised Natural Gas Systems spreadsheets. As we just discussed this morning, I [redacted] (b)(5) deliberative [redacted]

Like Friday, we have two versions of the spreadsheets - one with 2011 actual Gas STAR reductions and one with the 2010 Gas STAR reductions pulled forward to 2011.

Please let us know if you have any other questions.

Marty[attachment "NaturalGasSystems_1990-2011_111312_carriedforward2010GasSTAR.xlsx"

deleted by Melissa Weitz/DC/USEPA/US] [attachment "NaturalGasSystems_1990-2011_111312_actual2011GasSTAR.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

RE: RE: Natural Gas Systems Spreadsheet

Minnucci, Chris A. to: Melissa Weitz 11/13/2012 11:14 AM

Cc: "Richards, Richard Y.", "Kidman, Timothy M."

History: This message has been forwarded.

Melissa,

On the attached revised version of the Inventory spreadsheet we have

(b)(5) deliberative

[redacted]

[redacted]

[redacted]

(b)(5) deliberative

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 11/12/2012 7:58 PM
To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.
Subject: Re: RE: Natural Gas Systems Spreadsheet

Thank you!

Would you be able to correct the spreadsheet to address the "other production" error you describe below? If so, please go ahead and do so.

Are there any checks you may be able to do (b)(5) deliberative

Thanks,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA, "Kidman, Timothy M."
<TIMOTHY.M.KIDMAN@saic.com>
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 11/12/2012 04:51PM
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: Natural Gas Systems Spreadsheet

Melissa,

We completed a review of the draft Inventory. With two exceptions (discussed below), nothing major jumped out at us. (b)(5) deliberative

(b)(5) deliberative

Please let me know if you have any questions on this.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Sun 11/11/2012 8:17 PM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: Fw: Natural Gas Systems Spreadsheet

Hello,

The natural gas numbers are below. The "carriedforward" spreadsheet is the one we're going with. Please review the liquids unloading and fracking numbers, and if anything else jumps out at you as odd, let me know please.

Thank you!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 11/11/2012
08:15PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/09/2012 05:43PM
Cc: "Gopi Manne" <Gopi.Manne@erg.com>, "Paula Fields"
<Paula.Fields@erg.com>
Subject: Natural Gas Systems Spreadsheet

(See attached file:
NaturalGasSystems_1990-2011_110912_carriedforward2010GasSTA
R.xlsx)
(See attached file:
NaturalGasSystems_1990-2011_110912_actual2011GasSTAR.xlsx)

Melissa,

Attached are two versions of the Natural Gas Systems spreadsheet.

As we discussed a few minutes ago, the first version has the reductions as reported to date to GasSTAR for 2011, while the second version has the 2010 reductions carried forward to 2011. Any reductions reported to GasSTAR prior to July 15, 2012 are in the database, but nothing after that date.

The only difference between the two files are the reductions which can be found in the Data Input tab in cells Y40 through Y56.

We will be available on Monday (not a holiday for us) to resolve any last minute questions. Because of a somewhat reduced amount of QA on our part due to time constraints, we will also be reviewing the file on Monday morning to make sure that there are not any major issues that we have overlooked.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com
=

[attachment "OtherSources_v16.docx" removed by Melissa Weitz/DC/USEPA/US]

(b)(5) deliberative [redacted]

NaturalGasSystems_1990-2011_110912_carriedforward2010GasSTAR+DR(2).xlsx

Re: Revised Natural Gas Systems Spreadsheets
Melissa Weitz to: Marty Wolf 11/13/2012 01:21 PM
Cc: "Fields, Paula"

Hi Marty,

Give me a call if you are free.

(b)(5) deliberative

So, I still have the same question.

"Marty Wolf"	Melissa, In trying to identify the reasons for t...	11/13/2012 01:12:21 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Date: 11/13/2012 01:12 PM
Subject: Re: Revised Natural Gas Systems Spreadsheets

Melissa,

(b)(5) deliberative

(b)(5) deliberative

Please let me know if you need further clarification on this.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 11/13/2012 8:01 AM >>>
Thanks Marty,

Could you provide me with a few bullet points on (b)(5) deliberative

(b)(5) deliberative

If I could get this in the next hour, that'd be great. My division director is presenting this information to our assistant administrator in a few hours. I won't be there, so I won't be able to provide further explanation.

Thanks!

(b)(5) deliberative

"Marty Wolf" ---11/13/2012 10:30:05 AM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/13/2012 10:30 AM
Subject: Revised Natural Gas Systems Spreadsheets

Melissa,

Here are the revised Natural Gas Systems spreadsheets. As we just discussed this morning, I (b)(5) deliberative

Like Friday, we have two versions of the spreadsheets - one with 2011 actual Gas STAR reductions and one with the 2010 Gas STAR reductions pulled forward to 2011.

Please let us know if you have any other questions.

Marty[attachment "NaturalGasSystems_1990-2011_111312_carriedforward2010GasSTAR.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "NaturalGasSystems_1990-2011_111312_actual2011GasSTAR.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Re: Revised Natural Gas Systems Spreadsheets

Melissa Weitz to: Marty Wolf 11/13/2012 01:58 PM
Cc: "Fields, Paula"

Hi,

I'm still getting the numbers I presented in my email below. Please see tab "Other production" of the attached, which walks through the calculations. (b)(5) deliberative [redacted]

Melissa

(b)(5) deliberative [redacted]

Other production.xlsx

"Marty Wolf"	Melissa, In trying to identify the reasons for t...	11/13/2012 01:12:21 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Date: 11/13/2012 01:12 PM
Subject: Re: Revised Natural Gas Systems Spreadsheets

Melissa,

In trying to identify the reasons for the decrease in emissions from the other production categories, I (b)(5) deliberative [redacted]

(b)(5) deliberative

Please let me know if you need further clarification on this.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 11/13/2012 8:01 AM >>>
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Could you provide me with a few bullet points on the (b)(5) deliberative

(b)(5) deliberative

If I could get this in the next hour, that'd be great. My division director is presenting this information to our assistant administrator in a few hours. I won't be there, so I won't be able to provide further explanation.

Thanks!

(b)(5) deliberative

"Marty Wolf" ---11/13/2012 10:30:05 AM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/13/2012 10:30 AM
Subject: Revised Natural Gas Systems Spreadsheets

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Here are the revised Natural Gas Systems spreadsheets. As we just discussed this morning, I (b)(5) deliberative

Like Friday, we have two versions of the spreadsheets - one with 2011 actual Gas STAR reductions and one with the 2010 Gas STAR reductions pulled forward to 2011.

Please let us know if you have any other questions.

Marty[attachment "NaturalGasSystems_1990-2011_111312_carriedforward2010GasSTAR.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "NaturalGasSystems_1990-2011_111312_actual2011GasSTAR.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Re: Revised Natural Gas Systems Spreadsheets
Melissa Weitz to: 11/13/2012 02:27 PM
Cc: "Marty Wolf", "Fields, Paula"

It appears that [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted] (b)(5) deliberative [redacted]

Melissa Weitz	Hi, I'm still getting the numbers I presented i...	11/13/2012 01:58:03 PM

From: Melissa Weitz/DC/USEPA/US
To: "Marty Wolf" <Marty.Wolf@erg.com>
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Date: 11/13/2012 01:58 PM
Subject: Re: Revised Natural Gas Systems Spreadsheets

Hi,

I'm still getting the numbers I presented in my email below. Please see tab "Other production" of the attached, which walks through the calculations. [redacted] (b)(5) deliberative [redacted]

Melissa

[attachment "Other production.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

"Marty Wolf"	Melissa, In trying to identify the reasons for t...	11/13/2012 01:12:21 PM

Re: Revised Natural Gas Systems Spreadsheets

Melissa Weitz to: 11/13/2012 02:41 PM
Cc: "Marty Wolf", "Fields, Paula"

See updated spreadsheet and I'll give you a call in a second

(b)(5) deliberative [redacted]

Other production.xlsx

Melissa Weitz	Hi, I'm still getting the numbers I presented i...	11/13/2012 01:58:03 PM

From: Melissa Weitz/DC/USEPA/US
To: "Marty Wolf" <Marty.Wolf@erg.com>
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Date: 11/13/2012 01:58 PM
Subject: Re: Revised Natural Gas Systems Spreadsheets

Hi,

I'm still getting the numbers I presented in my email below. Please see tab "Other production" of the attached, which walks through the calculations. (b)(5) deliberative [redacted]

Melissa

[attachment "Other production.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

"Marty Wolf"	Melissa, In trying to identify the reasons for t...	11/13/2012 01:12:21 PM

Re: Revised Natural Gas Systems Spreadsheets
Melissa Weitz to: Marty Wolf 11/13/2012 02:50 PM

(b)(5) deliberative [redacted]

Gina Update on Nat Gas 11.13_11.13 version.pptx

"Marty Wolf"	Melissa, I think that the big difference can be...	11/13/2012 02:36:43 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Date: 11/13/2012 02:36 PM
Subject: Re: Revised Natural Gas Systems Spreadsheets

Melissa,

[redacted] (b)(5) deliberative [redacted]

Does that make sense?

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 11/13/2012 10:58 AM >>>
Hi,

I'm still getting the numbers I presented in my email below. Please see tab "Other production" of the attached, which walks through the calculations. [redacted] (b)(5) deliberative [redacted]

Melissa

(See attached file: Other production.xlsx)

"Marty Wolf" ---11/13/2012 01:12:21 PM---Melissa, In trying to identify the reasons for the decrease in emissions from the other production c

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Date: 11/13/2012 01:12 PM
Subject: Re: Revised Natural Gas Systems Spreadsheets

Melissa,

In trying to identify the reasons for [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Please let me know if you need further clarification on this.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
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916-635-6594 (phone)
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marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 11/13/2012 8:01 AM >>>
Thanks Marty,

Could you provide me with a few bullet points on (b)(5) deliberative

If I could get this in the next hour, that'd be great. My division director is presenting this information to our assistant administrator in a few hours. I won't be there, so I won't be able to provide further explanation.

Thanks!

(b)(5) deliberative

"Marty Wolf" ---11/13/2012 10:30:05 AM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/13/2012 10:30 AM
Subject: Revised Natural Gas Systems Spreadsheets

Melissa,

Here are the revised Natural Gas Systems spreadsheets. As we just discussed this morning, (b)(5) deliberative

Like Friday, we have two versions of the spreadsheets - one with 2011 actual Gas STAR reductions and one with the 2010 Gas STAR reductions pulled forward to 2011.

Please let us know if you have any other questions.

Marty[attachment "NaturalGasSystems_1990-2011_111312_carriedforward2010GasSTAR.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "NaturalGasSystems_1990-2011_111312_actual2011GasSTAR.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

gina briefing slide 6

Melissa Weitz to: Bill Irving 11/13/2012 03:00 PM

(b)(5) deliberative

(b)(5) deliberative

Natural Gas Inventory QA
Melissa Weitz to: Stricklin, Eric 11/13/2012 06:09 PM
Cc: Suzanne Waltzer

Hi Eric,

As we discussed, below is the draft spreadsheet for the 2013 GHG Inventory.

The main changes you'll see are [redacted] (b)(5) deliberative [redacted]

Feel free to call with any questions as you are reviewing. Thank you!

Melissa

[redacted] (b)(5) deliberative

NaturalGasSystems_1990-2011_111312_carriedforward2010GasSTAR_11.13.xlsx

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

RE: quick q on liquids unloading

Minnucci, Chris A. to: Melissa Weitz, Kidman, Timothy M. (b)(5) deliberative

History: This message has been forwarded.

Melissa,

Please see the added text in red font for the fourth bullet.

Chris

- [redacted]

- [redacted]

- [redacted]

- [redacted]

(b)(5) deliberative

-

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tue 11/13/2012 10:51 PM
To: Kidman, Timothy M.
Cc: Minnucci, Chris A.
Subject: RE: quick q on liquids unloading

Thanks!

Could you add a bit more about (b)(5) deliberative ?

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com> wrote:

To: Melissa Weitz/DC/USEPA/US@EPA, "Minnucci, Chris A."
<CHRIS.A.MINNUCCI@saic.com>
From: "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/13/2012 08:27PM
Subject: RE: quick q on liquids unloading

Hi Melissa,

Below are five bullets that I think should sum up why the data changed, and touch on why the trend in the current data exists. I'm not sure whether the last bullet is necessary, but it is at least a contributing factor. Hope these help.

- (b)(5) deliberative

(b)(5) deliberative

-

-

-

-

Tim

Tim Kidman | SAIC

Climate Change Analyst

Energy, Environment & Infrastructure Solutions

phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 13, 2012 1:40 PM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: quick q on liquids unloading

Hi,

My management is asking for a few bullets on (b)(5) deliberative [redacted]

Would you be able to draft up 5 bullets on the differences, based on your memo? They should be along the lines of the bullets (though I'm not sure that my bullets are correct) I've drafted below.

Does this make sense, and can you do this today by any chance?

Let me know--thank you!

- [redacted] (b)(5) deliberative [redacted]
- [redacted]
- [redacted]

RE: Natural Gas Inventory QA

Melissa Weitz to: Stricklin, Eric 11/14/2012 10:05 AM

Cc: "Robinson, Donald", "Seastream, Sandra", Suzanne Waltzer

Hi Eric,

For the completions/workovers, the update was to be consistent with the NSPS--let me know if you need other documentation on that.

For liquids unloading, please see the memo and spreadsheet below.

(b)(5) deliberative

(b)(5) deliberative (b)(5) deliberative

Liquids Unloading Interpolation.xlsx Liquids Unloading Recalculations_regional AF_correct.xlsx

(b)(5) deliberative (b)(5) deliberative

Liquids Unloading Recalculations_v6.xlsx API-ANGA EFs Memo_v10.docx

(b)(5) deliberative

(b)(5) deliberative

- (b)(5) deliberative [redacted]

- [redacted]

Thank you very much for conducting this review. I'll check to see if there is other documentation I can get you. Please let me know if you have questions while you're reviewing.

Melissa

"Stricklin, Eric"	Melissa, Do you have documentation for the...	11/14/2012 09:38:48 AM

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA, "Robinson, Donald" <Donald.Robinson@icfi.com>, "Seastream, Sandra" <Sandra.Seastream@icfi.com>
Date: 11/14/2012 09:38 AM
Subject: RE: Natural Gas Inventory QA

Melissa,

Do you have documentation for the improvements that were implemented in the Inventory spreadsheet? We'll need a firm understanding of the assumptions and the methodology for the improvements in order to conduct a thorough QA/QC.

Thanks,
Eric

Eric Stricklin | Associate | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 13, 2012 6:10 PM
To: Stricklin, Eric
Cc: Waltzer.Suzanne@epamail.epa.gov
Subject: Natural Gas Inventory QA

Hi Eric,

As we discussed, below is the draft spreadsheet for the 2013 GHG Inventory.

The main changes you'll see are [redacted] (b)(5) deliberative [redacted]

Feel free to call with any questions as you are reviewing. Thank you!

Melissa

(See attached file: NaturalGasSystems_1990-2011_111312_carriedforward2010GasSTAR_11.13.xlsx)

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

RE: RE: Natural Gas Systems Spreadsheet

Melissa Weitz to: Minnucci, Chris A. 11/14/2012 10:11 AM

Cc: "Richards, Richard Y.", "Kidman, Timothy M."

Checking into this, will get you what I can.

"Minnucci, Chris A."	Melissa,	11/14/2012 09:59:17 AM

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
Date: 11/14/2012 09:59 AM
Subject: RE: RE: Natural Gas Systems Spreadsheet

Melissa,

[redacted] (b)(5) deliberative [redacted]

[redacted] :

[redacted]

[redacted] Is this something ERG could provide for us?

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 11/12/2012 7:58 PM

To: Minnucci, Chris A.
Cc: Richards, Richard Y.; Kidman, Timothy M.
Subject: Re: RE: Natural Gas Systems Spreadsheet

Thank you!

Would you be able to correct the spreadsheet to address the "other production" error you describe below? If so, please go ahead and do so.

Are there any checks you may be able to do on [redacted] (b)(5) deliberative [redacted]

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Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA, "Kidman, Timothy M." <TIMOTHY.M.KIDMAN@saic.com>
From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
Date: 11/12/2012 04:51PM
Cc: "Richards, Richard Y." <RICHARD.Y.RICHARDS@saic.com>
Subject: RE: Natural Gas Systems Spreadsheet

Melissa,

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[redacted]

(b)(5) deliberative

(b)(5) deliberative

Please let me know if you have any questions on this.

thanks,
Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Sun 11/11/2012 8:17 PM
To: Minnucci, Chris A.; Kidman, Timothy M.
Subject: Fw: Natural Gas Systems Spreadsheet

Hello,

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Thank you!
Melissa

Melissa M. Weitz
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Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 11/11/2012 08:15PM -----
To: Melissa Weitz/DC/USEPA/US@EPA

From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/09/2012 05:43PM
Cc: "Gopi Manne" <Gopi.Manne@erg.com>, "Paula Fields" <Paula.Fields@erg.com>
Subject: Natural Gas Systems Spreadsheet

(See attached file: NaturalGasSystems_1990-2011_110912_carriedforward2010GasSTAR.xlsx)
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Melissa,

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Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com
=

[attachment "OtherSources_v16.docx" removed by Melissa Weitz/DC/USEPA/US]

FW: Natural Gas Inventory QA

Stricklin, Eric to: Suzanne Waltzer 11/14/2012 12:40 PM

Cc: "Seastream, Sandra", "Robinson, Donald" , "Kane, Drew", Melissa Weitz

History: This message has been replied to and forwarded.

Suzie,

Don, Sandy, and Drew would like to participate on our phone call this afternoon. I can set-up a conference call number for everyone. Let me know if I should.

Eric

Eric Stricklin | Associate | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, November 14, 2012 10:05 AM
To: Stricklin, Eric
Cc: Robinson, Donald; Seastream, Sandra; Waltzer.Suzanne@epamail.epa.gov
Subject: RE: Natural Gas Inventory QA

Hi Eric,

For the completions/workovers, the update was to be consistent with the NSPS--let me know if you need other documentation on that.

-

For liquids unloading, please see the memo and spreadsheet below.

(b)(5) deliberative [redacted]

(See attached file: Liquids Unloading Interpolation.xlsx)(See attached file: Liquids Unloading Recalculations_regional AF_correct.xlsx)(See attached file: Liquids Unloading

Recalculations_v6.xlsx)(See attached file: API-ANGA EFs Memo_v10.docx)

(b)(5) deliberative

(b)(5) deliberative

-
-
-
-

Thank you very much for conducting this review. I'll check to see if there is other documentation I can get you. Please let me know if you have questions while you're reviewing.

Melissa

-

"Stricklin, Eric" ---11/14/2012 09:38:48 AM---Melissa, Do you have documentation for the improvements that were implemented in the Inventory sprea

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA, "Robinson, Donald" <Donald.Robinson@icfi.com>, "Seastream, Sandra" <Sandra.Seastream@icfi.com>
Date: 11/14/2012 09:38 AM
Subject: RE: Natural Gas Inventory QA

Melissa,

Do you have documentation for the improvements that were implemented in the Inventory spreadsheet? We'll need a firm understanding of the assumptions and the methodology for the improvements in order to conduct a thorough QA/QC.

Thanks,
Eric

Eric Stricklin | Associate | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 13, 2012 6:10 PM
To: Stricklin, Eric
Cc: Waltzer.Suzanne@epamail.epa.gov
Subject: Natural Gas Inventory QA

Hi Eric,

As we discussed, below is the draft spreadsheet for the 2013 GHG Inventory.

The main changes you'll see are [redacted] (b)(5) deliberative [redacted]

Feel free to call with any questions as you are reviewing. Thank you!

Melissa

(See attached file: NaturalGasSystems_1990-2011_111312_carriedforward2010GasSTAR_11.13.xlsx)

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897 (b)(5) deliberative [redacted]
Weitz.Melissa@epa.gov

Liquids Unloading Interpolation.xlsx
(b)(5) deliberative

Liquids Unloading Recalculations_regional AF_correct.xlsx
(b)(5) deliberative

Liquids Unloading Recalculations_v6.xlsxAPI-ANGA EFs Memo_v10.docx

RE: Natural Gas Inventory QA
Melissa Weitz to: Stricklin, Eric 11/14/2012 01:48 PM
Cc: "Robinson, Donald", "Kane, Drew", "Seastream, Sandra", Suzanne Waltzer

Hi Eric,

The supplemental TSD will cover [redacted] (b)(5) deliberative [redacted].

The proposal TSD may cover some of the other pieces, but I'm less familiar with it.

We're less concerned about the completions/workovers #s--for now, it'd be good to just focus on liquids unloading. We can talk about the other pieces on our call later today.

Melissa

"Stricklin, Eric"	For completion/workovers, just to be clear, I...	11/14/2012 12:37:51 PM

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>, "Seastream, Sandra" <Sandra.Seastream@icfi.com>, Suzanne Waltzer/DC/USEPA/US@EPA, "Kane, Drew" <Drew.Kane@icfi.com>
Date: 11/14/2012 12:37 PM
Subject: RE: Natural Gas Inventory QA

For completion/workovers, just to be clear, I should follow the NSPS Supplemental Technical Support Document and Proposal Technical Support Document.

Thanks,

Eric

Eric Stricklin | Associate | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, November 14, 2012 10:05 AM
To: Stricklin, Eric
Cc: Robinson, Donald; Seastream, Sandra; Waltzer.Suzanne@epamail.epa.gov
Subject: RE: Natural Gas Inventory QA

Hi Eric,

For the completions/workovers, the update was to be consistent with the NSPS--let me know if you need other documentation on that.

-

For liquids unloading, please see the memo and spreadsheet below.

(b)(5) deliberative

(See attached file: Liquids Unloading Interpolation.xlsx)(See attached file: Liquids Unloading Recalculations_regional AF_correct.xlsx)(See attached file: Liquids Unloading Recalculations_v6.xlsx)(See attached file: API-ANGA EFs Memo_v10.docx)

(b)(5) deliberative

$W_{NATOT} * (W_{NAMC}/(W_{NATOT} - W_{NANE}))$

(b)(5) deliberative

Thank you very much for conducting this review. I'll check to see if there is other documentation I can get you. Please let me know if you have questions while you're reviewing.

Melissa

"Stricklin, Eric" ---11/14/2012 09:38:48 AM---Melissa, Do you have documentation for the improvements that were implemented in the Inventory sprea

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA, "Robinson, Donald" <Donald.Robinson@icfi.com>, "Seastream, Sandra" <Sandra.Seastream@icfi.com>
Date: 11/14/2012 09:38 AM
Subject: RE: Natural Gas Inventory QA

Melissa,

Do you have documentation for the improvements that were implemented in the Inventory spreadsheet? We'll need a firm understanding of the assumptions and the methodology for the improvements in order to conduct a thorough QA/QC.

Thanks,
Eric

Eric Stricklin | Associate | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 13, 2012 6:10 PM
To: Stricklin, Eric
Cc: Waltzer.Suzanne@epamail.epa.gov
Subject: Natural Gas Inventory QA

Hi Eric,

As we discussed, below is the draft spreadsheet for the 2013 GHG Inventory.

The main changes you'll see are (b)(5) deliberative

(b)(5) deliberative

Feel free to call with any questions as you are reviewing. Thank you!

Melissa

(See attached file: NaturalGasSystems_1990-2011_111312_carriedforward2010GasSTAR_11.13.xlsx)

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Fw: update on natural gas Inventory estimates--liquids unloading

Melissa Weitz to: Bill Irving 11/14/2012 01:55 PM

I'm just going to send this on now since it seems a bit urgent.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/14/2012 01:54 PM -----

From: Melissa Weitz/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA
Date: 11/14/2012 10:38 AM
Subject: update on natural gas Inventory estimates--liquids unloading

Suzie asked me to send Paul a few bullets on the liquids unloading estimates for Paul. Do you want to review this before I send it on?

Below are a few bullets on the updates to the liquids unloading methodology and impacts on emissions.

- [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Fw: update on natural gas Inventory estimates--liquids unloading

Melissa Weitz to: Suzanne Waltzer, Mark DeFigueiredo 11/14/2012 01:55 PM

Below are a few bullets on the updates to the liquids unloading methodology and impacts on emissions.

- (b)(5) deliberative

Update on Natural Gas GHG inventory--Liquids Unloading

Melissa Weitz to: Paul Gunning, Bill Irving, Suzanne Kocchi, Anhar Karimjee, Suzanne Waltzer, Mark DeFigueiredo, Leif Hockstad 11/14/2012 02:54 PM

Below are a few bullets on the updates to the liquids unloading methodology for the 2013 Inventory expert review draft and impacts on emissions.

(b)(5) deliberative

[redacted]

Re: FW: Natural Gas Inventory QA

Melissa Weitz to: Stricklin, Eric 11/14/2012 03:31 PM
Cc: "Robinson, Donald", "Kane, Drew", "Seastream, Sandra", Suzanne Waltzer

Sorry for the delayed response--

We can use my conference line--- (b)(6) personal privacy

Thanks!
Melissa

"Stricklin, Eric"	Suzie, Don, Sandy, and Drew would like to p...	11/14/2012 12:40:28 PM

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Seastream, Sandra" <Sandra.Seastream@icfi.com>, "Robinson, Donald" <Donald.Robinson@icfi.com>, "Kane, Drew" <Drew.Kane@icfi.com>, Melissa Weitz/DC/USEPA/US@EPA
Date: 11/14/2012 12:40 PM
Subject: FW: Natural Gas Inventory QA

Suzie,

Don, Sandy, and Drew would like to participate on our phone call this afternoon. I can set-up a conference call number for everyone. Let me know if I should.

Eric

Eric Stricklin | Associate | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, November 14, 2012 10:05 AM
To: Stricklin, Eric
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Hi Eric,

For the completions/workovers, the update was to be consistent with the NSPS--let me know if you need other documentation on that.

-

For liquids unloading, please see the memo and spreadsheet below.

(b)(5) deliberative

(b)(5) deliberative

(See attached file: Liquids Unloading Interpolation.xlsx)(See attached file: Liquids Unloading Recalculations_regional AF_correct.xlsx)(See attached file: Liquids Unloading Recalculations_v6.xlsx)(See attached file: API-ANGA EFs Memo_v10.docx)

(b)(5) deliberative

-

(b)(5) deliberative

-
-
-

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Melissa

"Stricklin, Eric" ---11/14/2012 09:38:48 AM---Melissa, Do you have documentation for the improvements that were implemented in the Inventory sprea

From: "Stricklin, Eric" <Eric.Stricklin@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA, "Robinson, Donald" <Donald.Robinson@icfi.com>, "Seastream, Sandra" <Sandra.Seastream@icfi.com>
Date: 11/14/2012 09:38 AM
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Do you have documentation for the improvements that were implemented in the Inventory spreadsheet? We'll need a firm understanding of the assumptions and the methodology for the improvements in order to conduct a thorough QA/QC.

Thanks,
Eric

Eric Stricklin | Associate | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 13, 2012 6:10 PM
To: Stricklin, Eric
Cc: Waltzer.Suzanne@epamail.epa.gov
Subject: Natural Gas Inventory QA

Hi Eric,

As we discussed, below is the draft spreadsheet for the 2013 GHG Inventory.

The main changes you'll see are [redacted] (b)(5) deliberative [redacted]

Feel free to call with any questions as you are reviewing. Thank you!

Melissa

(See attached file: NaturalGasSystems_1990-2011_111312_carriedforward2010GasSTAR_11.13.xlsx)

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov[attachment "Liquids Unloading Interpolation.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Recalculations_regional AF_correct.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Liquids Unloading Recalculations_v6.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "API-ANGA EFs Memo_v10.docx" deleted by Melissa Weitz/DC/USEPA/US]

API LU data

Melissa Weitz to: Stricklin, Eric, Robinson, Donald 11/14/2012 04:41 PM

Cc: Suzanne Waltzer

API/ANGA LU data is below. As I mentioned on the call, this should not be distributed. Please do not distribute beyond those who need to review the data to review the LU estimates.

Thank you!

(b)(5) deliberative [redacted]

Liquids Unloading Data Final Shared w EPA 9Oct12.xlsx

review so far
Melissa Weitz to: Paula Fields, Marty Wolf 11/14/2012 04:57 PM

Hello,

ICF is now conducting some QA on the GHG Inventory estimates and has quite a few questions. They'll send me over more details later, but there are a few issues I think we can address now:

(b)(5) deliberative

In good news, so far people feel pretty good about the Liquids Unloading updates. So, that was my major concern, but so far so good.

Once the review is completed (ICF is aiming for noon tomorrow), we'll need to act fast on making updates. We'll want the numbers as soon as possible, but we won't get the okay to release the numbers until our management is comfortable that we've addressed issues from this review.

Melissa

FW: Inventory QA/QC Preliminary Results

Robinson, Donald to: Melissa Weitz 11/15/2012 01:24 PM

Cc: Suzanne Waltzer, "Seastream, Sandra", "Stricklin, Eric" , "Kane, Drew", "Greene, Kevin"

History: This message has been replied to and forwarded.

Here is where we are, and we are talking about this on the phone now.

Don

Donald Robinson
Vice President
ICF International
703-218-2512
703-934-3915 fax

From: Stricklin, Eric
Sent: Thursday, November 15, 2012 12:35 PM
To: Robinson, Donald
Cc: Seastream, Sandra; Kane, Drew
Subject: Inventory QA/QC Preliminary Results

Don,

Below is a summary of ICF's on-going QA/QC of the 2011 Natural Gas Inventory.

[redacted] (b)(5) deliberative [redacted]

[redacted] |
[redacted]

[redacted]

(b)(5) deliberative

(b)(5) deliberative

Eric

Eric Stricklin | Associate | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

Fw: Inventory QA/QC Preliminary Results

Melissa Weitz to: Paula Fields, Marty Wolf 11/15/2012 02:01 PM

My comments below are underlined and in caps. Thanks!

Below is a summary of ICF's on-going QA/QC of the 2011 Natural Gas Inventory.

(b)(5) deliberative

(b)(5) deliberative

review of expert review draft text for natural gas?
Melissa Weitz to: Bill Irving 11/15/2012 02:20 PM

Hi,

Below is the latest version of the text on liquids unloading. I'll need to update this with the final numbers when they are ready (now looking like Monday).

I've highlighted in yellow the key areas I've updated. Would you be able to review those areas? I know we've discussed a number of things to include in the text and I'm sure I haven't captured them all.

Let me know your thoughts on what additional information to include.

Thanks!
Melissa

(b)(5) deliberative

[redacted]

3.6 Natural Gas Systems_erg_111412_MW.docx

Re: FW: Inventory QA/QC Preliminary Results

Melissa Weitz to: Robinson, Donald 11/15/2012 03:22 PM

Cc: "Kane, Drew", "Stricklin, Eric", "Greene, Kevin", "Seastream, Sandra", Suzanne Waltzer

Thanks so much for sending these over. I've added responses to #4 and #6 below.

"Robinson, Donald"	Here is where we are, and we are talking a...	11/15/2012 01:24:45 PM

From: "Robinson, Donald" <Donald.Robinson@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA, "Seastream, Sandra" <Sandra.Seastream@icfi.com>, "Stricklin, Eric" <Eric.Stricklin@icfi.com>, "Kane, Drew" <Drew.Kane@icfi.com>, "Greene, Kevin" <Kevin.Greene@icfi.com>
Date: 11/15/2012 01:24 PM
Subject: FW: Inventory QA/QC Preliminary Results

Here is where we are, and we are talking about this on the phone now.

Don

Donald Robinson
Vice President
ICF International
703-218-2512
703-934-3915 fax

From: Stricklin, Eric
Sent: Thursday, November 15, 2012 12:35 PM
To: Robinson, Donald
Cc: Seastream, Sandra; Kane, Drew
Subject: Inventory QA/QC Preliminary Results

Don,

Below is a summary of ICF's on-going QA/QC of the 2011 Natural Gas Inventory.

[redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

(b)(5) deliberative

[redacted]

[redacted]

[redacted]

[redacted]

Eric

Eric Stricklin | Associate | 703.218.2505 | eric.stricklin@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax VA 22031 | www.icfi.com

Re: liquids unloading
Melissa Weitz to: Erin Birgfeld 11/16/2012 11:49 AM
Cc: Anhar Karimjee, Bill Irving, Isabel DeLuca, Mark DeFigueiredo, Suzanne Kocchi, Suzanne Waltzer

---

I'm out today, but SAIC is working on this and should have something today or Monday.

-----Erin Birgfeld/DC/USEPA/US wrote: -----
To: Suzanne Kocchi/DC/USEPA/US@EPA
From: Erin Birgfeld/DC/USEPA/US
Date: 11/16/2012 10:34AM
Cc: Anhar Karimjee/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Isabel DeLuca/DC/USEPA/US@EPA
Subject: Re: liquids unloading

looping in Isabel ... I'm out for the rest of the day today.

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

Suzanne Kocchi---11/16/2012 10:30:33 AM---Bill is in another meeting with Gina right now and she is raising the liquids unloading numbers - th

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Anhar Karimjee/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA
Date: 11/16/2012 10:30 AM
Subject: liquids unloading

Bill is in another meeting with Gina right now and she is raising the liquids unloading numbers - the reduction we showed her the other day. She is looking for some type of communication piece/talking points to explain it clearly and concisely. We need to be able to explain the reduction, why we are confident and why our estimate was so much higher before.

No official time for response but it will be QTA when we get it. Can you please start pulling something together? We should have something later today or Mon at the latest.

Thanks!

RE: Update on Natural Gas GHG inventory--Liquids Unloading

Kidman, Timothy M. to: Melissa Weitz, Minnucci, Chris A. 11/16/2012 02:42 PM
Cc: "Richards, Richard Y."

History: This message has been replied to and forwarded.

Hi Melissa,

I think your three reasons are generally correct. We'll take a crack at drafting some new bullet points and will do our best to get them to you today.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, November 16, 2012 8:49 AM
To: Kidman, Timothy M.; Minnucci, Chris A.
Subject: Fw: Update on Natural Gas GHG inventory--Liquids Unloading

Hi,

Would you be able to pull together a communication piece/talking points on the liquids unloading update?

It should explain the decrease in the estimate, why we are confident and why our estimate was so much higher before.

I had pulled together the bullets below, but our communications office wants something more concise. It should be shorter than the write up below, but provide more key points on why the numbers are so much lower, why they were higher before, and why we think this update is correct.

And, just to check that I understand it, are the three key reasons that [redacted] (b)(5) deliberative [redacted]?

If it'd be possible to pull this together today, that'd be great.

I'm out of the office today but will be checking email periodically.

Melissa

(b)(5) deliberative

(b)(5) deliberative

[redacted]

RE: Update on Natural Gas GHG inventory--Liquids Unloading

Kidman, Timothy M. to: Melissa Weitz, Minnucci, Chris A. 11/16/2012 07:13 PM
Cc: "Richards, Richard Y."

History: This message has been replied to and forwarded.

Hi Melissa,

Please find attached some draft bullets. We tried to make these a little bit more concise (i.e., more bullets with less information each), and also attempted to use less jargon to make them more accessible to the public. Please let me know if you have any questions.

Tim

Tim Kidman | SAIC
Climate Change Analyst
Energy, Environment & Infrastructure Solutions
phone: 626.993.8872

Energy | Environment | National Security | Health | Critical Infrastructure

Please consider the environment before printing this email.

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, November 16, 2012 8:49 AM
To: Kidman, Timothy M.; Minnucci, Chris A.
Subject: Fw: Update on Natural Gas GHG inventory--Liquids Unloading

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If it'd be possible to pull this together today, that'd be great.

I'm out of the office today but will be checking email periodically.

Melissa

(b)(5) deliberative

(b)(5) deliberative

(b)(5) deliberative

Liquids Unloading Update Talking Points.docx

1 pager on liquids unloading

Melissa Weitz to: Suzanne Kocchi 11/19/2012 10:28 AM

Let me know if this is what Paul is looking for, or how I can edit it if not.

Thanks,
Melissa

(b)(5) deliberative

[redacted]

Liquids Unloading Update 1 pager.docx

Re: 1 pager on liquids unloading
Suzanne Kocchi to: Melissa Weitz 11/19/2012 11:49 AM

History: This message has been replied to and forwarded.

I changed the format some and hopefully retained most of what you had in there (which was good). We just need some additional background and framing. See spots where I flagged for you. Once you are good, maybe delete those comments and then ship down to Alex (and call him) to see if he can fill in or know who we can ask about this? Thanks!

(b)(5) deliberative

Liquids Unloading Update 1 pager_sk.docx

Melissa Weitz	Let me know if this is what Paul is looking for...	11/19/2012 10:28:06 AM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Date: 11/19/2012 10:28 AM
Subject: 1 pager on liquids unloading

Let me know if this is what Paul is looking for, or how I can edit it if not.

Thanks,
Melissa

[attachment "Liquids Unloading Update 1 pager.docx" deleted by Suzanne Kocchi/DC/USEPA/US]

RE: liquids unloading

Minnucci, Chris A. to: Melissa Weitz, Kidman, Timothy M. 11/19/2012 12:10 PM

History: This message has been forwarded.

Melissa,

I'm resending an analysis we sent previously of the differences between the June and September versions of the API/ANGA report. The appendix to this paper shows the specific data changes that API/ANGA made. As noted in the paper, changes were made to the inputs to the emissions equations for 10 of the datasets; the specific changes are shown in the appendix.

(b)(5) deliberative

[redacted]

[redacted]

[redacted]

What we would recommend is that EPA put this question to API/ANGA. Since API/ANGA is in effect asking EPA to use their data, since their data changed drastically between June and September, and since they have never offered an explanation for the change, we feel EPA does have a right to an answer to this question before committing to the use of the API/ANGA data.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 11/19/2012 10:58 AM
To: Kidman, Timothy M.; Minnucci, Chris A.
Subject: liquids unloading

Hello,

We're having ICF review the natural gas inventory estimates, with focus on the liquids unloading estimates.

Can you take a look at some of their preliminary findings below? Do you have any thoughts on the changes in the primary data from the first to the second API/ANGA report? I know you brought this to our attention before, but I don't think we spent much time discussing this.

Thank you!
Melissa

(b)(5) deliberative

[redacted]

[redacted]

(b)(5) deliberative

(b)(5) deliberative

Analysis of Changes to API ANGA LU calcs.docx

Liquids unloading and NEI

Melissa Weitz to: Alex Macpherson 11/19/2012 01:38 PM

Hi Alex,

I'm following up on some of the liquids unloading issues that Suzie K raised with you.

Below is a 1-pager on liquids unloading. Could you please review and provide information in the areas labeled "OAQPS/Alex"? If you do not have this information, could you please let me know who may have it? If we could get this back today, that'd be great.

In addition, pasted below are a few questions from our office director. I think the bullets in the attached one pager will cover the questions below, but if you have additional information, please let me know.

Thank you!
Melissa

Note from Sarah:

[redacted] (b)(5) deliberative [redacted]

[redacted] (b)(5) deliberative [redacted]

Liquids Unloading Update 1 pager_sk.docx

Re: Fw: Update on Inventory QA/QC
Marty Wolf to: Melissa Weitz 11/19/2012 02:22 PM
Cc: "Fields, Paula"

History: This message has been forwarded.

Melissa,

We'll be in Monday through Wednesday - although we might bail out a little early on Wednesday. We will not be in on Friday.

We should be able to make updates over the first 2-3 days of next week - assuming there is nothing totally earth-shattering!

We'll stay in a holding pattern with the Annex.

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 11/19/2012 10:50 AM
>>>

Hello,

Yes, still hold off on the Annex changes.

I'll be in the office Monday-Wednesday of this week. What are your schedules?

We should get the results of ICF QA/QC tomorrow afternoon. It looks like we may need a follow up call with API. By Wednesday, we should have all of the info we're going to get, and then I'm hoping we can make any updates we need by next Tuesday/Wednesday. Does that seem like it will work (though I know it's hard to say not knowing if there is anything that needs to be updated)?

Melissa

"Marty Wolf" ---11/19/2012 12:28:07 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Paula Fields" <Paula.Fields@erg.com>
Date: 11/19/2012 12:28 PM
Subject: Re: Fw: Update on Inventory QA/QC

Melissa,

Thanks for the update. At this point, do you still want us to

hold off on the Annex changes?

We have not been directly involved with the NEI development - other people in our RTP North Carolina office have been. ERG was splitting NEI development over the years with other contractors. However, we have become very familiar with the NEI through QA activities and through its use in other regional activities. Off hand, we do not have information about how and to what extent the liquids unloading changes would impact the NEI estimates. However, we would be willing and able to assist and facilitate that sort of reconciliation activity.

(b)(6) personal privacy

Again, what is your schedule for the rest of the week?

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>>
<Weitz.Melissa@epamail.epa.gov> 11/19/2012 8:32 AM
>>>

Hello,

Status update on ICF's review. I will let you know when I know more from them on timing. My guess is that there won't be much to change in the GHG Inventory based on this review.

Do you happen to work on the NEI at all (with OAQPS)? We have a few questions about how the liquids unloading changes may or may not impact the NEI estimates. I think we have them covered with our contacts at OAQPS, but let me know if you also have information on this.

I hope all's well. Marty, (b)(6) personal privacy?

Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/19/2012 11:06 AM -----

From: "Robinson, Donald" <Donald.Robinson@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Seastream, Sandra" <Sandra.Seastream@icfi.com>, "Stricklin, Eric" <Eric.Stricklin@icfi.com>, "Cacho, Mariella" <Mariella.Cacho@icfi.com>
Date: 11/16/2012 06:15 PM
Subject: FW: Update on Inventory QA/QC

Melissa,
Here is our status as of today. I am away from the office (in Colombia and Brazil) all of next week, so please revert to Sandy Seastream and Eric Stricklin in my absence. ERIC is away from the office starting Monday afternoon through Thanksgiving holiday, so Mariella Cacho is been brought up to date on the engineers' work, so please revert to her in Eric's absence.

Regards:
Don

Donald Robinson
Vice President
ICF International
703-218-2512
703-934-3915 fax

From: Stricklin, Eric
Sent: Thursday, November 15, 2012 9:00 PM
To: Robinson, Donald; Seastream, Sandra
Cc: Kane, Drew
Subject: Update on Inventory QA/QC

Don, Sandy,

I will be in late tomorrow due to (b)(6) personal privacy [redacted]. Below I have provided a summary of our progress on the Inventory QA/QC in case Suzie or Melissa asks.

(b)(5) deliberative
[redacted]

(b)(5) deliberative

(b)(5) deliberative

Re: 1 pager on liquids unloading

Melissa Weitz to: Suzanne Kocchi 11/19/2012 03:32 PM

Update--I added my info and sent this on to Alex and Mark to add their info. Hopefully will have something ready today or tomorrow a.m.

Suzanne Kocchi	I changed the format some and hopefully ret...	11/19/2012 11:49:13 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/19/2012 11:49 AM
Subject: Re: 1 pager on liquids unloading

I changed the format some and hopefully retained most of what you had in there (which was good). We just need some additional background and framing. See spots where I flagged for you. Once you are good, maybe delete those comments and then ship down to Alex (and call him) to see if he can fill in or know who we can ask about this? Thanks!

[attachment "Liquids Unloading Update 1 pager_sk.docx" deleted by Melissa Weitz/DC/USEPA/US]

Melissa Weitz	Let me know if this is what Paul is looking for...	11/19/2012 10:28:06 AM

RE: liquids unloading
Minnucci, Chris A. to: Melissa Weitz 11/20/2012 08:54 AM
Cc: "Kidman, Timothy M."

History: This message has been forwarded.

Melissa,

Here is what I would suggest:

(b)(5) deliberative

I couldn't resist taking the opportunity to slip that last question in there, as it obviously doesn't deal with the changes between the June and September reports--but it addresses the important broader issue of the representativeness of the data. Not that there's anything that can be done about the data's representativeness, but it is good to know as it relates to issues of uncertainty and bias.

Chris

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 11/19/2012 2:28 PM
To: Minnucci, Chris A.
Cc: Kidman, Timothy M.
Subject: RE: liquids unloading

Thank you!

Would you be able to provide me with the top 3 or 4 questions to ask API/ANGA about the changes to the data set?

I will let you know if I am able to schedule a call with them.

Melissa

"Minnucci, Chris A." ---11/19/2012 02:08:54 PM---Melissa,

From: "Minnucci, Chris A." <CHRIS.A.MINNUCCI@saic.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Kidman, Timothy M."
<TIMOTHY.M.KIDMAN@saic.com>
Date: 11/19/2012 02:08 PM
Subject: RE: liquids unloading

Melissa,

One other point here. In the last sentence of ICF's analysis they seem to be suggesting [redacted] (b)(5) deliberative [redacted]

Chris

From: Minnucci, Chris A.
Sent: Mon 11/19/2012 12:08 PM
To: Weitz.Melissa@epamail.epa.gov; Kidman, Timothy M.
Subject: RE: liquids unloading

Melissa,

I'm resending an analysis we sent previously of the differences between the June and September versions of the API/ANGA report. The appendix to this paper shows the specific data changes that API/ANGA made. As noted in the paper, changes were made to the inputs to the emissions equations for 10 of the datasets; the specific changes are shown in the appendix.

(b)(5) deliberative

[redacted]

What we would recommend is that EPA put this question to API/ANGA. Since API/ANGA is in effect asking EPA to use their data, since their data changed drastically between June and September, and since they have never offered an explanation for the change, we feel EPA does have a right to an answer to this question before committing to the use of the API/ANGA data.

Chris

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Mon 11/19/2012 10:58 AM
To: Kidman, Timothy M.; Minnucci, Chris A.
Subject: liquids unloading

Hello,

We're having ICF review the natural gas inventory estimates, with focus on the liquids unloading estimates.

Can you take a look at some of their preliminary findings below? Do you have any thoughts on the changes in the primary data from the first to the second API/ANGA report? I know you brought this to our attention before, but I don't think we spent much time discussing this.

Thank you!
Melissa

(b)(5) deliberative

[redacted]

[redacted]

(b)(5) deliberative

[redacted]

(b)(5) deliberative [redacted] graycol.gif

Hide Details

Review Liquids Unloading Estimates in 2013 Inventory

Thu 11/29/2012 11:00 AM - 12:00 PM

Attendance is **required** for Melissa Weitz

Chair: **Sarah Dunham/DC/USEPA/US**

Sent By: **Tina Murphy/DC/USEPA/US**

Rooms: 1310L Room 1002 OD/DC-1310L-OAR@EPA

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required:	Bill Irving/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Paul Gunning/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Optional:	Erin Birgfeld/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA

Description

Personal Notes

Re: timing of expert review for gina briefing ?
Suzanne Kocchi to: Bill Irving 11/20/2012 09:00 AM
Cc: Melissa Weitz, Leif Hockstad

History: This message has been replied to.

crap. it was sarah that wanted the pre-brief and brief 2 weeks before. i'll put in the requests and we will see if we can get close to those dates.

can we send everything out and hold the gas expert review back a week if we get stymied with schedules?

Bill Irving | The plan is to have it ready by December 5 for in... | 11/20/2012 08:56:33 AM

From: Bill Irving/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA
Date: 11/20/2012 08:56 AM
Subject: Re: timing of expert review for gina briefing?

The plan is to have it ready by December 5 for internal review, and then email to experts on December 10. We would need to brief both Sarah and Gina next week to make the schedule you suggested.

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Suzanne Kocchi | Leif/Melissa - Sarah wants us to have a meeting... | 11/20/2012 08:47:45 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA
Cc: Bill Irving/DC/USEPA/US@EPA
Date: 11/20/2012 08:47 AM
Subject: timing of expert review for gina briefing?

Leif/Melissa - Sarah wants us to have a meeting with Gina before the expert review draft goes out, preferably 2 weeks before and a pre-brief with Sarah. Can you please let me know today the approx date/or at least week so I can put in the meeting request before Thanksgiving. I suspect we will have to meet w/ her first week of Dec so I don't want to wait too long.

Melissa - how is the one pager coming? here back from alex yet?

Melissa Weitz | I'll check in with OAQPS on the NEI question. Fr... | 11/19/2012 11:03:04 AM

From: Melissa Weitz/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, "Pamela Franklin" <Franklin.Pamela@epamail.epa.gov>, "Suzanne Waltzer" <Waltzer.Suzanne@epamail.epa.gov>, Leif Hockstad/DC/USEPA/US@EPA
Date: 11/19/2012 11:03 AM
Subject: Re: Fw: For monday (sorry to send friday night, but I don't want to forget)

I'll check in with OAQPS on the NEI question.

Bill Irving | Copying Leif, who is managing the expert review... | 11/19/2012 10:50:52 AM

From: Bill Irving/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: "Pamela Franklin" <Franklin.Pamela@epamail.epa.gov>, "Suzanne Waltzer" <Waltzer.Suzanne@epamail.epa.gov>, "Melissa Weitz" <Weitz.Melissa@epamail.epa.gov>, Leif Hockstad/DC/USEPA/US@EPA
Date: 11/19/2012 10:50 AM
Subject: Re: Fw: For monday (sorry to send friday night, but I don't want to forget)

Copying Leif, who is managing the expert review and knows the planned dates.

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Suzanne Kocchi | Melissa - see below. Some points we have to ad... | 11/19/2012 10:48:00 AM

From: Suzanne Kocchi/DC/USEPA/US
To: "Melissa Weitz" <Weitz.Melissa@epamail.epa.gov>
Cc: "Suzanne Waltzer" <Waltzer.Suzanne@epamail.epa.gov>, "Bill Irving" <Irving.Bill@epamail.epa.gov>, "Pamela Franklin" <Franklin.Pamela@epamail.epa.gov>
Date: 11/19/2012 10:48 AM
Subject: Fw: For monday (sorry to send friday night, but I don't want to forget)

Melissa - see below. Some points we have to address in the one pager.

Also - what is the timing on expert review? We need to have another mtg with Gina on this.
Sarah Dunham

----- Original Message -----
From: Sarah Dunham
Sent: 11/19/2012 10:44 AM EST
To: Suzanne Kocchi
Cc: Paul Gunning; Jackie Krieger
Subject: Re: For monday (sorry to send friday night, but I don't want to forget)

ok, thanks. couple things-- (b)(5) deliberative

(b)(5) deliberative . Can you guys please request time on gina's calendar for this meeting, and let's sit down internally before then as well.
Thanks

Suzanne Kocchi | Quick update: 1) Suzie W and Bruce are both o... | 11/19/2012 10:00:33 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Paul Gunning/DC/USEPA/US@EPA
Cc: Sarah Dunham/DC/USEPA/US@EPA, Jackie Krieger/DC/USEPA/US@EPA
Date: 11/19/2012 10:00 AM
Subject: Re: For monday (sorry to send friday night, but I don't want to forget)

Quick update:

1) Suzie W and Bruce are both out all week
2) We have been added to the OAQPS/Devon/TCEQ call tmrw. Melissa is going to listen in. I will try to cover part of it.
3) I talked to Alex Macpherson. He said (b)(5) deliberative
4) Melissa is pulling together some points about our liquids unloading estimates and Alex is going to review so we can send up the chain to help explain things if necessary
5) (b)(5) deliberative

Paul Gunning | Sarah - No problem. I will have Suzie W. conn... | 11/18/2012 08:48:51 PM

From: Paul Gunning/DC/USEPA/US
To: Sarah Dunham/DC/USEPA/US@EPA
Cc: "Paul Gunning" <gunning.paul@epa.gov>, "Jackie Krieger" <krieger.jackie@epa.gov>, Suzanne Kocchi/DC/USEPA/US@EPA
Date: 11/18/2012 08:48 PM
Subject: Re: For monday (sorry to send friday night, but I don't want to forget)

Sarah -

No problem. I will have Suzie W. connect with Scott on Monday.

(b)(5) deliberative

We will have more on Monday.

Paul

-----Sarah Dunham/DC/USEPA/US wrote: -----

To: "Paul Gunning" <gunning.paul@epa.gov>
From: Sarah Dunham/DC/USEPA/US
Date: 11/16/2012 10:27PM
Cc: "Jackie Krieger" <krieger.jackie@epa.gov>
Subject: For monday (sorry to send friday night, but I don't want to forget)

I talked to janet this evening. Devon is going to OAQPS on Tuesday with the TX env Agency--janet thought if we weren't already hooked in, we should have someone listen in on the mtg. Scott Mathias is the contact person. Can you ask someone to connect with him on that mtg?

(b)(5) deliberative

Thanks

Re: timing of expert review for gina briefing?

Suzanne Kocchi to: Melissa Weitz 11/20/2012 09:29 AM

History: This message has been forwarded.

ok. we will need to pull something together for sarah and paul next week and then gina likely early the following week.

i am going to send a separate note to erin and isabel who you can work with on the comm strategy.

Melissa Weitz	The one pager should be ready soon (later t...	11/20/2012 09:27:43 AM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Date: 11/20/2012 09:27 AM
Subject: Re: timing of expert review for gina briefing?

The one pager should be ready soon (later today). Waiting on input from ICF and Alex.

For the expert review draft, ICF is wrapping up a QA of the results, and I need to touch base with API once more with a few clarifying questions (trying to schedule for today).

It's likely that the most recent numbers we had for Gina are still the final ones, but something may come up in ICF's review of well counts and the questions to API. I probably won't know if we need updates until later today/tomorrow. If we do need to make changes, our goal is to have them made by next Tuesday/Wednesday.

Suzanne Kocchi	Leif/Melissa - Sarah wants us to have a mee...	11/20/2012 08:47:44 AM
Melissa Weitz	I'll check in with OAQPS on the NEI question...	11/19/2012 11:03:04 AM
Bill Irving	Copying Leif, who is managing the expert re...	11/19/2012 10:50:52 AM
Suzanne Kocchi	Melissa - see below. Some points we have t...	11/19/2012 10:48:00 AM

Re: timing of expert review for gina briefing?

Bill Irving to: Suzanne Kocchi 11/20/2012 10:32 AM
Cc: Melissa Weitz, Leif Hockstad

History: This message has been forwarded.

We may need to stagger the oil & gas review, but perhaps only go there if we absolutely have to do it? I gave Paul a heads up during our weekly.

Leif, Paul was ok with having the oil and gas material appear as an addendum since we likely won't have time to integrate it fully into the broader document.

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Suzanne Kocchi	crap. it was sarah that wanted the pre-brief...	11/20/2012 09:00:20 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA
Date: 11/20/2012 09:00 AM
Subject: Re: timing of expert review for gina briefing?

crap. it was sarah that wanted the pre-brief and brief 2 weeks before. i'll put in the requests and we will see if we can get close to those dates.

can we send everything out and hold the gas expert review back a week if we get stymied with schedules?

Bill Irving	The plan is to have it ready by December 5 f...	11/20/2012 08:56:33 AM
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Bill Irving	Copying Leif, who is managing the expert re...	11/19/2012 10:50:52 AM
Suzanne Kocchi	Melissa - see below. Some points we have t...	11/19/2012 10:48:00 AM

Re: comm strategy on liquids unloading/inventory expert review

Erin Birgfeld to: Suzanne Kocchi 11/20/2012 11:12 AM

Cc: Bill Irving, Isabel DeLuca, Leif Hockstad, Mark DeFigueiredo, Melissa Weitz, Suzanne Waltzer

History: This message has been forwarded.

Hi Melissa and Suzie,

Here is a communications roll out plan that we used for Indicators. This could be a template for addressing Sarah's concerns and developing a briefing pager. It will certainly be useful for the comms folks. If you decide to use this format, I suggest adding a section titled "Expected Stakeholder Reaction" .

- Erin

(b)(5) deliberative

[redacted]

Roll Out and Q and A's - 11-7-12 -clean.docx

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

Suzanne Kocchi	Erin, Isabel - Sarah wants us to brief Gina o...	11/20/2012 10:19:15 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Erin Birgfeld/DC/USEPA/US@EPA, Isabel DeLuca/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/20/2012 10:19 AM
Subject: comm strategy on liquids unloading/inventory expert review

Erin, Isabel -

Sarah wants us to brief Gina on the communication strategy for the expert review draft of the Inventory, specifically the natural gas production sector. Leif's plan is to release the expert review draft on 12/10 therefore we need Gina to sign off on the plan before then. In particular the liquids unloading estimates in the production sector are substantially decreasing so the production sector emissions are going down compared to the last 2 years. Gina is particularly concerned given all the attention on the production sector, the NSPS, the previous changes that made it go way up, the stakeholder workshop, the GHGRP etc. So Sarah wants us to walk thru the changes and communication strategy with Sarah next week and we are trying to get on Gina's calendar for next week or early the following. Below is the note from Sarah on this issue and what she wants us to cover. I have included Melissa, Leif and Mark above as well. Melissa is working on a one pager right now for liquids unloading that I think can serve as the basis for this strategy/briefing. Perhaps she can circulate it when she has the draft and we can go from

there? I am going to put something on Paul's calendar for early next week so we can review materials with him before the Sarah and Gina briefings.

Does that make sense? Thanks- Suzie

From Sarah:
"What date is our current expected date for sending the inventory out for expert review? We need to sit down with gina before that date, probably at least a week or 2 before, and walk through the communications plan on this issue. that means, who is likely to react to his change, and how they will likely react, who should we be working with ahead of the expert review circulation to help on the communications of this, and what are the talking points. Can you guys please request time on gina's calendar for this meeting, and let's sit down internally before then as well."

Re: comm strategy on liquids unloading/inventory expert review

Suzanne Kocchi to: Erin Birgfeld 11/20/2012 11:14 AM

Cc: Bill Irving, Isabel DeLuca, Leif Hockstad, Mark DeFigueiredo, Melissa Weitz, Suzanne Waltzer

History: This message has been forwarded.

for now this is as good as anything. perhaps once the one pager is done and melissa circulates she can adapt it something like this?

Erin Birgfeld	Hi Melissa and Suzie, Here is a communicat...	11/20/2012 11:12:42 AM

From: Erin Birgfeld/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Bill Irving/DC/USEPA/US@EPA, Isabel DeLuca/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/20/2012 11:12 AM
Subject: Re: comm strategy on liquids unloading/inventory expert review

Hi Melissa and Suzie,

Here is a communications roll out plan that we used for Indicators. This could be a template for addressing Sarah's concerns and developing a briefing pager. It will certainly be useful for the comms folks. If you decide to use this format, I suggest adding a section titled "Expected Stakeholder Reaction" .

- Erin

[attachment "Roll Out and Q and A's - 11-7-12 -clean.docx" deleted by Suzanne Kocchi/DC/USEPA/US]

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

Suzanne Kocchi	Erin, Isabel - Sarah wants us to brief Gina o...	11/20/2012 10:19:15 AM

Draft Questions for the API/ANGA Report

Seastream, Sandra to: Melissa Weitz, Suzanne Waltzer 11/20/2012 11:57 AM

Cc: "Robinson, Donald", "Toukan, Ibrahim" , "Cacho, Mariella", "Seastream, Sandra"

History: This message has been replied to and forwarded.

Melissa,

Please find attached our Draft questions regarding the API/ANGA report. Let us know if you have questions.

Regards,
SANDY SEASTREAM | Principal | 703.218.2562 (o) |
Sandra.Seastream@icfi.com | icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov [
mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Monday, November 19, 2012 3:21 PM
To: Seastream, Sandra
Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella; Waltzer.Suzanne@epamail.epa.gov
Subject: RE: FW: Update on Inventory QA/QC

Thank you!

2 more requests...

[redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

- XXX
- Xxx
- xxx

Thank you!
Melissa

"Seastream, Sandra" ---11/19/2012 11:50:20 AM---Hi Melissa, We are still conducting our review and should have it completed and to you by tomorrow a

From: "Seastream, Sandra" <Sandra.Seastream@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Robinson, Donald" <Donald.Robinson@icfi.com>
Cc: "Stricklin, Eric" <Eric.Stricklin@icfi.com>, "Cacho, Mariella" <Mariella.Cacho@icfi.com>, Suzanne Waltzer/DC/USEPA/US@EPA, "Toukan, Ibrahim" <Ibrahim.Toukan@icfi.com>
Date: 11/19/2012 11:50 AM
Subject: RE: FW: Update on Inventory QA/QC

Hi Melissa,

We are still conducting our review and should have it completed and to you by tomorrow afternoon.
Just a friendly reminder that ICF holidays are this Thursday and Friday.

Thanks,
SANDY SEASTREAM | Principal | 703.218.2562 (o) |
Sandra.Seastream@icfi.com | icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Monday, November 19, 2012 10:33 AM
To: Robinson, Donald
Cc: Stricklin, Eric; Cacho, Mariella; Seastream, Sandra; Waltzer.Suzanne@epamail.epa.gov
Subject: Re: FW: Update on Inventory QA/QC

Hello,

Thank you for providing this update.

Do you have a sense of when you will conclude the review of liquids unloading, well counts, and dehydrators?

Thank you again for your work on this--very helpful.

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

"Robinson, Donald" ---11/16/2012 06:15:21 PM---Melissa, Here is our status as of today. I am away from the office (in Colombia and Brazil) all of n

From: "Robinson, Donald" <Donald.Robinson@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Seastream, Sandra" <Sandra.Seastream@icfi.com>, "Stricklin, Eric" <Eric.Stricklin@icfi.com>, "Cacho, Mariella" <Mariella.Cacho@icfi.com>
Date: 11/16/2012 06:15 PM
Subject: FW: Update on Inventory QA/QC

Melissa,
Here is our status as of today. I am away from the office (in Colombia and Brazil) all of next week, so please revert to Sandy Seastream and Eric Stricklin in my absence. ERIC is away from the office starting Monday afternoon through Thanksgiving holiday, so Mariella Cacho is been brought up to date on the engineers' work, so please revert to her in Eric's absence.

Regards:
Don

Donald Robinson
Vice President
ICF International
703-218-2512
703-934-3915 fax

From: Stricklin, Eric
Sent: Thursday, November 15, 2012 9:00 PM
To: Robinson, Donald; Seastream, Sandra
Cc: Kane, Drew
Subject: Update on Inventory QA/QC

Don, Sandy,

I will be in late tomorrow due to (b)(6) personal privacy. Below I have provided a summary of our progress on the Inventory QA/QC in case Suzie or Melissa asks.

(b)(5) deliberative

(b)(5) deliberative

(b)(5) deliberative

(b)(5) deliberative

API-ANGA Questions 11-20-2012.docx

Re: Draft Questions for the API/ANGA Report

Melissa Weitz to: Seastream, Sandra 11/20/2012 01:21 PM
Cc: "Robinson, Donald", "Toukan, Ibrahim", "Cacho, Mariella", Suzanne Waltzer

Great--Thank you!

Any sense of when you might be able to provide the bullets on the 1990-2009 LU estimates?

Melissa

"Seastream, Sandra"	Melissa, Please find attached our Draft q...	11/20/2012 11:57:10 AM

From: "Seastream, Sandra" <Sandra.Seastream@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>, "Toukan, Ibrahim" <Ibrahim.Toukan@icfi.com>, "Cacho, Mariella" <Mariella.Cacho@icfi.com>, "Seastream, Sandra" <Sandra.Seastream@icfi.com>
Date: 11/20/2012 11:57 AM
Subject: Draft Questions for the API/ANGA Report

Melissa,

Please find attached our Draft questions regarding the API/ANGA report. Let us know if you have questions.

Regards,
SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com | icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Monday, November 19, 2012 3:21 PM
To: Seastream, Sandra
Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella; Waltzer.Suzanne@epamail.epa.gov
Subject: RE: FW: Update on Inventory QA/QC

Thank you!

2 more requests...

[redacted] (b)(5) deliberative [redacted]

[redacted]

(b)(5) deliberative [redacted]

- XXX
- Xxx
- xxx

Thank you!
Melissa

"Seastream, Sandra" ---11/19/2012 11:50:20 AM---Hi Melissa, We are still conducting our review and should have it completed and to you by tomorrow a

From: "Seastream, Sandra" <Sandra.Seastream@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Robinson, Donald" <Donald.Robinson@icfi.com>
Cc: "Stricklin, Eric" <Eric.Stricklin@icfi.com>, "Cacho, Mariella" <Mariella.Cacho@icfi.com>, Suzanne Waltzer/DC/USEPA/US@EPA, "Toukan, Ibrahim" <Ibrahim.Toukan@icfi.com>
Date: 11/19/2012 11:50 AM
Subject: RE: FW: Update on Inventory QA/QC

Hi Melissa,

We are still conducting our review and should have it completed and to you by tomorrow afternoon.
Just a friendly reminder that ICF holidays are this Thursday and Friday.

Thanks,
SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com | icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Monday, November 19, 2012 10:33 AM
To: Robinson, Donald
Cc: Stricklin, Eric; Cacho, Mariella; Seastream, Sandra; Waltzer.Suzanne@epamail.epa.gov
Subject: Re: FW: Update on Inventory QA/QC

Hello,

Thank you for providing this update.

Do you have a sense of when you will conclude the review of liquids unloading, well counts, and dehydrators?

Thank you again for your work on this--very helpful.

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

"Robinson, Donald" ---11/16/2012 06:15:21 PM---Melissa, Here is our status as of today. I am away from the office (in Colombia and Brazil) all of n

From: "Robinson, Donald" <Donald.Robinson@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Cc: "Seastream, Sandra" <Sandra.Seastream@icfi.com>, "Stricklin, Eric" <Eric.Stricklin@icfi.com>, "Cacho, Mariella" <Mariella.Cacho@icfi.com>
Date: 11/16/2012 06:15 PM
Subject: FW: Update on Inventory QA/QC

Melissa,
Here is our status as of today. I am away from the office (in Colombia and Brazil) all of next week, so please revert to Sandy Seastream and Eric Stricklin in my absence. ERIC is away from the office starting Monday afternoon through Thanksgiving holiday, so Mariella Cacho is been brought up to date on the engineers' work, so please revert to her in Eric's absence.

Regards:
Don

Donald Robinson
Vice President
ICF International
703-218-2512
703-934-3915 fax

From: Stricklin, Eric
Sent: Thursday, November 15, 2012 9:00 PM
To: Robinson, Donald; Seastream, Sandra
Cc: Kane, Drew
Subject: Update on Inventory QA/QC

Don, Sandy,

I will be in late tomorrow due to my 9AM oral surgeon appointment. Below I have provided a summary of our progress on the Inventory QA/QC in case Suzie or Melissa asks.

(b)(5) deliberative
[redacted]

[redacted]

(b)(5) deliberative

Hide Details

Natural Gas Inventory – Liquids Unloading

Mon 12/03/2012 3:00 PM - 3:45 PM

Attendance is **required** for Melissa Weitz

Chair: **Gina McCarthy/DC/USEPA/US**

Sent By: **Cindy Huang/DC/USEPA/US**

Location: ARN 5400

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required:	Bill Irving/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Paul Gunning/DC/USEPA/US@EPA, Sarah Dunham/DC/USEPA/US@EPA, Suzanne
Optional:	Cynthia Browne/DC/USEPA/US@EPA, Daniel Hopkins/DC/USEPA/US@EPA, Don Zinger/DC/USEPA/US@EPA, Jackie Krieger/DC/USEPA/US@EPA, Larke Williams/DC/USEPA/US@EPA, Tina Murphy/DC/USEPA/US@EPA

Description

OAR Meeting Request Form

Requesting Meeting/Conference Call with: Gina McCarthy

Date of this Request: 11/20/12

Point of Contact (Name/Number): Suzie Kocchi

Title of Meeting: Natural Gas Inventory – Liquids Unloading

Purpose of Meeting: Brief Gina on updates to the 2013 numbers for liquids unloading portion of the natural gas inventory before the expert review draft goes out in mid Dec

Priority Status (check one)_X_Critical (time sensitive) **Less Immediate ___**
Last possible date for meeting: 12/4/12
If the meeting is critical, please explain why: We are sending out the expert review draft of the 2013 Inventory the second week of Dec and we would like to brief Gina on the changes to the liquids unloading estimates in the natural gas production sector before the draft goes out.

Location of Meeting: ARN
Length of Meeting: 45 min
Key Participants: (List all who need to be notified of the meeting)

Office/Organization	Name
OAR/OAP	Sarah Dunham
OAR/OAP/CCD	Paul Gunning
OAR/OAP/CCD	Bill Irving
OAR/OAP/CCD	Melissa Weitz
OAR/OAP/CCD	Suzie Kocchi
OAR/OAP/CCD	Leif Hockstad
OAR/OAP/CCD	Suzie Waltzer
OAR/OAP/CCD	Erin Birgfeld

___ Authorized by Office/Air Division Director

NOTE: Please provide briefing materials 24 hours before your meeting.

Personal Notes

Fw: Natural Gas in the GHG Inventory

Melissa Weitz to: Minnucci, Chris A., Kidman, Timothy M. 11/20/2012 01:46 PM

Info for API call today.

I sent API the questions below. On the call, I'll walk through the questions, and hopefully they'll have some information...

Thanks!

1. We noticed that one data set (covering 14 unconventional wells without plunger lifts in the Gulf Coast) that was included in the June report (Table C-3) was deleted from the September report. Why was this change made?

2. We noticed that two new data sets (covering unconventional wells without plunger lifts in the Rocky Mountain region and unconventional wells with plunger lifts in the Southwest) were included in the September report that weren't included in the June report. Why were these data sets included in September but not in June?

3. We found four data sets (all in the Northeast) where there were very large (orders of magnitude) reductions in the average gas flow rates. Can you please provide us with some details on why these changes were made? For example, if the original data sets were in error, what was the nature and cause of the errors? Did you go back to the survey respondents to get new data? Were these transcription errors? Unit errors? Please note that we are especially interested in more information on the change to the data set in the Northeast, for conventional wells without plunger lifts, that reduced the gas flow rate from 7388.4 to 7.21 Mscfd, as this change had a very large impact on national-level emissions.

4. We found seven datasets where there were changes to the surface pressure data between June and September. Can you please provide us with an explanation of the reason(s) for these changes?

5. We found one data set (for unconventional wells with plunger lifts in the Mid-Continent region) that had a change in both the average well depth and the gas flow rate between June and September. Can you please provide us with an explanation of the reason(s) for these changes?

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/20/2012 01:44 PM -----

Natural Gas in the GHG Inventory

Tue 11/20/2012 3:00 PM - 4:00 PM

Attendance is for Melissa Weitz

Chair: **Ritterk@api.org**

No Location Information

This entry has an alarm. The alarm will go off before the entry starts.

Required: Melissa Weitz/DC/USEPA/US, Terri.Shires@URS.com

Description

A call has also been scheduled for today November 20th at 3pm ET (1 hour duration):

To access the call, dial (toll-free) [redacted] (b)(6) personal privacy [redacted]. When prompted, then dial conference code: [redacted] (b)(6) personal privacy [redacted] followed by #.

Personal Notes

Re: Fw: Natural Gas in the GHG Inventory
Paula Fields to: Melissa Weitz, Wolf, Marty 11/20/2012 01:49 PM

History: This message has been forwarded.

Melissa -

Sorry - Marty and I both have a call with Mausami at that time. It will last about an hour.

Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: <Weitz.Melissa@epamail.epa.gov>
To: Paula Fields <Paula.Fields@erg.com>, Marty Wolf <Marty.Wolf@erg.com>
Date: 11/20/2012 10:44 AM
Subject: Fw: Natural Gas in the GHG Inventory

Would you be able to participate in the call below this afternoon?

This will be on liquids unloading

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/20/2012 01:40 PM -----

Natural Gas in the GHG Inventory

Tue 11/20/2012 3:00 PM - 4:00 PM

Attendance is for Melissa Weitz

Chair: Ritterk@api.org

No Location Information

This entry has an alarm. The alarm will go off before the entry starts.

Required: Melissa Weitz/DC/USEPA/US, Terri.Shires@URS.com

Description

A call has also been scheduled for today November 20th at 3pm ET (1 hour duration):

To access the call, dial (toll-free) [redacted] When prompted, then dial conferen

Personal Notes

Fw: Liquids Unloading 1-pager

Melissa Weitz to: Leif Hockstad 11/20/2012 02:44 PM

Draft 1 pager

----- Forwarded by Melissa Weitz/DC/USEPA/US on 11/20/2012 02:44 PM -----

From: Mark DeFigueiredo/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/20/2012 10:28 AM
Subject: Re: Liquids Unloading 1-pager

Sorry - I missed this email. Here are my comments.

(b)(5) deliberative

Liquids Unloading Update 1 pager 11.19 - mdf.docx

Melissa Weitz	Hi Mark, Would you be able to review and ed...	11/19/2012 03:31:13 PM

From: Melissa Weitz/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 11/19/2012 03:31 PM
Subject: Liquids Unloading 1-pager

Hi Mark,

Would you be able to review and edit as appropriate the bullets on GHGRP in the attached liquids unloading 1-pager?

If I could get this today, that'd be great. It is something that Paul has requested, and I'll be incorporating information from OAQPS as well.

Melissa

(b)(5) deliberative

Liquids Unloading Update 1 pager 11.19.docx

Re: QUESTIONS

Melissa Weitz to: Paula Fields 11/20/2012 03:11 PM

Cc: "Marty Wolf"

1. We noticed that one data set (covering 14 unconventional wells without plunger lifts in the Gulf Coast) that was included in the June report (Table C-3) was deleted from the September report. Why was this change made?

2. We noticed that two new data sets (covering unconventional wells without plunger lifts in the Rocky Mountain region and unconventional wells with plunger lifts in the Southwest) were included in the September report that weren't included in the June report. Why were these data sets included in September but not in June?

3. We found four data sets (all in the Northeast) where there were very large (orders of magnitude) reductions in the average gas flow rates. Can you please provide us with some details on why these changes were made? For example, if the original data sets were in error, what was the nature and cause of the errors? Did you go back to the survey respondents to get new data? Were these transcription errors? Unit errors? Please note that we are especially interested in more information on the change to the data set in the Northeast, for conventional wells without plunger lifts, that reduced the gas flow rate from 7388.4 to 7.21 Mscfd, as this change had a very large impact on national-level emissions.

4. We found seven datasets where there were changes to the surface pressure data between June and September. Can you please provide us with an explanation of the reason(s) for these changes?

5. We found one data set (for unconventional wells with plunger lifts in the Mid-Continent region) that had a change in both the average well depth and the gas flow rate between June and September. Can you please provide us with an explanation of the reason(s) for these changes?

"Paula Fields"	** High Priority ** Melissa -	11/20/2012 03:09:39 PM

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/20/2012 03:09 PM
Subject: QUESTIONS

Melissa -
It's difficult for us to take notes when we don't have the questions. Can you send them please?

Paula

****

Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185

API/ANGA RESPONSES TO Draft Questions for the API/ANGA Report

Melissa Weitz to: Seastream, Sandra, Robinson, Donald, Toukan, Ibrahim, Cacho, Mariella, Suzanne Waltzer 11/20/2012 04:41 PM

Hi,

I just had a quick call with API and URS. Responses to your questions (they've been re-worded/reordered a bit) are below. Please let me know if you have follow up questions or other concerns.

Thank you!
Melissa

1. We noticed that one data set (covering 14 unconventional wells without plunger lifts in the Gulf Coast) that was included in the June report (Table C-3) was deleted from the September report. Why was this change made?

Between the two reports, Reid Smith reviewed the data and flagged instances of reported flow rate and pressure being too high to have liquids unloading issues.

Reid flagged this particular data set. URS followed up with the data provider and learned that the data provided was actually for flowback after hydraulic fracturing, not liquids unloading, so they removed the data from the data set.

2. We noticed that two new data sets (covering unconventional wells without plunger lifts in the Rocky Mountain region and unconventional wells with plunger lifts in the Southwest) were included in the September report that weren't included in the June report. Why were these data sets included in September but not in June?

These were not actually new data sets. They were included in the "high level" data set in the June report. Reid/URS review of the data after the June report found that enough data was provided to include these in the "middle-level" data set, from which emissions factors were calculated.

3. We found four data sets (all in the Northeast) where there were very large (orders of magnitude) reductions in the average gas flow rates. Can you please provide us with some details on why these changes were made? For example, if the original data sets were in error, what was the nature and cause of the errors? Did you go back to the survey respondents to get new data? Were these transcription errors? Unit errors? Please note that we are especially interested in more information on the change to the data set in the Northeast, for conventional wells without plunger lifts, that reduced the gas flow rate from 7388.4 to 7.21 Mscfd, as this change had a very large impact on national-level emissions.

URS contacted these data providers because their flow rate appeared high. They determined that the data providers provided the sum of the flow rate from all wells, instead of the average rate on a per well basis. Data providers provided the per well number and it was incorporated into the analysis.

4. We found seven datasets where there were changes to the surface pressure data between June and September. Can you please provide us with an explanation of the reason(s) for these changes?

AND

5. We found one data set (for unconventional wells with plunger lifts in the Mid-Continent region) that had a change in both the average well depth and the gas flow rate between June and September. Can you please provide us with an explanation of the reason(s) for these changes?

For 4 and 5, data providers provided updated data, based on data they had collected and were planning to report under Subpart W.

Liquids unloading bullet points
Cacho, Mariella to: Melissa Weitz 11/20/2012 05:08 PM

History: This message has been replied to and forwarded.

Hi Melissa,

I just got a notice this email bounced back from your EPA account.

Please let me know if you have any questions.

Thanks,

Mariella

Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Cacho, Mariella
Sent: Tuesday, November 20, 2012 2:43 PM
To: 'Weitz.Melissa@epamail.epa.gov '
Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella; 'Waltzer.Suzanne@epamail.epa.gov'; Seastream, Sandra (Sandra.Seastream@icfi.com)
Subject: Liquids unloading bullet points

Hi Melissa,

We are drafting a memo compiling all the responses for the four main topics
Liquids Unloading Improvement, Gas Well Counts, Dehydrator Calculation, and QA/QC of Natural Gas Model. So you'll have everything in a single document.

As requested, please find below bullet points for your Liquids unloading question. We have also attached a memo developed for the 1990-2009 inventory, it describes in detail why the emissions increase so dramatically. We will include these bullet point the memo as well:

- [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberati

- (b)(5) deliberative

Please let us know if you have any more questions.

Thank you,

Mariella
Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

(b)(5) deliberative

Emissions from Well Cleanups 12-13-2010_FINAL.doc.doc

Fw: GHGs and Ozone Designations

Suzanne Kocchi to: Melissa Weitz 11/20/2012 05:13 PM

History: This message has been forwarded.

FYI to fold into the LU stuff. we have to send a note to janet tomorrow so can we touch base in the morning on the one pager and go from there?

----- Forwarded by Suzanne Kocchi/DC/USEPA/US on 11/20/2012 05:12 PM -----

From: Juan Santiago/RTP/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Date: 11/20/2012 05:05 PM
Subject: GHGs and Ozone Designations

Suzie,

Sorry for being so late in the day on this. Here's what I was able to get together on this issue. I hope it helps.

Thanks!
Juan

[redacted] (b)(5) deliberative [redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

Re: our feedback on the call
Melissa Weitz to: Paula Fields 11/20/2012 06:39 PM
Cc: "Marty Wolf"

Thanks Paula,

Sorry for not providing more info--these questions came up in the context of ICF/SAIC review and I forgot to send them over.

Below are my summary notes of the call.

Below also please find an SAIC memo of their QA of the well counts. It seems that there may be a few state #s that we may want to look into. ICF is also conducting review and will have something for us tomorrow. Sorry for so many memos/questions. Our management wants everyone in the world to review the natural gas #s this year! Probably would have been helpful to have done that a few years ago too...

Melissa

(b)(5) deliberative [redacted]

Well Count Memo_v2.docx

Summary of responses to questions on API/ANGA data.

1. We noticed that one data set (covering 14 unconventional wells without plunger lifts in the Gulf Coast) that was included in the June report (Table C-3) was deleted from the September report. Why was this change made?

Between the two reports, Reid Smith reviewed the data and flagged instances of reported flow rate and pressure being too high to have liquids unloading issues.

Reid flagged this particular data set. URS followed up with the data provider and learned that the data provided was actually for flowback after hydraulic fracturing, not liquids unloading, so they removed the data from the data set.

2. We noticed that two new data sets (covering unconventional wells without plunger lifts in the Rocky Mountain region and unconventional wells with plunger lifts in the Southwest) were included in the September report that weren't included in the June report. Why were these data sets included in September but not in June?

These were not actually new data sets. They were included in the "high level" data set in the June report. Reid/URS review of the data after the June report found that enough data was provided to include these in the "middle-level" data set, from which emissions factors were calculated.

3. We found four data sets (all in the Northeast) where there were very large (orders of magnitude) reductions in the average gas flow rates. Can you please provide us with some details on why these changes were made? For example, if the original data sets were in error, what was the

nature and cause of the errors? Did you go back to the survey respondents to get new data? Were these transcription errors? Unit errors? Please note that we are especially interested in more information on the change to the data set in the Northeast, for conventional wells without plunger lifts, that reduced the gas flow rate from 7388.4 to 7.21 Mscfd, as this change had a very large impact on national-level emissions.

URS contacted these data providers because their flow rate appeared high. They determined that the data providers provided the sum of the flow rate from all wells, instead of the average rate on a per well basis. Data providers provided the per well number and it was incorporated into the analysis.

4. We found seven datasets where there were changes to the surface pressure data between June and September. Can you please provide us with an explanation of the reason(s) for these changes?

AND

5. We found one data set (for unconventional wells with plunger lifts in the Mid-Continent region) that had a change in both the average well depth and the gas flow rate between June and September. Can you please provide us with an explanation of the reason(s) for these changes?

For 4 and 5, data providers provided updated data, based on data they had collected and were planning to report under Subpart W.

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

"Paula Fields"	Melissa - It seems to us the general messag...	11/20/2012 03:38:13 PM

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/20/2012 03:38 PM
Subject: our feedback on the call

Melissa -
It seems to us the general message from the call was that API/ANGI (URS, really) simply examined the data more closely after the June report, and went back to some sources to obtain better data for the questionable data, and then updated their information.

Sorry we cannot be of more assistance in providing detailed notes of the call. We could overcome that in the future with some advanced notice on the topics to be discussed, and a little background on the reason for the call (e.g., provide better documentation, etc.).

Please let me know if I'm missing something here.

Thanks,
Paula

****

Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185

Hide Details

Pre-brief on liquids unloading & communications strategy

Tue 11/27/2012 12:30 PM - 1:30 PM

Attendance is **required** for Melissa Weitz

Chair: **Paul Gunning/DC/USEPA/US**

Sent By: **Anne Hargrove/DC/USEPA/US**

Rooms: 1310L Room 809/DC-1310L-OAR@EPA

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required:	Erin Birgfeld/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Optional:	Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA

Description

Personal Notes

Re: our feedback on the call
Marty Wolf to: Fields, Paula, Melissa Weitz 11/21/2012 10:17 AM

History: This message has been forwarded.

Melissa,

We'll start review of SAIC's memo today, but we'll also wait for further instruction from you pending the results of ICF's review and any additional internal direction from you or your management.

Thanks,
Marty

>>> <Weitz.Melissa@epamail.epa.gov> 11/20/2012 3:39 PM >>>

Thanks Paula,

Sorry for not providing more info--these questions came up in the context of ICF/SAIC review and I forgot to send them over.

Below are my summary notes of the call.

Below also please find an SAIC memo of their QA of the well counts. It seems that there may be a few state #s that we may want to look into. ICF is also conducting review and will have something for us tomorrow. Sorry for so many memos/questions. Our management wants everyone in the world to review the natural gas #s this year! Probably would have been helpful to have done that a few years ago too...

Melissa

(See attached file: Well Count Memo_v2.docx)

Summary of responses to questions on API/ANGA data.

(b)(5) deliberative

(b)(5) deliberative

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

"Paula Fields" ---11/20/2012 03:38:13 PM---Melissa - It seems to us the general message from the call was that API/ANGI (URS, really) simply ex

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/20/2012 03:38 PM
Subject: our feedback on the call

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Please let me know if I'm missing something here.

Thanks,
Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185

Fw: Draft 2013 Inventory Review
Melissa Weitz to: Paula Fields, Marty Wolf 11/21/2012 03:38 PM

From: "Seastream, Sandra" [Sandra.Seastream@icfi.com]
Sent: 11/21/2012 08:19 PM GMT
To: Melissa Weitz; "Cacho, Mariella" <Mariella.Cacho@icfi.com>; "Robinson, Donald" <Donald.Robinson@icfi.com>; "Stricklin, Eric" <Eric.Stricklin@icfi.com>; Suzanne Waltzer; "Seastream, Sandra" <Sandra.Seastream@icfi.com>; "Toukan, Ibrahim" <Ibrahim.Toukan@icfi.com>
Subject: Draft 2013 Inventory Review

Melissa,

Please find attached our summary review to date. We need to do more analysis on well counts next week, as our expert staff is out for the holiday this week. Let us know if you have questions.

Thanks,
SANDY SEASTREAM | Principal | 703.218.2562 (o) |
Sandra.Seastream@icfi.com | icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 20, 2012 6:05 PM
To: Cacho, Mariella; Robinson, Donald; Stricklin, Eric; Waltzer.Suzanne@epamail.epa.gov; Seastream, Sandra
Subject: Re: Liquids unloading bullet points

Hi,

Thank you!

I'm going to need to fold this information into a one-pager, and only have space for around 3-4 bullets.

Could you review the 3 bullets below and complete the underlined bullet lines?

Thank you!
Melissa

(b)(5) deliberative [redacted]

"Cacho, Mariella" ---11/20/2012 05:08:55 PM---Hi Melissa, I just got a notice this email bounced back from your EPA account.

From: "Cacho, Mariella" <Mariella.Cacho@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/20/2012 05:08 PM
Subject: Liquids unloading bullet points

Hi Melissa,

I just got a notice this email bounced back from your EPA account.

Please let me know if you have any questions.

Thanks,

Mariella

Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Cacho, Mariella
Sent: Tuesday, November 20, 2012 2:43 PM
To: 'Weitz.Melissa@epamail.epa.gov '
Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella; 'Waltzer.Suzanne@epamail.epa.gov'; Seastream, Sandra (Sandra.Seastream@icfi.com)
Subject: Liquids unloading bullet points

Hi Melissa,

We are drafting a memo compiling all the responses for the four main topics Liquids Unloading Improvement, Gas Well Counts, Dehydrator Calculation, and

QA/QC of Natural Gas Model. So you'll have everything in a single document.

As requested, please find below bullet points for your Liquids unloading question. We have also attached a memo developed for the 1990-2009 inventory, it describes in detail why the emissions increase so dramatically. We will include these bullet point the memo as well:

(b)(5) deliberative

(b)(5) deliberative

Please let us know if you have any more questions.

Thank you,

Mariella
Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

[attachment "Emissions from Well Cleanups 12-13-2010_FINAL.doc.doc" deleted by Melissa Weitz/DC/USEPA/US]

(b)(5) deliberative

Draft 2013 Inventory Memo_112112.docx

Rescheduled: Review Liquids Unloading Estimates in 2013 Inventory

Thu 11/29/2012 11:00 AM - 12:00 PM

Attendance is **required** for Melissa Weitz

Chair: **Sarah Dunham/DC/USEPA/US**

Sent By: **Tina Murphy/DC/USEPA/US**

Rooms: 1310L Room 1002 OD/DC-1310L-OAR@EPA

This reschedule notice has been applied to the meeting.

Sarah has a meeting conflict.

Required:	Bill Irving/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Paul Gunning/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Optional:	Erin Birgfeld/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA

Description

Re: Fw: Draft 2013 Inventory Review
Paula Fields to: Melissa Weitz, Wolf, Marty 11/26/2012 11:19 AM

History: This message has been forwarded.

Hi Melissa -

(b)(6) personal privacy

Thanks.

On the well counts questions, Jessica and Casey are looking these over. Jess if out today, but Casey is reviewing the questions and formulating responses. We're checking to see if she's available at 2 pm ET to have a ck in call with you, and us.

Marty and I are looking over all the other comments/questions. We can discuss any questions we have with you on the non-well counts topics at 2 pm ET.

Shall we use our call in number?

Tx,
Paula

****

Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: <Weitz.Melissa@epamail.epa.gov>
To: "Marty Wolf" <Marty.Wolf@erg.com>
CC: "Fields, Paula" <Paula.Fields@erg.com>
Date: 11/26/2012 8:07 AM
Subject: Re: Fw: Draft 2013 Inventory Review

Hello,

I hope you had a great Thanksgiving!

Can we have a check in call this afternoon, once you've had a chance to review the memo below? I'm free other than 1:30-2 and

3-4.

There are a series of questions for ERG on well counts, on page 5 of the memo. Could you send me answers to those questions when you have them? They are pasted below for your reference.

(b)(5) deliberative

[redacted]

Thanks!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

"Marty Wolf" ---11/21/2012 04:04:55 PM---Melissa, I'm sure that we'll have more to discuss with you on Monday.

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: "Fields, Paula" <Paula.Fields@erg.com>, Melissa Weitz/DC/USEPA/US@EPA
Date: 11/21/2012 04:04 PM
Subject: Re: Fw: Draft 2013 Inventory Review

Melissa,

I'm sure that we'll have more to discuss with you on Monday.

Have a great Thanksgiving.

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>>
<Weitz.Melissa@epamail.epa.gov> 11/21/2012 12:38 PM
>>>

From: "Seastream, Sandra" [Sandra.Seastream@icfi.com]
Sent: 11/21/2012 08:19 PM GMT
To: Melissa Weitz; "Cacho, Mariella" <Mariella.Cacho@icfi.com>; "Robinson, Donald" <Donald.Robinson@icfi.com>; "Stricklin, Eric" <Eric.Stricklin@icfi.com>; Suzanne Waltzer; "Seastream, Sandra" <Sandra.Seastream@icfi.com>; "Toukan, Ibrahim" <Ibrahim.Toukan@icfi.com>
Subject: Draft 2013 Inventory Review

Melissa,

Please find attached our summary review to date. We need to do more analysis on well counts next week, as our expert staff is out for the holiday this week. Let us know if you have questions.

Thanks,
SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com | icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 20, 2012 6:05 PM
To: Cacho, Mariella; Robinson, Donald; Stricklin, Eric; Waltzer.Suzanne@epamail.epa.gov; Seastream, Sandra
Subject: Re: Liquids unloading bullet points

Hi,

Thank you!

I'm going to need to fold this information into a one-pager, and only have space for around 3-4 bullets.

Could you review the 3 bullets below and complete the underlined bullet lines?

Thank you!
Melissa

(b)(5) deliberative

"Cacho, Mariella" ---11/20/2012 05:08:55 PM---Hi Melissa, I just got a notice this email bounced back from your EPA account.

From: "Cacho, Mariella" <Mariella.Cacho@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/20/2012 05:08 PM
Subject: Liquids unloading bullet points

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I just got a notice this email bounced back from your EPA account.

Please let me know if you have any questions.

Thanks,

Mariella

Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Cacho, Mariella
Sent: Tuesday, November 20, 2012 2:43 PM
To: 'Weitz.Melissa@epamail.epa.gov '
Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella; 'Waltzer.Suzanne@epamail.epa.gov';

Seastream, Sandra (Sandra.Seastream@icfi.com)
Subject: Liquids unloading bullet points

Hi Melissa,

We are drafting a memo compiling all the responses for the four main topics
Liquids Unloading Improvement, Gas Well Counts, Dehydrator Calculation, and QA/QC of Natural Gas Model. So you'll have everything in a single document.

As requested, please find below bullet points for your Liquids unloading question. We have also attached a memo developed for the 1990-2009 inventory, it describes in detail why the emissions increase so dramatically. We will include these bullet point the memo as well:

(b)(5) deliberative

(b)(5) deliberative

Please let us know if you have any more questions.

Thank you,

Mariella
Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com

ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

[attachment "Emissions from Well Cleanups 12-13-2010_FINAL.doc.doc" deleted by Melissa Weitz/DC/USEPA/US]

Re: liquids unloading?

Erin Birgfeld to: Suzanne Kocchi 11/26/2012 12:32 PM

Cc: Melissa Weitz, Mark DeFigueiredo, Suzanne Waltzer, Isabel DeLuca

From: Erin Birgfeld/DC/USEPA/US

To: Suzanne Kocchi/DC/USEPA/US@EPA,

Cc: Melissa Weitz/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Isabel DeLuca/DC/USEPA/US@EPA

History: This message has been forwarded.

Hi all,

Here is a crack at a comms plan that presents high level messages on the oil and gas updates to the inventory and liquids unloading. Suzie W. and Melissa please edit and add language and detail as necessary.

Suzie K. please take a look and see if this format would be acceptable to Paul for our conversation tomorrow.

Thanks,
Erin

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

(b)(5) deliberative [redacted]

Outreach Plan - Inventory v1.docx

Suzanne Kocchi excellent. pls include suzie w as well as she can help with the oaqps stuff. Fr... 11/26/2012 09:29:40 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Erin Birgfeld/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/26/2012 09:29 AM

Subject: Re: liquids unloading?

excellent. pls include suzie w as well as she can help with the oaqps stuff.

Melissa Weitz | On the two missing pieces--I'm checking in with ICF again this a.m., and OAQP... | 11/26/2012 09:28:28 AM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Erin Birgfeld/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/26/2012 09:28 AM
Subject: Re: liquids unloading?

On the two missing pieces--I'm checking in with ICF again this a.m., and OAQPS and I have been exchanging emails on the factors and are setting up a call today.

Suzanne Kocchi | cool thanks. suzie w is back now and brought up to speed. given sarah and gi... | 11/26/2012 09:24:10 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Erin Birgfeld/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/26/2012 09:24 AM
Subject: Re: liquids unloading?

cool thanks. suzie w is back now and brought up to speed. given sarah and gina's interest in how the inventory relates/impacts the NSPS and OAQPS paul wants suzie to plan to give the briefing to sarah and gina (once we decide what we are actually going to brief them on).

Erin Birgfeld | Hi Suzie, I spoke with Melissa on Wed. I'll work on drafting the outreach plan t... | 11/26/2012 09:22:19 AM

From: Erin Birgfeld/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/26/2012 09:22 AM
Subject: Re: liquids unloading?

Hi Suzie,

I spoke with Melissa on Wed. I'll work on drafting the outreach plan today with spaces for experts to fill in detail. I should have it out to the group before 12.

-erin

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

Suzanne Kocchi | Good morning - where are we on liquids unloading? Since we are on with Paul... | 11/26/2012 08:42:44 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 11/26/2012 08:42 AM
Subject: liquids unloading?

Good morning - where are we on liquids unloading? Since we are on with Paul tomorrow do you think we can have something ready cob today ? I think Melissa one pager is a good start but we need ICF to fill in the details and then get to the comm strategy so we can walk through with Paul and figure out what we need to prepare for the Sarah briefing on Fri (and Gina on Mon). Thanks- Suzie

Re: liquids unloading?

Suzanne Kocchi to: Erin Birgfeld 11/26/2012 12:37 PM

Cc: Melissa Weitz, Mark DeFigueiredo, Suzanne Waltzer, Isabel DeLuca

History: This message has been forwarded.

yes, i think this works for paul. only thing i would add is in addition to the changes in liquids unloading shown in the table, drop in the graphic from the most recent briefing to sarah/gina or add an extra table/row that shows the 2010 inventory for nat gas production sector, the 2011/2012 inventory and then the new 2013 inventory so they get the whole picture which will help show how LU fits into it (and why this source is driving the changes).

Erin Birgfeld	Hi all, Here is a crack at a comms plan that p...	11/26/2012 12:32:49 PM

From: Erin Birgfeld/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Isabel DeLuca/DC/USEPA/US@EPA
Date: 11/26/2012 12:32 PM
Subject: Re: liquids unloading?

Hi all,

Here is a crack at a comms plan that presents high level messages on the oil and gas updates to the inventory and liquids unloading. Suzie W. and Melissa please edit and add language and detail as necessary.

Suzie K. please take a look and see if this format would be acceptable to Paul for our conversation tomorrow.

Thanks,
Erin

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

[attachment "Outreach Plan - Inventory v1.docx" deleted by Suzanne Kocchi/DC/USEPA/US]

Suzanne Kocchi	excellent. pls include suzie w as well as she...	11/26/2012 09:29:40 AM
Melissa Weitz	On the two missing pieces--I'm checking in w...	11/26/2012 09:28:28 AM
Suzanne Kocchi	cool thanks. suzie w is back now and broug...	11/26/2012 09:24:10 AM
Erin Birgfeld	Hi Suzie, I spoke with Melissa on Wed. I'll w...	11/26/2012 09:22:19 AM
Suzanne Kocchi	Good morning - where are we on liquids unl...	11/26/2012 08:42:44 AM

Fw: Call on liquids unloading VOCs

Suzanne Waltzer to: Melissa Weitz 11/26/2012 02:34 PM

History: This message has been replied to and forwarded.

Do you want to meet up here or call from our desks?

----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 11/26/2012 02:34 PM -----

Call on liquids unloading VOCs

Mon 11/26/2012 3:00 PM - 3:30 PM

Attendance is for Suzanne Waltzer

Chair: **Melissa Weitz/DC/USEPA/US**

No Location Information

Required:	Alex Macpherson/RTP/USEPA/US@EPA, Bob Schell/RTP/USEPA/US@EPA, Bruce Moore/RTP/USEPA/US@EPA, Jennifer Snyder/RTP/USEPA/US@EPA, Lee Tooly/RTP/USEPA/US@EPA, Marc Houyoux/RTP/USEPA/US@EPA, Roy Huntley/RTP/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA

Description

(b)(5) deliberative [redacted]

LU one pager 11.26.docx

Call to walk through liquids unloading information on VOCs and how it may relate to updates to the GHG Inventory.

Attached is the one pager on liquids unloading.

Before the call, I'll send out some key questions on the information we'll need for Gina.

Thank you!
Melissa

Toll-free dial-in number (U.S. and Canada):
(b)(6) personal privacy [redacted]

Conference code:
(b)(6) personal privacy [redacted]

Personal Notes

Hide Details

Touch base on Inventory/liquids unloading materials for briefing with Paul

Tue 11/27/2012 10:00 AM - 10:30 AM

Attendance is **required** for Melissa Weitz

Chair: **Suzanne Waltzer/DC/USEPA/US**

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required:	Erin Birgfeld/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA

Description

Personal Notes

liquids unloading

Mark DeFigueiredo to: Suzanne Waltzer, Melissa Weitz 11/26/2012 05:30 PM

History: This message has been forwarded.

I have to be in RTP tomorrow and Wed, so I'll need to call into the liquids unloading meeting with Paul. Could someone call my blackberry: 202-251-4951. Or if you don't think that I'm needed, that's fine too.

Melissa - I wanted to talk with you about the Subpart W vs. 2013 Inventory. Listen to my voicemail and let me know if you have time to talk tomorrow.

Thanks!
Mark

Re: roll out plan, 1 pager
Melissa Weitz to: Melissa Weitz 11/27/2012 08:40 AM
Cc: Suzanne Waltzer

I haven't updated these since I last sent them. I'll be in in around 20 mins and then I'll write up the pieces I still need to add and have them ready to add once you finish with your edits.

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Suzanne Waltzer/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 11/26/2012 06:39PM
Subject: roll out plan, 1 pager

This is as far as I got on these today. I need to leave now but plan to add more info later tonight. In case I don't get around to it, or forget to send you the updates, here are the most recent drafts:

(See attached file: Outreach Plan - Inventory mw.docx)(See attached file: LU one pager 11.26.docx)

[attachment "Outreach Plan - Inventory mw.docx" removed by Melissa Weitz/DC/USEPA/US]
[attachment "LU one pager 11.26.docx" removed by Melissa Weitz/DC/USEPA/US]

Re: 1 (3) pager
Erin Birgfeld to: Melissa Weitz 11/27/2012 12:12 PM
Cc: Suzanne Kocchi, Suzanne Waltzer, Leif Hockstad

From: Erin Birgfeld/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA,
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA
History: This message has been forwarded.

Thanks Melissa,

I made a few edits... Take a look and see if you are OK with them.

(b)(5) deliberative

Outreach Plan - Inventory 11.27 v3 - elb.docx

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

Melissa Weitz Thanks-- Updated version. There are still items that need to be added, which I... 11/27/2012 11:48:23 AM

From: Melissa Weitz/DC/USEPA/US
To: Erin Birgfeld/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA
Date: 11/27/2012 11:48 AM
Subject: Re: 1 (3) pager

Thanks--

Updated version. There are still items that need to be added, which I can do this afternoon.

Melissa

(b)(5) deliberative [redacted]

Outreach Plan - Inventory 11.27 v3.docx

Erin Birgfeld | HI All, Here are my edits to the Roll out Plan Section. I didn't include a lot of m... | 11/27/2012 11:12:03 AM

From: Erin Birgfeld/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/27/2012 11:12 AM
Subject: Re: 1 (3) pager

HI All,

Here are my edits to the Roll out Plan Section. I didn't include a lot of messages about the numbers that are in the report because I felt that would make people just want to see the draft. Please include or edit into the final version as necessary.

(b)(5) deliberative

- [redacted]
  - [redacted]
  - [redacted]
- [redacted]
  - [redacted]
  - [redacted]
  - [redacted]

(b)(5) deliberative

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

Melissa Weitz | From: Erin Birgfeld/DC/USEPA/US To: Melissa Weitz/DC/USEPA/US@EPA | 11/27/2012 09:49:00 AM

From: Melissa Weitz/DC/USEPA/US
To: Erin Birgfeld/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/27/2012 09:49 AM
Subject: 1 (3) pager

[attachment "LU one pager 11.27.docx" deleted by Melissa Weitz/DC/USEPA/US]

Erin Birgfeld | Thanks Melissa and Suzie...imy computer is hung up as a result of my email cl... | 11/27/2012 09:44:54 AM

From: Erin Birgfeld/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA
Date: 11/27/2012 09:44 AM
Subject: Re: Outreach plan - latest draft for you review and input

Thanks Melissa and Suzie...imy computer is hung up as a result of my email clean up attempts. Will add language re roll out as soon as I can get back in.
Erin Birgfeld
Sent by EPA Wireless E-Mail Services.

Melissa Weitz | One more edit From: Melissa Weitz/DC/USEPA/US | 11/27/2012 09:39 AM EST

From: Melissa Weitz
To: Melissa Weitz
Cc: Suzanne Waltzer; Erin Birgfeld; Suzanne Kocchi

Date: 11/27/2012 09:39 AM EST
Subject: Re: Outreach plan - latest draft for you review and input

One more edit

[attachment "Outreach Plan - Inventory 11.27 v2.docx" deleted by Erin Birgfeld/DC/USEPA/US]

Melissa Weitz	I added my edits in green. If anyone else is working in another version, I can ju...	11/27/2012 09:29:28 AM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Erin Birgfeld/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA
Date: 11/27/2012 09:29 AM
Subject: Re: Outreach plan - latest draft for you review and input

I added my edits in green. If anyone else is working in another version, I can just add my edits into it when it's ready.

Melissa

[attachment "Outreach Plan - Inventory 11.27.docx" deleted by Melissa Weitz/DC/USEPA/US]

Suzanne Waltzer	Hi Erin and Melissa, Attached is the updated outreach plan. This incorporates...	11/27/2012 09:01:07 AM

From: Suzanne Waltzer/DC/USEPA/US
To: Erin Birgfeld/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA
Date: 11/27/2012 09:01 AM
Subject: Outreach plan - latest draft for you review and input

[attachment "Outreach Plan - Inventory mw_SW.docx" deleted by Melissa Weitz/DC/USEPA/US]

Hi Erin and Melissa,

Attached is the updated outreach plan. This incorporates mine and Melissa comments so far. For now, I accepted all comments and left the comment bubbles in for the outstanding items. Please add your edits to this version.

Erin, I believe you were going to add something in for the roll-out plan and I think Melissa had a few more comments? Also, we can discuss at 10 whether we want to present the draft FAQs to Paul now or just give him a list of the FAQs we are working on.

I have by business plan meeting from 9-10 but will step out at 10. We can just meet in mine or Suzie' office at 10.

Melissa, I have not had a chance to look at the other 2 pager yet so the version you sent last night is still the latest.

Thanks!

Re: 1 (3) pager
Suzanne Kocchi to: Erin Birgfeld 11/27/2012 12:15 PM
Cc: Melissa Weitz, Suzanne Waltzer, Leif Hockstad

History: This message has been forwarded.

let's accept all changes and bring clean versions for the meeting with paul.

Erin Birgfeld	Thanks Melissa, I made a few edits... Take a...	11/27/2012 12:12:14 PM

From: Erin Birgfeld/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA
Date: 11/27/2012 12:12 PM
Subject: Re: 1 (3) pager

Thanks Melissa,

I made a few edits... Take a look and see if you are OK with them.

[attachment "Outreach Plan - Inventory 11.27 v3 - elb.docx" deleted by Suzanne Kocchi/DC/USEPA/US]
Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202

Melissa Weitz	Thanks-- Updated version. There are still ite...	11/27/2012 11:48:23 AM
Erin Birgfeld	HI All, Here are my edits to the Roll out Plan...	11/27/2012 11:12:03 AM
Melissa Weitz	From: Erin Birgfeld/DC/USEPA/US To: Melis...	11/27/2012 09:49:00 AM
Erin Birgfeld	Thanks Melissa and Suzie...imy computer is...	11/27/2012 09:44:54 AM
Melissa Weitz	One more edit From: Melissa Weitz/DC/US...	11/27/2012 09:39 AM EST
Melissa Weitz	I added my edits in green. If anyone else is...	11/27/2012 09:29:28 AM
Suzanne Waltzer	Hi Erin and Melissa, Attached is the updated...	11/27/2012 09:01:07 AM

Re: roll out plan, 1 pager
Suzanne Waltzer to: Melissa Weitz 11/27/2012 12:20 PM

History: This message has been forwarded.

(b)(5) deliberative [redacted]

Outreach Plan - Inventory 11.27 v3.docx

Melissa Weitz	I haven't updated these since I last sent the...	11/27/2012 08:40:33 AM

From: Melissa Weitz/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/27/2012 08:40 AM
Subject: Re: roll out plan, 1 pager

I haven't updated these since I last sent them. I'll be in in around 20 mins and then I'll write up the pieces I still need to add and have them ready to add once you finish with your edits.

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Suzanne Waltzer/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 11/26/2012 06:39PM
Subject: roll out plan, 1 pager

This is as far as I got on these today. I need to leave now but plan to add more info later tonight. In case I don't get around to it, or forget to send you the updates, here are the most recent drafts:

(See attached file: Outreach Plan - Inventory mw.docx)(See attached file: LU one pager 11.26.docx)

[attachment "Outreach Plan - Inventory mw.docx" removed by Melissa Weitz/DC/USEPA/US]
[attachment "LU one pager 11.26.docx" removed by Melissa Weitz/DC/USEPA/US]

question on dehydrator methods

Melissa Weitz to: Seastream, Sandra 09/10/2013 10:45 AM

Cc: Melissa Weitz, "Robinson, Donald", "Stricklin, Eric", "Toukan, Ibrahim", "Cacho, Mariella", Suzanne Waltzer

In response to the questions on the method for dehydrators, we were wondering if (b)(5) deliberative [redacted]

"Seastream, Sandra"	Melissa, The information is in the docum...	11/26/2012 09:46:23 AM

From: "Seastream, Sandra" <Sandra.Seastream@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>, "Stricklin, Eric" <Eric.Stricklin@icfi.com>, "Toukan, Ibrahim" <Ibrahim.Toukan@icfi.com>, "Cacho, Mariella" <Mariella.Cacho@icfi.com>, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/26/2012 09:46 AM
Subject: RE: Draft 2013 Inventory Review

Melissa,

The information is in the document we sent on page 4.

Regards,
SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com | icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Monday, November 26, 2012 9:40 AM
To: Seastream, Sandra
Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella; Waltzer.Suzanne@epamail.epa.gov
Subject: Re: Draft 2013 Inventory Review

Thank you! I'll let you know later today if I have questions on the review.

This morning, we're trying to wrap up the one pager I mentioned below (including the bullets on the changes to the Inventory on liquids unloading).

Could you please send me the information requested (bullets below) in the next few hours?

Thank you!
Melissa

(b)(5) deliberative

"Seastream, Sandra" ---11/21/2012 03:20:21 PM---Melissa, Please find attached our summary review to date. We need to do more analysis on well count

From: "Seastream, Sandra" <Sandra.Seastream@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Cacho, Mariella" <Mariella.Cacho@icfi.com>, "Robinson, Donald" <Donald.Robinson@icfi.com>, "Stricklin, Eric" <Eric.Stricklin@icfi.com>, Suzanne Waltzer/DC/USEPA/US@EPA, "Seastream, Sandra" <Sandra.Seastream@icfi.com>, "Toukan, Ibrahim" <Ibrahim.Toukan@icfi.com>
Date: 11/21/2012 03:20 PM
Subject: Draft 2013 Inventory Review

Melissa,

Please find attached our summary review to date. We need to do more analysis on well counts next week, as our expert staff is out for the holiday this week. Let us know if you have questions.

Thanks,
SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com | icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 20, 2012 6:05 PM
To: Cacho, Mariella; Robinson, Donald; Stricklin, Eric; Waltzer.Suzanne@epamail.epa.gov; Seastream, Sandra
Subject: Re: Liquids unloading bullet points

Hi,

Thank you!

I'm going to need to fold this information into a one-pager, and only have space for around 3-4 bullets.

Could you review the 3 bullets below and complete the underlined bullet lines?

Thank you!
Melissa

[redacted] (b)(5) deliberative [redacted]

"Cacho, Mariella" ---11/20/2012 05:08:55 PM---Hi Melissa, I just got a notice this email bounced back from your EPA account.

From: "Cacho, Mariella" <Mariella.Cacho@icfi.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/20/2012 05:08 PM
Subject: Liquids unloading bullet points

Hi Melissa,

I just got a notice this email bounced back from your EPA account.

Please let me know if you have any questions.

Thanks,

Mariella

Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Cacho, Mariella
Sent: Tuesday, November 20, 2012 2:43 PM
To: 'Weitz.Melissa@epamail.epa.gov '
Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella; 'Waltzer.Suzanne@epamail.epa.gov'; Seastream, Sandra (Sandra.Seastream@icfi.com)
Subject: Liquids unloading bullet points

Hi Melissa,

We are drafting a memo compiling all the responses for the four main topics
Liquids Unloading Improvement, Gas Well Counts, Dehydrator Calculation, and QA/QC of Natural Gas Model. So you'll have everything in a single document.

As requested, please find below bullet points for your Liquids unloading question. We have also attached a memo developed for the 1990-2009 inventory, it describes in detail why the emissions increase so dramatically. We will include these bullet point the memo as well:

(b)(5) deliberative

(b)(5) deliberative

Please let us know if you have any more questions.

Thank you,

Mariella
Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

[attachment "Emissions from Well Cleanups 12-13-2010_FINAL.doc.doc" deleted by Melissa Weitz/DC/USEPA/US]
[attachment "Draft 2013 Inventory Memo_112112.docx" deleted by Melissa Weitz/DC/USEPA/US]

Re: Very rough draft briefing slides
Erin Birgfeld to: Suzanne Waltzer 11/27/2012 04:37 PM
Cc: Melissa Weitz, Suzanne Kocchi, Leif Hockstad

History: This message has been forwarded.

Hi guys,

This is what I've got so far....

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202
(b)(5) deliberative

Gina Update on Nat Gas 11.27_12 version - elb.pptx

Suzanne Waltzer	I posted some draft slides on the G drive at -...	11/27/2012 04:10:32 PM

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA
Date: 11/27/2012 04:10 PM
Subject: Very rough draft briefing slides

I posted some draft slides on the G drive at - (b)(6) personal privacy

This is still a work in progress but should provide a draft outline for us to fill in. I pulled in some slides from other presentations and added some initial input but I need to finish in the morning. I added in red placeholder slides for the communication strategy (7-9) and next steps that still need to be filled in.

I will resume work on this in the morning but in the meantime, I wanted to send it around for input on the overall outline and the sections that still need to be fleshed out. Please add your edits to the version on the G drive.

Thanks!

(b)(5) deliberative

Gina Update on Nat Gas 11.27_12 version.pptx

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544

Web: www.epa.gov/gasstar

Melissa Weitz	Thanks-- Updated version. There are still ite...	11/27/2012 11:48:23 AM
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Suzanne Waltzer	Hi Erin and Melissa, Attached is the updated...	11/27/2012 09:01:07 AM

Re: punch list, revision expectation by COB 11/28
Melissa Weitz to: Paula Fields 11/27/2012 06:21 PM
Cc: "MacQueen, Casey", "Gray, Jessica", "Wolf, Marty"

It's at 11 a.m.

Possibly the issues you're addressing by tomorrow will explain a lot of it?

I've attached the well counts from the 2012 and 2013 Inventory and their differences, you've probably already done this, but here is what I get when I calculate the differences.

(b)(5) deliberative [redacted]

well counts.xlsx

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

"Paula Fields"	OK, we'll start this analysis in the morning....	11/27/2012 06:12:50 PM

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Gray, Jessica" <Jessica.Gray@erg.com>, "MacQueen, Casey" <Casey.MacQueen@erg.com>, "Wolf, Marty" <Marty.Wolf@erg.com>
Date: 11/27/2012 06:12 PM
Subject: Re: punch list, revision expectation by COB 11/28

OK, we'll start this analysis in the morning. What time is your briefing on Thursday (i.e., do we have any time on Thursday AM to work with)?

Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: <Weitz.Melissa@epamail.epa.gov>
To: "Paula Fields" <Paula.Fields@erg.com>

CC: "Casey MacQueen" <Casey.MacQueen@erg.com>, "Jessica Gray" <Jessica.Gray@erg.com>, "Marty W
<Marty.Wolf@erg.com>
Date: 11/27/2012 2:46 PM
Subject: Re: punch list, revision expectation by COB 11/28

Thanks!

This sounds good, except we will need an answer for Issue #6 this week. We're briefing our office director, and our as
[redacted] (b)(5) deliberative [redacted]

Will it be possible to get an answer to that question tomorrow?

Melissa

"Paula Fields" ---11/27/2012 05:23:17 PM---** High Priority ** Hi Melissa -

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Casey MacQueen" <Casey.MacQueen@erg.com>, "Jessica Gray" <Jessica.Gray@erg.com>, "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/27/2012 05:23 PM
Subject: punch list, revision expectation by COB 11/28

Hi Melissa -
The 'punch list' of items to address related to well counts is attached, along with our proposed resolution.

In short, we plan to fix database coding to completely address Issues #1 and #2, and implement a tempora
final fix for Issue #3 by next Friday, 12/7, which we can implement once we get feedback from you. Issue
propose addressing during the expert review period, if EPA wants to move forward with addressing these i

Please let us know if you agree with this plan, or we need a call to discuss.

We'll follow up shortly with the responses to ICF comments.

Tx,
Paula

****
Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185[attachment "NG Systems GHG Inventory.Well Counts Punch List.2012.11.27.doc

Re: Very rough draft briefing slides
Suzanne Kocchi to: Erin Birgfeld 11/27/2012 06:47 PM
Cc: Suzanne Waltzer, Melissa Weitz, Leif Hockstad

History: This message has been forwarded.

ok, i am BEYOND irritated because i couldn't recover the changes i had made. i redid as much as i could but it isn't as helpful as my previous version. i have just run out of time. hopefully it is clear. i also saved on G drive.

(b)(5) deliberative [redacted]

Gina Update on Nat Gas 11.27_12 version - elb_sk.pptx

Erin Birgfeld	Hi guys, This is what I've got so far....	11/27/2012 04:37:15 PM

From: Erin Birgfeld/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA
Date: 11/27/2012 04:37 PM
Subject: Re: Very rough draft briefing slides

Hi guys,

This is what I've got so far....

Erin Birgfeld
Director of Communications
Climate Change Division
U.S. Environmental Protection Agency
phone: (202) 343-9079
fax: (202) 343-2202
[attachment "Gina Update on Nat Gas 11.27_12 version - elb.pptx" deleted by Suzanne Kocchi/DC/USEPA/US]

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Erin Birgfeld	Thanks Melissa and Suzie...imy computer is...	11/27/2012 09:44:54 AM
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Suzanne Waltzer	Hi Erin and Melissa, Attached is the updated...	11/27/2012 09:01:07 AM

Re: comm strategy on liquids unloading/inventory expert review

Suzanne Kocchi to: Erin Birgfeld, Suzanne Waltzer, Melissa Weitz 11/28/2012 09:58 AM

History: This message has been forwarded.

Just add a column to the table

Erin Birgfeld	Definitely... Erin Birgfeld	11/28/2012 09:56 AM EST

From: Erin Birgfeld
To: Suzanne Waltzer; Suzanne Kocchi; Melissa Weitz
Date: 11/28/2012 09:56 AM EST
Subject: Re: comm strategy on liquids unloading/inventory expert review

Definitely...
Erin Birgfeld
Sent by EPA Wireless E-Mail Services.

Suzanne Waltzer	Just finally getting caught up on emails fro...	11/28/2012 09:49 AM EST

From: Suzanne Waltzer
To: Suzanne Kocchi; Erin Birgfeld; Melissa Weitz
Cc:
Date: 11/28/2012 09:49 AM EST
Subject: Fw: comm strategy on liquids unloading/inventory expert review

Just finally getting caught up on emails from being out last week. Based on this note, should we add possible stakeholder reactions to the briefing?

----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 11/28/2012 09:48 AM -----

From: Suzanne Kocchi/DC/USEPA/US
To: Erin Birgfeld/DC/USEPA/US@EPA, Isabel DeLuca/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/20/2012 10:19 AM
Subject: comm strategy on liquids unloading/inventory expert review

Erin, Isabel -

Sarah wants us to brief Gina on the communication strategy for the expert review draft of the Inventory, specifically the natural gas production sector. Leif's plan is to release the expert review draft on 12/10 therefore we need Gina to sign off on the plan before then. [redacted] (b)(5) deliberative [redacted] So Sarah wants us to walk thru the changes and communication strategy with Sarah next week and we are trying to get on Gina's calendar for next week or early the following. Below is the note from Sarah on this issue and what she wants us to cover. I have included Melissa, Leif and Mark above as well. Melissa is working on a one pager right now for liquids unloading that I think can serve as the basis for this strategy/briefing. Perhaps she can circulate it when she has the draft and we can go from there? I am going to put something on Paul's calendar for early next week so we can review materials

with him before the Sarah and Gina briefings.

Does that make sense? Thanks- Suzie

From Sarah:
"What date is our current expected date for sending the inventory out for expert review? We need to sit down with gina before that date, probably at least a week or 2 before, and walk through the communications plan on this issue. that means, who is likely to react to his change, and how they will likely react, who should we be working with ahead of the expert review circulation to help on the communications of this, and what are the talking points. Can you guys please request time on gina's calendar for this meeting, and let's sit down internally before then as well."

Information Update - Location has changed: Natural Gas Inventory – Liquids Unloading

Mon 12/03/2012 3:00 PM - 3:45 PM

Attendance is **required** for Melissa Weitz

Chair: **Gina McCarthy/DC/USEPA/US**

Sent By: **Cindy Huang/DC/USEPA/US**

Location: ARN 5400 / conference: 1-866-299-3188 access: 2025647412

Gina McCarthy has sent updated information; location has changed

Required:	Bill Irving/DC/USEPA/US@EPA, Bruce Moore/RTP/USEPA/US@EPA, David Cozzie/RTP/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Paul
Optional:	Cynthia Browne/DC/USEPA/US@EPA, Daniel Hopkins/DC/USEPA/US@EPA, Don Zinger/DC/USEPA/US@EPA, Jackie Krieger/DC/USEPA/US@EPA, Larke Williams/DC/USEPA/US@EPA, Tina Murphy/DC/USEPA/US@EPA

Description

OAR Meeting Request Form

Requesting Meeting/Conference Call with: Gina McCarthy

Date of this Request: 11/20/12

Point of Contact (Name/Number): Suzie Kocchi

Title of Meeting: Natural Gas Inventory – Liquids Unloading

Purpose of Meeting: Brief Gina on updates to the 2013 numbers for liquids unloading portion of the natural gas inventory before the expert review draft goes out in mid Dec

Priority Status (check one)_X_Critical (time sensitive) **Less Immediate ___**
Last possible date for meeting: 12/4/12
If the meeting is critical, please explain why: We are sending out the expert review draft of the 2013 Inventory the second week of Dec and we would like to brief Gina on the changes to the liquids unloading estimates in the natural gas production sector before the draft goes out.

Location of Meeting: ARN
Length of Meeting: 45 min

Key Participants: (List all who need to be notified of the meeting)

Office/Organization	Name
OAR/OAP	Sarah Dunham
OAR/OAP/CCD	Paul Gunning
OAR/OAP/CCD	Bill Irving
OAR/OAP/CCD	Melissa Weitz
OAR/OAP/CCD	Suzie Kocchi
OAR/OAP/CCD	Leif Hockstad
OAR/OAP/CCD	Suzie Waltzer
OAR/OAP/CCD	Erin Birgfeld

___ Authorized by Office/Air Division Director

NOTE: Please provide briefing materials 24 hours before your meeting.

RE: Draft 2013 Inventory Review

Melissa Weitz to: Seastream, Sandra 11/28/2012 01:22 PM

Cc: "Robinson, Donald", "Stricklin, Eric", "Toukan, Ibrahim", "Cacho, Mariella", Suzanne Waltzer

---

Hello,

Thanks again for all of your help on this.

Below I've pasted ERG's responses on the questions on well counts on page 5 of your QA memo. Please review these responses, and let me know if anything else has come up in your well count experts' review. There is still a large difference between last year's well counts and this year's that we're trying to sort out.

Thank you,
Melissa

(b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] (b)(5) deliberative [redacted]

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Cc: "Robinson, Donald" <Donald.Robinson@icfi.com>, "Stricklin, Eric" <Eric.Stricklin@icfi.com>, "Toukan, Ibrahim" <Ibrahim.Toukan@icfi.com>, "Cacho, Mariella" <Mariella.Cacho@icfi.com>, Suzanne Waltzer/DC/USEPA/US@EPA
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Subject: RE: Draft 2013 Inventory Review

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The information is in the document we sent on page 4.

Regards,
SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com | icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

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Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella; Waltzer.Suzanne@epamail.epa.gov
Subject: Re: Draft 2013 Inventory Review

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Could you please send me the information requested (bullets below) in the next few hours?

Thank you!
Melissa

(b)(5) deliberative

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SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com | icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

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Sent: Tuesday, November 20, 2012 6:05 PM
To: Cacho, Mariella; Robinson, Donald; Stricklin, Eric; Waltzer.Suzanne@epamail.epa.gov; Seastream, Sandra
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Thank you!
Melissa

(b)(5) deliberative

(b)(5) deliberative

[redacted]

"Cacho, Mariella" ---11/20/2012 05:08:55 PM---Hi Melissa, I just got a notice this email bounced back from your EPA account.

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To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/20/2012 05:08 PM
Subject: Liquids unloading bullet points

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Please let me know if you have any questions.

Thanks,

Mariella

Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Cacho, Mariella
Sent: Tuesday, November 20, 2012 2:43 PM
To: 'Weitz.Melissa@epamail.epa.gov '
Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella; 'Waltzer.Suzanne@epamail.epa.gov'; Seastream, Sandra (Sandra.Seastream@icfi.com)
Subject: Liquids unloading bullet points

Hi Melissa,

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Liquids Unloading Improvement, Gas Well Counts, Dehydrator Calculation, and QA/QC of Natural Gas Model. So you'll have everything in a single document.

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[redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Please let us know if you have any more questions.

Thank you,

Mariella
Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

[attachment "Emissions from Well Cleanups 12-13-2010_FINAL.doc.doc" deleted by Melissa Weitz/DC/USEPA/US]
[attachment "Draft 2013 Inventory Memo_112112.docx" deleted by Melissa Weitz/DC/USEPA/US]

Re: updates since GRI
Suzanne Waltzer to: Melissa Weitz 11/28/2012 03:50 PM

History: This message has been forwarded.

Yes, this is my understanding as well. Agree on the sources for review next.

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

Melissa Weitz	I looked into this, since it'd be good for me to...	11/28/2012 02:19:50 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 11/28/2012 02:19 PM
Subject: updates since GRI

I looked into this, since it'd be good for me to have this down, and the following do not use GRI (with 2011 emissions in parentheses)

(b)(5) deliberative

Re: call at 11 am /2 pm today?
Paula Fields to: Melissa Weitz 11/29/2012 10:58 AM
Cc: "Wolf, Marty"

History: This message has been forwarded.

Melissa -

Let's move our call to 10 am ET tomorrow. Does that work for you?

Paula

****

Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: <Weitz.Melissa@epamail.epa.gov>
To: "Paula Fields" <Paula.Fields@erg.com>
CC: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/29/2012 7:55 AM
Subject: Re: call at 11 am /2 pm today?

We can do our call later today. I'll be in until 6:30/7 EST, so if it works out with your number crunching schedule, we can do it late today, and if not, do it tomorrow instead?

API wanted to discuss the old liquids unloading model. Let me check to see if they still want to do that.

"Paula Fields" ---11/29/2012 10:43:06 AM---Hi Melissa- We have our weekly call scheduled for today. Marty will be crunching numbers, so I'd pre

From: "Paula Fields" <Paula.Fields@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/29/2012 10:43 AM
Subject: call at 11 am /2 pm today?

Hi Melissa-
We have our weekly call scheduled for today. Marty will be crunching numbers, so I'd prefer if we could delay until later or until tomorrow (although I will only be available between 9:30-10:30 ET on Friday).

Also, I see that we have a tentative call with API scheduled for 1 pm ET tomorrow. Is that still necessary?

Tx,
Paula

****

Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185

Natural Gas Spreadsheet and Well Counts
Marty Wolf to: Melissa Weitz 11/29/2012 04:00 PM
Cc: "Gopi Manne", "Paula Fields"

History: This message has been replied to and forwarded.

Melissa,

Attached is the Natural Gas Systems spreadsheet, as well as our latest well counts. For reference, I am also including a table that describes the changes that we made to the spreadsheet in response to ICF's comments.

[redacted]
(b)(5) deliberative
[redacted]

At this point, please send over the text and I will make redline/strike-out changes based upon this version of the spreadsheet. I should be able to send the text back to you later this afternoon.

We will send you the annex tomorrow - we need to spend more time QAing all of the involved tables.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

(b)(5) deliberative [redacted]
NaturalGasSystems_1990-2011_112912.xlsx
(b)(5) deliberative [redacted]
(b)(5) deliberative [redacted]
Response to ICF comments_112912.docx
DRAFT Gas Well Counts_112812.xlsx

Re: Natural Gas Spreadsheet and Well Counts - NEED EI SECTION TEXT

Paula Fields to: Melissa Weitz 11/29/2012 04:39 PM

Cc: "Marty Wolf"

History: This message has been forwarded.

Melissa -
We need the inventory text now. Please send ASAP.

Also, send the annex if you've made any changes to that.

Tx,
Paula

****

Paula G. Fields
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185
>>>

From: Marty Wolf
To: weitz.melissa@epa.gov
CC: Fields, Paula; Manne, Gopi
Date: 11/29/2012 12:58 PM
Subject: Natural Gas Spreadsheet and Well Counts

Melissa,

Attached is the Natural Gas Systems spreadsheet, as well as our latest well counts. For reference, I am also including a table that describes the changes that we made to the spreadsheet in response to ICF's comments.

(b)(5) deliberative

At this point, please send over the text and I will make

redline/strike-out changes based upon this version of the spreadsheet. I should be able to send the text back to you later this afternoon.

We will send you the annex tomorrow - we need to spend more time QAing all of the involved tables.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

Re: Natural Gas Spreadsheet and Well Counts
Melissa Weitz to: Marty Wolf 11/29/2012 05:01 PM
Cc: "Gopi Manne", "Paula Fields"

Thank you!!!

Question--- The most recent spreadsheet I had before [redacted] (b)(5) deliberative [redacted] Does that make sense to you? Did that other changes make that much of a difference?

Thanks!
Melissa

"Marty Wolf"	Melissa,	11/29/2012 04:00:02 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Gopi Manne" <Gopi.Manne@erg.com>, "Paula Fields" <Paula.Fields@erg.com>
Date: 11/29/2012 04:00 PM
Subject: Natural Gas Spreadsheet and Well Counts

Melissa,

Attached is the Natural Gas Systems spreadsheet, as well as our latest well counts. For reference, I am also including a table that describes the changes that we made to the spreadsheet in response to ICF's comments.

[redacted] (b)(5) deliberative [redacted]

At this point, please send over the text and I will make redline/strike-out changes based upon this version of the spreadsheet. I should be able to send the text back to you later this afternoon.

We will send you the annex tomorrow - we need to spend more time QAing all of the involved tables.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA

916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "NaturalGasSystems_1990-2011_112912.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "response to icf comments_112912.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "DRAFT Gas Well Counts_112812.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Re: Fw: Rescheduled: Review Liquids Unloading Estimates in 2013 Inventory (Nov 29 11:00 AM EST in 1310L Room 1002 OD/DC-1310L-OAR@EPA)

Melissa Weitz to: Leif Hockstad 11/29/2012 05:10 PM

Oh yeah, we got your well counts. And we even have new Inventory numbers. What now? Only 28 days after the drop-dead-deadline? Not bad, eh!

Leif Hockstad	We have well counts.....????????????...	11/29/2012 04:53:07 PM

From: Leif Hockstad/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/29/2012 04:53 PM
Subject: Re: Fw: Rescheduled: Review Liquids Unloading Estimates in 2013 Inventory (Nov 29 11:00 AM EST in 1310L Room 1002 OD/DC-1310L-OAR@EPA)

We have well counts.....????????????????????????

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Leif Hockstad/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 11/29/2012 04:51PM
Subject: Re: Fw: Rescheduled: Review Liquids Unloading Estimates in 2013 Inventory (Nov 29 11:00 AM EST in 1310L Room 1002 OD/DC-1310L-OAR@EPA)

Better than expected. We're good. We're calm(ish).

Leif Hockstad---11/29/2012 02:50:16 PM---How did it go? -----Forwarded by Leif Hockstad/DC/USEPA/US on 11/29/2012 02:49PM -----

From: Leif Hockstad/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/29/2012 02:50 PM
Subject: Fw: Rescheduled: Review Liquids Unloading Estimates in 2013 Inventory (Nov 29 11:00 AM EST in 1310L Room 1002 OD/DC-1310L-OAR@EPA)

How did it go?

-----Forwarded by Leif Hockstad/DC/USEPA/US on 11/29/2012 02:49PM -----

Calendar Entry

Meeting Change **Sarah Dunham has rescheduled this meeting**

Subject	**Description / Agenda**
Review Liquids Unloading Estimates in 2013 Inventory	
When	

Begins: 11/29/2012 11:00 AM Ends: 11/29/2012 12:00 PM **Where** Rooms 1310L Room 1002 OD/DC-1310L-OAR@EPA **Chair** Sarah Dunham/DC/USEPA/US **Sent by** Tina Murphy/DC/USEPA/US **Invitees** To (required): Bill Irving/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Paul Gunning/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA cc (optional): Erin Birgfeld/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA		Sarah has a meeting conflict.

Re: Natural Gas Spreadsheet and Well Counts
Melissa Weitz to: Marty Wolf 11/29/2012 05:55 PM
Cc: "Manne, Gopi", "Fields, Paula"

Thanks,

Just heard back from API and we're rescheduling tomorrow's call to some point next week.

We're still editing the text here and plan to give it to our division director without the updated numbers tomorrow a.m. I'll send you that same version and then you can update the numbers tomorrow and whenever I get my division director's edits I'll add them into your version. I'll do the same with the annex.

Thank you!

Melissa

"Marty Wolf"	Melissa, Here's a quick breakdown. There is...	11/29/2012 05:37:32 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Fields, Paula" <Paula.Fields@erg.com>, "Manne, Gopi" <Gopi.Manne@erg.com>
Date: 11/29/2012 05:37 PM
Subject: Re: Natural Gas Spreadsheet and Well Counts

Melissa,

Here's a quick breakdown. [redacted] (b)(5) deliberative [redacted]

I think this makes sense to me given the changes made.

Can you please send us the your latest text and annex file?

I am leaving within the next 15 minutes or so, so I will need to push the revised text back until tomorrow, since I have not received your latest text file.

As I explained earlier, the annex file definitely will not be ready until tomorrow.

Finally, can you confirm whether we need to be on the API call scheduled for tomorrow?

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 11/29/2012 2:01 PM >>>

Thank you!!!

Question--- The most recent spreadsheet I had before this one [redacted] (b)(5) deliberative [redacted] Does that make sense to you? Did that other changes make that much of a difference?

Thanks!
Melissa

"Marty Wolf" ---11/29/2012 04:00:02 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Gopi Manne" <Gopi.Manne@erg.com>, "Paula Fields" <Paula.Fields@erg.com>
Date: 11/29/2012 04:00 PM
Subject: Natural Gas Spreadsheet and Well Counts

Melissa,

Attached is the Natural Gas Systems spreadsheet, as well as our latest well counts. For reference, I am also including a table that describes the changes that we made to the spreadsheet in response to ICF's comments.

[redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

At this point, please send over the text and I will make redline/strike-out changes based upon this version of the spreadsheet. I should be able to send the text back to you later this afternoon.

We will send you the annex tomorrow - we need to spend more time QAing all of the involved tables.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
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916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "NaturalGasSystems_1990-2011_112912.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "response to icf comments_112912.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "DRAFT Gas Well Counts_112812.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Re: Natural Gas Spreadsheet and Well Counts
Marty Wolf to: Melissa Weitz 11/29/2012 10:34 PM
Cc: "Gopi Manne", "Paula Fields"

History: This message has been forwarded.

Melissa,

I'll look into this first thing in the morning - maybe I can get something figured out before the call.

One thing to remember is that there was an ICF calculational error that was in the previous draft. If I remember correctly off the top of my head, [redacted] (b)(5) deliberative [redacted]. Again, I'll check into this issue first thing.

Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/29/12 3:32 ?? >>>

[redacted] (b)(5) deliberative [redacted]? This is just my understanding of it. Let me know--thanks!

"Marty Wolf" ---11/29/2012 05:37:32 PM---Melissa, Here's a quick breakdown. [redacted] (b)(5) deliberative [redacted]

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Fields, Paula" <Paula.Fields@erg.com>, "Manne, Gopi" <Gopi.Manne@erg.com>
Date: 11/29/2012 05:37 PM
Subject: Re: Natural Gas Spreadsheet and Well Counts

Melissa,

Here's a quick breakdown. [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

[redacted]

I think this makes sense to me given the changes made.

Can you please send us the your latest text and annex file?

I am leaving within the next 15 minutes or so, so I will need to push the revised text back until tomorrow, since I have not received your latest text file.

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Marty

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10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>>

<Weitz.Melissa@epamail.epa.gov> 11/29/2012 2:01 PM
>>>

Thank you!!!

Question--- The most recent spreadsheet I had before this one
(b)(5) deliberative
. Does that make sense to you?
Did that other changes make that much of a difference?

Thanks!
Melissa

"Marty Wolf" ---11/29/2012 04:00:02 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Gopi Manne" <Gopi.Manne@erg.com>, "Paula Fields" <Paula.Fields@erg.com>
Date: 11/29/2012 04:00 PM
Subject: Natural Gas Spreadsheet and Well Counts

Melissa,

Attached is the Natural Gas Systems spreadsheet, as well as our latest well counts. For reference, I am also including a table that describes the changes that we made to the spreadsheet in response to ICF's comments.

(b)(5) deliberative

At this point, please send over the text and I will make redline/strike-out changes based upon this version of the spreadsheet. I should be able to send the text back to you later this afternoon.

We will send you the annex tomorrow - we need to spend more time QAing all of the involved tables.

Thanks,

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "NaturalGasSystems_1990-2011_112912.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "response to icf comments_112912.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "DRAFT Gas Well Counts_112812.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Re: annex text?
Marty Wolf to: Melissa Weitz, Paula Fields 11/30/2012 11:42 AM

History: This message has been replied to and forwarded.

Melissa,

Here is our latest version of the annex text.

[redacted] (b)(5) deliberative [redacted]

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 11/30/2012 8:18 AM >>>
Can you send me the most recent version of the annex text you have?
I think I've been looking at the wrong one.

[redacted] (b)(5) deliberative [redacted]

Thank you!

(b)(5) deliberative [redacted]

Annex 3.4 Methodology for Estimating CH4 and CO2 Emissions from Natural Gas Systems 11.29_GM.docx

Re: annex text?
Marty Wolf to: Melissa Weitz 11/30/2012 12:14 PM
Cc: "Paula Fields"

History: This message has been forwarded.

This is the only other version I have.

>>> <Weitz.Melissa@epamail.epa.gov> 11/30/2012 9:07 AM >>>
Wasn't there a version that included footnotes on the activity data source?

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Marty Wolf" <Marty.Wolf@erg.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA, "Paula Fields" <Paula.Fields@erg.com>
From: "Marty Wolf" <Marty.Wolf@erg.com>
Date: 11/30/2012 11:42AM
Subject: Re: annex text?

Melissa,

Here is our latest version of the annex text.

[redacted] (b)(5) deliberative [redacted]

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 11/30/2012 8:18 AM >>>
Can you send me the most recent version of the annex text you have? I think I've been looking at the wrong one.

[redacted] (b)(5) deliberative [redacted]

Thank you!

[attachment "Annex 3.4 Methodology for Estimating CH4 and CO2 Emissions from Natural Gas Systems 11.29_GM.docx" removed by

Melissa Weitz/DC/USEPA/US] (b)(5) deliberative [redacted]

Annex 3.4 Methodology for Estimating CH4 and CO2 Emissions from Natural Gas Systems 11.13.docx

Fw: Natural Gas Inventory - Liquids Unloading

Suzanne Kocchi to: Melissa Weitz, Suzanne Waltzer, Mark DeFigueiredo, Erin Birgfeld 11/30/2012 02:09 PM

History: This message has been forwarded.

FYI

----- Forwarded by Suzanne Kocchi/DC/USEPA/US on 11/30/2012 02:09 PM -----

From: Suzanne Kocchi/DC/USEPA/US
To: Daniel Hopkins/DC/USEPA/US@EPA, Larke Williams/DC/USEPA/US@EPA
Cc: Jackie Krieger/DC/USEPA/US@EPA
Date: 11/30/2012 02:09 PM
Subject: Fw: Natural Gas Inventory - Liquids Unloading

Attached are the slides for this meeting. Sarah had to leave early so we might have slight updates on Mon but we will bring copies to the meeting and those hardcopies will reflect any edits that Sarah may have. Thanks - Suzie

(b)(5) deliberative [redacted]

Gina Update on Nat Gas 11.30 830 am.pptx

Suzie Kocchi, Chief of Staff
Climate Change Division
US Environmental Protection Agency
Phone: 202.343.9387
Fax: 202.343.2359

----- Forwarded by Suzanne Kocchi/DC/USEPA/US on 11/30/2012 02:07 PM -----

Natural Gas Inventory – Liquids Unloading

Mon 12/03/2012 3:00 PM - 3:45 PM

Attendance is for Suzanne Kocchi

Chair: **Gina McCarthy/DC/USEPA/US**
Sent By: **Cindy Huang/DC/USEPA/US**
Location: ARN 5400 / conference: (b)(6) personal privacy [redacted]

Required:	Bill Irving/DC/USEPA/US@EPA, Bruce Moore/RTP/USEPA/US@EPA, David Cozzie/RTP/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Leif Hockstad/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, Paul Gunning/DC/USEPA/US@EPA, Sarah Dunham/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Optional:	Cynthia Browne/DC/USEPA/US@EPA, Daniel Hopkins/DC/USEPA/US@EPA, Don Zinger/DC/USEPA/US@EPA, Jackie Krieger/DC/USEPA/US@EPA, Larke

Williams/DC/USEPA/US@EPA, Tina Murphy/DC/USEPA/US@EPA

Description

OAR Meeting Request Form

Requesting Meeting/Conference Call with: Gina McCarthy

Date of this Request: **11/20/12**

Point of Contact (Name/Number): Suzie Kocchi

Title of Meeting: Natural Gas Inventory – Liquids Unloading

Purpose of Meeting: Brief Gina on updates to the 2013 numbers for liquids unloading portion of the natural gas inventory before the expert review draft goes out in mid Dec

Priority Status (check one)_X_Critical (time sensitive) **Less Immediate ___**
Last possible date for meeting: 12/4/12
If the meeting is critical, please explain why: We are sending out the expert review draft of the 2013 Inventory the second week of Dec and we would like to brief Gina on the changes to the liquids unloading estimates in the natural gas production sector before the draft goes out.

Location of Meeting: ARN
Length of Meeting: 45 min
Key Participants: (List all who need to be notified of the meeting)

Office/Organization	Name
OAR/OAP	Sarah Dunham
OAR/OAP/CCD	Paul Gunning
OAR/OAP/CCD	Bill Irving
OAR/OAP/CCD	Melissa Weitz
OAR/OAP/CCD	Suzie Kocchi
OAR/OAP/CCD	Leif Hockstad
OAR/OAP/CCD	Suzie Waltzer
OAR/OAP/CCD	Erin Birgfeld

Fw: RE: Draft 2013 Inventory Review
Melissa Weitz to: Paula Fields 11/30/2012 06:07 PM
Cc: "Marty Wolf"

The rest of icf's review is below. I haven't looked at this yet, but will soon.

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 11/30/2012 06:05PM -----

==========
To: "Seastream, Sandra" <Sandra.Seastream@icfi.com>, Melissa Weitz/DC/USEPA/US@EPA
From: "Cacho, Mariella" <Mariella.Cacho@icfi.com>
Date: 11/30/2012 05:49PM
Cc: "Thompson, Victoria" <Victoria.Thompson@icfi.com>, Tom Wirth/DC/USEPA/US@EPA, "Robinson, Donald" <Donald.Robinson@icfi.com>, "Stricklin, Eric" <Eric.Stricklin@icfi.com>
Subject: RE: Draft 2013 Inventory Review
==========

Melissa,

ICF has completed a review of the proposed natural gas well count improvement based on the information provided.

We have done this review [redacted] (b)(5) deliberative .

Please find attached the updated review memo with additions in track changes for your convenience.

Thank you,

Mariella

Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com<mailto:mcacho@icfi.com>
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Seastream, Sandra
Sent: Friday, November 30, 2012 11:52 AM
To: Weitz.Melissa@epamail.epa.gov
Cc: Thompson, Victoria; Wirth.Tom@epamail.epa.gov; Cacho, Mariella
Subject: RE: Draft 2013 Inventory Review

Hi Melissa,

Thanks for the TD. We will get draft information back to you today.

Regards,
SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com<mailto:Sandra.Seastream@icfi.com> | icfi.com<http://www.icfi.com/>
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov<mailto:Weitz.Melissa@epamail.epa.gov> [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, November 30, 2012 10:09 AM
To: Seastream, Sandra; Robinson, Donald
Cc: Thompson, Victoria; Wirth.Tom@epamail.epa.gov<mailto:Wirth.Tom@epamail.epa.gov>
Subject: RE: Draft 2013 Inventory Review

Hello,

Victoria Thompson at ICF will be contacting you soon with a TO # for the TD below.

We'd like to get as much information we can on the review by COB today, and then [redacted] (b)(5) deliberative by early next week. I apologize for the tight turnaround, but we need to wrap things up on the expert review draft.

Please let me know if you have any questions.
Melissa

TD for ICF

[redacted] (b)(5) deliberative

-----"Seastream, Sandra" <Sandra.Seastream@icfi.com><mailto:Sandra.Seastream@icfi.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Seastream, Sandra" <Sandra.Seastream@icfi.com><mailto:Sandra.Seastream@icfi.com>
Date: 11/26/2012 09:46AM
Cc: "Robinson, Donald" <Donald.Robinson@icfi.com><mailto:Donald.Robinson@icfi.com>, "Stricklin, Eric" <Eric.Stricklin@icfi.com><mailto:Eric.Stricklin@icfi.com>, "Toukan, Ibrahim" <Ibrahim.Toukan@icfi.com><mailto:Ibrahim.Toukan@icfi.com>, "Cacho, Mariella" <Mariella.Cacho@icfi.com><mailto:Mariella.Cacho@icfi.com>, Suzanne Waltzer/DC/USEPA/US@EPA
Subject: RE: Draft 2013 Inventory Review

Melissa,

The information is in the document we sent on page 4.

Regards,
SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com<mailto:Sandra.Seastream@icfi.com> | icfi.com<http://www.icfi.com/>
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov<mailto:Weitz.Melissa@epamail.epa.gov> [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Monday, November 26, 2012 9:40 AM
To: Seastream, Sandra
Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella; Waltzer.Suzanne@epamail.epa.gov<mailto:Waltzer.Suzanne@epamail.epa.gov>
Subject: Re: Draft 2013 Inventory Review

Thank you! I'll let you know later today if I have questions on the review.

This morning, we're trying to wrap up the one pager I mentioned below (including the bullets on the changes to the Inventory on liquids unloading).

Could you please send me the information requested (bullets below) in the next few hours?

Thank you!
Melissa

(b)(5) deliberative

[Inactive hide details for "Seastream, Sandra" ---11/21/2012 03:20:21 PM---Melissa, Please find attached our summary review to d]"Seastream, Sandra" ---11/21/2012 03:20:21 PM---Melissa, Please find attached our summary review to date. We need to do more analysis on well count

From: "Seastream, Sandra" <Sandra.Seastream@icfi.com<mailto:Sandra.Seastream@icfi.com>>
To: Melissa Weitz/DC/USEPA/US@EPA, "Cacho, Mariella" <Mariella.Cacho@icfi.com<mailto:Mariella.Cacho@icfi.com>>, "Robinson, Donald" <Donald.Robinson@icfi.com<mailto:Donald.Robinson@icfi.com>>, "Stricklin, Eric" <Eric.Stricklin@icfi.com<mailto:Eric.Stricklin@icfi.com>>, Suzanne Waltzer/DC/USEPA/US@EPA, "Seastream, Sandra" <Sandra.Seastream@icfi.com<mailto:Sandra.Seastream@icfi.com>>, "Toukan, Ibrahim" <Ibrahim.Toukan@icfi.com<mailto:Ibrahim.Toukan@icfi.com>>
Date: 11/21/2012 03:20 PM
Subject: Draft 2013 Inventory Review

Melissa,

Please find attached our summary review to date. We need to do more analysis on well counts next week, as our expert staff is out for the holiday this week. Let us know if you have questions.

Thanks,
SANDY SEASTREAM | Principal | 703.218.2562 (o) | Sandra.Seastream@icfi.com<mailto:Sandra.Seastream@icfi.com> | icfi.com<http://www.icfi.com/>
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Weitz.Melissa@epamail.epa.gov<mailto:Weitz.Melissa@epamail.epa.gov> [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 20, 2012 6:05 PM
To: Cacho, Mariella; Robinson, Donald; Stricklin, Eric; Waltzer.Suzanne@epamail.epa.gov<mailto:Waltzer.Suzanne@epamail.epa.gov>; Seastream, Sandra
Subject: Re: Liquids unloading bullet points

Hi,

Thank you!

I'm going to need to fold this information into a one-pager, and only have space for around 3-4 bullets.

Could you review the 3 bullets below and complete the underlined bullet lines?

Thank you!
Melissa

(b)(5) deliberative

[Inactive hide details for "Cacho, Mariella" ---11/20/2012 05:08:55 PM---Hi Melissa, I just got a notice this email bounced back]"Cacho, Mariella" ---11/20/2012 05:08:55 PM---Hi Melissa, I just got a notice this email bounced back from your EPA account.

From: "Cacho, Mariella" <Mariella.Cacho@icfi.com<mailto:Mariella.Cacho@icfi.com>>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/20/2012 05:08 PM
Subject: Liquids unloading bullet points

Hi Melissa,

I just got a notice this email bounced back from your EPA account.

Please let me know if you have any questions.

Thanks,

Mariella

Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com<
mailto:mcacho@icfi.com>
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

From: Cacho, Mariella
Sent: Tuesday, November 20, 2012 2:43 PM
To: 'Weitz.Melissa@epamail.epa.gov<mailto:Weitz.Melissa@epamail.epa.gov> '
Cc: Robinson, Donald; Stricklin, Eric; Toukan, Ibrahim; Cacho, Mariella;
'Waltzer.Suzanne@epamail.epa.gov<mailto:Waltzer.Suzanne@epamail.epa.gov>';
Seastream, Sandra (Sandra.Seastream@icfi.com<
mailto:Sandra.Seastream@icfi.com>)
Subject: Liquids unloading bullet points

Hi Melissa,

We are drafting a memo compiling all the responses for the four main topics Liquids Unloading Improvement, Gas Well Counts, Dehydrator Calculation, and QA/QC of Natural Gas Model. So you'll have everything in a single document.

As requested, please find below bullet points for your Liquids unloading question. We have also attached a memo developed for the 1990-2009 inventory, it describes in detail why the emissions increase so dramatically. We will include these bullet point the memo as well:

(b)(5) deliberative

(b)(5) deliberative [redacted]

Please let us know if you have any more questions.

Thank you,

Mariella
Mariella Cacho | 703.218.2712 | mariella.cacho@icfi.com<
mailto:mcacho@icfi.com>
ICF INTERNATIONAL | 9300 Lee Highway, Fairfax, VA 22031

[attachment "Emissions from Well Cleanups 12-13-2010_FINAL.doc.doc" deleted by Melissa Weitz/DC/USEPA/US] [attachment "Draft 2013 Inventory Memo_112112.docx" deleted by Melissa Weitz/DC/USEPA/US]

(b)(5) deliberative [redacted]

Draft 2013 Inventory Memo_112912.docx

Fw: Natural Gas Spreadsheet and Well Counts
Melissa Weitz to: hockstad.leif 12/03/2012 04:11 PM

From: "Marty Wolf" [Marty.Wolf@erg.com]
Sent: 11/29/2012 03:58 PM EST
To: Melissa Weitz
Cc: "Gopi Manne" <Gopi.Manne@erg.com>; "Paula Fields" <Paula.Fields@erg.com>
Subject: Natural Gas Spreadsheet and Well Counts

Melissa,

Attached is the Natural Gas Systems spreadsheet, as well as our latest well counts. For reference, I am also including a table that describes the changes that we made to the spreadsheet in response to ICF's comments.

(b)(5) deliberative

At this point, please send over the text and I will make redline/strike-out changes based upon this version of the spreadsheet. I should be able to send the text back to you later this afternoon.

We will send you the annex tomorrow - we need to spend more time QAing all of the involved tables.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)

(b)(5) deliberative [redacted]

marty.wolf@erg.com NaturalGasSystems_1990-2011_112912.xlsx

(b)(5) deliberative [redacted] (b)(5) deliberative [redacted]

response to icf comments_112912.docx DRAFT Gas Well Counts_112812.xlsx

Re: annex text-- a few edits
Melissa Weitz to: Marty Wolf 12/07/2012 03:34 PM
Cc: "Fields, Paula"

Would 2 work?

"Marty Wolf"	Got it. Do you have a meeting time in mind f...	12/07/2012 02:19:21 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Date: 12/07/2012 02:19 PM
Subject: Re: annex text-- a few edits

Got it.

Do you have a meeting time in mind for Monday?

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 12/7/2012 11:13 AM >>>

Just re-reading the text, please check what I wrote about [redacted] (b)(5) deliberative [redacted]

Please update the text as appropriate. Thanks!
Melissa

"Marty Wolf" ---12/07/2012 01:53:16 PM---We'll work on this today. Might even be able to turn it around today...

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Paula Fields" <Paula.Fields@erg.com>
Date: 12/07/2012 01:53 PM
Subject: Re: annex text-- a few edits

We'll work on this today. Might even be able to turn it around today...

We'll see.

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 12/7/2012 9:58 AM >>>

Hello,

I have a few questions/edits to the annex text--these are in comment bubbles in the text.

The key comments:

(b)(5) deliberative

Thanks! Let me know if you have other questions. I'd like this by Monday, but earlier is better. :)

Melissa

(See attached file: Annex 3.4_120512_erg.MW 12PM.docx)

Revised Annex - 12/7
Marty Wolf to: Melissa Weitz 12/07/2012 05:21 PM
Cc: "Paula Fields"

History: This message has been forwarded.

Melissa,

Attached are our revisions to the Annex. Highlights include:

Additional paragraph talking about DI Desktop and how KY, MI, IL, and IN were dealt with.

Parentheses added for reductions to indicate that they are being subtracted.

Footnote added to Tables A-6, A-8, and A-9 discussing the 1990 reductions. This is actually included as a "Note 2", so you might want to switch this to a lettered footnote. Since you have put the reductions as numbers in parentheses, the 1990 values in these tables have been switched to numbers without parentheses. It's a bit awkward, but I think that it is better than the alternative - putting a negative number in the parentheses to indicate that it is being added back into emission estimates. This is issue is caused by the selection of a 1992 base year.

For the actual (non-potential) emission factors, we have liquids unloading (plunger and non-plunger) and condensate tanks (with and without control devices).

There are also a number of other minor edits throughout the upfront text.

Please let us know if you have any other issues that need to be addressed.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)

(b)(5) deliberative

[redacted]

marty.wolf@erg.com Annex 3.4_120712_erg.docx

Re: Revised Annex - 12/7
Marty Wolf to: Melissa Weitz 12/07/2012 05:42 PM
Cc: "Paula Fields"

History: This message has been forwarded.

Melissa,

Here is Version 2 that picks up the language for centrifugal compressors.

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> Marty Wolf 12/7/2012 2:20 PM >>>
Melissa,

Attached are our revisions to the Annex. Highlights include:

Additional paragraph talking about DI Desktop and how KY, MI, IL, and IN were dealt with.

Parentheses added for reductions to indicate that they are being subtracted.

Footnote added to Tables A-6, A-8, and A-9 discussing the 1990 reductions. This is actually included as a "Note 2", so you might want to switch this to a lettered footnote. Since you have put the reductions as numbers in parentheses, the 1990 values in these tables have been switched to numbers without parentheses. It's a bit awkward, but I think that it is better than the alternative - putting a negative number in the parentheses to indicate that it is being added back into emission estimates. This is issue is caused by the selection of a 1992 base year.

For the actual (non-potential) emission factors, we have liquids unloading (plunger and non-plunger) and condensate tanks (with and without control devices).

There are also a number of other minor edits throughout the upfront

text.

Please let us know if you have any other issues that need to be addressed.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)

marty.wolf@erg.com

(b)(5) deliberative [redacted]

Annex 3.4_120712_erg_v2.docx

Fw: draft note for Sarah/Gina and updated cover memo
Suzanne Kocchi to: Paul Gunning 12/11/2012 10:53 AM
Cc: Erin Birgfeld, Melissa Weitz, Leif Hockstad, Suzanne Waltzer

History: This message has been forwarded.

Here are all the comm materials updated if you want to share with Sarah

(b)(5) deliberative

Outreach Plan - Inventory 12-11 11am.docx Desk Statement_12-11 11am.docx INTERNAL FAQs 12-11.docx

----- Forwarded by Suzanne Kocchi/DC/USEPA/US on 12/11/2012 10:46 AM -----

From: Suzanne Kocchi/DC/USEPA/US
To: Paul Gunning/DC/USEPA/US@EPA
Cc: Erin Birgfeld/DC/USEPA/US@EPA
Date: 12/11/2012 10:46 AM
Subject: draft note for Sarah/Gina and updated cover memo

We have updated the memo and other materials. The memo is attached as well as a draft note Sarah can send to Gina.

As a follow up to our meeting last week, we wanted to get back to you on a few items:

1) **Cover memo and timing**: attached below is the memo that will accompany the draft of the 2013 GHG Inventory that will go out for expert review to help communicate the changes to the natural gas sector estimates. Based on our discussion with you on timing, we plan to send this out to the reviewers on **Mon 12/17**.

2) **Impact to OAQPS programs**: we triple checked with OAQPS on how might these changes impact their programs. Our updates to the GHG estimates for liquids unloading and hydraulic fracturing will not impact the ozone designation for Wise County or the NSPS analysis. Our GHG estimates are not used in the ozone designation. Devon's concern in that case is related to a TCEQ study on VOC emissions from tanks, not the GHG Inventory estimates. For the NSPS analysis, liquids unloading is not covered by the recent NSPS and the update we are making to hydraulic fracturing was already made in the NSPS. That change makes our Inventory estimates consistent with the NSPS analysis from April.

3) **Uncertainty across the Inventory**: the natural gas sector is a unique sector in the Inventory that has has experienced expanded production and has implemented novel drilling technologies, including hydraulic fracturing and unconventional wells in recent years in recent years that has lead to us updating the estimates as data on these changes becomes available. We perform uncertainty analysis on all of the sectors covered by the Inventory. For the well monitored sectors in the Inventory, such as the emissions associated with fuel combustion, the uncertainty range is lower (+5 to -2%) as opposed this sector which has an uncertainty range of +30 to -19%.

(b)(5) deliberative

[redacted]

Cover memo for Inventory draft_12-11 11 am.docx

Re: do you think **this** will work **for the** NG slide **?**

Leif Hockstad to: Melissa Weitz 12/13/2012 12:14 PM

From: Leif Hockstad/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA,
History: This message has been forwarded.

I believe this should work.

Are you going to make these edits to the NG slide #12 in the version where you and Chris are making edits to the markets/offsets slides?

Melissa Weitz Turns out they are both covered by SUbpart W. So my continually evolving sli... 12/13/2012 11:55:59 AM

From: Melissa Weitz/DC/USEPA/US
To: Leif Hockstad/DC/USEPA/US@EPA
Date: 12/13/2012 11:55 AM
Subject: Re: do you think this will work for the NG slide?

Turns out they are both covered by SUbpart W.

So my continually evolving slide will now read:

(b)(5) deliberative

[redacted]

Leif Hockstad Getting closer. For the second bullet, could we specify which parts of natural g... 12/13/2012 11:33:59 AM

From: Leif Hockstad/DC/USEPA/US

To: Melissa Weitz/DC/USEPA/US@EPA
Date: 12/13/2012 11:33 AM
Subject: Re: do you think this will work for the NG slide?

Getting closer.

(b)(5) deliberative

Melissa Weitz FY12 •Large effort to update emissions estimates, in particular the production s... 12/13/2012 11:23:21 AM

From: Melissa Weitz/DC/USEPA/US
To: Leif Hockstad/DC/USEPA/US@EPA
Date: 12/13/2012 11:23 AM
Subject: do you think this will work for the NG slide?

(b)(5) deliberative

(b)(5) deliberative

Hide Details

hold for call with API on API's liquids unloading analysis

Mon 12/17/2012 10:30 AM - 11:30 AM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Suzanne Waltzer/DC/USEPA/US@EPA

Description

Fw: GHG Inventory Expert Review - Oil and Gas

Paul Gunning to: Suzie Kocchi, Bill Irving, Melissa Weitz 12/14/2012 06:37 AM

History: This message has been forwarded.

Good news. Looks like we are on for Monday. Let's make the addition Gina suggests.

Thanks
Paul Gunning
Sent by EPA Wireless E-Mail Services.
Gina McCarthy

----- Original Message -----
From: Gina McCarthy
Sent: 12/14/2012 02:06 AM EST
To: Sarah Dunham
Cc: Janet McCabe; Jim DeMocker; John Millett; Joseph Goffman; Paul Gunning
Subject: Re: GHG Inventory Expert Review - Oil and Gas

Thanks Sarah. The memo looks fine. I was thinking about [redacted] (b)(5) deliberative [redacted] What do you think?

Sarah Dunham	Gina- As a follow up to our meeting last wee...	12/13/2012 03:06:07 PM

From: Sarah Dunham/DC/USEPA/US
To: Gina McCarthy/DC/USEPA/US
Cc: Janet McCabe/DC/USEPA/US@EPA, Joseph Goffman/DC/USEPA/US@EPA, Paul Gunning/DC/USEPA/US@EPA, Jim DeMocker/DC/USEPA/US@EPA, John Millett/DC/USEPA/US@EPA
Date: 12/13/2012 03:06 PM
Subject: GHG Inventory Expert Review - Oil and Gas

Gina-

As a follow up to our meeting last week, we wanted to get back to you on your questions and our plan for moving forward with this year's expert review draft of the US GHG Inventory (I apologize for the lengthy email). Based on our discussion last week on timing (and after consideration of the answers/approach laid out below), we would like to send this out to the reviewers on **Monday 12/17**.

1) **Cover memo**: attached below is the memo that will accompany the draft of the 2013 GHG Inventory that will go out for expert review to help communicate the changes to the natural gas sector estimates.

(b)(5) deliberative [redacted]

Cover memo for Inventory draft_12-12 12.docx

2) **Impact to other OAR efforts**: we triple checked with OAQPS on how might these changes impact their programs. Our updates to the GHG estimates for liquids unloading and hydraulic fracturing will not impact the ozone designation for Wise County or the NSPS analysis. Our GHG estimates are not used in the ozone designation. Devon's concern in that case is related to a TCEQ study on VOC emissions from tanks, not the GHG Inventory estimates. For the NSPS analysis, liquids unloading is not covered by the recent NSPS and the update we are making to hydraulic fracturing was already made in the NSPS. That change makes our Inventory estimates consistent with the NSPS analysis

from April.

3) **Uncertainty across the Inventory**: The natural gas sector is a unique sector in the Inventory that has experienced expanded production and has implemented novel drilling technologies in recent years, including hydraulic fracturing and unconventional wells, that has lead to us updating the estimates as data on these changes has recently become available. In addition, the oil and gas sector is relatively complex with emissions that have historically been estimated (as opposed to measured directly), and summed to provide the total estimate. We perform uncertainty analysis on all of the sectors covered by the Inventory. For the well monitored sectors in the Inventory, such as the emissions associated with fuel combustion, the uncertainty range is lower (+5 to -2%) and we would not expect new data to have as large an impact as in this sector which has one of the largest uncertainty ranges (+30 to -19%). EPA believes that additional data provided by the industry this year has improved the data and reduced uncertainty considerably, and we look forward to input on this point from the expert and public review.

4) We plan to give key stakeholders a heads-up that this is coming (and some sense of the changes and why) on Monday before we send the email to reviewers.

Please let me know if you'd like to discuss further.

Thanks,
Sarah

FYI, I am also attaching below drafts of the internal outreach plan and FAQs. We also are working on a desk statement.

(b)(5) deliberative [redacted] (b)(5) deliberative [redacted]

Outreach Plan - Inventory 12-11 11am.docx INTERNAL FAQs 12-12.docx

---

Fw: GHG Inventory Expert Review - Oil and Gas

Leif Hockstad to: Melissa Weitz 12/14/2012 09:43 AM

History: This message has been forwarded.

If you're still working on the text and annex, I guess that means you can look at the memo.

Here's the most recent version from the G:\ drive.

(b)(5) deliberative

Cover memo for Inventory draft_12-12 12.docx

Do you think there is a way to make the NSPS reference more prominent as Gina requested?

- Leif

----- Forwarded by Leif Hockstad/DC/USEPA/US on 12/14/2012 09:41 AM -----

From: Paul Gunning/DC/USEPA/US
To: Suzanne Kocchi/DC/USEPA/US@EPA
Cc: Bill Irving/DC/USEPA/US@EPA, "Leif Hockstad" <Hockstad.Leif@epamail.epa.gov>, Melissa Weitz/DC/USEPA/US@EPA
Date: 12/14/2012 08:18 AM
Subject: Re: GHG Inventory Expert Review - Oil and Gas

It does :)

I guess we just need to make this point more prominently.

Suzanne Kocchi	Good news! Adding Leif because Melissa is...	12/14/2012 08:09:28 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Paul Gunning/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA, "Leif Hockstad" <Hockstad.Leif@epamail.epa.gov>
Date: 12/14/2012 08:09 AM
Subject: Re: GHG Inventory Expert Review - Oil and Gas

Good news!

Adding Leif because Melissa is out today. I thought the memo already contained the point Gina wants but maybe I am thinking of the FAQs.

Paul Gunning	Good news. Looks like we are on for Mon...	12/14/2012 06:37 AM EST

Gina McCarthy

----- Original Message -----
From: Gina McCarthy
Sent: 12/14/2012 02:06 AM EST
To: Sarah Dunham
Cc: Janet McCabe; Jim DeMocker; John Millett; Joseph Goffman; Paul

Gunning

Subject: Re: GHG Inventory Expert Review - Oil and Gas

Thanks Sarah. The memo looks fine. I was thinking [redacted] (b)(5) deliberative [redacted] What do you think?

Sarah Dunham	Gina- As a follow up to our meeting last wee...	12/13/2012 03:06:07 PM

Re: Annex, etc.
Suzanne Waltzer to: Melissa Weitz 12/14/2012 11:30 AM

History: This message has been replied to and forwarded.

sounds good. We can definitely use the call on Monday for whatever needed. I think the press request should be quick and we can hopefully use the analysis ICF already did on that to just confirm (refresh our memory) on what that number is, then provide a general response. We can use the rest of the time for inventory, etc.

(b)(6) personal privacy

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Suzanne Waltzer/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 12/14/2012 11:22AM
Subject: Re: Annex, etc.

(b)(6) personal privacy

I'm going to send you a copy of the annex as soon as it is done, and I'd like to use part of our Monday a.m. meeting to check to see if there are any last minute emergency edits. There are some statements I want to run by you that that refer to GasSTAR. Unfortunately, I emailed myself the wrong copy of the annex, so I won't be able to send it to you for an hour or so, after I can get into work (b)(6) personal privacy

-----Suzanne Waltzer/DC/USEPA/US wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: Suzanne Waltzer/DC/USEPA/US
Date: 12/14/2012 08:43AM
Subject: Re: Annex, etc.

Hi Melissa,

Thanks for your note. Sorry I never got to the annex review. It has definitely been a crazy couple of weeks. (b)(6) personal privacy

(b)(6) personal privacy

I saw the API meeting was set for Monday. Probably a good thing since I will be out this afternoon and that gives us a chance to touch base briefly before.

Thanks!

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Suzanne Waltzer/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 12/13/2012 01:12PM
Subject: Annex, etc.

Suzie! (b)(6) personal privacy

If you have already reviewed the annex, I'm happy to incorporate your comments today. Leif and I are planning to PDF the files at 4:30 this afternoon. If you see something really big, we can change it on Monday a.m.

(b)(6) personal privacy

In other news, API just sent me an email containing their proposed methodology for applying their LU data to the Inventory across the time series. They had not indicated that they were doing this so, it was a pretty big surprise to me! Good news though, their 2011 estimate is pretty close to ours, and they seem to have used roughly the same method to extrapolate (or interpolate...whatever) plunger lifts across the time series.

There is obviously no way we can incorporate it for expert review at this point, but it will be something useful for us to review before the public review draft.

They'd like to have a call with us tomorrow at 11 to walk through their update (b)(6) personal privacy

Re:
Suzanne Kocchi to: (b)(6) personal privacy 12/17/2012 08:26 AM
Cc: Leif Hockstad, Suzanne Waltzer, Erin Birgfeld, Melissa Weitz

History: This message has been replied to and forwarded.

Those edits seem fine. You will need to carry them through all the relevant documents. On the
(b)(5) deliberative

Melissa Weitz	Hi, I took a stab at making the NSPS referen...	12/14/2012 10:18:51 AM

From: Melissa Weitz <(b)(6) personal privacy>
To: Leif Hockstad/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA
Date: 12/14/2012 10:18 AM
Subject: Re:

Hi,

I took a stab at making the NSPS reference more prominent.

There are also two other edits I'd like to make.

(b)(5) deliberative

Melissa

Re:
Melissa Weitz to: Suzanne Kocchi 12/17/2012 09:51 AM
Cc: Leif Hockstad, Suzanne Waltzer, Erin Birgfeld

I accepted the NSPS and liquids unloading edits in tracked changes, and moved/edited the sentence on uncertainty.

Let me know if this works.

Thanks!

(b)(5) deliberative [redacted]

Cover memo 12.17.docx

Suzanne Kocchi	Those edits seem fine. You will need to carr...	12/17/2012 08:26:11 AM

From: Suzanne Kocchi/DC/USEPA/US
To: (b)(6) personal privacy
Cc: Leif Hockstad/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 12/17/2012 08:26 AM
Subject: Re:

Those edits seem fine. You will need to carry them through all the relevant documents. On the [redacted]

(b)(5) deliberative

Melissa Weitz	Hi, I took a stab at making the NSPS referen...	12/14/2012 10:18:51 AM

Re:
Melissa Weitz to: Suzanne Kocchi 12/17/2012 10:02 AM
Cc: Leif Hockstad, Suzanne Waltzer, Erin Birgfeld

Fixed it. Thanks for catching that.

Suzanne Kocchi	Looks ok. I think the track change may have...	12/17/2012 09:57:53 AM

From: Suzanne Kocchi/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Leif Hockstad/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA
Date: 12/17/2012 09:57 AM
Subject: Re:

Looks ok. I think the track change may have missed something with this sentence. Here is a suggestion:

[redacted]
(b)(5) deliberative
[redacted]

Melissa Weitz	I accepted the NSPS and liquids unloading...	12/17/2012 09:51:44 AM
Suzanne Kocchi	Those edits seem fine. You will need to carr...	12/17/2012 08:26:11 AM
Melissa Weitz	Hi, I took a stab at making the NSPS referen...	12/14/2012 10:18:51 AM

API LU Fw: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa Weitz to: Suzanne Waltzer 12/17/2012 10:21 AM

----- Forwarded by Melissa Weitz/DC/USEPA/US on 12/17/2012 10:21 AM -----

From: "Karin C. Ritter" <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 12/13/2012 10:20 AM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa,

After reviewing EPA's spreadsheet, attached is a proposed alternative methodology using the API/ANGA survey data and back-casting it.
I would like to propose that we "guide" you through this proposal during a conference call on Friday December 14th at 11am ET? (I'll offer to send the calendar notice?)

Let me know,
Karin

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Friday, December 07, 2012 10:30 AM
To: Karin C. Ritter
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Thank you Karin,

That sounds great. I'm so sorry I didn't get back to you--I was out sick and then just remembered that we were planning to talk today.

Melissa

"Karin C. Ritter" ---12/06/2012 03:51:25 PM---Hi Melissa, Once again I'd like to postpone the call to next Friday December 14th at 11am ET.

From: "Karin C. Ritter" <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 12/06/2012 03:51 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Melissa,

Once again I'd like to postpone the call to next Friday December 14th at 11am ET.

Thank you,
Karin

From: Karin C. Ritter
Sent: Thursday, November 29, 2012 5:13 PM
To: 'Weitz.Melissa@epamail.epa.gov'
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Melissa,

We are not ready to discuss the spreadsheet that EPA used to calculate emission factors for liquids unloading and that you sent on October 25th.

Is it possible to tentatively postpone the call to Friday December 7th at 11am ET?

Much appreciated,
Karin

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, November 29, 2012 1:05 PM
To: Karin C. Ritter
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Karin,

I hope you had a nice Thanksgiving.

Are we still on for tomorrow's call at 1PM? There are no new questions or information from our end at the moment, so if you'd like to reschedule, that's fine with us.

Thanks,
Melissa

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(202) 343-9897
Weitz.Melissa@epa.gov

"Karin C. Ritter" ---11/20/2012 01:38:47 PM---Melissa, OK to have SAIC and ERG on the call.

From: "Karin C. Ritter" <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: 'TERRI SHIRES ' <Terri.Shires@URS.com>
Date: 11/20/2012 01:38 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa,
OK to have SAIC and ERG on the call.
Karin

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 20, 2012 1:18 PM
To: Karin C. Ritter
Cc: 'TERRI SHIRES '
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hello,

I wanted to send you our questions in advance of the call, so that you'll have a little time to look into the answers beforehand.

The questions all relate to the changes from the June report to the September report.

Thank you,
Melissa

1. We noticed that one data set (covering 14 unconventional wells without plunger lifts in the Gulf Coast) that was included in the June report (Table C-3) was deleted from the September report. Why was this change made?

2. We noticed that two new data sets (covering unconventional wells without plunger lifts in the Rocky Mountain region and unconventional wells with plunger lifts in the Southwest) were included in the September report that weren't included in the June report. Why were these data sets included in September but not in June?

3. We found four data sets (all in the Northeast) where there were very large (orders of magnitude) reductions in the average gas flow rates. Can you please provide us with some details on why these changes were made? For example, if the original data sets were in error, what was the nature and cause of the errors? Did you go back to the survey respondents to get new data? Were these transcription errors? Unit errors? Please note that we are especially interested in more information on the change to the data set in the Northeast, for conventional wells without plunger lifts, that reduced the gas flow rate from 7388.4 to 7.21 Mscfd, as this change had a very large impact on national-level emissions.

4. We found seven datasets where there were changes to the surface pressure data between June and September. Can you please provide us with an explanation of the reason(s) for these changes?

5. We found one data set (for unconventional wells with plunger lifts in the Mid-Continent region) that had a change in both the average well depth and the gas flow rate between June and September. Can you please provide us with an explanation of the reason(s) for these changes?

"Karin C. Ritter" ---11/20/2012 11:38:45 AM---Melissa, Can you call at any time after 2pm today?

From: "Karin C. Ritter" <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: 'TERRI SHIRES ' <Terri.Shires@URS.com>
Date: 11/20/2012 11:38 AM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

---

Melissa,
Can you call at any time after 2pm today?
karin

From: Karin C. Ritter
Sent: Tuesday, November 20, 2012 9:58 AM
To: 'Weitz.Melissa@epamail.epa.gov'
Cc: TERRI SHIRES ; Amy Emmert
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa
Terri and I would have to be available. I'm here today and not tomorrow. Not sure about Terri's availability?
Karin

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, November 20, 2012 9:43 AM
To: Karin C. Ritter
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Karin,

We're pulling together the expert review draft of the GHG Inventory, and on conducting some additional review of the liquids unloading estimates, we found we have a few more questions on the API/ANGA data, specifically on changes from the earlier report to the most recently released report/data.

Would it be possible to set up a time to talk this afternoon or tomorrow? Sorry for the last minute request--we received the questions from our contractor yesterday, and we're in a bit of a rush to get the numbers locked down for expert review.

Thank you,
Melissa

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"Karin C. Ritter" ---11/07/2012 04:56:04 PM---Friday would be best. At 11am? From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.ep

From: "Karin C. Ritter" <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/07/2012 04:56 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

---

Friday would be best. At 11am?

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, November 07, 2012 12:18 PM
To: Karin C. Ritter
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Karin,

Sorry for my delayed response. Yes, it makes sense to cancel the tentative November 7th call. Thank you.

I would like to give you a call to run a few quick Inventory items by you though. I need to head out of the office soon for today, but are you available tomorrow or Friday for ~15 mins?

Let me know, thank you!
Melissa

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"Karin C. Ritter" ---11/05/2012 12:02:26 PM---Hi Melissa, It looks like we are not going to be ready to talk to you about this data set on Novembe

From: "Karin C. Ritter" <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 11/05/2012 12:02 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

---

Hi Melissa,

It looks like we are not going to be ready to talk to you about this data set on November 7th which was the date we tentatively set aside for another joint call. Unless there is something you wanted to cover I believe we should reschedule this call for next week? If so I will get back to you with dates/times for a rescheduled call.

Thank you
Karin

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Thursday, October 25, 2012 1:37 PM
To: Karin C. Ritter
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hello Karin,

Attached below please find the spreadsheet that EPA used to calculate emission factors for liquids unloading, for the 1990-2009 and 1990-2010 Inventories.

Please share this with the participants in our recent conversations, but please do not distribute more widely. It was not developed with broad distribution in mind, and would need some reformatting and more detailed background information before being made public.

We can walk through this spreadsheet on our follow-up call. If you have questions on the spreadsheet before our next call, please feel free contact me.

Thank you,
Melissa

(See attached file: Copy of Liquids Unloading EF Calculation (2010Inv) 10.25.xlsx)

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Weitz.Melissa@epa.gov

Karin Ritter ---10/17/2012 04:49:09 PM---Hi Melissa, Just by way of background...

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/17/2012 04:49 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

---

Hi Melissa,

Just by way of background…
I will be out of the office on business travel October 22nd to 26th and then vacation until the 31st.
So our discussions will have to be postponed until early November. We do have the November 7th call scheduled.
Cheers,
Karin

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 17, 2012 4:39 PM
To: Karin Ritter
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Karin,

We're still a bit delayed on the spreadsheet--we're trying to determine if there is any company identifying information we need to remove before sending. I'm now aiming for tomorrow afternoon.

We can cancel tomorrow's call, and check in another time once you've had a chance to review the spreadsheet.

Thank you,
Melissa

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(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---10/16/2012 06:28:16 PM---Melissa, I also had down a conference call tentatively for Thursday 10/18 @3pm ET. Do you think we'

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/16/2012 06:28 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

---

Melissa,
I also had down a conference call tentatively for Thursday 10/18 @3pm ET. Do you think we'll still need this call?
I believe part of the reason we scheduled it was for us to discuss EPA's unloading factor information after we had a chance to review it. Don't think we'll have had enough time to review your material for a discussion during the call.
Can't recall what the other reason was for the tentative call?

Regards,
Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, October 16, 2012 5:54 PM
To: Karin Ritter
Cc: GHGInventory
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Thank you Karin.

It's not too late. I'm working on the updates now and the final should be posted by the end of the week.

Also, I'm a bit behind on getting the EPA liquids unloading factor information together. Hopefully I'll be able to send you something tomorrow.

Thank you,
Melissa

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(202) 343-9897
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Karin Ritter ---10/16/2012 02:39:18 PM---Melissa, Attached are just a few API comments. Hopefully these can still be considered even though

From: Karin Ritter <Ritterk@api.org>
To: GHGInventory@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 10/16/2012 02:39 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

---

Melissa,
Attached are just a few API comments. Hopefully these can still be considered even though they are a day late?

Regards,
Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov] **On Behalf Of** GHGInventory
Sent: Wednesday, October 10, 2012 3:12 PM

Subject: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Natural Gas Stakeholder Workshop Participant,

A draft summary report for the Stakeholder Workshop on Natural Gas in the GHG Inventory is attached below, for your review.

The report summarizes the presentations and discussions from the workshop, highlights next steps for natural gas emissions calculations, and provides a list of attendees.

We request any comments on the report by Monday, October 15, as we plan to post the final report to the Stakeholder Workshop website next week.

For more information on the Stakeholder Workshop, including agenda and presentations, please visit http://www.epa.gov/climatechange/ghgemissions/Sept2012stakeholderworkshop.html.

Please continue to contact us with any questions or new information relevant to the Inventory at GHGInventory@epa.gov.

Thank you,
Melissa

(See attached file: Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.10.docx)[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.10 bg.docx" deleted by Melissa Weitz/DC/USEPA/US]

Copy of Copy of Liquids Unloading EF Calculation (2010Inv) 2TMS.XLSX

	1990	**1991**	**1992**	**1,993**	**1994**	**1995**	**1996**
Total US Gas Wells by Year	269,782	276,981	276,009	282,144	291,761	298,526	301,787
% w/plunger lift (linked to row 36 below)	0%	0.0%	0.0%	0.0%	3.5%	3.7%	3.8%
Number w/plunger lift	0	0	0	0	10,203	10,988	11,512
Number w-o/plunger lift	269,782	276,981	276,009	282,144	281,558	287,538	290,275
% of plunger wells that vent	21.10%	21.10%	21.10%	21.10%	21.10%	21.10%	21.10%
% of non-plunger wells that vent	9.30%	9.30%	9.30%	9.30%	9.30%	9.30%	9.30%
Number of plunger equipped wells that vent	0	0	0	0	2,153	2,319	2,429
Number of wells w/o plunger lift that vent	25,090	25,759	25,669	26,239	26,185	26,741	26,996
Methane Emissions per venting plunger equipped well per year (scf - API Survey)	288,989	288,989	288,989	288,989	288,989	288,989	288,989
Methane Emissions per venting non-plunger well per year (scf - API Survey)	254,432	254,432	254,432	254,432	254,432	254,432	254,432
Annual Methane Emissions - wells w/plunger lift (MMSCF)	0.00	0.00	0.00	0.00	622.17	670.03	701.94
Annual Methane Emissions - wells w-o/plunger lift (MMSCF)	6,383.64	6,553.98	6,530.98	6,676.15	6,662.27	6,803.78	6,868.56
Annual Methane Emissions - wells w/plunger lift (Giga grams)	0.000	0.000	0.000	0.000	11.983	12.905	13.519
Annual Methane Emissions - wells w-o/plunger lift (Giga grams)	122.949	126.230	125.787	128.583	128.315	131.041	132.288
Total Annual Methane Emissions (Giga grams)	**122.95**	**126.23**	**125.79**	**128.58**	**140.30**	**143.95**	**145.81**

EPA 2010 Inventory	1990		1992			1995	
Annual Methane Emissions (Giga grams)	2,652		2,699			2,931	

API % of EPA	4.64%		4.66%			4.91%	

The percent of total wells with plungers can be determined from the draft July 14, 2011 EPA Memo "Emission Rec
Unloading by Plunger Lifts" proposal for inventory improvement. The annual Gas Star reported reductions are fro
scaled to 2009 based on the percent increase from 2008 to 2009. For 2010 and 2011 the inventory should use the
from the API/ANGA survey - it is a much larger and more robust data set than a discussion with one vendor. This
wells can be updated annually from the Subpart W reported data (I think).

	1990	1991	1992	1993	1994	1995	1996
Gas Star Partner Reported Reductions in Liquids Unloading (bcf)	0	0	0	0	1.17	1.26	1.32
Number of plunger equipped wells	0	0	0	0	10,203	10,988	11,512
Percent of wells with plungers	0.00%	0.00%	0.00%	0.00%	3.50%	3.68%	3.81%

Please note: The result of zero wells with plunger lift for 1990 thru 1993 is not correct. Plunger lifts have been a very long time. However, I have no idea how to determine the number of plunger lifts in early years.

1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
310,971	316,929	302,421	341,678	370,033	384,527	390,288	391,987
4.1%	4.3%	6.1%	9.4%	9.3%	9.5%	9.7%	12.2%
12,645	13,692	18,401	32,180	34,448	36,715	37,936	47,791
298,326	303,237	284,020	309,498	335,585	347,812	352,352	344,196
21.10%	21.10%	21.10%	21.10%	21.10%	21.10%	21.10%	21.10%
9.30%	9.30%	9.30%	9.30%	9.30%	9.30%	9.30%	9.30%
2,668	2,889	3,883	6,790	7,268	7,747	8,005	10,084
27,744	28,201	26,414	28,783	31,209	32,347	32,769	32,010
288,989	288,989	288,989	288,989	288,989	288,989	288,989	288,989
254,432	254,432	254,432	254,432	254,432	254,432	254,432	254,432
771.07	834.88	1,122.04	1,962.24	2,100.50	2,238.77	2,313.21	2,914.12
7,059.05	7,175.26	6,720.54	7,323.40	7,940.69	8,230.00	8,337.43	8,144.45
14.851	16.080	21.611	37.793	40.456	43.119	44.552	56.126
135.957	138.196	129.438	141.049	152.938	158.510	160.579	156.862
150.81	**154.28**	**151.05**	**178.84**	**193.39**	**201.63**	**205.13**	**212.99**

EPA 2010 to Alternative Comparison

			2000				
			3,328				

			5.37%				

luctions of Gas Well Liquids
om the same memo with 2010
e 174,743 wells with plunger lifts
percent of plunger equipped

Calculation of Number and Percent of Wells with Plunger Lifts per Year

1997	1998	1999	2000	2001	2002	2003	2004
1.45	1.57	2.11	3.69	3.95	4.21	4.35	5.48
12,645	13,692	18,401	32,180	34,448	36,715	37,936	47,791
4.07%	4.32%	6.08%	9.42%	9.31%	9.55%	9.72%	12.19%

in use for

2005	**2006**	**2007**	**2008**	**2009**	**2010**	
395,466	411,041	431,418	455,015	455,016	484,795	
19.9%	23.7%	28.7%	33.0%	38.3%	36.0%	
78,837	97,326	124,012	150,000	174,244	174,743	
316,629	313,715	307,406	305,015	280,772	310,052	
21.10%	21.10%	21.10%	21.10%	21.10%	21.10%	
9.30%	9.30%	9.30%	9.30%	9.30%	9.30%	
16,635	20,536	26,166	31,650	36,766	36,871	survey showed 36,806
29,446	29,176	28,589	28,366	26,112	28,835	survey showed 28,863
288,989	288,989	288,989	288,989	288,989	288,989	Based on 345,343*83.7
254,432	254,432	254,432	254,432	254,432	254,432	Based on 304,048*83.7
4,807.23	5,934.59	7,561.82	9,146.50	10,624.83	10,655.25	
7,492.14	7,423.20	7,273.92	7,217.33	6,643.68	7,336.52	
92.587	114.300	145.641	176.162	204.634	205.220	
144.299	142.971	140.096	139.006	127.957	141.301	
236.89	**257.27**	**285.74**	**315.17**	**332.59**	**346.52**	

	2006	2007	2008	2009	2010
	3,974	4,127	4,360	4,548	4,564

	6.47%	6.92%	7.23%	7.31%	7.59%

2005	2006	2007	2008	2009	2010
9.04	11.16	14.22	**17.2**	19.98	23.21
78,837	97,326	124,012	**150,000**	174,244	174,743
19.94%	23.68%	28.75%	32.97%	38.29%	36.04%

(difference is roundoff)

(difference is roundoff)

7% CH4

7%CH4

$$V_i = (0.37x10^{-6}) \times D^2 \times h_i \times P_i \times M + t_B \times Q$$

V_i	volume of methane emissions (Mcf/blowdown) for each sample basin i
D	casing diameter, assumed to be 5 inches on average.
h_i	well depth (feet), provided for each basin i by GASIS and Lasser databases
P_i	well shut in pressure (psig), provided for each basin i by GASIS and Lasser databases
M	methane content, estimated in the U.S. Inventory for each NEMS region
t_B	blowtime (hours-well/blowdown)
Q_i	gas production rate (Mcf per hour per well), provided as an average per basin by Lasser® for each sample basin i

EPA derives a **methane** volume emissions factor per vent for each NEMS region using the above equation. They apply this equation at the basin level for each basin where they had data (19) to calculate a per vent methane volume. This methane volume is then multiplied by the number of vents/well/year (GRI - 38.7) and the number of venting wells (conventional we ls in basins sampled multiplied by their 41.3% of wells venting) to derive overall methane emissions - expressed as Mg. They then add up the methane emissions and divide it by the number of venting wells for each NEMS region (based on the number of conventional we ls in each basin multiplied by 41.35%) Split into NEMS regions's the fo lowing are the values used for each basin sampled. The 0.37 X 10-6 has the units of 1 000-sq-ft/square inch/1lb-psig. Only the basins with full information that EPA used are shown.

NEMS	Basin	D^2 (inches)	h (feet)	P (PSIG)	M	t_s (Hours flow after depressure)	Q (mscf/hr-well)	V (mscf/vent)	Gas Well Count	% Conventional	% Unloading	# Vents per Well per Year	Total Methane Volume Vented (mscf)	Total Methane Vented (Mg)	EPA Data	Ratio EPA/Reid
North East	No Data													24.61		
Gulf Coast	ARKLA BASIN	5	7 357	98	83.7%	3.0	3.25	13.67	15 076	98%	41.35%	38.73	3 233 092	62 269	62 340	100.1%
	BLACK WARRIOR BASIN	5	3 360	7	83.7%	3.0	2.81	7.17	4 527	50%	41.35%	38.73	260 037	5 008	5 009	100.0%
	EAST TEXAS BASIN	5	8 266	749	83.7%	3.0	11.64	76.92	18 158	98%	41.35%	38.73	21 919 124	422 162	422 895	100.2%
	GULF COAST BASIN ONSHORE	5	8 732	406	83.7%	3.0	17.74	71.64	25 358	98%	41.35%	38.73	28 505 795	549 022	549 608	100.1%
	GULF OF MEXICO	5	8 254	1247	83.7%	3.0	0.56	81.06	3 982	100%	41.35%	38.73	5 168 460	99 545	99 817	100.3%
	MID-GULF COAST BASIN	5	12 623	74	83.7%	3.0	17.74	51.46	1 444	98%	41.35%	38.73	1 165 988	22 457	22 466	100.0%
	OUACHITA FOLDED BELT	5	7 889	225	83.7%	3.0	15.16	51.48	183	100%	41.35%	38.73	150 857	2 906	2 908	100.1%
Gulf Coast Basin Factor (Mg/Venting-Well/Year)														**43.110**	**43.172**	100.1%
Mid-Central	ANADARKO BASIN	5	8 963	75	83.7%	3.0	3.78	14.64	52 565	98%	41.35%	38.73	12 075 483	232 574		
	ARKOMA BASIN	5	6 346	286	83.7%	3.0	5.99	28.95	14 654	98%	41.35%	38.73	6 656 901	128 212		
	CENTRAL KANSAS UPLIFT	5	3 686	69	83.7%	3.0	0.97	4.41	704	100%	41.35%	38.73	49 688	957		
	SEDGWICK BASIN	5	4 170	92	83.7%	3.0	1.34	6.31	2 606	100%	41.35%	38.73	263 520	5 075		
	SOUTH OKLAHOMA FOLDED BELT	5	8 148	141	83.7%	3.0	4.22	19.39	2 641	98%	41.35%	38.73	803 415	15 474		
Mid-Central NEMS Factor (Mg/Venting-Well/Year)														**12.881**	**12.896**	100.1%
Rocky Mountain	SAN JUAN BASIN	5	4 494	268	83.7%	3.0	3.64	18.39	26 861	75%	41.35%	38.73	5 932 796	114 266		
Rocky Mt. NEMS Factor (Mg/Venting-Well/Year)														**13.717**	**13.736**	100.1%
South West	BEND ARCH	5	3 117	169	83.7%	3.0	0.83	6.15	5 827	98%	41.35%	38.73	562 331	10 830		
	FORT WORTH SYNCLINE	5	5 075	243	83.7%	3.0	4.84	21.62	9 345	98%	41.35%	38.73	3 170 023	61 055		
	PALO DURO BASIN	5	4 275	25	83.7%	3.0	1.28	4.02	671	100%	41.35%	38.73	43 145	831		
	PERMIAN BASIN	5	8 297	124	83.7%	3.0	5.79	22.35	32 270	98%	41.35%	38.73	11 317 407	217 973		
	SIERRA GRANDE UPLIFT	5	2 455	232	83.7%	3.0	26.84	71.23	443	100%	41.35%	38.73	505 250	9 731		
	STRAWN BASIN	5	3 006	165	83.7%	3.0	18.05	48.78	2 386	100%	41.35%	38.73	1 863 622	35 893		
South West NEMS Factor (Mg/Venting-Well/Year)														**16.269**	**16.284**	100.1%
West Coast	No Data													24.61		

To arrive at a national well venting emission estimate in Mg EPA uses the "Mg/Venting-Well/Year" for each NEMS Region (above) multiplied by the number of venting wells in each NEMS region as shown below. To arrive at a "Mg/Venting-Well/Year" for the NE and West Coast NEMS regions EPA uses an average of the "normalized" (nomalized by taking sample emissions * (sample conventional well count/2006 inventory well count) multiplied by the number of conventional wells in the region multiplied by the EPA 41.35% of conventional wells venting.

Total Well Count and Well Count with Liquids Unloading (Reid Note: The wells by NEMS region are actually conventional wells not total wells)

Note: Values from 2008 U.S Inventory	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	Terri'S Updates 2009
North East	124 241	127 336	129 157	126 845	133 846	129 789	130 271	128 700	126 550	127 279	143 922	149 436	154 590	156 320	155 257	158 238	164 322	172 493	174 682	183 834	183 834
Gulf Coast	41 753	39 810	37 307	39 939	38 163	41 978	43 227	44 475	49 015	47 846	48 316	51 182	53 198	54 245	54 544	57 600	60 715	68 188	72 047	75 046	75 046
Mid-Central	53 838	57 572	59 029	60 453	60 515	65 033	64 151	64 144	64 082	51 766	49 505	61 291	64 926	66 431	67 744	65 696	67 188	72 125	70 003	73 913	87 190
Rocky Mountain	24 287	26 899	26 224	29 458	32 294	32 347	34 512	41 605	43 677	41 468	60 085	62 072	60 548	56 551	54 275	65 704	52 796	45 504	65 868	75 418	98 391
South West	24 139	23 504	22 510	23 495	24 645	27 126	27 106	28 934	29 878	28 873	31 620	32 546	33 079	33 809	33 484	29 662	29 697	30 738	30 030	27 802	41 987
West Coast	1 292	1 503	1 254	1 223	1 384	1 114	1 098	1 088	1 010	1 270	1 338	1 434	1 415	1 459	1 388	1 424	1 503	1 506	1 693	1 786	1 786
Onshore Conventional Gas Wells	269 550	276 624	275 481	281 412	290 847	297 387	300 365	308 946	314 213	298 503	334 786	357 961	367 756	368 815	366 692	378 323	376 221	390 554	414 323	437 800	488 234
Total Onshore Wells	269 782	276 981	276 009	282 144	291 761	298 526	301 787	310 971	316 929	302 421	341 678	370 033	384 527	390 288	391 987	395 466	411 041	431 418	455 015	455 016	
Wells Requiring Liquid Unloading	111 458	114 383	113 910	116 363	120 264	122 968	124 200	127 748	129 926	123 430	138 433	148 015	152 066	152 504	151 626	156 435	155 566	161 493	171 321	181 029	201 885
Methane Emissions - Mg/Year																					
North East	1 264 306	1 295 801	1 314 332	1 290 805	1 362 048	1 320 763	1 325 668	1 309 681	1 287 803	1 295 221	1 464 584	1 520 696	1 573 144	1 590 749	1 579 932	1 610 267	1 672 179	1 755 329	1 777 605	1 870 738	1 870 738
Gulf Coast	744 284	709 642	665 034	711 942	680 294	748 290	770 550	792 807	873 729	852 901	861 278	912 370	948 299	966 968	972 286	1 026 768	1 082 299	1 215 513	1 284 306	1 337 767	1 337 760
Mid-Central	286 764	306 650	314 413	321 996	322 328	346 393	341 694	341 656	341 330	275 729	263 686	326 461	345 821	353 837	360 834	349 923	357 870	384 169	372 863	393 691	464 410
Rocky Mountain	137 757	152 569	148 741	167 087	183 173	183 474	195 753	235 985	247 738	235 204	340 802	352 070	343 429	320 758	307 850	372 671	299 459	258 097	373 602	427 774	558 074
South West	162 387	158 119	151 431	158 054	165 789	182 480	182 349	194 643	200 997	194 237	212 713	218 944	222 528	227 440	225 252	199 540	199 780	206 779	202 019	187 031	282 455
West Coast	13 148	15 295	12 761	12 446	14 084	11 336	11 174	11 072	10 278	12 924	13 616	14 593	14 399	14 847	14 125	14 491	15 295	15 325	17 228	18 175	18 175
Total/Year	**2,608,645**	**2,638,077**	**2,606,711**	**2,662,329**	**2,727,717**	**2,792,737**	**2,827,188**	**2,885,845**	**2,961,875**	**2,866,217**	**3,156,679**	**3,345,133**	**3,447,621**	**3,474,599**	**3,460,278**	**3,573,660**	**3,626,882**	**3,835,213**	**4,027,624**	**4,235,175**	**4,531,611**

This represents an "uncontrolled" emission quantity based on EPA's assumptions and methodologies. EPA then deducts "controlled emissions (believed to be those reported into Natural Gas Star) from these uncontrolled totals. However the deduction per source type is not transparent.

EPA 2009 Giga grams	4 554.42	
Ratio EPA/Reid	108%	1.005033333

This analysis is based on the principle that, as liquids gradually accumulate in the production tubing, ever flow to the sales line, this is tantamount to shutting in a well which manifests itself with the well casing acc pressure. This shut-in pressure gas “bubble” is what pushes the liquids out of the tubing to the atmosphe and GASIS databases, EPA/GRI raw well data, and engineering statics equations to estimate emissions 1990 to 2008. The Lasser® and GASIS databases provided well counts, average well depths, and averag basins, representing 54 percent of conventional U.S. gas wells. The 19 basins are a sample of 35 basins, have shut-in pressure data available. The emissions from the 19 sample basins were calculated from a s estimates discussed below. Finally, the total U.S. emissions for each year was determined by developing using 2006 Lasser® data, and multiplying them by their respective well counts in each year.

The methodology for 1990-2010 U.S. Inventory is broken into the six parts listed below:

1) Estimate the fraction of conventional wells that require liquids unloading
   Other Inputs, F47
2) Estimate the percentage of wells in each basin that are conventional
   Basin Data and Factor Calcs, Column H
3) Estimate the annual number of blowdowns per well which require unloading
   Other Inputs, F49
4) Estimate the uncontrolled emissions per blowdown for each sample well
   A) Estimate the casing volume at shut-in pressure
   Basin Data and Factor Calcs, Calculated in Column H, using equation in Column N, and da
   B) Estimate the volume produced to the atmosphere in addition to venting the casing gas
   Basin Data and Factor Calcs, Calculated in Column H, using equation in Column N, with data c B, information on hours of venting after the venting of casing gas from Other Inputs, K55.
5) Estimate the uncontrolled emissions from well clean ups for all sample wells
   Basin Data and Factor Calcs, Column L
6) NEMS region emission factors from the uncontrolled Lasser® sample emissions
   Basin Data and Factor Calcs, starting in Row 43

ntually reaching a head that stops gas
cumulating gas at reservoir shut-in
re. This is analyzed by using the Lasser®
from gas well liquids unloading from
ge well shut-in pressures for only 19
, and excludes the 16 basins that did not
eries of assumptions and engineering
emission factors for each NEMS region,

ta displayed in table beginning with Column B

displayed in table beginning with Column

Key Input Data for Liquids Unloading Emission Factor Calculation

From Lasser database, a collection of data available from state records. These are the basins that h

2006 Lasser and GASIS Database Input Data			
Basin Name	NEMS Region	Average Production Rate (Mscf/hr-well)	Average Depth (feet)
ARKLA BASIN	Gulf Coast	3.25	7,357
BLACK WARRIOR BASIN	Gulf Coast	2.81	3,360
EAST TEXAS BASIN	Gulf Coast	11.64	8,266
GULF COAST BASIN ONSHORE	Gulf Coast	17.74	8,732
GULF OF MEXICO	Gulf Coast	0.56	8,254
MID-GULF COAST BASIN	Gulf Coast	17.74	12,623
OUACHITA FOLDED BELT	Gulf Coast	15.16	7,889
ANADARKO BASIN	Mid-Central	3.78	8,963
ARKOMA BASIN	Mid-Central	5.99	6,346
CENTRAL KANSAS UPLIFT	Mid-Central	0.97	3,686
SEDGWICK BASIN	Mid-Central	1.34	4,170
SOUTH OKLAHOMA FOLDED BELT	Mid-Central	4.22	8,148
APPALACHIAN BASIN	North East	0.66	2,288
CHAUTAUQUA PLATFORM	North East	2.14	4,267
CINCINNATI ARCH	North East		
ILLINOIS BASIN	North East		
BIG HORN BASIN	Rocky Mountain	4.14	4,548
CENTRAL WESTERN OVERTHRUST	Rocky Mountain	15.69	9,905
DENVER BASIN	Rocky Mountain	1.55	5,774
GREEN RIVER BASIN	Rocky Mountain	13.81	7,268
LAS ANIMAS ARCH	Rocky Mountain	2.42	3,760
NORTH PARK BASIN	Rocky Mountain	13.19	3,455
PARADOX BASIN	Rocky Mountain	8.31	4,171
PICEANCE BASIN	Rocky Mountain	8.33	4,668
POWDER RIVER BASIN	Rocky Mountain	2.74	7,674
SAN JUAN BASIN	Rocky Mountain	3.64	4,494
UINTA BASIN	Rocky Mountain	7.54	5,717
WIND RIVER BASIN	Rocky Mountain	22.55	8,330
BEND ARCH	South West	0.83	3,117
FORT WORTH SYNCLINE	South West	4.84	5,075
LAS VEGAS-RATON BASIN	South West	9.18	4,069
PALO DURO BASIN	South West	1.28	4,275
PERMIAN BASIN	South West	5.79	8,297
SIERRA GRANDE UPLIFT	South West	26.84	2,455
STRAWN BASIN	South West	18.05	3,006
			6,413

Emission Factor Calculation for Gulf Coast, Mid-Central, South West, and Rocky M

NEMS Regions	Uncontrolled Sample Emissions (Mg)	Conventional Sample Well Count	Wells in Sample Conducting Liquids Unloading (.413 x well count)
North East	-	-	-
Gulf Coast	1,165,043	65,264	26,986
Mid-Central	382,724	71,774	29,678
South West	336,635	49,994	20,672
Rocky Mountain	114,427	20,146	8,330
West Coast	-	-	-
Total	1,998,828	207,176	85,667

For the Northeast and West Coast, there was no Lasser data for production rate, well depth, shut in The emission factor for the North East and West Coast NEMS regions were estimated by scaling the emissions to the national level, then subtracting the emissions from the represented NEMS regions dividing it by the total wells from the North East and West Coast NEMS oil and gas supply regions. T shows the calculation in cells I64 and I69.

$$\frac{Sample\ Emissions \times \dfrac{\#Total\ wells}{\#Sample\ wells} - \sum_{RM,MC,GC,SW} Emissions_i}{\sum_{NE,WC} wells_i}$$

Emission Factor Calculation for North East and West Coast

NEMS Regions	Uncontrolled Sample Emissions (Mg)	Conventional Sample Well Count	2006 U.S Inventory Conventional Well Count
North East	-	-	164,322
Gulf Coast	1,165,043	65,264	60,715
Mid-Central	382,724	71,774	67,188
South West	336,635	49,994	29,697
Rocky Mountain	114,427	20,146	52,796
West Coast	-	-	1,503
Total	1,998,828	207,176	376,221

ıad all of the data pieces needed for this analysis.

Average Shut-In Pressure (psi)	Gas Well Count	% of Conventional Wells in each Basin	% of Wells that Require Liquids Unloading	Average Sales Line Pressure (psi)
97.88	15,076	98%	41%	78
6.67	4,527	50%	21%	5
749.28	18,158	98%	41%	100
406.19	25,358	98%	41%	100
1246.93	3,982	100%	41%	100
74.45	1,444	98%	41%	60
224.75	183	100%	41%	100
75.20	52,565	98%	41%	60
285.71	14,654	98%	41%	100
69.33	704	100%	41%	55
92.48	2,606	100%	41%	74
140.63	2,641	98%	41%	100
0.00	48,677	98%	41%	-
0.00	7,620	100%	41%	-
0.00	475	100%	41%	-
0.00	1,919	100%	41%	-
0.00	11,018	75%	31%	-
0.00	8,041	50%	21%	-
0.00	583	100%	41%	-
0.00	10	100%	41%	-
0.00	780	100%	41%	-
0.00	5,677	98%	41%	-
0.00	21,007	50%	21%	-
268.02	26,861	75%	31%	100
0.00	4,175	50%	21%	-
0.00	1,409	98%	41%	-
169.31	5,827	98%	41%	100
243.28	9,345	98%	41%	100
0.00	2,966	100%	41%	-
25.33	671	100%	41%	20
123.54	32,270	98%	41%	100
231.56	443	100%	41%	100
165.18	2,386	100%	41%	100
247.09	334,059			

ountain

Calculated Emission Factor for wells conducting Liquids Unloading (Mg/unloaded well)	Emission factor converted to scf/well*
43.2	2,241,523
12.9	669,566
16.3	845,506
13.7	713,210
23.3	1,211,454.7

pressure, etc.
: total sample
from that total and
The equation below

Uncontrolled Sample Emissions Normalized by Inventory Well Count (Mg)	Wells in Sample Conducting Liquids Unloading (.413 x well count)	Calculated Emission Factor for wells conducting Liquids Unloading (Mg/unloaded well)	Emission factor converted to scf/well*
	-		1,278,034.62
1,083,847	26,986	43.2	2,241,523
358,270	29,678	12.9	669,566
199,968	20,672	16.3	845,506
299,879	8,330	13.7	713,210
	-		1,278,035
3,629,762	85,667	23.3	1,211,454.7

Well Depth minus Standing Liquids (feet)	Total Sample Emissions from Well Clean Ups w/out Reductions (Mg)
7,318	62,340.1
3,357	5,008.7
6,967	422,895.3
8,120	549,607.9
5,960	99,817.1
12,593	22,465.8
7,640	2,907.7
8,933	232,804.7
5,974	128,385.1
3,659	958.2
4,133	5,082.1
8,067	15,493.5
2,288	-
4,267	-
	-
	-
4,548	-
9,905	-
5,774	-
7,268	-
3,760	-
3,455	-
4,171	-
4,668	-
7,674	-
4,158	114,427.0
5,717	-
8,330	-
2,978	10,850.5
4,789	61,129.9
4,069	-
4,264	831.5
8,250	218,188.9
2,192	9,732.8
2,875	35,901.2
	1,998,828

$$V_i = (0.37x10^{-6})$$

V_i = volume of methane en

D = casing diameter, assu

h_i = well depth (feet), provi

P_i = well shut in pressure (

M = methane content, esti

t_B = blowtime (hours-well/b

Q_i = gas production rate (M

$$\times D^2 \times h_{ii} \times P_{ii} \times M + t_{BB} \times Q$$

nissions (Mcf/blowdown) for each sample basin i

med to be 5 inches on average.

ded for each basin i by GASIS and Lasser databases

psig), provided for each basin i by GASIS and Lasser databases

nated in the U.S. Inventory for each NEMS region

lowdown)

Mcf per hour per well), provided as an average per basin by Lasser® for each sample basin i

Casing Diameter (inches)	5	Volume Constant	3.71E-07

Total Well Count and Well Count with Liquids Unloading

Note: Values from 2008 *U.S Inventory*

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
North East	124,241	127,336	129,157	126,845	133,846	129,789	130,271	128,700	126,550	127,279	143,922	149,436	154,590	156,320	155,257	158,238	164,322	172,493	174,682	183,834
Gulf Coast	41,753	39,810	37,307	39,939	38,163	41,978	43,227	44,475	49,015	47,846	48,316	51,182	53,198	54,245	54,544	57,600	60,715	68,188	72,047	75,046
Mid-Central	53,838	57,572	59,029	60,453	60,515	65,033	64,151	64,144	64,082	51,766	49,505	61,291	64,926	66,431	67,744	65,696	67,188	72,125	70,003	73,913
Rocky Mountain	24,287	26,899	26,224	29,458	32,294	32,347	34,512	41,605	43,677	41,468	60,085	62,072	60,548	56,551	54,275	65,704	52,796	45,504	65,868	75,418
South West	24,139	23,504	22,510	23,495	24,645	27,126	27,106	28,934	29,878	28,873	31,620	32,546	33,079	33,809	33,484	29,662	29,697	30,738	30,030	27,802
West Coast	1,292	1,503	1,254	1,223	1,384	1,114	1,098	1,088	1,010	1,270	1,338	1,434	1,415	1,459	1,388	1,424	1,503	1,506	1,693	1,786
Onshore Conventional Gas Wells	269,550	276,624	275,481	281,412	290,847	297,387	300,365	308,946	314,213	298,503	334,786	357,961	367,756	368,815	366,692	378,323	376,221	390,554	414,323	437,800
Total Onshore Wells	269,782	276,981	276,009	282,144	291,761	298,526	301,787	310,971	316,929	302,421	341,678	370,033	384,527	390,288	391,987	395,466	411,041	431,418	455,015	455,016
Wells Requiring Liquid Unloading	111,458	114,383	113,910	116,363	120,264	122,968	124,200	127,748	129,926	123,430	138,433	148,015	152,066	152,504	151,626	156,435	155,566	161,493	171,321	181,029

1992 GRI Data (Used to Calculate Wells Needing Liquids Unloading, Blowdowns per Year)

Site	Gas Wells	Gas Wells that need Liquid Unloading	Blowdowns per year
1	-	-	-
2	80	80	12
3	-	-	-
4	13	13	1
5	12	-	-
6	6	-	-
7	130	43	103
8	26	5	3
9	138	55	193
10	321	25	72
11	500	-	-
12	500	-	-
13	600	-	-
14	53	53	1
15	800	600	3,600
16	1,000	1,000	2,600
17	520	520	6,240
18	1,439	245	89,425
19	100	-	-
20	15	-	-
21	2	2	24
22	12	-	-
23	80	-	-
24	40	-	-
25			
TOTALS	6,387	2,641	102,274

Percent of Conventional Wells that need Unloading:	41.35%
Well Liquid Unloading per Year per Unloading Wells:	38.73

Calculations for Blowtime

Data set 1: Average Uncontrolled Emissions from Wells			
Total Well Count	2,200	wells	2004 Spring *Partner Update pg. 2* <http://epa.gov/gasstar/documents/partner-updates/spring2004.pdf>
Total Uncontrolled Emissions	4,000,000	Mcf/yr	Information from Partner Company
Uncontrolled Emissions per Well	1,818.18	Mcf/yr	Information from Partner Company
Uncontrolled Emission per Blowdown	46.95	Mcf/blowdown	Calculated by EPA
Required Diameter*	11.42	inches	Uses average # of blowdowns per year from GRI
Gas Vented after Blowdown	37.61	Mcf/blowdown	This diameter was calculated by using the casing volume equation below. See http://www.epa.gov/gasstar/documents/ll_plungerlift.pdf.
			Partner Company uncontrolled emission (K24) minus calculated emissions from casing (L43)

*This was calculated to determine whether the volume of gas vented could have come entirely from the casing volume blowdown.
If the value calculated was near 5 inches, would have been possible that it was all from the casing.

$$V_i = (0.37x10^{-6}) \times D^2 \times h_i \times P_i \times M$$

San Juan Basin 2007 Average Well Depth	4,493.61	feet	Partner Company wells are in San Juan Basin. This information was used to calculate hours of blowtime after liquids unloading.
San Juan Basin 2007 Average Shut-In Pressure	268.02	psia	Partner Company wells are in San Juan Basin. This information was used to calculate hours of blowtime after liquids unloading.

Uncontrolled Emission per Blowdown (5" Casing)	9.3	Mcf/blowdown	Calculated with eqn to the right

$$V_i = (0.37x10^{-6}) \times D^2 \times h_i \times P_i \times M$$

V_i = volume of methane emissions (Mcf/blowdown) for each sample basin i
D = casing diameter, assumed to be 5 inches on average.
h_i = well depth (feet), provided for each basin i by GASIS and Lasser databases
P_i = well shut in pressure (psig), provided for each basin i by GASIS and Lasser databases
M = methane content, estimated in the U.S. Inventory for each NEMS region

Lasser Database Entries for Partner Company, Conventional Gas, in San Juan Basin (580)

			Oil (bbl/yr)	Gas (Mscf/yr)	Well Count	Mscf / Well-Year
PRODUCTION COMPANY	580	CONV/OTHER	831	41,152,848	190	216,593.94
PRODUCTION COMPANY	580	CONV/OTHER	6,537	4,356,502	221	19,712.68

Lasser Database Weighted Average for All Conventional Gas Wells in San Juan Basin (580)

			Gas (Mscf/yr)	Well Count	Mscf / Well-Year
ALL	580	CONV/OTHER	7,614,333	4408	31,904.11

Estimated Partner Company Well Production Rate	110,728	Mcf/Year-Well
Estimated Partner Company Well Production Rate	12.64	Mcf/Hr-Well
Time Gas Vented after Blowdown	2.98	Hr-Well/Blowdown
Time Gas Vented to Atmosphere after Blowdown	2.98	Hr-Well/Blowdown

Methane Content

Standard Methane Content	78.80%

Methane Content from 2008 *U.S Inventory*
Note: These are the simple average of the NEMS regions

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Methane Content	74.9%	76.2%	78.6%	80.0%	81.3%	82.7%	85.5%	84.1%	84.2%	84.1%	84.1%	83.9%	83.9%	83.2%	83.8%	83.8%	83.7%	83.6%	83.6%

Methane Content by NEMS Region
Updated content From 2009 US Inventory

Region	Well Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
NE North East	Conventional	84.0%	83.8%	83.5%	82.9%	82.0%	81.5%	81.3%	80.5%	81.2%	80.7%	81.0%	80.4%	80.5%	76.5%	80.5%	80.3%	79.8%	79.2%	79.2%	84.1%
	Unconventional																				
	All	84.0%	83.8%	83.5%	82.9%	82.0%	81.5%	81.2%	80.3%	81.0%	80.5%	80.8%	80.3%	80.4%	76.4%	80.4%	80.1%	79.5%	79.1%	79.1%	83.9%
GC Gulf Coast	Conventional	79.8%	80.1%	82.7%	84.1%	85.6%	87.2%	88.6%	88.6%	88.6%	88.7%	88.7%	88.6%	88.6%	88.6%	88.6%	88.6%	88.6%	88.5%	88.5%	88.6%
	Unconventional																				
	All	79.8%	80.1%	82.7%	84.1%	85.6%	87.2%	88.7%	88.6%	88.6%	88.7%	88.7%	88.7%	88.6%	88.6%	88.6%	88.6%	88.6%	88.5%	88.5%	88.6%
SW South West	Conventional	64.4%	67.1%	74.4%	76.1%	77.4%	79.0%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%
	Unconventional	64.4%	67.1%	74.4%	76.1%	77.4%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%
	All	64.4%	67.1%	74.4%	76.1%	77.4%	79.0%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%
MC Mid-Central	Conventional	78.3%	78.7%	79.1%	79.9%	80.7%	81.6%	82.5%	82.5%	82.5%	82.5%	82.5%	82.5%	82.5%	82.6%	82.6%	82.7%	82.7%	83.0%	83.0%	83.6%
	Unconventional	78.3%	78.7%	79.1%	79.9%	80.7%	81.6%	50.0%	50.2%	51.9%	53.0%	54.8%	56.2%	57.5%	58.2%	59.0%	58.3%	57.8%	56.3%	56.3%	52.2%
	All	78.3%	78.7%	79.1%	79.9%	80.7%	81.6%	82.6%	82.5%	82.5%	82.5%	82.5%	82.5%	82.5%	82.6%	82.7%	82.7%	82.7%	83.0%	83.0%	83.6%
RM Rocky Mountain	Conventional	67.4%	69.3%	71.2%	73.4%	75.5%	77.6%	87.3%	79.5%	79.6%	79.5%	79.2%	78.3%	78.1%	77.9%	77.8%	77.7%	77.6%	77.2%	77.2%	77.0%
	Unconventional	67.4%	69.3%	71.2%	73.4%	75.5%	77.6%	73.9%	68.2%	68.3%	68.9%	70.0%	72.5%	74.5%	75.6%	76.0%	76.0%	76.2%	76.9%	76.9%	77.3%
	All	67.4%	69.3%	71.2%	73.4%	75.5%	77.6%	88.4%	80.4%	80.5%	80.4%	80.2%	79.5%	79.3%	79.1%	79.0%	79.0%	78.9%	78.6%	78.6%	78.4%
WC West Coast	Conventional	75.3%	78.1%	80.8%	83.6%	86.4%	89.1%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%
	Unconventional																				
	All	75.3%	78.1%	80.8%	83.6%	86.4%	89.1%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%

Last year's Inventory LU Fw: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa Weitz to: Suzanne Waltzer 12/17/2012 10:22 AM

Melissa M. Weitz
----- Forwarded by Melissa Weitz/DC/USEPA/US on 12/17/2012 10:22 AM -----

From: Melissa Weitz/DC/USEPA/US
To: Karin Ritter <Ritterk@api.org>
Date: 10/25/2012 01:37 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hello Karin,

Attached below please find the spreadsheet that EPA used to calculate emission factors for liquids unloading, for the 1990-2009 and 1990-2010 Inventories.

Please share this with the participants in our recent conversations, but please do not distribute more widely. It was not developed with broad distribution in mind, and would need some reformatting and more detailed background information before being made public.

We can walk through this spreadsheet on our follow-up call. If you have questions on the spreadsheet before our next call, please feel free contact me.

Thank you,
Melissa

Copy of Liquids Unloading EF Calculation (2010Inv) 10.25.xlsx

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter	Hi Melissa, Just by way of background...	10/17/2012 04:49:09 PM

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/17/2012 04:49 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Melissa,
Just by way of background...
I will be out of the office on business travel October 22nd to 26th and then vacation until the 31st.
So our discussions will have to be postponed until early November. We do have the November 7th call

scheduled.
Cheers,
Karin

From: Weitz.Melissa@epamail.epa.gov [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Wednesday, October 17, 2012 4:39 PM
To: Karin Ritter
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Karin,

We're still a bit delayed on the spreadsheet--we're trying to determine if there is any company identifying information we need to remove before sending. I'm now aiming for tomorrow afternoon.

We can cancel tomorrow's call, and check in another time once you've had a chance to review the spreadsheet.

Thank you,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Karin Ritter ---10/16/2012 06:28:16 PM---Melissa, I also had down a conference call tentatively for Thursday 10/18 @3pm ET. Do you think we'

From: Karin Ritter <Ritterk@api.org>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 10/16/2012 06:28 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa,
I also had down a conference call tentatively for Thursday 10/18 @3pm ET. Do you think we'll still need this call?
I believe part of the reason we scheduled it was for us to discuss EPA's unloading factor information after we had a chance to review it. Don't think we'll have had enough time to review your material for a discussion during the call.
Can't recall what the other reason was for the tentative call?

Regards,
Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov]
Sent: Tuesday, October 16, 2012 5:54 PM

To: Karin Ritter
Cc: GHGInventory
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Thank you Karin.

It's not too late. I'm working on the updates now and the final should be posted by the end of the week.

Also, I'm a bit behind on getting the EPA liquids unloading factor information together. Hopefully I'll be able to send you something tomorrow.

Thank you,
Melissa

Melissa M. Weitz
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(202) 343-9897
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Karin Ritter ---10/16/2012 02:39:18 PM---Melissa, Attached are just a few API comments. Hopefully these can still be considered even though

From: Karin Ritter <Ritterk@api.org>
To: GHGInventory@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 10/16/2012 02:39 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa,
Attached are just a few API comments. Hopefully these can still be considered even though they are a day late?

Regards,
Karin

From: Melissa Weitz [mailto:Weitz.Melissa@epamail.epa.gov] **On Behalf Of** GHGInventory
Sent: Wednesday, October 10, 2012 3:12 PM
Subject: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Natural Gas Stakeholder Workshop Participant,

A draft summary report for the Stakeholder Workshop on Natural Gas in the GHG Inventory is attached below, for your review.

The report summarizes the presentations and discussions from the workshop, highlights next steps for natural gas emissions calculations, and provides a list of attendees.

We request any comments on the report by Monday, October 15, as we plan to post the final report to the Stakeholder Workshop website next week.

For more information on the Stakeholder Workshop, including agenda and presentations, please visit http://www.epa.gov/climatechange/ghgemissions/Sept2012stakeholderworkshop.html.

Please continue to contact us with any questions or new information relevant to the Inventory at GHGInventory@epa.gov.

Thank you,
Melissa

(See attached file: Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.10.docx)[attachment "Stakeholder Workshop on NG in the GHG Inventory Draft Report.2012.10.10 bg.docx" deleted by Melissa Weitz/DC/USEPA/US]

This analysis is based on the principle that, as liquids gradually accumulate in the production tubing, ever flow to the sales line, this is tantamount to shutting in a well which manifests itself with the well casing acc pressure. This shut-in pressure gas “bubble” is what pushes the liquids out of the tubing to the atmosphe and GASIS databases, EPA/GRI raw well data, and engineering statics equations to estimate emissions 1990 to 2008. The Lasser® and GASIS databases provided well counts, average well depths, and averag basins, representing 54 percent of conventional U.S. gas wells. The 19 basins are a sample of 35 basins, have shut-in pressure data available. The emissions from the 19 sample basins were calculated from a s estimates discussed below. Finally, the total U.S. emissions for each year was determined by developing using 2006 Lasser® data, and multiplying them by their respective well counts in each year.

The methodology for 1990-2010 U.S. Inventory is broken into the six parts listed below:

1) Estimate the fraction of conventional wells that require liquids unloading
   Other Inputs, F47
2) Estimate the percentage of wells in each basin that are conventional
   Basin Data and Factor Calcs, Column H
3) Estimate the annual number of blowdowns per well which require unloading
   Other Inputs, F49
4) Estimate the uncontrolled emissions per blowdown for each sample well
   A) Estimate the casing volume at shut-in pressure
   Basin Data and Factor Calcs, Calculated in Column H, using equation in Column N, and da
   B) Estimate the volume produced to the atmosphere in addition to venting the casing gas
   Basin Data and Factor Calcs, Calculated in Column H, using equation in Column N, with data c B, information on hours of venting after the venting of casing gas from Other Inputs, K55.
5) Estimate the uncontrolled emissions from well clean ups for all sample wells
   Basin Data and Factor Calcs, Column L
6) NEMS region emission factors from the uncontrolled Lasser® sample emissions
   Basin Data and Factor Calcs, starting in Row 43

ntually reaching a head that stops gas
cumulating gas at reservoir shut-in
re. This is analyzed by using the Lasser®
from gas well liquids unloading from
ge well shut-in pressures for only 19
, and excludes the 16 basins that did not
eries of assumptions and engineering
emission factors for each NEMS region,

ta displayed in table beginning with Column B

displayed in table beginning with Column

Key Input Data for Liquids Unloading Emission Factor Calculation

From Lasser database, a collection of data available from state records. These are the basins that h

		2006 Lasser and GASIS Database Input Data	
Basin Name	NEMS Region	Average Production Rate (Mscf/hr-well)	Average Depth (feet)
ANADARKO BASIN	Mid-Central	3.78	8,963
APPALACHIAN BASIN	North East	0.66	2,288
ARKLA BASIN	Gulf Coast	3.25	7,357
ARKOMA BASIN	Mid-Central	5.99	6,346
BEND ARCH	South West	0.83	3,117
BIG HORN BASIN	Rocky Mountain	4.14	4,548
BLACK WARRIOR BASIN	Gulf Coast	2.81	3,360
CENTRAL KANSAS UPLIFT	Mid-Central	0.97	3,686
CENTRAL WESTERN OVERTHRUST	Rocky Mountain	15.69	9,905
CHAUTAUQUA PLATFORM	North East	2.14	4,267
CINCINNATI ARCH	North East		
DENVER BASIN	Rocky Mountain	1.55	5,774
EAST TEXAS BASIN	Gulf Coast	11.64	8,266
FORT WORTH SYNCLINE	South West	4.84	5,075
GREEN RIVER BASIN	Rocky Mountain	13.81	7,268
GULF COAST BASIN ONSHORE	Gulf Coast	17.74	8,732
GULF OF MEXICO	Gulf Coast	0.56	8,254
ILLINOIS BASIN	North East		
LAS ANIMAS ARCH	Rocky Mountain	2.42	3,760
LAS VEGAS-RATON BASIN	South West	9.18	4,069
MID-GULF COAST BASIN	Gulf Coast	17.74	12,623
NORTH PARK BASIN	Rocky Mountain	13.19	3,455
OUACHITA FOLDED BELT	Gulf Coast	15.16	7,889
PALO DURO BASIN	South West	1.28	4,275
PARADOX BASIN	Rocky Mountain	8.31	4,171
PERMIAN BASIN	South West	5.79	8,297
PICEANCE BASIN	Rocky Mountain	8.33	4,668
POWDER RIVER BASIN	Rocky Mountain	2.74	7,674
SAN JUAN BASIN	Rocky Mountain	3.64	4,494
SEDGWICK BASIN	Mid-Central	1.34	4,170
SIERRA GRANDE UPLIFT	South West	26.84	2,455
SOUTH OKLAHOMA FOLDED BELT	Mid-Central	4.22	8,148
STRAWN BASIN	South West	18.05	3,006
UINTA BASIN	Rocky Mountain	7.54	5,717
WIND RIVER BASIN	Rocky Mountain	22.55	8,330
			6,413

Emission Factor Calculation for Gulf Coast, Mid-Central, South West, and Rocky M

NEMS Regions	Uncontrolled Sample Emissions (Mg)	Conventional Sample Well Count	Wells in Sample Conducting Liquids Unloading (.413 x well count)
North East	-	-	-
Gulf Coast	1,165,043	65,264	26,986
Mid-Central	382,724	71,774	29,678
South West	336,635	49,994	20,672
Rocky Mountain	114,427	20,146	8,330
West Coast	-	-	-
Total	1,998,828	207,176	85,667

For the Northeast and West Coast, there was no Lasser data for production rate, well depth, shut in The emission factor for the North East and West Coast NEMS regions were estimated by scaling the emissions to the national level, then subtracting the emissions from the represented NEMS regions dividing it by the total wells from the North East and West Coast NEMS oil and gas supply regions. T shows the calculation in cells I64 and I69.

$$\frac{Sample\ Emi\ ssions \times \frac{\#Total\ wel\ ls}{\#Sample\ we\ lls} - \sum_{RM,MC,GC,SW} Emissions_i}{\sum_{NE,WC} wells_i}$$

Emission Factor Calculation for North East and West Coast

NEMS Regions	Uncontrolled Sample Emissions (Mg)	Conventional Sample Well Count	2006 U.S Inventory Conventional Well Count
North East	-	-	164,322
Gulf Coast	1,165,043	65,264	60,715
Mid-Central	382,724	71,774	67,188
South West	336,635	49,994	29,697
Rocky Mountain	114,427	20,146	52,796
West Coast	-	-	1,503
Total	1,998,828	207,176	376,221

ıad all of the data pieces needed for this analysis.

Average Shut-In Pressure (psi)	Gas Well Count	% of Conventional Wells in each Basin	% of Wells that Require Liquids Unloading	Average Sales Line Pressure (psi)
75.20	52,565	98%	41%	60
0.00	48,677	98%	41%	-
97.88	15,076	98%	41%	78
285.71	14,654	98%	41%	100
169.31	5,827	98%	41%	100
0.00	475	100%	41%	-
6.67	4,527	50%	21%	5
69.33	704	100%	41%	55
0.00	1,919	100%	41%	-
0.00	7,620	100%	41%	-
0.00	11,018	75%	31%	-
749.28	18,158	98%	41%	100
243.28	9,345	98%	41%	100
0.00	8,041	50%	21%	-
406.19	25,358	98%	41%	100
1246.93	3,982	100%	41%	100
0.00	583	100%	41%	-
0.00	2,966	100%	41%	-
74.45	1,444	98%	41%	60
0.00	10	100%	41%	-
224.75	183	100%	41%	100
25.33	671	100%	41%	20
0.00	780	100%	41%	-
123.54	32,270	98%	41%	100
0.00	5,677	98%	41%	-
0.00	21,007	50%	21%	-
268.02	26,861	75%	31%	100
92.48	2,606	100%	41%	74
231.56	443	100%	41%	100
140.63	2,641	98%	41%	100
165.18	2,386	100%	41%	100
0.00	4,175	50%	21%	-
0.00	1,409	98%	41%	-
247.09	334,059			

ountain

Calculated Emission Factor for wells conducting Liquids Unloading (Mg/unloaded well)	Emission factor converted to scf/well*
43.2	2,241,523
12.9	669,566
16.3	845,506
13.7	713,210
23.3	1,211,454.7

pressure, etc.
: total sample
from that total and
The equation below

Uncontrolled Sample Emissions Normalized by Inventory Well Count (Mg)	Wells in Sample Conducting Liquids Unloading (.413 x well count)	Calculated Emission Factor for wells conducting Liquids Unloading (Mg/unloaded well)	Emission factor converted to scf/well*
	-		1,278,034.62
1,083,847	26,986	43.2	2,241,523
358,270	29,678	12.9	669,566
199,968	20,672	16.3	845,506
299,879	8,330	13.7	713,210
	-		1,278,035
3,629,762	85,667	23.3	1,211,454.7

Well Depth minus Standing Liquids (feet)	Total Sample Emissions from Well Clean Ups w/out Reductions (Mg)
8,933	232,804.7
2,288	-
7,318	62,340.1
5,974	128,385.1
2,978	10,850.5
4,548	-
3,357	5,008.7
3,659	958.2
9,905	-
4,267	-
	-
5,774	-
6,967	422,895.3
4,789	61,129.9
7,268	-
8,120	549,607.9
5,960	99,817.1
	-
3,760	-
4,069	-
12,593	22,465.8
3,455	-
7,640	2,907.7
4,264	831.5
4,171	-
8,250	218,188.9
4,668	-
7,674	-
4,158	114,427.0
4,133	5,082.1
2,192	9,732.8
8,067	15,493.5
2,875	35,901.2
5,717	-
8,330	-
	1,998,828

$$V_i = (0.37x10^{-6})$$

V_i = volume of methane en

D = casing diameter, assu

h_i = well depth (feet), provi

P_i = well shut in pressure (

M = methane content, esti

t_B = blowtime (hours-well/b

Q_i = gas production rate (M

$$\times D^2 \times h_i \times P_i \times M + t_B \times Q$$

nissions (Mcf/blowdown) for each sample basin i

med to be 5 inches on average.

ded for each basin i by GASIS and Lasser databases

psig), provided for each basin i by GASIS and Lasser databases

mated in the U.S. Inventory for each NEMS region

lowdown)

Mcf per hour per well), provided as an average per basin by Lasser® for each sample basin i

Casing Diameter (inches)	5

Volume Constant

Total Well Count and Well Count with Liquids Unloading

Note: Values from 2008 *U.S Inventory*

	1990	1991	1992	1993	1994
North East	124,241	127,336	129,157	126,845	133,846
Gulf Coast	41,753	39,810	37,307	39,939	38,163
Mid-Central	53,838	57,572	59,029	60,453	60,515
Rocky Mountain	24,287	26,899	26,224	29,458	32,294
South West	24,139	23,504	22,510	23,495	24,645
West Coast	1,292	1,503	1,254	1,223	1,384
Onshore Conventional Gas Wells	269,550	276,624	275,481	281,412	290,847
Total Onshore Wells	269,782	276,981	276,009	282,144	291,761
Wells Requiring Liquid Unloading	111,458	114,383	113,910	116,363	120,264

1992 GRI Data (Used to Calculate Wells Needing Liquids Unloading, Blowdowns per Year)

Site	Gas Wells	Gas Wells that need Liquid Unloading	Blowdowns per year
1	-	-	-
2	80	80	12
3	-	-	-
4	13	13	1
5	12	-	-
6	6	-	-
7	130	43	103
8	26	5	3
9	138	55	193
10	321	25	72
11	500	-	-
12	500	-	-
13	600	-	-
14	53	53	1
15	800	600	3,600
16	1,000	1,000	2,600
17	520	520	6,240
18	1,439	245	89,425
19	100	-	-

20	15	-	-	
21	2	2	24	
22	12	-	-	
23	80	-	-	
24	40	-	-	
25				
TOTALS	**6,387**	**2,641**	**102,274**	
Percent of Conventional Wells that need Unloading:				**41.3%**
Well Liquid Unloading per Year per Unloading Wells:				**38.73**

Methane Content

Standard Methane Content	78.80%

Methane Content from 2008 *U.S Inventory*
Note: These are the simple average of the NEMS regions

	1990	1991	1992	1993
Methane Content	74.9%	76.2%	78.6%	80.0%

Methane Content by NEMS Region
Updated content From 2009 US Inventory

Region	Well Type	1990	1991	1992	1993
NE North East	Conventional	84.0%	83.8%	83.5%	82.9%
	Unconventional				
	All	84.0%	83.8%	83.5%	82.9%
GC Gulf Coast	Conventional	79.8%	80.1%	82.7%	84.1%
	Unconventional				
	All	79.8%	80.1%	82.7%	84.1%
SW South West	Conventional	64.4%	67.1%	74.4%	76.1%
	Unconventional	64.4%	67.1%	74.4%	76.1%
	All	64.4%	67.1%	74.4%	76.1%
MC Mid-Central	Conventional	78.3%	78.7%	79.1%	79.9%
	Unconventional	78.3%	78.7%	79.1%	79.9%
	All	78.3%	78.7%	79.1%	79.9%
RM Rocky Mountain	Conventional	67.4%	69.3%	71.2%	73.4%
	Unconventional	67.4%	69.3%	71.2%	73.4%
	All	67.4%	69.3%	71.2%	73.4%
WC	Conventional	75.3%	78.1%	80.8%	83.6%

West Coast	Unconventional All	75.3%	78.1%	80.8%	83.6%

3.71E-07

1995	1996	1997	1998	1999	2000
129,789	130,271	128,700	126,550	127,279	143,922
41,978	43,227	44,475	49,015	47,846	48,316
65,033	64,151	64,144	64,082	51,766	49,505
32,347	34,512	41,605	43,677	41,468	60,085
27,126	27,106	28,934	29,878	28,873	31,620
1,114	1,098	1,088	1,010	1,270	1,338
297,387	300,365	308,946	314,213	298,503	334,786
298,526	301,787	310,971	316,929	302,421	341,678
122,968	124,200	127,748	129,926	123,430	138,433

Calculations for Blowtime

Data set 1: Average Uncontrolled Emissions from Wells			2004 Spring *Partr*
Total Well Count	2,200	wells	Information from P
Total Uncontrolled Emissions	4,000,000	Mcf/yr	Information from P
Uncontrolled Emissions per Well	1,818.18	Mcf/yr	Calculated by EPA
Uncontrolled Emission per Blowdown	46.95	Mcf/blowdown	Uses average # of
Required Diameter*	11.42	inches	This diameter was
Gas Vented after Blowdown	37.61	Mcf/blowdown	Partner Company

*This was calculated to determine whether the volume of gas vented could have come entirely from the cas
If the value calculated was near 5 inches, would have been possible that it was all from the casing.

San Juan Basin 2007 Average Well Depth	4,493.61	feet	Partner Company
San Juan Basin 2007 Average Shut-In Pressure	268.02	psia	Partner Company

Uncontrolled Emission per Blowdown (5" Casing)	9.3	Mcf/blowdown

Lasser Database Entries for Partner Company, Conventional Gas, in San Juan Basin (580)

PRODUCTION COMPANY	580	CONV/OTHER
PRODUCTION COMPANY	580	CONV/OTHER

Lasser Database Weighted Average for All Conventional Gas Wells in San Juan Basin (580)

ALL	580	CONV/OTHER

Estimated Partner Company Well Production Rate	110,728	Mcf/Year-Well
Estimated Partner Company Well Production Rate	12.64	Mcf/Hr-Well
Time Gas Vented after Blowdown	2.98	Hr-Well/Blowdown

Time Gas Vented to Atmosphere after Blowdown	3.0	Hr-Well/Blowdown

1994	1995	1996	1997	1998	1999
81.3%	82.7%	85.5%	84.1%	84.2%	84.1%

1994	1995	1996	1997	1998	1999
82.0%	81.5%	81.3%	80.5%	81.2%	80.7%
82.0%	81.5%	81.2%	80.3%	81.0%	80.5%
85.6%	87.2%	88.6%	88.6%	88.6%	88.7%
85.6%	87.2%	88.7%	88.6%	88.6%	88.7%
77.4%	79.0%	80.5%	80.5%	80.5%	80.5%
77.4%	79.0%	79.0%	79.0%	79.0%	79.0%
77.4%	79.0%	80.5%	80.5%	80.5%	80.5%
80.7%	81.6%	82.5%	82.5%	82.5%	82.5%
80.7%	81.6%	50.0%	50.2%	51.9%	53.0%
80.7%	81.6%	82.6%	82.5%	82.5%	82.5%
75.5%	77.6%	87.3%	79.5%	79.6%	79.5%
75.5%	77.6%	73.9%	68.2%	68.3%	68.9%
75.5%	77.6%	88.4%	80.4%	80.5%	80.4%
86.4%	89.1%	91.9%	91.9%	91.9%	91.9%

86.4%	89.1%	91.9%	91.9%	91.9%	91.9%

2001	2002	2003	2004	2005	2006	2007
149,436	154,590	156,320	155,257	158,238	164,322	172,493
51,182	53,198	54,245	54,544	57,600	60,715	68,188
61,291	64,926	66,431	67,744	65,696	67,188	72,125
62,072	60,548	56,551	54,275	65,704	52,796	45,504
32,546	33,079	33,809	33,484	29,662	29,697	30,738
1,434	1,415	1,459	1,388	1,424	1,503	1,506
357,961	367,756	368,815	366,692	378,323	376,221	390,554
370,033	384,527	390,288	391,987	395,466	411,041	431,418
148,015	152,066	152,504	151,626	156,435	155,566	161,493

ner Update pg. 2 **< http://epa.gov/gasstar/documents/partner-updates/spring2004.pdf>**

artner Company

artner Company

blowdowns per year from GRI

calculated by using the casing volume equation below. See http://www.epa.gov/gasstar/documents/ll_plunger

uncontrolled emission (K24) minus calculated emissions from casing (L43)

sing volume blowdown.

$$V_i = (0.37\,x10^{-6}) \times D^2 \times h_i \times P_i \times M$$

wells are in San Juan Basin. This information was used to calculate hours of blowtime after liquids unloading.
wells are in San Juan Basin. This information was used to calculate hours of blowtime after liquids unloading.

Calculated with eqn to the right

$$V_i = (0.$$

V_i = volume of
D = casing dia
h_i = well depth
P_i = well shut i
M = methane

Oil (bbl/yr)	Gas (Mscf/yr)	Well Count	Mscf / Well-Year
831	41,152,848	190	216,593.94
6,537	4,356,502	221	19,712.68

Gas (Mscf/yr)	Well Count	Mscf / Well-Year
7,614,333	4408	31,904.11

2000	2001	2002	2003	2004	2005	2006
84.1%	83.9%	83.9%	83.2%	83.8%	83.8%	83.7%

2000	2001	2002	2003	2004	2005	**2006**
81.0%	80.4%	80.5%	76.5%	80.5%	80.3%	79.8%
80.8%	80.3%	80.4%	76.4%	80.4%	80.1%	79.5%
88.7%	88.6%	88.6%	88.6%	88.6%	88.6%	88.6%
88.7%	88.7%	88.6%	88.6%	88.6%	88.6%	88.6%
80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%
79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%
80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%
82.5%	82.5%	82.5%	82.6%	82.6%	82.7%	82.7%
54.8%	56.2%	57.5%	58.2%	59.0%	58.3%	57.8%
82.5%	82.5%	82.5%	82.6%	82.7%	82.7%	82.7%
79.2%	78.3%	78.1%	77.9%	77.8%	77.7%	77.6%
70.0%	72.5%	74.5%	75.6%	76.0%	76.0%	76.2%
80.2%	79.5%	79.3%	79.1%	79.0%	79.0%	78.9%
91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%

91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%

2008	2009
174,682	183,834
72,047	75,046
70,003	73,913
65,868	75,418
30,030	27,802
1,693	1,786
414,323	437,800
455,015	455,016
171,321	181,029

lift.pdf.

$$.37\,x10^{-6}) \times D^2 \times h_i \times P_i \times M$$

methane emissions (Mcf/blowdown) for each sample basin i

meter, assumed to be 5 inches on average.

(feet), provided for each basin i by GASIS and Lasser databases

in pressure (psig), provided for each basin i by GASIS and Lasser databases

content, estimated in the U.S. Inventory for each NEMS region

2007	2008
83.6%	83.6%

2007	2008	2009
79.2%	79.2%	84.1%
79.1%	79.1%	83.9%
88.5%	88.5%	88.6%
88.5%	88.5%	88.6%
80.5%	80.5%	80.5%
79.0%	79.0%	79.0%
80.5%	80.5%	80.5%
83.0%	83.0%	83.6%
56.3%	56.3%	52.2%
83.0%	83.0%	83.6%
77.2%	77.2%	77.0%
76.9%	76.9%	77.3%
78.6%	78.6%	78.4%
91.9%	91.9%	91.9%

91.9%	91.9%	91.9%

expert review draft spreadsheet
Melissa Weitz to: Suzanne Waltzer 12/17/2012 10:25 AM

----- Forwarded by Melissa Weitz/DC/USEPA/US on 12/17/2012 10:24 AM -----

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Gopi Manne" <Gopi.Manne@erg.com>, "Paula Fields" <Paula.Fields@erg.com>
Date: 11/29/2012 04:00 PM
Subject: Natural Gas Spreadsheet and Well Counts

Melissa,

Attached is the Natural Gas Systems spreadsheet, as well as our latest well counts. For reference, I am also including a table that describes the changes that we made to the spreadsheet in response to ICF's comments.

[redacted] (b)(5) deliberative [redacted]

At this point, please send over the text and I will make redline/strike-out changes based upon this version of the spreadsheet. I should be able to send the text back to you later this afternoon.

We will send you the annex tomorrow - we need to spend more time QAing all of the involved tables.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

[redacted] (b)(5) deliberative NaturalGasSystems_1990-2011_112912.xlsx response to icf comments_112912.docx [redacted] (b)(5) deliberative [redacted] (b)(5) deliberative [redacted]

DRAFT Gas Well Counts_112812.xlsx

Re: Inventory Annex - a few edits, still reviewing....

Suzanne Waltzer to: Melissa Weitz 12/17/2012 10:29 AM
Cc: Suzanne Kocchi

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA,
Cc: Suzanne Kocchi/DC/USEPA/US@EPA
History: This message has been forwarded.

Sure no problem on the files. I received them all.

Also, on the inventory text, just wanted to remind you to carry over any edits made to the potential emissions discussion to the expert review draft if there is a similar section on potential emissions in that document as well.

Thanks!

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

Melissa Weitz These look great--thanks, I'll update it right now. If we could meet in your offic... 12/17/2012 10:19:28 AM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA
Date: 12/17/2012 10:19 AM
Subject: Re: Inventory Annex - a few edits, still reviewing....

These look great--thanks, I'll update it right now.

If we could meet in your office, that'd be great. Would you mind pulling up API's spreadsheet, our liquids unloading spreadsheet, and the expert review Inventory spreadsheet so we can access them during the call? I'll send all 3 to you in an email.

Suzanne Waltzer Hi Melissa, I made a few suggested edits to the description of potential emissio... 12/17/2012 10:09:01 AM

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Suzanne Kocchi/DC/USEPA/US@EPA
Date: 12/17/2012 10:09 AM
Subject: Inventory Annex - a few edits, still reviewing....

Hi Melissa,

I made a few suggested edits to the description of potential emissions. Please feel free to tweak if you disagree with any of these edits or if I changed anything incorrectly. I understand your point but I thought the reference to higher emissions may be confusing given the updates we made in recent years to certain emission factors based on new information. I also wanted to clarify that the GRI study still represents best available data in many cases.

I thought I would send these along in phases as I know you are crashing on this. I will continue to review and let you know if I find anything further.

BTW - are you coming up here for the API call or should we meet in a conference room, call from our desks?

Thanks!

Suzie

(b)(5) deliberative

(b)(5) deliberative

Re: Summary of call with API this a.m.

Paul Gunning to: Melissa Weitz 12/17/2012 01:38 PM

Cc: Bill Irving, Suzanne Kocchi, Suzanne Waltzer, Leif Hockstad

History: This message has been forwarded.

Great. I just completed all my calls. We are good to go whenever you are ready.

Great work everyone!!

Melissa Weitz	Suzie W. and I had a call this a.m. with API (...	12/17/2012 01:30:10 PM

From: Melissa Weitz/DC/USEPA/US
To: Paul Gunning/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA, Bill Irving/DC/USEPA/US@EPA
Cc: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 12/17/2012 01:30 PM
Subject: Summary of call with API this a.m.

Suzie W. and I had a call this a.m. with API (Karin Ritter), BP (Reid Smith), and URS (Terri Shires).

We informed them that the expert review draft will be distributed this afternoon, and explained the updates, at a high level. We then set up a call for early January to discuss their initial feedback on the expert review draft.

We then discussed a methodology proposed by API for incorporating their liquids unloading information into the GHG Inventory (the initial purpose of the scheduled call). Their proposed method closely matches the method we used for the expert review draft, and their results are similar (API calculated 7 TgCO2e for 2011, versus EPA's 5 TgCo2e).

We're planning to share the spreadsheet we used for our update with API, and then further discuss the EPA and API methods with them on a subsequent call.

On the expert review draft itself, ERG is fixing the formatting on a few tables in the Annex, and then we should be ready to send out the draft in the next 2 hours.

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Re: Ideas for ICF analysis and cross walk
Melissa Weitz to: Suzanne Waltzer 12/18/2012 10:39 AM
Cc: Mark DeFigueiredo

Hi--

I put some responses in red below.

I thought when we last talked, we wanted to [redacted] (b)(5) deliberative [redacted]

I'll think more about this before we meet tomorrow.

Thanks!
Melissa

Suzanne Waltzer	Sorry to hear about BAMM troubles. Hope it'...	12/17/2012 09:03:37 AM

From: Suzanne Waltzer/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA
Date: 12/17/2012 09:03 AM
Subject: Re: Ideas for ICF analysis and cross walk

Sorry to hear about BAMM troubles. Hope it's improving and you are getting it all sorted out.

I put responses to your questions on ICF in below in blue. I would like to get Melissa's thought on these as well.

[redacted] (b)(5) deliberative [redacted]

[redacted]

Thanks!

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

Mark DeFigueiredo	Thanks Suzie. Sorry I wasn't able to talk ea...	12/14/2012 05:43:40 PM

From: Mark DeFigueiredo/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA
Date: 12/14/2012 05:43 PM
Subject: Re: Ideas for ICF analysis and cross walk

Thanks Suzie. Sorry I wasn't able to talk earlier. BAMM turned into a cluster and so I'm now in "BAMM-ageddon". I had a few questions for you so maybe let's plan to talk on Monday.

(b)(5) deliberative

Just my two cents. Melissa, please chime in with your thoughts/preferences as well.

Thanks!

Mark de Figueiredo, J.D., Ph.D.
Climate Change Division
U.S. Environmental Protection Agency
(202) 343-9928

Suzanne Waltzer	From: Suzanne Waltzer/DC/USEPA/US To:...	12/14/2012 10:23:34 AM

From: Suzanne Waltzer/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 12/14/2012 10:23 AM
Subject: Ideas for ICF analysis and cross walk

Hi,

I am working from home this morning and as follow-up to our meeting with ICF, just wanted to send some thoughts on potential analysis they can get started on the Subpart W data.

(b)(5) deliberative

I think for next steps, we can send our final direction to Roger and he can send to ICF and establish Mark as the SME. Sound ok?

Thanks!

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544

Web: www.epa.gov/gasstar

-----Forwarded by Suzanne Waltzer/DC/USEPA/US on 12/14/2012 09:56AM -----
To: Anhar Karimjee/DC/USEPA/US@EPA, Suzanne Kocchi/DC/USEPA/US@EPA
From: Suzanne Waltzer/DC/USEPA/US
Date: 11/30/2012 04:18PM
Cc: Melissa Weitz/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA
Subject: Preliminary results of cross walk - more to come next week

(See attached file: Internal Draft Preliminary Crosswalk_ 11-30-12.docx)

Hi Suzie and Anhar,

Just wanted to share what we have so far for the Inventory/W cross walk. We have completed the [redacted] (b)(5) deliberative [redacted]. Much of this has already been completed (thanks to Mark and Melissa) but we are working now to complete a couple of additional analyses and input everything into a consistent table/format. The sector-level table should be complete by early next week (with all the appropriate caveats). We will send an updated file once that is done.

Just wanted to send along what we have found so far - [redacted] (b)(5) deliberative [redacted]

Please let us know if you have questions.

Thanks!

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar[attachment "Internal Draft Preliminary Crosswalk_11-30-12.docx" deleted by Mark DeFigueiredo/DC/USEPA/US]

Re: expert review draft of GHG Inventory

Melissa Weitz to: Jameel Alsalam 12/19/2012 05:10 PM

From: Melissa Weitz/DC/USEPA/US
To: Jameel Alsalam/DC/USEPA/US@EPA,

Hi Jameel--

Thanks for pointing out the error in Table C. I'll have ERG take a look at it.

[redacted] (b)(5) deliberative [redacted]

[redacted] ?

We can check in about this tomorrow if you'd like more info.

Melissa

Jameel Alsalam Melissa, Thanks very much for sending this along. Today I took a look at the na... 12/19/2012 04:03:40 PM

From: Jameel Alsalam/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 12/19/2012 04:03 PM
Subject: Re: expert review draft of GHG Inventory

Melissa,

Thanks very much for sending this along. Today I took a look at the natural gas supplement with a mind towards how it would impact producing projections for the U.S. natural gas sector. I appreciate the transparency you add- more tables means that it is easier for me to pull more information from the inventory itself, as opposed to having to go into the spreadsheets.

One small issue I noticed - in the natural gas supplement, on table C [redacted] (b)(5) deliberative [redacted]

I believe that Dan Hooper had a couple of conversations with you about the methodology he was developing for projecting emissions from this source. Since he ended up leaving earlier than originally anticipated, I am now picking up completing all of these methodologies, so I apolgize if I

end up asking any questions that you and he already had settled. (b)(5) deliberative

I also see that incorporating regulatory and voluntary actions for future projections is going to be more complicated than I had hoped.

Anyway, on Friday I have a call with ERG who is supporting me on the U.S. projections project at which time they will be proposing updates to the methodology for this source, but I wanted to be prepared by taking a look at the new inventory numbers.

best,
Jameel

Jameel Alsalam
Economist, Climate Economics Branch
U.S. Environmental Protection Agency
voice: 202-343-9807
fax: 202-343-2202
alsalam.jameel@epa.gov

Melissa Weitz ----- Forwarded by Melissa Weitz/DC/USEPA/US on 12/17/2012 05:43 PM -----... 12/17/2012 05:46:14 PM

From: Melissa Weitz/DC/USEPA/US
To: Jameel Alsalam/DC/USEPA/US@EPA
Date: 12/17/2012 05:46 PM
Subject: expert review draft of GHG Inventory

----- Forwarded by Melissa Weitz/DC/USEPA/US on 12/17/2012 05:43 PM -----

From: GHGInventory
To: Leif Hockstad/DC/USEPA/US@EPA

Cc: Melissa Weitz/DC/USEPA/US@EPA
Date: 12/17/2012 05:05 PM
Subject: Draft Inventory of U.S. Greenhouse Gases and Sinks: 1990-2011 for Expert Review
Sent by: Melissa Weitz

Dear Colleagues,

Attached you will find, for your review, a cover letter and files containing the Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011 . As an expert in this field, we are again requesting technical comments from you, particularly on those parts of the inventory which are new or have changed since last year. I wanted to take this opportunity to thank you for your comments in the past, and to encourage you to take a fresh look at this year's document. The expert review process has been a vital part of maintaining the high quality of the U.S. national greenhouse gas inventory.

We are including updated sections for natural gas systems separately from the full draft report. Due to timing constraints in compiling the full draft report, we were not able to integrate these updated calculations and materials on natural gas systems in the full draft report for the expert review, but we would like you to review these separate natural gas systems sections as you review the full draft report. We have additionally attached an updated summary table of total U.S. greenhouse gas emissions which includes the updated emissions calculations for natural gas systems to better provide you context.

There are other sections of the report that are highlighted in gray for source categories for which updated emissions calculations were not able to be performed, due to delays in data collection necessary to conduct our latest calculations. These sections will be updated for the next draft report that we will release in early 2013 for its public comment period, and all sections will be compiled in a full, complete draft report for that distribution.

Also, as a reminder, due to formatting constraints, you will find the figures referenced within each chapter at the end of that chapter (except for the maps in the Agriculture and Land Use, Land-Use Change and Forestry chapters, which are either not available for this draft or provided separately).

The attached Adobe Acrobat file containing the GHG Inventory report is a very large file, so please contact us if you are having any problems with the file size. Also due to size considerations, there will be an email immediately following this one with the Annex files and large figures for the draft report.

Our deadline for comments this year will be Friday, January 11, 2013. As always, there will be an additional opportunity to provide comments during the public review phase which will begin in February, 2013, and we encourage you to provide comments then if you are unable to do so now or are awaiting the full updates to all source categories. You may send comments via email, to hockstad.leif@epa.gov or weitz.melissa@epa.gov. If you have any questions please do not hesitate to call me at (202) 343-9432, or Melissa Weitz at (202) 343-9897.

Best regards,
Leif Hockstad & Melissa Weitz

[attachment "US GHG Inventory 90-11 Expert Review-Letter.pdf" deleted by Jameel Alsalam/DC/USEPA/US]

[attachment "DRAFT US GHG Inventory 90-11-ER - Full Report.pdf" deleted by Jameel Alsalam/DC/USEPA/US]

[attachment "Supplement on Natural Gas in the GHG Inventory.pdf" deleted by Jameel Alsalam/DC/USEPA/US]

[attachment "DRAFT US GHG Inventory 90-11 Table ES-2_with natl gas sys updates.pdf" deleted by Jameel Alsalam/DC/USEPA/US]

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Leif Hockstad
Climate Change Division
OAR - Office of Atmospheric Programs
U.S. Environmental Protection Agency
Phone: 202 343 9432
Fax: 202 343 2359
hockstad.leif@epa.gov
****

----- Forwarded by Melissa Weitz/DC/USEPA/US on 12/17/2012 05:42 PM -----

From: GHGInventory
To:
Cc: Leif Hockstad/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 12/17/2012 05:08 PM
Subject: Annexes and Figures for Draft Inventory of U.S. Greenhouse Gases and Sinks: 1990-2011 for Expert Review
Sent by: Melissa Weitz

And the Annexes of the report, along with large figures from the main report.

[attachment "DRAFT US GHG Inventory 90-11-ER - Annexes.pdf" deleted by Jameel Alsalam/DC/USEPA/US] [attachment "Large Figures from DRAFT US GHG Inventory 90-11-ER - Full Report.pdf" deleted by Jameel Alsalam/DC/USEPA/US]

Dear Colleagues,

Attached you will find, for your review, a cover letter and files containing the Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011 . As an expert in this field, we are again requesting technical comments from you, particularly on those parts of the inventory which are new or have changed since last year. I wanted to take this opportunity to thank you for your comments in the past, and to encourage you to take a fresh look at this year's document. The expert review process has been a vital part of maintaining the high quality of the U.S. national greenhouse gas inventory.

We are including updated sections for natural gas systems separately from the full draft report. Due to timing constraints in compiling the full draft report, we were not able to integrate these updated calculations and materials on natural gas systems in the full draft report for the expert review,

but we would like you to review these separate natural gas systems sections as you review the full draft report. We have additionally attached an updated summary table of total U.S. greenhouse gas emissions which includes the updated calculations for natural gas systems to better provide you context.

There are other sections of the report that are highlighted in gray for source categories for which updated emissions calculations were not able to be performed, due to delays in data collection necessary to conduct our latest calculations. These sections will be updated for the next draft report that we will release in early 2013 for its public comment period, and all sections will be compiled in a full, complete draft report for that distribution.

Also, as a reminder, due to formatting constraints, you will find the figures referenced within each chapter at the end of that chapter (except for the maps in the Agriculture and Land Use, Land-Use Change and Forestry chapters, which are either not available for this draft or provided separately).

The attached Adobe Acrobat file containing the GHG Inventory report is a very large file, so please contact us if you are having any problems with the file size. Also due to size considerations, there will be an email immediately following this one with the Annex files for the draft report.

Our deadline for comments this year will be Friday, January 11, 2013. As always, there will be an additional opportunity to provide comments during the public review phase which will begin in February, 2013, and we encourage you to provide comments then if you are unable to do so now or are awaiting the full updates to all source categories. You may send comments via email, to hockstad.leif@epa.gov or weitz.melissa@epa.gov. If you have any questions please do not hesitate to call me at (202) 343-9432, or Melissa Weitz at (202) 343-9897.

Best regards,
Leif Hockstad & Melissa Weitz

****
Leif Hockstad
Climate Change Division
OAR - Office of Atmospheric Programs
U.S. Environmental Protection Agency
Phone: 202 343 9432
Fax: 202 343 2359
hockstad.leif@epa.gov
****

Re: liquids unloading
Marty Wolf to: Melissa Weitz 12/21/2012 01:15 PM

History: This message has been forwarded.

Melissa,

Here are the two supporting files. ERG developed the Liquids Unloading Calc file; SAIC (right?) developed the Interpolated Venting Rates file.

I think this should give you what you need.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
12/20/2012 2:59 PM >>>

Hi,

Can you send me the most recent version of the spreadsheet used to calculated the emissions from liquids unloading (I recall these were not calculated in the main Inventory spreadsheet)? We'll need to share these with API and interested stakeholders and I want to be sure I have the most recent version.

(b)(5) deliberative [redacted]

Melissa Interpolated Venting Rates_110512.xlsx

(b)(5) deliberative [redacted]

liquids unloading calc 112912.xlsx

liquids unloading spreadsheets

Melissa Weitz to: Suzanne Waltzer 12/21/2012 03:22 PM

Hi Suzie,

I combined relevant spreadsheets from a number of excel files to develop what I think is a straightforward calculation of the liquids unloading emissions estimates.

Let me know if the order of the spreadsheets/information presented makes sense to you, and if you think it is okay to send on to API/ANGA.

At this point, I think I'll wait until after new year's to send this. I'm also taking a look at the memos SAIC did to see if I can put together a brief summary of the analysis.

Melissa

(b)(5) deliberative [redacted]

background calcs on liquids unloading.xlsx

Re: liquids unloading spreadsheets

Suzanne Waltzer to: Melissa Weitz 01/02/2013 09:24 AM

History: This message has been forwarded.

Hi Melissa,

I started to review this on Monday but I was wondering if we could chat quickly and walk through it briefly. That would be really helpful. Then I can follow-up with more detailed comments.

I am in today and pretty open. I am blocking off the day tomorrow as [redacted] (b)(6) personal privacy [redacted] I am working all day Friday from home.

Thanks,

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

Melissa Weitz	Hi Suzie, I combined relevant spreadsheets...	12/21/2012 03:22:17 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 12/21/2012 03:22 PM
Subject: liquids unloading spreadsheets

Hi Suzie,

I combined relevant spreadsheets from a number of excel files to develop what I think is a straightforward calculation of the liquids unloading emissions estimates.

Let me know if the order of the spreadsheets/information presented makes sense to you, and if you think it is okay to send on to API/ANGA.

At this point, I think I'll wait until after new year's to send this. I'm also taking a look at the memos SAIC did to see if I can put together a brief summary of the analysis.

Melissa

[attachment "background calcs on liquids unloading.xlsx" deleted by Suzanne Waltzer/DC/USEPA/US]

Hide Details

liquids unloading spreadsheet

Wed 01/02/2013 4:00 PM - 4:30 PM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Suzanne Waltzer/DC/USEPA/US@EPA

Description

Fw: Re: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa Weitz to: Paula Fields, Marty Wolf 01/03/2013 08:57 AM

The call with API will be moved to Monday.

-----Forwarded by Melissa Weitz/DC/USEPA/US on 01/03/2013 08:56AM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: "Karin C. Ritter" <Ritterk@api.org>
Date: 01/03/2013 08:44AM
Subject: Re: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Melissa
Happy New Year.
[redacted] (b)(6) personal privacy [redacted]
Maybe a call on Monday afternoon?
We've also been working on our "expert" comments and hope to have these to you on schedule.
Karin

Sent from my iPhone

On Jan 2, 2013, at 5:06 PM, "Weitz.Melissa@epamail.epa.gov" <Weitz.Melissa@epamail.epa.gov> wrote:

> Hi Karin,
>
> I hope you had a nice holiday break.
>
> Per our last call, attached below is the spreadsheet that we used to calculate emissions from liquids unloading for the expert review draft GHG Inventory.
>
> Apologies for the delay in sending this over.
>
> Would you still like to talk tomorrow at 11AM? We can walk you through the spreadsheet. We're also available on Friday, if you'd prefer to speak then.
>
> Thank you,
> Melissa
>
> (See attached file: background calcs on liquids unloading 1.2.xlsx)
>
> Melissa M. Weitz
> U.S. Environmental Protection Agency
> Climate Change Division
> (202) 343-9897

Weitz.Melissa@epa.gov

<background calcs on liquids unloading 1.2.xlsx>

Hide Details

hold for call with API on liquids unloading

Mon 01/07/2013 3:00 PM - 4:00 PM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Marty.Wolf@erg.com, Paula.Fields@erg.com, Suzanne Waltzer/DC/USEPA/US@EPA

Description

Fw: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa Weitz to: Marty Wolf, Paula Fields 01/03/2013 10:50 AM

Hello,

I hope you both had a good New Year's!

I sent the background calculations on liquids unloading to API yesterday. EDF is now also requesting the spreadsheet, and I was about to send it over when I realized that contains information API shared with EPA, but was not in the API/ANGA report (I think), see tab API-ANGA survey data.

Can you let me know if everything in that tab can be found in API-ANGA's report? If it cannot, is there any way to remove the information from that tab without messing up everything in the spreadsheets (e.g., could you pull some of these data points from the final two spreadsheets instead, which I believe came directly from the API/ANGA report)?

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/03/2013 10:45 AM -----

From:	Melissa Weitz/DC/USEPA/US
To:	"Karin C. Ritter" <Ritterk@api.org>
Date:	01/02/2013 05:06 PM
Subject:	RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Karin,

I hope you had a nice holiday break.

Per our last call, attached below is the spreadsheet that we used to calculate emissions from liquids unloading for the expert review draft GHG Inventory.

Apologies for the delay in sending this over.

Would you still like to talk tomorrow at 11AM? We can walk you through the spreadsheet. We're also available on Friday, if you'd prefer to speak then.

Thank you,
Melissa

background calcs on liquids unloading 1.2.xlsx

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Tab Name

Annual Plunger-Venting Data
Well Counts
Annual EF
Emissions
Conversions
EF options
API-ANGA survey data
API-ANGA data on conventional
API-ANGA data on unconventional

Contents

Shows activity data for the Inventory's 1990-2011 time series, based on API/ANGA's 2011 data
Applies the percentages from Annual Plunger-Venting Data to DI Desktop well counts
Shows annual emission factors, updated with annual methane content data
Presents total national emissions, using emission factors from EF Calculation, and activity data from Well Cou
Conversion factors
Options EPA considered for Emission factors, calculated from API/ANGA data.
Data on liquids unloading from API/ANGA report
API/ANGA Emissions data for liquids unloading for conventional wells
API/ANGA Emissions data for liquids unloading for unconventional wells

nts

Region	Percent wells with plungers (%)	Wells venting with plungers	Percent wells with other artificial lifts	Wells venting wtihout plungers	Percent Wells with LU Issues
Northeast	5%	4%	8%	11%	24%
Mid-Continent	19%	2%	30%	4%	54%
Rocky	64%	13%	8%	2%	74%
SouthWest	22%	3%	18%	19%	59%
West Coast	36%	8%	13%	7%	56%
Gulf Coast	22%	2%	9%	7%	38%
National	36%	8%	13%	7%	56%

Percentages calculated fr

Calculation of time series of data for plunger lift use and venting

	1990	1991	1992	1993	1994	1995	1996
Percent of wells that vent using plungers							
Northeast	0.00%	0.22%	0.44%	0.65%	0.87%	1.09%	1.31%
Mid-Continent	0.00%	0.12%	0.23%	0.35%	0.47%	0.58%	0.70%
Rocky	0.00%	0.64%	1.29%	1.93%	2.58%	3.22%	3.86%
SouthWest	0.00%	0.17%	0.33%	0.50%	0.66%	0.83%	1.00%
West Coast	0.00%	0.38%	0.76%	1.14%	1.52%	1.90%	2.28%
Gulf Coast	0.00%	0.12%	0.23%	0.35%	0.46%	0.58%	0.70%
Percent of wells that vent without plungers							
Northeast	24.07%	23.43%	22.79%	22.15%	21.51%	20.87%	20.23%
Mid-Continent	53.87%	51.38%	48.89%	46.41%	43.92%	41.43%	38.95%
Rocky	73.86%	70.24%	66.63%	63.01%	59.39%	55.78%	52.16%
SouthWest	58.84%	56.87%	54.90%	52.94%	50.97%	49.00%	47.03%
West Coast	56.25%	53.78%	51.30%	48.83%	46.36%	43.89%	41.41%
Gulf Coast	38.19%	36.63%	35.08%	33.52%	31.97%	30.41%	28.86%
Percent of wells that do not vent							
Northeast	75.93%	76.35%	76.78%	77.20%	77.62%	78.04%	78.47%
Mid-Continent	46.13%	48.51%	50.88%	53.25%	55.62%	57.99%	60.36%
Rocky	26.14%	29.11%	32.09%	35.06%	38.03%	41.01%	43.98%
SouthWest	41.16%	42.96%	44.76%	46.57%	48.37%	50.17%	51.97%
West Coast	43.75%	45.84%	47.94%	50.03%	52.12%	54.22%	56.31%
Gulf Coast	61.81%	63.25%	64.69%	66.13%	67.57%	69.01%	70.45%

·om API/ANGA data, to develop % representative of 2010 and 2011

1997	1998	1999	2000	2001	2002	2003	2004
1.52%	1.74%	1.96%	2.18%	2.40%	2.61%	2.83%	3.05%
0.82%	0.93%	1.05%	1.16%	1.28%	1.40%	1.51%	1.63%
4.51%	5.15%	5.79%	6.44%	7.08%	7.73%	8.37%	9.01%
1.16%	1.33%	1.50%	1.66%	1.83%	1.99%	2.16%	2.33%
2.66%	3.04%	3.42%	3.80%	4.18%	4.56%	4.93%	5.31%
0.81%	0.93%	1.04%	1.16%	1.28%	1.39%	1.51%	1.62%
19.59%	18.95%	18.31%	17.67%	17.03%	16.39%	15.75%	15.11%
36.46%	33.97%	31.49%	29.00%	26.51%	24.03%	21.54%	19.05%
48.54%	44.92%	41.31%	37.69%	34.07%	30.46%	26.84%	23.22%
45.06%	43.09%	41.12%	39.16%	37.19%	35.22%	33.25%	31.28%
38.94%	36.47%	34.00%	31.52%	29.05%	26.58%	24.11%	21.63%
27.30%	25.75%	24.19%	22.64%	21.08%	19.52%	17.97%	16.41%
78.89%	79.31%	79.73%	80.16%	80.58%	81.00%	81.42%	81.85%
62.73%	65.10%	67.47%	69.84%	72.21%	74.58%	76.95%	79.32%
46.95%	49.93%	52.90%	55.87%	58.85%	61.82%	64.79%	67.77%
53.78%	55.58%	57.38%	59.18%	60.98%	62.79%	64.59%	66.39%
58.40%	60.49%	62.59%	64.68%	66.77%	68.87%	70.96%	73.05%
71.89%	73.33%	74.77%	76.20%	77.64%	79.08%	80.52%	81.96%

2005	2006	2007	2008	2009	2010
3.27%	3.48%	3.70%	3.92%	4.14%	4.36%
1.75%	1.86%	1.98%	2.10%	2.21%	2.33%
9.66%	10.30%	10.94%	11.59%	12.23%	12.88%
2.49%	2.66%	2.82%	2.99%	3.16%	3.32%
5.69%	6.07%	6.45%	6.83%	7.21%	7.59%
1.74%	1.86%	1.97%	2.09%	2.20%	2.32%
14.47%	13.82%	13.18%	12.54%	11.90%	11.26%
16.57%	14.08%	11.59%	9.11%	6.62%	4.14%
19.60%	15.99%	12.37%	8.75%	5.14%	1.52%
29.31%	27.35%	25.38%	23.41%	21.44%	19.47%
19.16%	16.69%	14.21%	11.74%	9.27%	6.80%
14.86%	13.30%	11.75%	10.19%	8.64%	7.08%
82.27%	82.69%	83.11%	83.54%	83.96%	84.38%
81.69%	84.06%	86.43%	88.80%	91.17%	93.54%
70.74%	73.71%	76.69%	79.66%	82.63%	85.60%
68.19%	70.00%	71.80%	73.60%	75.40%	77.20%
75.15%	77.24%	79.33%	81.42%	83.52%	85.61%
83.40%	84.84%	86.28%	87.72%	89.16%	90.60%

Well Counts (Non-Associated Gas Wells [2]) **Applies the percentages from Annual Plunger-Venting D**

	1990	1991	1992	1993	1994	1995
North East	51,429	71,970	67,863	71,616	76,059	75,346
Midcontinent	54,537	55,286	55,757	56,103	56,198	57,670
Rocky Mountain	16,916	17,743	18,699	19,887	21,130	21,879
South West	30,173	30,543	30,448	31,033	32,122	32,530
West Coast	2,029	2,017	1,938	1,864	1,877	1,913
Gulf Coast	36,342	37,015	36,403	36,753	37,680	38,086
TOTAL	191,426	214,574	211,108	217,256	225,066	227,424
Percent of wells that vent using plungers						
Northeast	0.00%	0.22%	0.44%	0.65%	0.87%	1.09%
Mid-Continent	0.00%	0.12%	0.23%	0.35%	0.47%	0.58%
Rocky Mountain	0.00%	0.64%	1.29%	1.93%	2.58%	3.22%
SouthWest	0.00%	0.17%	0.33%	0.50%	0.66%	0.83%
West Coast	0.00%	0.38%	0.76%	1.14%	1.52%	1.90%
Gulf Coast	0.00%	0.12%	0.23%	0.35%	0.46%	0.58%
Percent of wells that vent without plungers						
Northeast	24.07%	23.43%	22.79%	22.15%	21.51%	20.87%
Mid-Continent	53.87%	51.38%	48.89%	46.41%	43.92%	41.43%
Rocky Mountain	73.86%	70.24%	66.63%	63.01%	59.39%	55.78%
SouthWest	58.84%	56.87%	54.90%	52.94%	50.97%	49.00%
West Coast	56.25%	53.78%	51.30%	48.83%	46.36%	43.89%
Gulf Coast	38.19%	36.63%	35.08%	33.52%	31.97%	30.41%
Percent of wells that do not vent						
Northeast	75.93%	76.35%	76.78%	77.20%	77.62%	78.04%
Mid-Continent	46.13%	48.51%	50.88%	53.25%	55.62%	57.99%
Rocky Mountain	26.14%	29.11%	32.09%	35.06%	38.03%	41.01%
SouthWest	41.16%	42.96%	44.76%	46.57%	48.37%	50.17%
West Coast	43.75%	45.84%	47.94%	50.03%	52.12%	54.22%
Gulf Coast	61.81%	63.25%	64.69%	66.13%	67.57%	69.01%
Wells that vent using plungers						
Northeast	-	157	296	468	663	820
Mid-Continent	-	64	130	196	262	336
Rocky Mountain	-	114	241	384	544	704
SouthWest	-	51	101	155	214	270
West Coast	-	8	15	21	29	36
Gulf Coast	-	43	84	128	175	221
Total	-	437	867	1,352	1,885	2,388
Wells that vent without plungers						
Northeast	12,379	16,862	15,465	15,862	16,359	15,723
Mid-Continent	29,376	28,405	27,261	26,035	24,682	23,894
Rocky Mountain	12,494	12,463	12,458	12,531	12,550	12,203

SouthWest	17,754	17,371	16,717	16,428	16,372	15,939
West Coast	1,141	1,085	994	910	870	840
Gulf Coast	13,878	13,560	12,769	12,320	12,045	11,583
Total	87,023	89,746	85,665	84,086	82,877	80,182
Wells that do not vent						
Northeast	39,050	54,951	52,102	55,286	59,037	58,802
Mid-Continent	25,161	26,816	28,366	29,872	31,255	33,440
Rocky Mountain	4,422	5,165	6,000	6,972	8,036	8,972
SouthWest	12,419	13,122	13,630	14,451	15,537	16,320
West Coast	888	925	929	933	978	1,037
Gulf Coast	22,464	23,412	23,549	24,305	25,460	26,283
Total	104,403	124,392	124,576	131,818	140,303	144,854

ata to DI Desktop well counts

1996	1997	1998	1999	2000	2001	2002	2003	2004
83,768	92,435	96,366	96,577	93,325	106,614	106,672	111,790	112,339
58,433	59,593	61,093	61,614	62,495	64,857	66,184	68,668	72,950
22,466	23,728	25,219	27,720	32,149	38,041	43,149	46,846	51,046
33,115	33,840	34,458	34,946	35,934	37,755	39,213	41,086	43,391
1,916	2,047	1,835	1,856	2,004	2,107	2,007	2,008	1,925
39,088	40,102	41,342	41,939	43,504	46,471	47,689	50,217	53,418
238,786	251,745	260,313	264,652	269,411	295,845	304,914	320,615	335,069
1.31%	1.52%	1.74%	1.96%	2.18%	2.40%	2.61%	2.83%	3.05%
0.70%	0.82%	0.93%	1.05%	1.16%	1.28%	1.40%	1.51%	1.63%
3.86%	4.51%	5.15%	5.79%	6.44%	7.08%	7.73%	8.37%	9.01%
1.00%	1.16%	1.33%	1.50%	1.66%	1.83%	1.99%	2.16%	2.33%
2.28%	2.66%	3.04%	3.42%	3.80%	4.18%	4.56%	4.93%	5.31%
0.70%	0.81%	0.93%	1.04%	1.16%	1.28%	1.39%	1.51%	1.62%
20.23%	19.59%	18.95%	18.31%	17.67%	17.03%	16.39%	15.75%	15.11%
38.95%	36.46%	33.97%	31.49%	29.00%	26.51%	24.03%	21.54%	19.05%
52.16%	48.54%	44.92%	41.31%	37.69%	34.07%	30.46%	26.84%	23.22%
47.03%	45.06%	43.09%	41.12%	39.16%	37.19%	35.22%	33.25%	31.28%
41.41%	38.94%	36.47%	34.00%	31.52%	29.05%	26.58%	24.11%	21.63%
28.86%	27.30%	25.75%	24.19%	22.64%	21.08%	19.52%	17.97%	16.41%
78.47%	78.89%	79.31%	79.73%	80.16%	80.58%	81.00%	81.42%	81.85%
60.36%	62.73%	65.10%	67.47%	69.84%	72.21%	74.58%	76.95%	79.32%
43.98%	46.95%	49.93%	52.90%	55.87%	58.85%	61.82%	64.79%	67.77%
51.97%	53.78%	55.58%	57.38%	59.18%	60.98%	62.79%	64.59%	66.39%
56.31%	58.40%	60.49%	62.59%	64.68%	66.77%	68.87%	70.96%	73.05%
70.45%	71.89%	73.33%	74.77%	76.20%	77.64%	79.08%	80.52%	81.96%
1,095	1,409	1,679	1,893	2,032	2,554	2,788	3,165	3,425
408	486	569	646	728	831	925	1,040	1,189
868	1,069	1,299	1,606	2,070	2,694	3,334	3,921	4,601
330	394	458	523	597	690	782	888	1,009
44	54	56	63	76	88	91	99	102
272	326	384	438	505	593	664	757	867
3,017	3,738	4,444	5,169	6,008	7,450	8,583	9,869	11,195
16,945	18,106	18,259	17,680	16,488	18,153	17,479	17,602	16,969
22,757	21,727	20,755	19,400	18,124	17,196	15,902	14,792	13,900
11,718	11,518	11,329	11,450	12,117	12,962	13,141	12,573	11,854

15,574	15,249	14,849	14,371	14,070	14,040	13,811	13,661	13,574
793	797	669	631	632	612	533	484	416
11,279	10,948	10,644	10,145	9,847	9,796	9,311	9,024	8,768
79,067	78,345	76,506	73,679	71,277	72,759	70,178	68,136	65,481
65,729	72,920	76,428	77,004	74,805	85,907	86,405	91,023	91,944
35,267	37,380	39,769	41,568	43,644	46,830	49,357	52,837	57,861
9,880	11,141	12,591	14,664	17,962	22,385	26,674	30,352	34,591
17,211	18,197	19,151	20,052	21,266	23,025	24,620	26,537	28,808
1,079	1,195	1,110	1,162	1,296	1,407	1,382	1,425	1,406
27,537	28,828	30,315	31,356	33,152	36,082	37,714	40,436	43,783
156,703	169,662	179,363	185,805	192,126	215,636	226,153	242,610	258,393

2005	2006	2007	2008	2009	2010	2011
117,748	125,782	124,712	140,993	140,544	134,520	130,983
75,597	79,178	83,287	88,089	90,247	90,070	90,379
55,233	60,860	65,757	70,207	71,527	70,956	71,142
45,601	48,115	50,829	53,279	53,912	54,146	54,338
1,991	2,011	2,177	2,307	2,292	2,117	2,115
57,271	61,491	66,285	71,432	73,302	74,971	76,337
353,441	377,437	393,047	426,307	431,824	426,780	425,294
3.27%	3.48%	3.70%	3.92%	4.14%	4.36%	4.36%
1.75%	1.86%	1.98%	2.10%	2.21%	2.33%	2.33%
9.66%	10.30%	10.94%	11.59%	12.23%	12.88%	12.88%
2.49%	2.66%	2.82%	2.99%	3.16%	3.32%	3.32%
5.69%	6.07%	6.45%	6.83%	7.21%	7.59%	7.59%
1.74%	1.86%	1.97%	2.09%	2.20%	2.32%	2.32%
14.47%	13.82%	13.18%	12.54%	11.90%	11.26%	11.26%
16.57%	14.08%	11.59%	9.11%	6.62%	4.14%	4.14%
19.60%	15.99%	12.37%	8.75%	5.14%	1.52%	1.52%
29.31%	27.35%	25.38%	23.41%	21.44%	19.47%	19.47%
19.16%	16.69%	14.21%	11.74%	9.27%	6.80%	6.80%
14.86%	13.30%	11.75%	10.19%	8.64%	7.08%	7.08%
82.27%	82.69%	83.11%	83.54%	83.96%	84.38%	84.38%
81.69%	84.06%	86.43%	88.80%	91.17%	93.54%	93.54%
70.74%	73.71%	76.69%	79.66%	82.63%	85.60%	85.60%
68.19%	70.00%	71.80%	73.60%	75.40%	77.20%	77.20%
75.15%	77.24%	79.33%	81.42%	83.52%	85.61%	85.61%
83.40%	84.84%	86.28%	87.72%	89.16%	90.60%	90.60%
3,847	4,383	4,617	5,527	5,816	5,859	5,705
1,320	1,475	1,649	1,846	1,997	2,098	2,105
5,334	6,269	7,197	8,136	8,750	9,136	9,160
1,137	1,279	1,436	1,594	1,702	1,799	1,806
113	122	140	158	165	161	161
996	1,141	1,307	1,491	1,616	1,739	1,771
12,747	14,670	16,346	18,752	20,045	20,793	20,708
17,033	17,389	16,443	17,687	16,730	15,152	14,754
12,525	11,149	9,657	8,024	5,976	3,725	3,738
10,828	9,730	8,134	6,145	3,674	1,078	1,081

13,367	13,157	12,899	12,472	11,559	10,543	10,581
381	336	309	271	212	144	144
8,510	8,180	7,787	7,281	6,331	5,310	5,406
62,644	59,942	55,230	51,879	44,483	35,951	35,702
96,869	104,010	103,652	117,779	117,998	113,509	110,524
61,752	66,553	71,981	78,219	82,274	84,247	84,536
39,071	44,861	50,426	55,926	59,104	60,742	60,901
31,097	33,678	36,494	39,214	40,651	41,803	41,952
1,496	1,553	1,727	1,878	1,914	1,812	1,811
47,765	52,169	57,191	62,660	65,355	67,922	69,160
278,050	302,825	321,471	355,676	367,296	370,036	368,884

Emission Factors **Shows annual emission factors, updated with annual methane content**

scfy gas/well	Plungers	Without	
Northeast	314,626	166,174	
Mid-Continent	1,379,958	230,199	
Rocky Mountain	154,300	2,579,444	
SouthWest	3,547	96,748	
West Coast	345,343	304,048	(National Average)
Gulf Coast	70,021	300,592	

CH4 Content	1990	1991	1992	1993	1994	1995	1996	1997
Northeast	84.0%	83.8%	83.5%	82.9%	82.0%	81.5%	81.2%	80.3%
Mid-Continent	78.3%	78.7%	79.1%	79.9%	80.7%	81.6%	82.6%	82.5%
Rocky Mountain	67.4%	69.3%	71.2%	73.4%	75.5%	77.6%	80.5%	80.4%
SouthWest	64.4%	67.1%	74.4%	76.1%	77.4%	79.0%	80.5%	80.5%
West Coast	75.3%	78.1%	80.8%	83.6%	86.4%	89.1%	91.9%	91.9%
Gulf Coast	79.8%	80.1%	82.7%	84.1%	85.6%	87.2%	88.7%	88.6%

Plunger Emission Factors

scfy CH4/well	1990	1991	1992	1993	1994	1995	1996	1997
Northeast	264,295	263,667	262,795	260,690	257,982	256,526	255,529	252,767
Mid-Continent	1,081,052	1,086,677	1,091,556	1,102,643	1,113,404	1,125,459	1,139,409	1,138,902
Rocky Mountain	103,995	106,946	109,937	113,239	116,512	119,765	124,285	124,114
SouthWest	2,284	2,379	2,638	2,698	2,745	2,800	2,855	2,855
West Coast	260,043	269,585	279,126	288,668	298,209	307,751	317,292	317,292
Gulf Coast	55,876	56,105	57,914	58,901	59,953	61,028	62,073	62,058

Without Emission Factors

scfy CH4/well	1990	1991	1992	1993	1994	1995	1996	1997
Northeast	139,591	139,260	138,799	137,687	136,257	135,488	134,962	133,502
Mid-Continent	180,336	181,275	182,089	183,938	185,733	187,744	190,071	189,987
Rocky Mountain	1,738,491	1,787,827	1,837,832	1,893,034	1,947,739	2,002,122	2,077,678	2,074,832
SouthWest	62,306	64,891	71,957	73,595	74,881	76,388	77,886	77,885
West Coast	228,948	237,348	245,749	254,149	262,550	270,951	279,351	279,351
Gulf Coast	239,872	240,852	248,619	252,856	257,373	261,986	266,475	266,411

: data

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
81.0%	80.5%	80.8%	80.3%	80.4%	76.4%	80.4%	80.1%	79.5%	84.2%
82.5%	82.5%	82.5%	82.5%	82.5%	82.6%	82.7%	82.7%	83.0%	83.0%
80.5%	80.4%	80.2%	79.5%	79.3%	79.1%	79.0%	79.0%	79.0%	78.1%
80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%	80.5%
91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%	91.9%
88.6%	88.7%	88.7%	88.7%	88.6%	88.6%	88.6%	88.6%	88.6%	88.7%

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
254,937	253,403	254,306	252,536	252,898	240,288	253,027	252,054	249,997	264,759
1,138,644	1,139,040	1,138,999	1,139,039	1,139,053	1,139,933	1,140,783	1,141,072	1,145,786	1,145,000
124,226	124,099	123,715	122,676	122,331	122,039	121,917	121,876	121,860	120,530
2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,856	2,856
317,292	317,292	317,292	317,292	317,292	317,292	317,292	317,292	317,292	317,292
62,062	62,079	62,082	62,074	62,051	62,044	62,033	62,030	62,030	62,074

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
134,649	133,839	134,316	133,381	133,572	126,912	133,640	133,126	132,040	139,836
189,944	190,010	190,003	190,010	190,012	190,159	190,300	190,349	191,135	191,004
2,076,699	2,074,570	2,068,164	2,050,791	2,045,012	2,040,141	2,038,099	2,037,415	2,037,139	2,014,907
77,887	77,886	77,885	77,884	77,886	77,888	77,889	77,889	77,893	77,906
279,351	279,351	279,351	279,351	279,351	279,351	279,351	279,351	279,351	279,351
266,428	266,500	266,512	266,477	266,378	266,351	266,301	266,288	266,290	266,477

2008	2009	2010	2011
84.2%	84.1%	84.1%	84.1%
82.7%	82.7%	82.7%	82.7%
83.5%	77.8%	77.8%	77.8%
80.5%	80.5%	80.5%	80.5%
91.9%	91.9%	91.9%	91.9%
88.5%	88.5%	88.5%	88.5%

2008	2009	2010	2011
264,759	264,628	264,628	264,628
1,141,282	1,141,256	1,141,192	1,141,192
128,892	120,067	120,021	120,021
2,856	2,856	2,856	2,856
317,292	317,292	317,292	317,292
61,997	61,942	61,944	61,944

2008	2009	2010	2011
139,836	139,767	139,767	139,767
190,384	190,379	190,369	190,369
2,154,693	2,007,180	2,006,406	2,006,406
77,903	77,903	77,901	77,901
279,351	279,351	279,351	279,351
266,146	265,912	265,920	265,920

Emissions **Presents total national emissions, using emission factors from EF Calculation, and activit**

Wells that vent using plungers

Mg CH4	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
Northeast	-	796	1,496	2,349	3,292	4,054	5,387	6,860
Mid-Continent	-	1,347	2,730	4,162	5,613	7,278	8,959	10,655
Rocky Mountain	-	235	510	838	1,221	1,625	2,077	2,556
SouthWest	-	2	5	8	11	15	18	22
West Coast	-	40	79	118	164	215	267	332
Gulf Coast	-	46	94	145	202	260	325	389
Total	-	2,467	4,914	7,620	10,503	13,446	17,034	20,815

Wells that vent without plungers

Mg CH4	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
Northeast	33,281	45,227	41,343	42,064	42,932	41,030	44,045	46,555
Mid-Continent	102,032	99,172	95,604	92,233	88,292	86,400	83,310	79,504
Rocky Mountain	418,349	429,155	440,988	456,865	470,778	470,560	468,901	460,265
SouthWest	21,305	21,710	23,168	23,285	23,611	23,450	23,362	22,874
West Coast	5,033	4,958	4,706	4,456	4,400	4,381	4,269	4,289
Gulf Coast	64,117	62,901	61,144	60,000	59,708	58,444	57,889	56,176
Total	644,117	663,123	666,954	678,903	689,720	684,266	681,777	669,664

Total Wells

Mg CH4	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
Northeast	33,281	46,023	42,839	44,414	46,224	45,084	49,432	53,415
Mid-Continent	102,032	100,520	98,334	96,395	93,905	93,679	92,269	90,159
Rocky Mountain	418,349	429,390	441,497	457,703	471,999	472,184	470,978	462,822
SouthWest	21,305	21,712	23,174	23,293	23,623	23,465	23,381	22,896
West Coast	5,033	4,998	4,785	4,574	4,564	4,596	4,536	4,621
Gulf Coast	64,117	62,947	61,239	60,146	59,910	58,704	58,214	56,565
Total	644,117	665,590	671,868	686,523	700,224	697,712	698,811	690,479

y data from Well Counts

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
8,244	9,239	9,955	12,422	13,579	14,647	16,692	18,673	21,103	23,544
12,481	14,166	15,965	18,225	20,289	22,823	26,130	29,020	32,555	36,360
3,108	3,839	4,932	6,365	7,854	9,216	10,804	12,521	14,714	16,707
25	29	33	38	43	49	56	63	70	79
341	387	465	538	559	606	625	693	746	859
459	523	603	709	793	905	1,036	1,190	1,363	1,563
24,657	28,183	31,952	38,298	43,117	48,245	55,343	62,159	70,552	79,111

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
47,351	45,576	42,652	46,633	44,968	43,026	43,678	43,672	44,223	44,285
75,929	70,997	66,323	62,930	58,196	54,174	50,947	45,917	41,044	35,526
453,142	457,508	482,649	511,959	517,594	494,022	465,298	424,899	381,752	315,666
22,275	21,559	21,107	21,061	20,717	20,494	20,363	20,053	19,739	19,355
3,601	3,395	3,399	3,293	2,870	2,604	2,241	2,052	1,806	1,665
54,618	52,073	50,546	50,276	47,770	46,290	44,971	43,643	41,955	39,966
656,916	651,107	666,675	696,152	692,114	660,610	627,496	580,237	530,518	456,462

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
55,595	54,814	52,607	59,055	58,546	57,673	60,370	62,345	65,326	67,829
88,411	85,163	82,287	81,156	78,486	76,996	77,077	74,937	73,599	71,885
456,250	461,347	487,581	518,324	525,448	503,238	476,101	437,419	396,466	332,373
22,300	21,587	21,139	21,099	20,760	20,543	20,418	20,116	19,809	19,434
3,941	3,782	3,864	3,831	3,429	3,210	2,866	2,745	2,552	2,523
55,076	52,597	51,149	50,985	48,563	47,195	46,007	44,834	43,318	41,529
681,573	679,290	698,627	734,450	735,231	708,855	682,839	642,396	601,070	535,573

2008	2009	2010	2011
28,184	29,640	29,863	29,078
40,586	43,889	46,106	46,264
20,197	20,233	21,120	21,175
88	94	99	99
963	1,010	982	981
1,781	1,927	2,075	2,113
91,799	96,794	100,245	99,710

2008	2009	2010	2011
47,635	45,037	40,788	39,715
29,421	21,913	13,657	13,704
255,024	142,015	41,647	41,757
18,713	17,343	15,819	15,875
1,457	1,143	774	773
37,321	32,426	27,193	27,689
389,571	259,877	139,879	139,513

2008	2009	2010	2011
75,818	74,677	70,651	68,793
70,007	65,802	59,763	59,968
275,221	162,248	62,767	62,932
18,800	17,437	15,918	15,974
2,421	2,153	1,756	1,755
39,102	34,353	29,268	29,802
481,370	356,670	240,124	239,224

CH4 density	19.26	g/ft3
Mg to g	1,000,000	g per Mg

Emissions per Well (scfy/well) **Options EPA considered for Emission factors, calculated from API/A**

Source	Northeast	Gulf Coast	Mid-Continent	Southwest	Rocky Mountain	U.S. Total
Conventional						
w/ Plunger Lifts	20,682	0	1,744,596	0	0	974,798
w/o Plunger Lifts	82,921	285,707	986,002	41,081	0	104,371
All Conventional	75,839	285,707	1,606,991	41,081	0	267,096
Unconventional						
w/ Plunger Lifts	414,963	70,021	937,364	3,547	154,300	250,387
w/o Plunger Lifts	439,404	301,603	174,688	148,422	2,579,444	485,966
All Unconventional	425,902	242,406	338,279	112,548	389,504	349,011
All w/ Plunger Lifts	314,626	70,021	1,379,958	3,547	154,300	345,343
All w/o Plunger Lifts	166,174	300,592	230,199	96,748	2,579,444	304,048
All Well Types	207,572	244,490	644,422	83,160	389,504	322,854

EPA analyzed a number of options, including regional factors differentiating between conventional and ur
and also using regional factors without differentiating between conventional and unconventional.

The factors in the expert review draft are those highlighted in yellow here (regional factors that differenti
between wells with and without plunger lifts.

ANGA data.

nconventional formations,

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Region	Total Wells	Wells with Plunger Data	Wells with Plunger and Vent Plunger Vent Data	Wells with Plungers	Percent wells with plungers (%)
Northeast	12,811	12,811	12,811	605	5%
Mid-Continent	13,783	13,783	13,783	2,660	19%
Rocky	25,974	25,974	9,744	16,669	64%
SouthWest	2,347	2,347	2,347	509	22%
West Coast	0	0	0	0	-
Gulf Coast	4,965	4,733	3,764	1,057	22%
National	59,880	59,648	42,449	21,500	36%
					Require LU - may

(Data pulled directly from API/ANGA LU file: *Liquids Unloading Data Final Shared w EPA 9Oct12.xls*)

Well Type	NEMS Region	Number of Operated Gas Wells Represented by the information provided	Number of Gas Wells with Plunger Lift Installed	Number of Gas Wells with Other Artificial Lift (Beam Pump; ESP; etc.)	Number of Gas Wells Vented to the atmosphere for Liquids Unloading
Conventional	Gulf Coast	31	0	0	12
Conventional	Gulf Coast	21	0	3	6
Conventional	Gulf Coast	232			0
Conventional	Gulf Coast	11	0	0	0
Conventional	Gulf Coast	10	0		
Conventional	Gulf Coast	969	181	74	114
Conventional	Gulf Coast	201	71	0	0
Unconventional	Gulf Coast	79	0	8	6
Unconventional	Gulf Coast	33	0	0	0
Unconventional	Gulf Coast	48	0	0	8
Unconventional	Gulf Coast	436	0	2	27
Unconventional	Gulf Coast	198	47	48	14
Unconventional	Gulf Coast	169	4	0	17
Unconventional	Gulf Coast	220	0	0	0
Unconventional	Gulf Coast	1,223	262	232	168
Unconventional	Gulf Coast	406	370	25	61
Unconventional	Gulf Coast	134	4	15	10
Unconventional	Gulf Coast	460	66	0	45
Unconventional	Gulf Coast	84	52		0
Conventional	Mid-Continent	2,446	0	2446	0
Conventional	Mid-Continent	519	285	100	10
Conventional	Mid-Continent	631	166	3	202
Conventional	Mid-Continent	607	195	264	3
Conventional	Mid-Continent	184	75	22	0

Conventional	Mid-Continent	1,692	0	489	0
Unconventional	Mid-Continent	2,080	69	213	225
Unconventional	Mid-Continent	98	30	0	7
Unconventional	Mid-Continent	1,385	460	0	200
Unconventional	Mid-Continent	90	48	0	0
Unconventional	Mid-Continent	278	118	9	0
Unconventional	Mid-Continent	2,002	1,144		29
Unconventional	Mid-Continent	151	16	0	0
Unconventional	Mid-Continent	1,620	54	39	215
Conventional	Northeast	1,210	33	223	223
Conventional	Northeast	4,365	109	108	1025
Unconventional	Northeast	8	0	0	0
Unconventional	Northeast	3,532	355	24	645
Unconventional	Northeast	1,750	103	527	103
Unconventional	Northeast	46	5	0	5
Unconventional	Northeast	1,900	0		0
Conventional	Rocky	1,856	428	58	
Unconventional	Rocky	61	33	0	5
Unconventional	Rocky	1	1	0	0
Unconventional	Rocky	1,787	674	0	915
Unconventional	Rocky	594	452	0	360
Unconventional	Rocky	263	242	0	23
Unconventional	Rocky	1,285	1,120	0	298
Unconventional	Rocky	297	112	2	47
Unconventional	Rocky	238	48	223	
Unconventional	Rocky	4,958	4,908	12	793
Unconventional	Rocky	8,323	5,323	1302	
Unconventional	Rocky	107	96	5	
Unconventional	Rocky	2,285	0	0	0
Unconventional	Rocky	2,927	2,240	438	39
Unconventional	Rocky	992	992		67
Conventional	Southwest	2	0	0	0
Conventional	Southwest	46	0	0	0
Conventional	Southwest	1,111	106	271	220
Unconventional	Southwest	700	145	0	246
Unconventional	Southwest	105	25	80	6
Unconventional	Southwest	86	0	0	3
Unconventional	Southwest	297	233	64	60

Wells with plungers that have vent data	Wells with Plungers that Vent	Wells with Plungers that vent (%)	Wells venting with plungers	Wells with Artificial Lifts Data	Wells with Other Artificial Lifts (i.e., not plungers)
605	558	92%	4%	10,911	882
2,660	321	12%	2%	11,781	3,585
6,868	1,378	20%	13%	24,982	2,040
509	78	15%	3%	2,347	415
0	0	-	-	0	0
876	91	10%	2%	4,639	407
11,518	2,426	21%	8%	54,660	7,329

vent Require LU - do vent

Total number of Gas Well Vents - Annualized	Number of Wells with Plunger Lifts that vent to the atmosphere	Number of Wells without Plunger Lifts that vent to the atmosphere
144	0	12
60	0	6
-	0	0
-	0	0
	0	0
1,328		
-	0	0
6	0	6
-	0	0
104	0	8
207	0	27
728	3	11
17	2	15
-	0	0
168	22	146
366	59	2
120	0	10
45	5	40
-	0	0
-	0	0
7,300	10	0
492,356	164	38
24	2	1
-	0	0

-	0	0
156,142	48	177
17	4	3
562	64	136
-	0	0
-	0	0
348	29	0
-	0	0
2,580	0	215
5,607	33	190
43,885	109	916
-	0	0
91,560	308	337
75,190	103	0
194	5	0
-	0	0
1,800	0	5
-	0	0
7,371		
3,480	247	113
51	23	0
2,084	296	2
32,472	19	28
9,516	793	0
-	0	0
234		
402		
-	0	0
-	0	0
880	0	220
246	18	228
6	0	6
3	0	3
60	60	0

Percent wells with other artificial lifts	Wells with non-plunger vent info	Wells venting wtihout plungers	Wells venting wtihout plungers
8%	12,811	1,443	11%
30%	13,783	570	4%
8%	9,744	148	2%
18%	2,347	457	19%
-	0	0	-
9%	3,996	283	7%
13%	42,681	2,901	7%
Require LU - do not vent			Require LU - do vent

Survey Table 3A. Conventional Gas Well Venting for Liquids Unloading (Well Clean-ups)

NEMS Region	Northeast	Northeast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Coninent	Mid-Coninent
Number of Operated Gas Wells Represented by the information provided	1,210	4,365	31	21	232	11	10	969	201	631	607	184	1,692	2,446	519
Number of Gas Wells with Plunger Lift Installed	33	109	0	0		0	0	181	71	166	195	75	0	0	285
Number of Gas Wells with Other Artificial Lift (Beam Pump; ESP; etc.)	223	108	0	3		0		74	0	3	264	22	489	2446	100
Number of Gas Wells Vented to the atmosphere for Liquids Unloading	223	1025	12	6	0	0		114	0	202	3	0	0	0	10
Total number of Gas Well Vents - Annualized	5,607	43,885	144	60	-	-		1,328	-	492,356	24	-	-	-	7,300
Number of Wells with Plunger Lifts that vent to the atmosphere	33	109	0	0	0	0	0		0	164	2	0	0	0	10
Number of Wells without Plunger Lifts that vent to the atmosphere	190	916	12	6	0	0	0		0	38	1	0	0	0	0
Total Count of Gas Well Vents for Time Period - w/plunger - Annualized	1272	4217	0	0	0	0	0		0	489,912	23	0	0	0	7300
Total Count of Gas Well Vents for Time Period - w-o/plunger - Annualized	4335	39668	144	60	0	0	0		0	2444	1	0	0	0	0
Average Venting Time - w/plunger	1	0.3								0.0667	0.75				0.08
Average Venting Time - w-o/plunger	1	2	1	2.5						4.95	0.25				
Average Daily Production of Venting Gas Wells (MCF/day)	12.83	7.21	300	664	49.55					84	58.43				30
Average Depth of Venting Wells (feet)	3375	3448	10,000	19334	11391					4269	7,033	NA		N/A	9500
Average Casing Diameter of Venting Gas Wells (inches)	5	4.5	5.5	3.65	4.62					4	4.83	NA		N/A	4.5
Average Tubing Diameter of Venting Gas Wells w/plunger Lift (inches)	2	2.375	2.375	N/A	0					1.995	2	NA		N/A	2.375

Number of venting wells (from row 8)	223	1025	12	6	0					202	3				10
Average Surface Pressure - Venting Gas Wells (psig)	85	50	Applied wt. avg. pressure	224	20					60.8	25.5	NA		N/A	500

Emissions Calculations															
Conventional wells without Plunger Lift			applied wt. avg. pressure												
Total Emissions, scf/yr	13,492,728	78,217,780	1,287,782	3,854,938						38,451,629	2,440				
Emissions per well, scf/yr	71,014	85,391	107,315	642,490						1,011,885	2,440				
# wells vented w/out plunger lift	190	916	12	6						38	1				
Weighted emissions per vented well, scf/yr															
Conventional wells with Plunger Lift															
Emissions, scf/yr	973,440	1,963,379								232,529,848	23,623				74,495,422
Emissions per well, scf/yr	29,498	18,013								1,417,865	11,811				7,449,542
# wells vented w/ plunger lift	33	109								164	2				10
Weighted emissions per vented well, scf/yr															
# wells with plunger lifts total	33	109								166	195				285
NEMS Region Average Emission Factor	**Northeast**		**Gulf Coast**							**Mid-Continent**					
	75,839		**285,707**							**1,606,991**					

Regional Averages/Emissions per Well				
Conventional w/o Plunger Lifts	82,921	285,707		986,002
Conventional w/ Plunger Lifts	20,682			1,744,596

Note: EPA's 2009 National Inventory included emission estimates for 180,811 wells with liquid unloading.

Southwest	Southwest	Southwest	Rocky
2	46	1,111	1,856
0	0	106	428
0	0	271	58
0	0	220	
-	-	880	
0	0	0	
0	0	220	
0	0	0	
0	0	880	
		1	
	44.25	100	
	8157	8,000	
	4.5	5.5	
	0	2.375	

Calculations

Data Sets

19	16,144	Total Wells				
18	15,912	# with plunger info	1649	# w/plunger	10.36%	% w/plunger
17	15,902	# with lift info	4061	# w/lift	25.54%	% w/lift
17	14,056	# with total wells venting info	1815	# vented	12.91%	% vented
17	14,056	# with total vents info	551,584	# vents	303.9	vents/venting well
	1,040	Wells with plunger info and with plungers	12,279	Wells with non-plunger info and w/o plungers		
17	13,319	Wells with plunger well vent info	318	# of plunger wells venting	30.58%	% of plunger wells that vent
17	13,319	wells with non-plunger well vent info	1,383	# of non-plunger wells venting	11.26%	% of non-plunger wells that vent
17	13,319	Wells with plunger vent info	502,724	# of vents from plunger wells	1,581	# vents per venting plunger well
17	13,319	Wells with non-plunger vent info	47,532	# of vents from non-plunger wells	34	# vents per venting non-plunger well
5	7,332	Wells with non-zero plunger venting	0.07	Vent weighted average vent time for vents w/plunger		
7	7,976	Wells with non-zero non-plunger venting	2.04	Vent weighted average vent time for vents w/o plunger		
	82.39	Vent weighted average mcf production for venting plunger wells	15.10	Average mcf production for venting non-plunger wells		
	4,336	Vent weighted average depth for venting plunger wells	3,608	Average depth for venting non plunger wells		
	4.01	Vent weighted average casing diameter for venting plunger wells	4.54	Average casing diameter for venting non-plunger wells		
	2.00	Vent weighted average tubing diameter for venting plunger wells	2.32	Average tubing diameter for venting non-plunger wells		

		220	
	30	100	

9,037,809		144,345,106
41,081		
220		1,383
		309,985,712
		318
Southwest	**Rocky**	
41,081		

41,081

67.15	Vent weighted average pressure for venting plunger wells	54.74	Average pressure for venting non-plunger wells	65.20	Total average pressure for all venting wells
144,345,106	Non-plunger vent volume scf - gas				
309,985,712	Plunger vent volume scf - gas				

Survey Table 3A. Unconventional Gas Well Venting for Liquids Unloading (Well Clean-ups)

NEMS Region	Northeast	Northeast	Northeast	Northeast	Northeast	Gulf Coast	Gulf Coast
Number of Operated Gas Wells Represented by the information provided	8	3,532	1,750	46	1,900	79	33
Number of Gas Wells with Plunger Lift Installed	0	355	103	5	0	0	0
Number of Gas Wells with Other Artificial Lift (Beam Pump; ESP; etc.)	0	24	527	0		8	0
Number of Gas Wells Vented to the atmosphere for Liquids Unloading	0	645	103	5	0	6	0
Total number of Gas Well Vents - Annualized	-	91,560	75,190	194	-	6	-

Number of Wells with Plunger Lifts that vent to the atmosphere	0	308	103	5	0	0	0
Number of Wells without Plunger Lifts that vent to the atmosphere	0	337	0	0	0	6	0
Total Count of Gas Well Vents for Time Period - w/plunger - Annualized	0	63840	75,190	194	0	0	0
Total Count of Gas Well Vents for Time Period - w-o/plunger - Annualized	0	27720	0	0	0	6	0
Average Venting Time - w/plunger (hours)		0 2209	0.05	0.1			
Average Venting Time - w-o/plunger (hours)		1 3638				3	
Average Daily Production of Venting Gas Wells (MCF/day)		26	15	628	N/A	200	
Average Depth of Venting Wells (feet)		4845	2500	7000	N/A	6000	not applicable
Average Casing Diameter of Venting Gas Wells (inches)		4.5	7	4.5	N/A	5.5	not applicable
Average Tubing Diameter of Venting Gas Wells w/plunger Lift (inches)		2.375	2.375	2 375	N/A	2 375	2.875
Number of venting wells (from row 8)		645	103	5	0	6	0

Average Surface Pressure - Venting Gas Wells (psig)		121.6	200	130		400	

Emission Calculations				
Unconventional wells without Plunger Lift				
Total Emissions, scf/yr	148,079,273			267,095
Emissions per well, scf/yr	439,404			44,516
# wells vented w/out plunger lift	337			6
Weighted emissions per vented well, scf/yr				
Unconventional wells with Plunger Lift				
Emissions, scf/yr	87,985,573	84,228,892	410,107	
Emissions per well, scf/yr	285,667	817,756	82,021	
# wells vented w/ plunger lift	308	103	5	
Weighted emissions per vented well, scf/yr				
NEMS Region Average Emission Factor	**Northeast**			
	425,902			

Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast	Gulf Coast
48	436	198	169	220	1,223	406	134	460	84
0	0	47	4	0	262	370	4	66	52
0	2	48	0	0	232	25	15	0	
8	27	14	17	0	168	61	10	45	0
104	207	728	17	-	168	366	120	45	-

9

0	0	3	2	0	22	59	0	5	0
8	27	11	15	0	146	2	10	40	0
0	0	156	2	0	22	354	0	5	0
104	207.4	572	15	0	146	12	120	40	0
		2	1		0.875	0.3		0.5	
1	5.3	2	2		0.6875	1.5	4	1	
25	130	353	8500		99	83	92	6500	
11,000	9,000	13752	16000		8500	11647	11000	12500	
5.5	4.5	5.5	10.75		4.5	5.5	5.5	8.625	
2.375	2.375	2.375	2.375		2.375	2.375	2.375	2.375	
8	27	14	17		168	61	10	45	

200	50	450	540		15	25	94	530	

2,749,066	5,736,344	49,326,199	11,004,804		276,156	82,853	2,985,945	7,496,306
343,633	212,457	4,484,200	733,654		1,891	41,427	298,594	187,408
8	27	11	15		146	2	10	40
		5,522,367	391,212		45,622	341,615		71,050
		1,840,789	195,606		2,074	5,790		14,210
		3	2		22	59		5
			Gulf Coast					
			242,406					

Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Mid-Continent	Southwest
2,080	98	1,385	90	278	2,002	151	1,620	700
69	30	460	48	118	1,144	16	54	145
213	0	0	0	9		0	39	0
225	7	200	0	0	29	0	215	246
156,142	17	562	-	-	348	-	2,580	246

48	4	64	0	0	29	0	0	18
177	3	136	0	0	0	0	215	228
155742	9.6	170.4	0	0	348	0	0	25
400	7.2	391.2	0	0	0	0	2580	221
0.0833	2 99	2.6			0 5425			0.5
2 5	1 58	1 925					0.5	1
250	727	875			Unavailable		100	1500
3911	10,293	7,888		N/A	Unavailable	NA	11000	8725
5 5	4 92	5.02		N/A	5.6	NA	5.5	9.625
2.375	3 88	4.11		N/A	2.4	NA	2.75	1.995
225	7	200	0	0	29	0	215	246

80	90 04	98.75			74.69		200	516

7,908,154	196,019	16,457,032		68,197,984	35,075,995
44,679	65,340	121,008		317,200	153,842
177	3	136		215	228
			applied wt. avg. depth & production		
120,385,033	781,741	13,999,323	751,651		170,468
2,508,022	195,435	218,739	25,919		9,470
48	4	64	29		18
		Mid-Continent			
		338,279			

Southwest	Southwest	Southwest	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky	Rocky
105	86	297	61	1	1,787	594	263	1,285	297	238
25	0	233	33	1	674	452	242	1,120	112	48
80	0	64	0	0	0	0	0	0	2	223
6	3	60	5	0	915	360	23	298	47	
6	3	60	1,800	-	7,371	3,480	51	2,084	32,472	

0	0	60	0	0		247	23	296	19	
6	3	0	5	0		113	0	2	28	
0	0	60	0	0		1476	51.43	2080	21888	
6	1	0	1800	0		2004	0	4	10584	
		0.2				0.407	1.12	2.1	0.455	
0.5	6.67		0.77			1.616	N/A	0.75	3.18	
12	150	25	41.54			127	454	433	83	
8000	15000	6,800	11,597			11149	11164	11056	10,844	
5.5	5	4.5	4.5			4 038	6.174	4.7	4 5	
2.375	2.375	2.375	2 375			1 997	1.92	2.375	2.375	
6	3	60	5			360	23	298	47	

50	200	110	476			250	290	250	198	

34,759	65,227		76,746,923			42,212,132		95,677	262,702,911	
5,793	21,742		15,349,385			373,559		47,839	9,382,247	
6	3		5			113		2	28	
		106,183				6,427,381	841,788	72,746,777	105,363,947	
		1,770				26,022	36,599	245,766	5,545,471	
		60				247	23	296	19	
Southwest									**Rocky**	
112,548									**389,504**	

Rocky	Rocky	Rocky	Rocky	Rocky	Rocky
4,958	8,323	107	2,285	2,927	992
4,908	5,323	96	0	2,240	992
12	1302	5	0	438	
793			0	39	67
9,516			-	234	402

793			0		
0			0		
9516			0		
0			0		
0.67					
46					
7,400					
4.5					
2.375					
793					

Calculations

Data sets

43	43,736	Total Wells	
43	43,736	# with plunger info	19851
39	38,758	# with lift info	3268
40	35,068	# with total wells venting info	4647
40	35,068	# with total vents info	386,079
	10,478	Wells with plunger info and with plungers	18,884
37	29,362	Wells with plunger well vent info	2,108
37	29,362	wells with non-plunger well vent info	1,518
37	29,362	Wells with plunger vent info	331,129
37	29,362	Wells with non-plunger vent info	46,941
19	21,743	Wells with non-zero plunger venting	0.16
22	15,259	Wells with non-zero non-plunger venting	1.76
	137.54	Vent weighted average mcf production for venting plunger wells	76.99
	4,422	Vent weighted average depth for venting plunger wells	7,281
	5.54	Vent weighted average casing diameter for venting plunger wells	4.60
	2.37	Vent weighted average tubing diameter for venting plunger wells	2.39

150							127	Vent weighted average pressure for venting plunger wells	167
						737,696,856 1,518	737,696,856	Non-plunger vent volume scf - gas	
27,245,035 34,357 793						527,815,767 2,108	527,815,767	Plunger vent volume scf - gas	

# w/plunger	45.39%	% w/plunger
# w/lift	8.43%	% w/lift
# vented	13.25%	% vented
# vents	83.1	vents/venting well
Wells with non-plunger info and w/o plungers		
# of plunger wells venting	20.12%	% of plunger wells that vent
# of non-plunger wells venting	8.04%	% of non-plunger wells that vent
# of vents from plunger wells	157.1	# vents per venting plunger well
# of vents from non-plunger wells	30.9	# vents per venting non-plunger well
Vent weighted average vent time for vents w/plunger		
Vent weighted average vent time for vents w/o plunger		
Average mcf production for venting non-plunger wells	371	Average daily production for all venting wells
Average depth for venting non-plunger wells	7,888	Average depth for all venting wells
Average casing diameter for venting non-plunger wells		
Average tubing diameter for venting non-plunger wells		

Average pressure for venting non-plunger wells

Re: Fw: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Marty Wolf to: Melissa Weitz 01/03/2013 12:31 PM

Cc: "Fields, Paula"

History: This message has been forwarded.

Melissa,

Please call to discuss. I just want to confirm exactly what you need.

I do have a short call from 1:00 to 1:30 pm Eastern, so I won't be able to pick up then.

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 1/3/2013 9:00 AM >>>

Thanks Marty!

I'd like to send it to EDF today, if possible. If you can't remove the tab easily by pulling from the other two spreadsheets, can you propose another way to remove the data but keep the spreadsheet intact otherwise? For example, we could hardwire the values pulled from the API-ANGA survey data tab, then then just add notes explaining where they came from?

"Marty Wolf" ---01/03/2013 11:29:34 AM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Paula Fields" <Paula.Fields@erg.com>
Date: 01/03/2013 11:29 AM
Subject: Re: Fw: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

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Melissa,

I am not absolutely sure right off the top of my head, so I will take a quick look and get back to you in a bit.

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 1/3/2013 7:50 AM >>>

Hello,

I hope you both had a good New Year's!

I sent the background calculations on liquids unloading to API yesterday. EDF is now also requesting the spreadsheet, and I was about to send it over when I realized that contains information API shared with EPA, but was not in the API/ANGA report (I think), see tab API-ANGA survey data.

Can you let me know if everything in that tab can be found in API-ANGA's report? If it cannot, is there any way to remove the information from that tab without messing up everything in the spreadsheets (e.g., could you pull some of these data points from the final two spreadsheets instead, which I believe came directly from the API/ANGA report)?

Thanks!
Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/03/2013 10:45 AM -----

From: Melissa Weitz/DC/USEPA/US
To: "Karin C. Ritter" <Ritterk@api.org>
Date: 01/02/2013 05:06 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

---

Hi Karin,

I hope you had a nice holiday break.

Per our last call, attached below is the spreadsheet that we used to calculate emissions from liquids unloading for the expert review draft GHG Inventory.

Apologies for the delay in sending this over.

Would you still like to talk tomorrow at 11AM? We can walk you through the spreadsheet. We're also available on Friday, if you'd prefer to speak then.

Thank you,
Melissa

(See attached file: background calcs on liquids unloading 1.2.xlsx)

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Fw: Preliminary Liquids Unloading Estimates

Melissa Weitz to: Marty Wolf 01/03/2013 02:19 PM

I know what happened--I combined your spreadsheet below with SAIC's spreadsheet on the emission factor.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/03/2013 02:19 PM -----

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 10:51 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

Here are the revised preliminary liquids unloading estimates using Data Set #2 (Non-Associated Gas Wells).

Marty

>>> 11/07/12 7:01 ?? >>>
We will want to include non-associated gas wells, both with hydraulic fracturing, and without. I believe that is data set #2.

"Marty Wolf" ---11/07/2012 01:26:12 AM---Melissa, This should be fairly easy, but just so we are totally clear - do we

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/07/2012 01:26 AM
Subject: Re: Preliminary Liquids Unloading Estimates

Melissa,

This should be fairly easy, but just so we are totally clear - do we want to be using Data Set #1 (Associated Gas Wells), Data Set #2 (Non-Associated Gas Wells), Data Set #3 (Gas Wells with Hydraulic Fracturing), or some combination of these?

Data Sets #5 through #10 include some filtering for water production and/or the 300 threshold, so we will not be using these.

Thanks,
Marty

Marty Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275

Rancho Cordova, CA 95670
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

>>> 11/06/12 2:56 ?? >>>
Hi Marty,

(b)(5) deliberative

Thank you!
Melissa

"Marty Wolf" ---11/06/2012 05:41:53 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 11/06/2012 05:41 PM
Subject: Preliminary Liquids Unloading Estimates

Melissa,

I just finished up the preliminary liquids unloading estimates.

Just a quick step-by-step description of what I did.

(b)(5) deliberative

(b)(5) deliberative

Please let us know if you have any questions. Also, please let us know if you have any adjustments or tweaks that we need to make with these estimates.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "liquids unloading preliminary calc 110612.xlsx" deleted

(b)(5) deliberative

by Melissa Weitz/DC/USEPA/US] liquids unloading preliminary calc 110712.xlsx

Fw: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Melissa Weitz to: Paula Fields, Marty Wolf 01/07/2013 02:43 PM

Spreadsheet for the call today.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/07/2013 02:43 PM -----

From: Melissa Weitz/DC/USEPA/US
To: "Karin C. Ritter" <Ritterk@api.org>
Date: 01/02/2013 05:06 PM
Subject: RE: For your Review: Draft Summary Report on Stakeholder Workshop on Natural Gas in the GHG Inventory

Hi Karin,

I hope you had a nice holiday break.

Per our last call, attached below is the spreadsheet that we used to calculate emissions from liquids unloading for the expert review draft GHG Inventory.

Apologies for the delay in sending this over.

Would you still like to talk tomorrow at 11AM? We can walk you through the spreadsheet. We're also available on Friday, if you'd prefer to speak then.

Thank you,
Melissa

background calcs on liquids unloading 1.2.xlsx

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Fw: Comments on the EPA Inventory
Melissa Weitz to: Paula Fields, Marty Wolf 01/11/2013 01:13 PM

Straightforward comment from EIA. I bolded the natural gas piece below.

-----Forwarded by Melissa Weitz/DC/USEPA/US on 01/11/2013 01:12PM -----
To: Leif Hockstad/DC/USEPA/US@EPA
From: "Lindstrom, Perry" <Perry.Lindstrom@eia.gov>
Date: 01/11/2013 11:46AM
Cc: Melissa Weitz/DC/USEPA/US@EPA
Subject: Comments on the EPA Inventory

Hey Leif and Melissa,

I have been overcome by events, but wanted to get a couple of comments to you all.

- [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted]

That's it for now. My read was fast and not very thorough. If I get a

chance I'll go through it in more detail during the public review.

And certainly let me know if you need data updates.

Perry

Perry M. Lindstrom

Industry Economist, EI-35

Energy Information Administration

1000 Independence Avenue, SW

Washington, DC 20585

(202)586-0934

perry.lindstrom@eia.gov

Data from Inventory

Tichenor, James to: Melissa Weitz, Suzanne Waltzer, Jones, Eric C, Ben Kniola 01/11/2013 04:19 PM

History: This message has been replied to and forwarded.

Hi Melissa and Suzie,
I went through the draft inventory and did a rough extraction of the LU and storage tank data (attached). We are most interested in Rocky Mountain data, and also in how you adjusted the methodology for the activity data. Maybe we can use that topic as the basis for our discussion on Monday?

--

James Tichenor
Economist
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jtichenor@blm.gov
202-912-7543 office
202-258-7108 blackberry

(b)(5) deliberative [redacted]

LU and storage tank data from Draft Inventory.xlsx

Fw: Comments on Draft Inventory

Melissa Weitz to: Paula Fields, Marty Wolf 01/11/2013 04:58 PM

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 01/11/2013 04:58PM -----
To: Melissa Weitz/DC/USEPA/US@EPA
From: Leif Hockstad/DC/USEPA/US
Date: 01/11/2013 02:40PM
Subject: Fw: Comments on Draft Inventory

-----Forwarded by Leif Hockstad/DC/USEPA/US on 01/11/2013 02:40PM -----
To: Leif Hockstad/DC/USEPA/US@EPA
From: Michael Obeiter <MObeiter@wri.org>
Date: 01/11/2013 11:48AM
Cc: James Bradbury <JBradbury@wri.org>
Subject: Comments on Draft Inventory

Hi Leif,

James Bradbury and I have reviewed the Natural Gas Systems section of the draft Inventory, and have a couple minor comments and questions.

1. Why does the draft Inventory have lower workover frequency and emissions than are estimated by the API/ANGA study?

2. We feel strongly that EPA should use a second data source, if at all possible, for liquids unloading, well completions and workovers. We hope EPA will be able to compare data from the API/ANGA study to data reported under Subpart W to determine how representative a sample was used in the API/ANGA study. Ideally this would be accomplished in time for the release of the public draft, but if not, then by the time the final version of the Inventory is released.

We’re happy to discuss these issues further with you or your team if you’d like any clarification. Thanks for the opportunity to review!

Michael Obeiter

Senior Associate, Climate and Energy Program

World Resources Institute

10 G Street, NE, Suite 800

Washington, DC 20002

202-729-7617

Fw: Comments of Richard Meyer & Pam Lacey (AGA) on EPA Peer Review Draft 2013 GHG Inventory

Leif Hockstad to: Van Pelt Marian, Mandel Toby 01/11/2013 04:58 PM

Cc: Melissa Weitz

History: This message has been forwarded.

-----Forwarded by Leif Hockstad/DC/USEPA/US on 01/11/2013 04:58PM -----
To: Leif Hockstad/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
From: "Lacey, Pam" <PLacey@aga.org>
Date: 01/11/2013 04:50PM
Cc: Paul Gunning/DC/USEPA/US@EPA, "Meyer, Richard" <RMeyer@aga.org>, "Gant, Paula" <PGant@aga.org>, "Clay, Kathryn" <KClay@aga.org>
Subject: Comments of Richard Meyer & Pam Lacey (AGA) on EPA Peer Review Draft 2013 GHG Inventory

(See attached file: AGA Peer Review Com 2013 US GHG Inventory Jan 11 2013.pdf)

Leif and Melissa -

Please see the attached letter for our comments on the Peer Review Draft of EPA's 2013 Greenhouse Gas Inventory. Thank you very much for the opportunity to review the peer review draft, and thank you especially for incorporating data on liquids unloading and well completions and workovers.

Richard Meyer's calculations indicate the new data brings the estimated leak rate down to 1.4% of produced natural gas - even if you include emissions that are actually related to producing petroleum! Are we right? If so - THANK YOU! That brings us very close to the 1% level that Ramon Alvarez and Steven Hamburg et al said

was needed to demonstrate immediate benefits for switching heavy duty diesel trucks to natural gas, and it in the range at which the EDF study said switching cars from gasoline to CNG would immediately reduce climate impacts.

I understand from Paul Gunning that you are still planning to include the Subpart W data for liquids unloading and well completions and workovers in the Inventory. I hope you can do so in the upcoming draft, but at the very least, please do include it in the final 2013 Inventory.

Best regards,

Pam

Pamela A. Lacey | Senior Managing Counsel, Environment
American Gas Association
400 North Capitol St., NW | Washington, DC 20001
P: 202.824.7340 |F: 202-824-7092| placey@aga.org

The American Gas Association represents more than 200 local energy companies committed to the safe delivery of clean natural gas to more than 65 million customers throughout the nation.

AGA Peer Review Com 2013 US GHG Inventory Jan 11 2013.pdf

American Gas Association

January 11, 2013

Leif Hockstad
Melissa Weitz
U.S. Environmental Protection Agency
Climate Change Division (6207J),
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: AGA Comments on Peer Review Draft - 2013 Inventory of U.S. Greenhouse Gas Emissions and Sinks

Dear Leif and Melissa:

Richard Meyer and I appreciate the opportunity to review and comment on the December 17, 2012 peer review draft of EPA's 2013 Draft Inventory of U.S. Greenhouse Gas (GHG) Emissions and Sinks for 1990-2011 (Draft Inventory).

On behalf of AGA, we congratulate you for incorporating new information and data as it becomes available, including the liquids unloading data provided in the API/ANGA study and emissions estimation methodologies used for hydraulic fractured well completions in the new source performance standard (NSPS) rulemaking regulating volatile organic compound (VOC) emissions from production. The new draft better reflects the widespread use of emission control technologies as well as the shorter duration of emissions during liquids unloading.

We are frankly thrilled at the resulting corrected estimate for the carbon footprint of the natural gas value chain. Richard Meyer's calculations indicate that you are now estimating in the peer review draft Inventory that emissions from leaks and venting from production through distribution now account for 1.4% of gross U.S. natural gas production. Please let us know if you believe we are miscalculating the leak rate, but if we are correct, this is significantly lower than the 2.4% annual leak rate estimated in the 2012 Inventory, and we believe the new 1.4% estimate is much closer to reality. We expect that as additional data becomes available, this estimate will decline further.

It is puzzling that you have not mentioned this important news in your introductory section. We urge you to include a discussion about the annual leak rate for natural gas in the Executive Summary and Introduction to the Inventory, as well as the chapter on the natural gas chapter. The new estimated leak rate and carbon footprint for natural gas should also be featured in EPA's press release and public outreach materials. As you know, the estimated carbon footprint for the natural gas value chain has been at the heart of an important national policy debate regarding the role of natural gas in helping to reduce global warming impacts. This makes it paramount to ensure the public is made aware of the EPA Inventory's new estimated leak rate, to support rational, fact-based policy debate and decisions.

AGA of course is disappointed that you have not yet been able to verify and incorporate in this peer review draft 2011 data relating to (1) liquids unloading and (2) hydraulically fractured well completions and workovers that was submitted to EPA in September 2012 under the Greenhouse Gas Mandatory Reporting Rule for oil and natural gas systems, 40 C.F.R. Part 98, Subpart W. The Subpart W reports provided hard data regarding how many wells in 2011 used liquids unloading and how many well completions and workovers vented or flared methane as opposed to capturing emissions. While it was understandably difficult verify all of the Subpart W reported data following

the UN Framework Convention on Climate Change (UNFCCC) process in time to include it in the Inventory, as I suggested at the September 2012 EPA Inventory Workshop, EPA has to start somewhere. Logically it would be best to start with the highest priority data points that will have the greatest impact on improving the accuracy of the estimated carbon footprint for natural gas – namely with liquids unloading and well completions and workovers. I was encouraged by EPA's response at the Workshop and afterwards that your team would make this a priority. On several occasions, Paul Gunning has reiterated a commitment to prioritize verifying and incorporating this important data in the 2013 Inventory. On behalf of AGA and its members, I urge you to keep up the good work and to incorporate the Subpart W data on liquids unloading and well completions and workovers in the next public draft of the Inventory as well as in the final Inventory to be published in April 2013.

Regarding natural gas distribution, the peer review draft indicates that distribution methane emissions were 28.2 Tg CO2-eq in 2011, a decline 1.4 percent from 2010. The ratio of distribution system methane emissions to LDC gas deliveries is 0.52% and is declining. Richard Meyer noticed there was a slight revision to earlier data (up 0.4%), but the reason for this revision was unclear. Could you please explain this revision?

As you know, several initiatives are underway to collect field measurement data to help provide updated, more accurate estimates and emission factors for buried natural gas distribution pipe (including plastic, cast iron and bare steel pipe). AGA members are working with the Gas Technology Institute (GTI) Operations Technology Development (OTD) group to collect data to develop updated emission factors for plastic, cast iron and unprotected steel distribution pipe. In addition, AGA members are working with the Environmental Defense Fund (EDF) to collect emissions data for transmission to distribution pressure regulator stations (T-Ds), other regulator stations, and buried distribution pipe. AGA urges EPA to review and include the resulting improved data in the Inventory as soon as feasible.

Overall lifecycle emissions for the natural gas value chain are low, and they are getting lower. We look forward to working with you both to obtain a more accurate picture of greenhouse gas emissions from the natural gas value chain, and to identify smart, cost-effective opportunities to reduce emissions further.

Respectfully,

Pamela A. Lacey
Senior Managing Counsel, Environment
American Gas Association
400 North Capitol Street, NW
Washington, D.C. 20001
(202) 824-7340
placey@aga.org

Fw: Comments of Richard Meyer & Pam Lacey (AGA) on EPA Peer Review Draft 2013 GHG Inventory

Melissa Weitz to: Paula Fields, Marty Wolf 01/11/2013 05:07 PM

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 01/11/2013 05:07PM -----
To: Leif Hockstad/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
From: "Lacey, Pam" <PLacey@aga.org>
Date: 01/11/2013 04:50PM
Cc: Paul Gunning/DC/USEPA/US@EPA, "Meyer, Richard" <RMeyer@aga.org>, "Gant, Paula" <PGant@aga.org>, "Clay, Kathryn" <KClay@aga.org>
Subject: Comments of Richard Meyer & Pam Lacey (AGA) on EPA Peer Review Draft 2013 GHG Inventory

(See attached file: AGA Peer Review Com 2013 US GHG Inventory Jan 11 2013.pdf)

Leif and Melissa -

Please see the attached letter for our comments on the Peer Review Draft of EPA's 2013 Greenhouse Gas Inventory. Thank you very much for the opportunity to review the peer review draft, and thank you especially for incorporating data on liquids unloading and well completions and workovers.

Richard Meyer's calculations indicate the new data brings the estimated leak rate down to 1.4% of produced natural gas - even if you include emissions that are actually related to producing

petroleum! Are we right? If so - THANK YOU! That brings us very close to the 1% level that Ramon Alvarez and Steven Hamburg et al said was needed to demonstrate immediate benefits for switching heavy duty diesel trucks to natural gas, and it in the range at which the EDF study said switching cars from gasoline to CNG would immediately reduce climate impacts.

I understand from Paul Gunning that you are still planning to include the Subpart W data for liquids unloading and well completions and workovers in the Inventory. I hope you can do so in the upcoming draft, but at the very least, please do include it in the final 2013 Inventory.

Best regards,

Pam

Pamela A. Lacey | Senior Managing Counsel, Environment
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P: 202.824.7340 |F: 202-824-7092| placey@aga.org

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AGA Peer Review Com 2013 US GHG Inventory Jan 11 2013.pdf

Re: Fw: Data from Inventory
Suzanne Waltzer to: Melissa Weitz 01/14/2013 01:22 PM

History: This message has been forwarded.

No prob. i think that is fine but am in my branch meeting tho. could u send an email to James/Eric?

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

-----Melissa Weitz/DC/USEPA/US@EPA wrote: -----

==========
To: Suzanne Waltzer/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/14/2013 01:18PM
Subject: Fw: Data from Inventory
==========

I am free at 2, but I will not have looked at the calculations they did before the call.

I know it was tough to find a time to schedule this, but if we could reschedule it, I think I could be more helpful on this tomorrow or Wednesday.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/14/2013 01:17 PM -----

From: "Tichenor, James" <jtichenor@blm.gov>
To: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, "Jones, Eric C" <ejones@blm.gov>, "Ben Kniola" <bkniola@blm.gov>
Date: 01/11/2013 04:19 PM
Subject: Data from Inventory

Hi Melissa and Suzie,
I went through the draft inventory and did a rough extraction of the LU and storage tank data (attached). We are most interested in Rocky Mountain data, and also in how you adjusted the methodology for the activity data. Maybe we can use that topic as the basis for our discussion on Monday?

--
James Tichenor
Economist
WS-4204
Minerals and Realty Management WO-300
Bureau of Land Management
jtichenor@blm.gov

202-912-7543 office
202-258-7108 blackberry[attachment "LU and storage tank data from Draft Inventory.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Re: Data from Inventory
Kniola, Benjamin to: Jones, Eric 01/14/2013 02:38 PM
Cc: "Tichenor, James", Melissa Weitz, Suzanne Waltzer

History: This message has been forwarded.

That works for me as well.

On Mon, Jan 14, 2013 at 1:59 PM, Jones, Eric <ejones@blm.gov> wrote:

Tomorrow afternoon suits my schedule.

On Mon, Jan 14, 2013 at 11:49 AM, Tichenor, James <jtichenor@blm.gov> wrote:

Can we shoot for tomorrow at 2pm?

The sheet I sent contains data that I pulled directly from draft inventory (the supplement), and nothing that I calculated. I believe I followed the supplement accurately. However, it was hard to follow the new methodology for developing the activity data for liquids unloading. So maybe that could be the place to start? Ideally, we would like to use the emissions factors as presented, and develop activity data for LU on BLM-managed lands that is consistent with your methods and the API/ANGA data.

As a side note, we are primarily interested in the Rocky Mountain region emissions factors since that is where most of the activity on BLM-managed lands occurs.

On Mon, Jan 14, 2013 at 1:28 PM, <Weitz.Melissa@epamail.epa.gov> wrote:

Hi James,

I took a quick look at the spreadsheet, but will need a bit more time to provide you with more information on liquids unloading and storage tank data.

Would it be possible to reschedule our call so that we'll have a chance to review your calculation in more detail? We're available tomorrow at 2PM, or anytime Thursday a.m. or Friday a.m.

Please let me know if a reschedule is okay, and if any of the proposed times work for you.

Thanks!
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

"Tichenor, James" ---01/11/2013 04:19:56 PM---Hi Melissa and Suzie, I went through the draft inventory and did a rough extraction of the LU and

From: "Tichenor, James" <jtichenor@blm.gov>
To: Melissa Weitz/DC/USEPA/US@EPA, Suzanne Waltzer/DC/USEPA/US@EPA, "Jones, Eric C" <ejones@blm.gov>, "Ben Kniola" <bkniola@blm.gov>
Date: 01/11/2013 04:19 PM
Subject: Data from Inventory

Hi Melissa and Suzie,
I went through the draft inventory and did a rough extraction of the LU and storage tank data (attached). We are most interested in Rocky Mountain data, and also in how you adjusted the methodology for the activity data. Maybe we can use that topic as the basis for our discussion on Monday?

--
James Tichenor
Economist
WS-4204
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Bureau of Land Management
jtichenor@blm.gov

202-912-7543 office
202-258-7108 blackberry[attachment "LU and storage tank data from Draft Inventory.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

--
James Tichenor
Economist

WS-4204
Minerals and Realty Management WO-300
Bureau of Land Management
jtichenor@blm.gov
202-912-7543 office
202-258-7108 blackberry

--

Eric Jones
Petroleum Engineer
BLM Moab Field Office
ejones@blm.gov
435-259-2117

--

Ben Kniola
Natural Resource Specialist
BLM - Washington Office
Division of Fluid Minerals, WO-310
bkniola@blm.gov
202-912-7159 (Desk)
202-617-6774 (Mobile)

"Change is the law of life and those who look only to the past or present are certain to miss the future." - JFK

Re: Fw: Comments of Richard Meyer & Pam Lacey (AGA) on EPA Peer Review Draft 2013 GHG Inventory

Melissa Weitz to: Leif Hockstad 01/14/2013 05:09 PM

From: Melissa Weitz/DC/USEPA/US
To: Leif Hockstad/DC/USEPA/US@EPA,

Good call--I'll add it to the next ones I send out.

Leif Hockstad I think this looks good. Maybe one tweak?: 01/14/2013 04:59:43 PM

From: Leif Hockstad/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/14/2013 04:59 PM
Subject: Fw: Comments of Richard Meyer & Pam Lacey (AGA) on EPA Peer Review Draft 2013 GHG Inventory

I think this looks good.

Maybe one tweak?:
The next draft will be available in February for its public comment period, following an announcement in the Federal Register.

----- Forwarded by Leif Hockstad/DC/USEPA/US on 01/14/2013 04:58 PM -----

From: Melissa Weitz/DC/USEPA/US
To: "Lacey, Pam" <PLacey@aga.org>
Cc: "Clay, Kathryn" <KClay@aga.org>, Leif Hockstad/DC/USEPA/US@EPA, "Gant, Paula" <PGant@aga.org>, "Meyer, Richard" <RMeyer@aga.org>
Date: 01/14/2013 04:57 PM
Subject: Re: Comments of Richard Meyer & Pam Lacey (AGA) on EPA Peer Review Draft 2013 GHG Inventory

Hello Pam,

Thank you for your comments on the expert review draft of the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011.

We are currently reviewing comments received, and evaluating potential updates to the Inventory based on the comments.

The public review draft will be available in February.

Thank you again for your comments and we look forward to your continued input into the GHG Inventory development process.

Best regards,
Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

"Lacey, Pam" Leif and Melissa - Please see the attached letter for our comments on the Peer... 01/11/2013 04:50:53 PM

From: "Lacey, Pam" <PLacey@aga.org>
To: Leif Hockstad/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Cc: Paul Gunning/DC/USEPA/US@EPA, "Meyer, Richard" <RMeyer@aga.org>, "Gant, Paula" <PGant@aga.org>, "Clay, Kathryn" <KClay@aga.org>
Date: 01/11/2013 04:50 PM
Subject: Comments of Richard Meyer & Pam Lacey (AGA) on EPA Peer Review Draft 2013 GHG Inventory

Leif and Melissa –

Please see the attached letter for our comments on the Peer Review Draft of EPA's 2013 Greenhouse Gas Inventory. Thank you very much for the opportunity to review the peer review draft, and thank you especially for incorporating data on liquids unloading and well completions and workovers.

Richard Meyer's calculations indicate the new data brings the estimated leak rate down to 1.4% of produced natural gas – even if you include emissions that are actually related to producing petroleum! Are we right? If so – THANK YOU! That brings us very close to the 1% level that Ramon Alvarez and Steven Hamburg et al said was needed to demonstrate *immediate* benefits for switching heavy duty diesel trucks to natural gas, and it in the range at which the EDF study said switching cars from gasoline to CNG would immediately reduce climate impacts.

I understand from Paul Gunning that you are still planning to include the Subpart W data for liquids unloading and

well completions and workovers in the Inventory. I hope you can do so in the upcoming draft, but at the very least, please do include it in the final 2013 Inventory.

Best regards,

Pam

Pamela A. Lacey | Senior Managing Counsel, Environment
American Gas Association
400 North Capitol St., NW | Washington, DC 20001
P: 202.824.7340 |F: 202-824-7092| placey@aga.org

The American Gas Association represents more than 200 local energy companies committed to the safe delivery of clean natural gas to more than 65 million customers throughout the nation.
[attachment "AGA Peer Review Com 2013 US GHG Inventory Jan 11 2013.pdf" deleted by Melissa Weitz/DC/USEPA/US]

Re: Comments on Draft Inventory
Leif Hockstad to: Michael Obeiter 01/14/2013 05:20 PM
Cc: James Bradbury, Melissa Weitz

History: This message has been forwarded.

Hello Michael,

Thank you for your comments on the expert review draft of the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011.

We are currently reviewing comments received, and evaluating potential updates to the Inventory based on the comments.

The next draft will be available in February for its public comment period, following an announcement in the Federal Register.

Thank you again for your comments and we look forward to your continued input into the GHG Inventory development process.

Best regards,
Leif

****
Leif Hockstad
Climate Change Division
OAR - Office of Atmospheric Programs
U.S. Environmental Protection Agency
Phone: 202 343 9432
Fax: 202 343 2359
hockstad.leif@epa.gov
****

Michael Obeiter	Hi Leif, James Bradbury and I have reviewed...	01/11/2013 11:48:19 AM

From: Michael Obeiter <MObeiter@wri.org>
To: Leif Hockstad/DC/USEPA/US@EPA
Cc: James Bradbury <JBradbury@wri.org>
Date: 01/11/2013 11:48 AM
Subject: Comments on Draft Inventory

Hi Leif,

James Bradbury and I have reviewed the Natural Gas Systems section of the draft Inventory, and have a couple minor comments and questions.

1. Why does the draft Inventory have lower workover frequency and emissions than are estimated by the API/ANGA study?

2. We feel strongly that EPA should use a second data source, if at all possible, for liquids

unloading, well completions and workovers. We hope EPA will be able to compare data from the API/ANGA study to data reported under Subpart W to determine how representative a sample was used in the API/ANGA study. Ideally this would be accomplished in time for the release of the public draft, but if not, then by the time the final version of the Inventory is released.

We're happy to discuss these issues further with you or your team if you'd like any clarification. Thanks for the opportunity to review!

Michael Obeiter
Senior Associate, Climate and Energy Program
World Resources Institute
10 G Street, NE, Suite 800
Washington, DC 20002
202-729-7617

?s on GHG Inventory comments

Melissa Weitz to: Suzanne Waltzer 01/16/2013 01:33 PM

Hi Suzie,

There are two comments that I am particularly interested in getting your input on. I can walk you through these when we talk at 3.

Melissa

1. Clean Air Task Force Comment on Liquids Unloading-- See pages 1-4. I want to be sure I understand what they are saying about the earlier BP data.

CATF - 2013 Inventory Draft Expert Review.doc

2. Devon's comment on HF completions/workovers-- see pages 3-9.

ENV - GHG - Devon Comment Letter 1-11-13 with Attachments.pdf

Clean Air Task Force (CATF) appreciates the opportunity to review and comment on the draft edition of the 2013 *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2011*.

Summary of Comments: In the draft document, EPA has made several important improvements to the natural gas systems section of the inventory, which greatly improve the transparency and usability of the inventory. EPA has also made two significant adjustments to specific source estimates in the draft inventory, which combined would reduce emissions estimates from natural gas production by 51%. Unfortunately, one of these changes, a ~94% decrease in the estimated emissions of methane during liquids unloading, is not supported by the sum of the evidence available on emissions from this source. Finally, we commend EPA for regularly updating this inventory and seeking information to improve it. However, given the importance of the inventory and the substantial new information that will become available just in the coming year on emissions from natural gas systems, EPA needs to provide readers with guidance on coming information, and *known weaknesses in the current inventory*. We recognize that time and resources are limited and that the task of providing an accurate inventory of emissions from such an enormous, diverse, and dispersed industry cannot be perfected in a single year. However, when sources are missing entirely, or other issues exist in the inventory, EPA needs to make this as clear as possible to readers.

Improvements in Transparency / Clarity: For the first time, the natural gas section of the inventory provides critical information that gives inventory users access to EPA's best estimates of actual emissions for several important emission sources. This new information includes:

- Estimates of emissions during gas well completions with hydraulic fracturing for all six NEMS regions. Previous editions of the inventory only reported emissions for two of the six regions, and listed emissions as zero for the other four.

- Separate reporting of emissions reductions (relative to potential emissions) due to state regulations and voluntary programs. Previous editions lumped these two categories together.

- Separate reporting of specific emissions reductions due to voluntary programs for eight activities, and reductions due to regulations for four activities. Previous editions did not provide this information.

- Other clarifications in wording and approach. EPA has wisely stopped using the poorly defined term "unconventional." Other clarifications throughout are helpful.

Adjustment to Liquids Unloading Estimates: The draft estimate for methane emissions during liquids unloading (for 2010) is 94.5% lower than the previous estimate from the 2012 edition of the GHG inventory. EPA has calculated this using data submitted by API and ANGA in report that they produced in 2011-2012. CATF recognizes that the data used by EPA to estimate emissions previously was limited. **However, we do not find that the draft estimate of methane emissions from liquids unloading is credible**.

While the data EPA used for its previous estimate (described in the TSD for Subpart W of EPA's Mandatory GHG Reporting Rule, published in late 2010) was only based on data from two operators, one of datasets was based on a very substantial number of wells: ~2200 wells BP operates in the South San Juan (SSJ) Basin of New Mexico. The emissions from these wells have been described in at least

two reports. The first is an EPA publication from 2004,[1] and the second is a presentation from 2006.[2] These wells emitted about 4.8 billion cubic feet (Bcf) of natural gas in 2000, although plunger lifts had already been installed on 1000 of them. Smart automation of those plunger lifts substantially reduced the emissions from those wells, so that they were emitting less than 1 Bcf by 2006.[3] The ~4 Bcf emissions reduction was all from automating the plunger lifts, so in 2000 at least 4 Bcf was emitted by just the 1000 wells with plunger lifts.

Assuming that this gas was 79% methane by volume (using a national average; coal-bed natural gas is usually considerably higher in methane content), 4 Bcf of natural gas would contain 61.4 Gg of methane. These figures are actual emissions, as measured and presented by the well owners.

The second report which EPA used for its previous estimate of emissions during liquids unloading, from Wyoming, was based on a far smaller number of wells, but reported emissions per well in a similar range (about half of that per well for the wells from the SSJ Basin).[4]

American Petroleum Institute (API) and America's Natural Gas Alliance (ANGA) have recently published a report, based on a survey of their members, which provides data for several thousand wells that can be used to estimate emissions during liquids unloading.[5] **Unlike the report from BP for the SSJ Basin, the API / ANGA report does *not* present data on actual emissions measurements**. Rather, API / ANGA surveyed members for the parameters used in the engineering equation used to estimate emissions due to liquids unloading under EPA's Mandatory GHG Reporting Rule. Using the national averages of these data, API / ANGA uses the engineering equation to estimate that national emissions during liquids unloading were 320,000 Mg of methane. EPA has presented an even smaller figure, 249,000 Mg of methane, in the draft 2013 GHG inventory. EPA arrived at this figure by averaging API / ANGA's figures by NEMS region and applying those figures to well counts for each region.

While the API / ANGA study presents data on wells of all types[6] and from a number of regions and operators, three significant caveats about this data must be kept in mind:

- This data has not been independently obtained. Indeed, API / ANGA is clear in the text of their report and in the text of their survey questions that the purpose of the survey was to demonstrate that emissions were lower than EPA estimated they were at the time.

- While API and ANGA emphasize the large number of wells covered in their survey, the data used to calculate emissions during liquids unloading is based on a subset of those wells. While they report survey results on liquids unloading from 49,124 wells, the data on well parameters used to calculate the

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[1] EPA. *Natural Gas STAR Partner Update: Spring 2004*. Available online at: http://epa.gov/gasstar/documents/partner-updates/spring2004.pdf.
[2] G.P. Desaulniers, "Plunger Well Vent Reduction Project," Presentation at the 2006 Natural Gas Star Workshop. Available online at: http://www.epa.gov/gasstar/documents/desaulniers.pdf
[3] Figures derived from slides 16 – 18 of Desaulniers presentation.
[4] EPA. *Installing Plunger Lift Systems in Gas Wells: Lessons Learned from Natural Gas STAR Partners*. October, 2003. Available online at: <http://epa.gov/gasstar/documents/ll_plungerlift.pdf>.
[5] API / ANGA (2012), Characterizing Pivotal Sources of Methane Emissions from Natural Gas Production. Available online at: http://www.api.org/news-and-media/news/newsitems/2012/oct-2012/~/media/Files/News/2012/12-October/API-ANGA-Survey-Report.pdf
[6] We note that the number of coal-bed methane wells in the API / ANGA dataset is very low.

volume of gas vented from wells that vent during liquids unloading is from a much smaller set of wells, 5,284 wells.[7] While these wells are distributed in various basins, and are owned by various operators, this is not a vastly larger number than the number of wells in the reports EPA used for their previous estimate of emissions from liquids unloading (~2,200).

- Finally, it is not clear that operators responding to this survey would be representative of all natural gas well operations. Members of API and ANGA are larger firms among oil and gas producers. Smaller firms may not have the staff, funding, and awareness to operate wells in a manner to minimize emissions (and product loss) that larger firms do, especially in the absence of any regulations which require them to act to minimize emissions. As a result, wells owned and operated by the firms that responded to the API / ANGA survey may be operated with less emissions than wells operated by smaller firms.

Given these caveats, we now consider the estimates for emissions during liquids unloading that EPA has presented in the draft inventory. For 2011, EPA estimates that total emissions were 149 Gg of methane. For comparison, BP reports that the 1000 wells with plunger lifts in the SSJ basin were emitting at least 4 Bcf (61.4 Gg methane) in 2000. **EPA's estimate for 2011 for the entire nation is only 2.4 times larger than the reported emissions from just 1000 wells in 2000.** Smart automation can dramatically reduce these emissions, as BP demonstrated, but we are not aware of any evidence that smart automation has been so widely adopted that nationwide emissions would be expected to have dropped so dramatically.

Indeed, EPA's draft estimate of nationwide emissions from wells with plunger lifts for year 2000 – 32.75 Gg methane[8] – is almost 50% lower than the **actual reported emissions in 2000** (61.4 Gg) from just 1000 wells with plunger lifts in the SSJ Basin.

These comparisons of the draft estimate to previous reports of actual emissions show that the draft estimate of emissions is not consistent with the data available to EPA. With the limitations of the API / ANGA study described above, it is not appropriate for EPA to discard their previous estimate of emissions from liquids unloading and rely entirely on API / ANGA's data to produce an indirect estimate of emissions during liquids unloading. At the very least, the estimate in the 2013 inventory should be produced using data both from BP's report and the API / ANGA study.

Context. This is the second time since 2009 that the inventory for methane emissions from the natural gas industry has changed dramatically from one year to the next. We commend EPA for examining and re-examining emissions from the industry and revising the inventory based on new information. However, given the intense interest in these results from the industry, academics, and policymakers, it would behoove EPA to provide some important context for the estimates of emissions from the gas industry.

First, when forced to choose among conflicting data points for large / potentially large emissions sources such as liquids unloading, EPA should note the various data sources, including those not used, and whenever possible note why a source is used / not used. Readers should be aware of other data.

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[7] See well counts in Appendix C of API / ANGA report.
[8] See table A-8 of Natural Gas Supplement to Draft GHG Inventory.

Second, a large number of data and studies are expected to appear in 2013 which will provide data and input that will inform future estimates of methane emissions from natural gas. These include but are not limited to the data from the Mandatory GHG Reporting Rule; a large study conducted by Environmental Defense Fund, academic partners, and partners from the natural gas industry; and a number of studies conducted by government and academic researchers who have conducted measurements of methane and other compounds adjacent to natural gas facilities. **Given all this expected information, there is a good chance for further substantial changes in the inventory estimates for methane from natural gas systems. EPA should make readers aware that substantial amounts of information will be made available in the coming year and as such it is quite possible that the inventory will continue to change dramatically.**

Third, EPA might provide a list of known issues with the current inventory, and be sure that tables and such flag those issues when needed. An example that has been fixed was the lack of data in previous editions of the inventory for 4 of the 6 NEMS regions for emissions from hydraulic fracking. This problem was noted in the text, but not prominently, and quite a few tables with data affected by this issue did not note it in any way. Fortunately, this large data hole has been fixed, but other gaps remain. One small gap, for example, is that methane emissions from produced water are only listed for coal bed methane.

Finally, EPA should consider modifying the approach to calculating emissions from gas production. Currently, separate emissions factors for each NEMS region are calculated for all or most production sources. This is not logical, because the variation within each NEMS region (which contains many basins, of many types) is much greater than the variation between NEMS regions. As a result of this approach, for example, the emissions factors for liquids unloading vary tremendously between NEMS regions. Odder still, in some NEMS regions the emissions factor is much larger for wells with plunger lifts, and in some NEMS region it is much smaller for those wells. The separate emissions factors for each NEMS region are only adding meaningless complexity to the data set.

Concluding Thoughts: Thank you again for considering these comments. If clarification or discussion of any of these comments would be helpful, please do not hesitate to contact me.

Respectfully,

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January 11, 2013

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Draft GHG Inventory Necessary Improvements

Leif and Melissa:

Thank you for the opportunity to participate in the expert review process for the 2013 Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011. Devon Energy submits comments on the following inaccuracies within the current draft inventory:

1. The Completions with Hydraulic Fracturing emission factor remains to be an overestimate and an inappropriate use of Natural Gas Star data, and a method of correctly using that data is suggested as an alternative.
2. The draft inventory does not account for the flaring of gas wells where flaring is not required by state regulations, and therefore text in the inventory is incorrect and misleading. An appropriate method of accounting for flaring is suggested as an alternative.
3. Other critical inaccuracies are addressed within the comments submitted by the American Petroleum Institute with respect to liquids unloading, the unconventional well count, and wells with plunger lifts. Devon's position on these errors and on other issues not addressed directly below can be understood by reference to the thoughtful comments presented by the American Petroleum Institute.

If the above recommendations are not addressed, the resulting inventory will contain values that are overestimated as a direct result of assumptions that do not match industry practice or regulatory structure. In the past years, the inventory has been used to support policy arguments and decisions that are both dangerous and irresponsible – the inventory has been used for erroneous calculations in scientific journal papers that claim natural gas is no better than coal for its climate change effects [1], it has been cited as a cost savings rationale to justify burdensome regulations on industry[2], and has been

[1] Howarth R, Santoro T, and Ingraffea A (2011) Methane and the greenhouse gas footprint of natural gas from shale formations, Climatic Change, DOI 10.1007/s10584-011-0061-5. http://www.springerlink.com/content/e384226wr4160653/
[2] 76 Fed. Reg. 52756/1

cited in a notice of intent to sue by attorney generals from northeastern states (Attachment F)[3] in a call for direct regulation of methane emissions that under actual industry practice, simply do not exist.

In the detailed comment below, Devon will demonstrate where the current draft of the inventory is in error, and which improvements can be made prior to the public comment period to improve upon the accuracy of the represented information.

Devon recognizes the significant progress that has been made between this draft inventory and last year's published version for the natural gas systems section of the report, and believes similar diligence and further refining of the data sources used and the methodology employed could lead to a product that is ultimately reflective of natural gas systems in the United States, and could lead to responsible policy decisions in the future.

Devon also noted the addition of footnote "aa" under Table A-1, and fully supports that caveat. EPA may consider directly highlighting the caution of that footnote by also including that text in the main body of the report.

Headquartered in Oklahoma City, Devon is a leading independent oil and gas exploration and production company. Devon's operations are focused onshore in the United States and Canada. We also own transmission and processing assets in many of our production areas, making us one of North America's larger producers of natural gas liquids. Devon is among the largest U.S. -based independent oil and natural gas producers. As such, we are pleased to offer these comments. Devon supports the Environmental Protection Agency's effort toward ever-improving environmental quality standards, and believes and accurate representation of actual emissions is important evidence that supports the continued use of natural gas and oil to fulfill much of the nation's energy needs.

[3] Letter to Lisa Jackson, *RE: Clean Air Act Notice of Intent to Sue for Failure to Determine Whether Standards of Performance Are Appropriate for Methane Emissions from Oil and Gas Operations, and to Establish Such Standards and Related Guidelines for New and Existing Sources*. December 11, 2012 - http://www.ag.ny.gov/pdfs/ltr_NSPS_Methane_Notice.pdf

1. Completion Emissions Factor

The EPA assumes that 9,000 Mscf of natural gas is emitted from most unconventional well completions. Devon questions the credibility of this emission factor. If true, it would mean that Devon would be losing more than $40 million per year to the atmosphere. Given this estimated forfeiture of significant income, Devon conducted investigations into the industry practices surrounding this estimate and the source of data for the initial estimate.

Through this investigation, Devon found the emissions estimate was derived using a flawed methodology, in which data EPA received from the Natural Gas Star program was used inappropriately. Problems with the methodology have previously been described in a recent IHS CERA report (Attachment B), in a position paper developed by Devon (Attachment C), in testimony provided by Devon (Attachment D) before the Senate EPW Subcommittee on clean air and Nuclear Safety, in testimony provided by Devon (Attachment G) in Edmond, OK on July 13, 2012, in a presentation presented by Devon (Attachment E) and a paper presented by Dr. Russel Evans and Dr. Jacob Dearmon from Oklahoma City University (Attachment H) at the Greenhouse Gas Inventory Workshop help on September 13-14, 2012, in Washington, DC. Unfortunately, even after these flaws were described and identified, the methodology was not significantly improved upon in the last year. The following are significant findings of those previous documents:

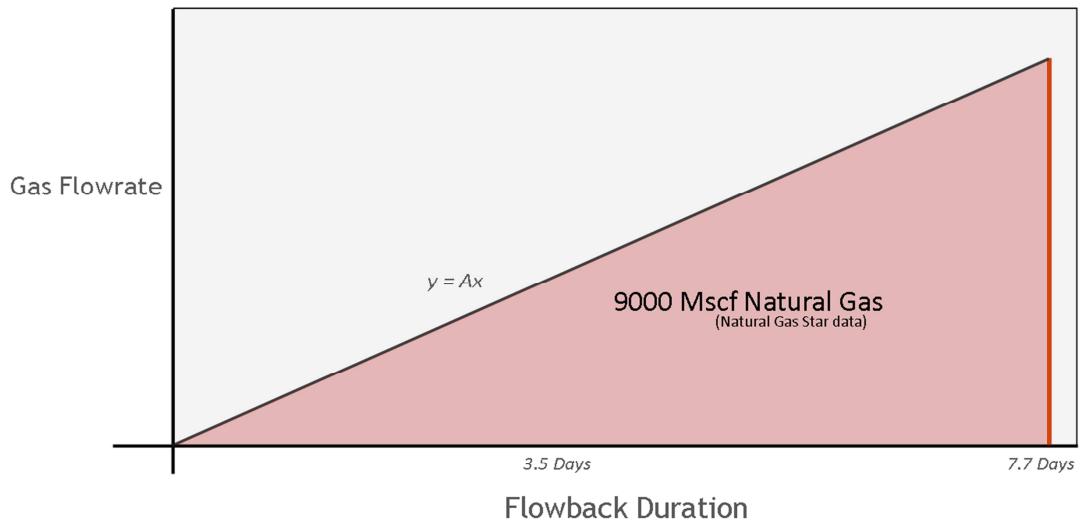
1. The EPA assumes that the volume of gas captured from performing a reduced emissions completion is the same volume of gas emitted when reduced emissions completions are not performed. This assumption is invalid. IHS CERA states "EPA derives its new emissions factor from two slide presentations at Natural Gas STAR technology transfer workshops, one in 2004 and one in 2007. These two presentations primarily describe methane that was captured during "green" well completions, not methane emissions. EPA assumes that all methane captured during these green completions would have been emitted in all other completions. This assumption does not reflect industry practice."
2. It is unknown how the Natural Gas Star data was calculated. It is not known whether consistent methods were used or how robust the data is. Green completion or reduced emission completion reporting under the Natural Gas Star Program was never meant to represent emissions from wells that were not green completed. The quality of this data and what it represents is questionable.
3. EPA assumes that producers vent to the atmosphere during flowback, rather than commonly flaring or capturing emissions, in those states that do not mandate flaring or recovery. This assumption is flawed and is further evaluated in the second section below.
4. EPA assumes that flowback periods for wells that use reduced emissions completion equipment are identical to those periods for wells that are vented or flared. However the URS Memo Data (Attachment A) provided below shows this assumption to be incorrect. From the survey data, for the wells that were completed using reduced emissions completion equipment, the average flowback duration was 7.7 days. For those wells whose emissions were flared or vented instead this average value was only 3.5 days.

5. Research studies and reports that estimate the life-cycle greenhouse gas emission from unconventional gas are using this gross overestimate. The potential policy implications of this could be damaging to the natural gas industry, and to local and national government officials when determining the appropriate energy mixture for the future with respect to limiting greenhouse gas emissions.
6. Statistical objections to the manner in which the Bayesian methodology was employed in the previous iteration of the report were raised by Dr. Russel Evans and Dr. Jacob Dearmon, including criticism of the use a tight prior variance value, which imposes the beliefs of the researcher into the data. To date, these objections have yet to be addressed in an update of the methodologies used to estimate the mean value for methane emissions from completions. The result of this failure is a flawed estimation method that is driven by inputs of the researcher, resulting in a significantly higher estimate than the data alone can be used to support.

While Devon believes the methodology for estimating the potential emissions from well completions of wells with hydraulic fracturing is incorrect, a significant improvement could be made based simply on the survey data previously provided to EPA. In a presentation provided by Devon to EPA at the Greenhouse Gas Inventory Workshop on September 13-14, 2012, Devon provided the technical basis supporting the fact that the rate of increase of the gas production rate increases nearly linearly from the moment that the wells begin to produce gas to the time that flowback ceases, and the well is sent to production. This position is also further corroborated by the presentation by Dr. Francis O'Sullivan from MIT[4]. Given this fact, the appropriate use of the data from the Natural Gas Star program would be to reduce the estimate based on the difference in flowback duration for wells that are vented or flared and those that use reduced emissions completions.

For example, if the Natural Gas Star data shows that a green completed well captures 9,000 Mscf of natural gas per completion, this gas captured would have increased at a near linear rate from the moment the well was first brought on flowback through the time it was put on production. If we assume, most conservatively, that gas was present at the very instant the well was put on flowback, the rate of increase of the gas rate for the average well can be solved by setting the area under the curve from x=0 to x=7.7 to 9000 for the integral $\int_0^{7.7} Ax\ dx$. The line represents the relationship between the instantaneous natural gas flowrate, y, at the given time, x.

[4] Francis O'Sullivan and Sergey Paltsev (2012) Shale gas production: potential versus actual greenhouse gas emissions. *Environmental Research Letters* doi: 10.1088/1748-9326/7/4/044030

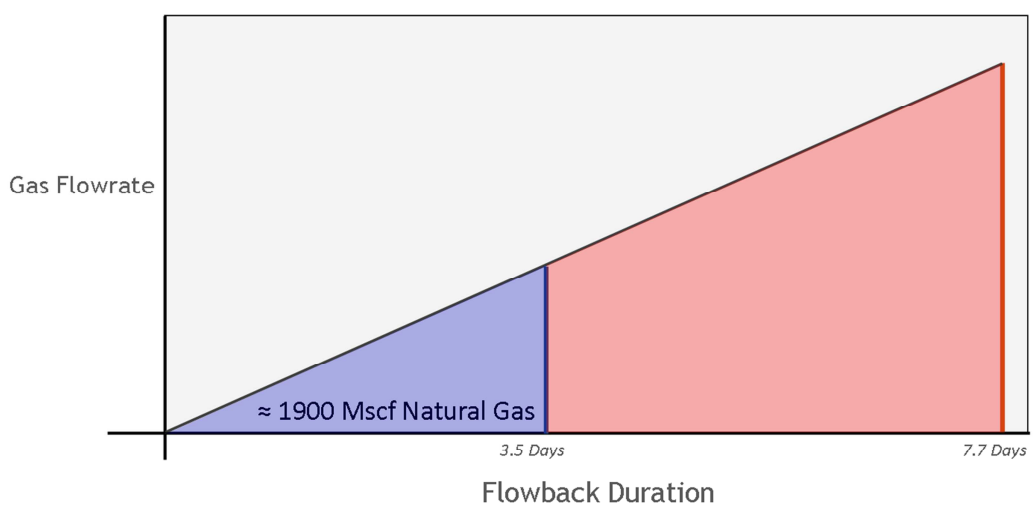


Solving for A,

$$9000 = \int_0^{7.6} Ax\,dx = A(1/2(7.7)^2)$$

$$A = \frac{9000}{1/2(7.7^2)} = 303.592\ Mscf/day^2$$

Then, knowing the rate of the increase in production rate for the average well, *A,* and setting x at 3.5 days, (the timeframe for those wells that are vented or flared) the area under that curve, which represents the total potential emissions from wells that do not use reduced emission completion equipment, can be estimated.



$$\int_0^{3.6} 303.592x\,dx = 303.592(1/2)(3.6^2) = 1859 \approx 1900\ Mscf/completion$$

This estimate while still very conservative would be much more reflective of actual emissions than the current EPA estimate of 9000 Mscf/completion of natural gas. Devon suggests EPA use this value, 1900 Mscf of natural gas for the potential emission factor for natural gas lost from completions from wells using hydraulic fracturing, at least until a definitive study is published which directly measures emissions from such completions. Devon believes an upcoming study being performed by the UT Austin Institute with the Environmental Defense Fund uses just that type of methodology, and therefore it will, if followed, accurately estimate methane emissions from wells completed with hydraulic fracturing.

2. Flaring Rate

The footnote on Table A: CH4 Emissions from Natural Gas Systems (Tg CO2 Eq.) notes that CH_4 that is captured, ***flared***, or otherwise controlled (and not emitted to the atmosphere) has been calculated and removed from the emission totals [emphasis added]. The only reductions used by the Greenhouse Gas Inventory are those from voluntary reductions and regulatory reductions.

Voluntary reductions in emissions include those reported through the Natural Gas Star Program, and include reduced emission completions and vapor recovery units. However, Natural Gas Star data does not include any reductions for those wells which are flared, as flaring is not considered a Recommended Technology or Practice under the Natural Gas Star Program[5]. Regulatory reductions in the greenhouse gas inventory recognize that some states require that natural gas produced during hydraulic fractured well completions be controlled, and not vented. In these states, the emissions from natural gas well completions are either recovered or flared. The analysis considered regulations in Wyoming and Colorado and determined that 15.1 percent of the total U.S. 2010 completions were covered by state regulations. However, this 15.1 percent represented simply the percentage of wells that were in Colorado or Wyoming as opposed to any other state. This regulatory reduction therefore doesn't recognize the flaring of wells in any other state in the U.S. even though flaring is a very often used practice in the production sector.

Flaring is used not exclusively to limit potential greenhouse gas emissions from completions, but it is also often used due to safety concerns for the protection of industry employees. The assumption that flaring is not used where there is no state regulation mandating its use is not an accurate representation of industry practice, and it is the suggestion of Devon Energy to create and alternate category for those wells that are flared reflective of actual survey data provided in the URS Memo Data (Attachment A) Provided below.

Knowing that the actual emissions from the industry must be much smaller than estimated by the previous inventory, Devon launched a data collection effort to provide the EPA with actual emission estimates from unconventional gas wells. Devon, working with ANGA, coordinated an industry effort to provide EPA with this data. A total of eight (8) companies participated in the second data collection effort and, provided data on approximately 1,200 wells. This data is attached below as the URS Memo Data (Attachment A). This effort revealed that 92% of the wells represented were completed using reduced emission completion technology, and that of the remaining wells, 55% of those that were not completed using reduced emissions completions were flared instead of vented. Devon suggests that the EPA adjusts their inventory to reflect this industry data in the revised inventory.

[5] Natural Gas Star Recommended Technologies and Practices http://www.epa.gov/gasstar/tools/recommended.html

Devon suggests that the EPA adds additional categories for each NEMS region as follows:

Draft:	Gas Well Completions without Hydraulic Fracturing
	Gas Well Completions with Hydraulic Fracturing
Proposed:	Gas Well Completions without Hydraulic Fracturing
	Gas Well Completions with Hydraulic Fracturing Flared
	Gas Well Completions with Hydraulic Fracturing Vented
	Gas Well Completions with Hydraulic Fracturing Using REC

Given the Natural Gas Star data, if EPA has a count of wells that Natural Gas Star data represents, EPA can use this particular percentage for each NEMS region to split the total number of wells. If well count data is not available to EPA, instead they can use data from the URS Memo Data (Attachment A). Based on this count, 92% of the surveyed wells were completed using reduced emissions completion equipment. The balance of the wells was flared (4.4%) or vented (3.6%). To see how this would be applied to a certain NEMS region, take the North East for example. The North East region, by the most recent estimate contained 1675 Gas Well Completions with Hydraulic Fracturing and 274 without hydraulic fracturing. Splitting that by the categories above would have a final result of:

North East NEMS Region

Proposed:	Gas Well Completions without Hydraulic Fracturing:	274	
	Gas Well Completions with Hydraulic Fracturing Flared:	74	(4.4%)
	Gas Well Completions with Hydraulic Fracturing Vented:	60	(3.6%)
	Gas Well Completions with Hydraulic Fracturing Using REC:	1541	(92%)

For regions with state regulations that require controls or flaring, those wells can be added to the category of Gas Well Completions with Hydraulic Fracturing Flared, and the balance can then be split according to the percentages above.

Each of these categories would have a unique emissions factor. This would more accurately represent the fact that while flares are also used as emissions control devices, they are an integral part of the safety of a particular site and are therefore a part of the process of completions. For this reason, completions that use flaring should not be considered as part of either a regulatory reduction or a voluntary reduction, but instead a unique process.

Gas Well Completions with Hydraulic fracturing using REC should use the original 9000 Mscf/completion from section 1 above until a better number is measured and presented through peer-reviewed scientific literature, so long as this number would be reduced by the Natural Gas Star program based voluntary reductions in *Table A-6: CH_4 Reductions Derived from the Natural Gas STAR Program (Gg)*. The potential emission factor for Gas Well Completions with Hydraulic Fracturing Vented should use improved emission factor from section 1 above of 1900 Mscf/completion of natural gas. The emission for Gas Well Completions with Hydraulic Fracturing Flared should be reduced by 93.1% to reflect the BACT standards

for 98% destruction efficiency and 95% capture efficiency. If the proposed number above were adopted, this number would be 131 Mscf/completion of natural gas.

This change would present another benefit for the EPA Climate Change division, in that it would incentivize greater participation by oil and gas production companies in the Natural Gas Star program. Currently, given the URS Memo data for the amount of wells having used reduced emissions completion equipment, and comparing that number to the voluntary reductions under the GHG inventory Table A-6, it becomes clear that there are at least an appreciable number of wells that are using reduced emissions completions, but not reporting volumes to the Natural Gas Star program. Given a unique category for wells completed using reduced emissions completions equipment, producers would be more likely to report volumes to the Natural Gas Star program to reduce the overall impact, as the potential emissions number would far exceed that of the other two.

The suggestions in this section, if adopted, would much more accurately represent the industry practice of flaring completion emissions of wells using hydraulic fracturing, while not irresponsibly duplicating any reductions in emissions.

3. Gas Wells Liquids Unloading

Other critical inaccuracies are included within the comments submitted by the American Petroleum Institute with respect to the liquids unloading, the unconventional well count, and wells with plunger lifts. Devon's position on these errors, and on other issues not addressed directly above can be understood by reference to the thoughtful comments submitted by the American Petroleum Institute.

Summary of Recommendations

In summary, Devon Energy makes several suggestions to improve the accuracy and representative nature of the draft greenhouse gas inventory report through the expert review process. Devon suggests the creation of new activity categories for different types of completions for wells using hydraulic fracturing: Gas Well Completions with Hydraulic Fracturing Flared, Gas Well Completions with Hydraulic Fracturing Vented, and Gas Well Completions with Hydraulic Fracturing Using REC. Devon suggests assigning to each of these categories potential emissions factors that accurately represent industry practice. Devon provides a suggested methodology for combining the best available data EPA has currently to correct the emissions factor from previous estimates, and this methodology should be used to provide potential emissions factors for each of the three new activity categories. Finally, Devon echoes the concerns expressed by the American Petroleum Institute in the comments that will be submitted by them with respect to Gas Wells Liquids Unloading

Devon supports the Environmental Protection Agency's effort toward ever-improving environmental quality standards, and believes and accurate representation of actual emissions is important evidence that supports the continued use of natural gas and oil to fulfill much of the nation's energy needs. Devon appreciates the opportunity to participate, and welcomes the opportunity to participate in future emissions inventories.

Sincerely,

Richard Luedecke
Vice President
Environmental, Health and Safety
Devon Energy

Cc: Bill Whitsitt – Devon Energy
Dave Hager – Devon Energy
Darren Smith – Devon Energy
Jesse Sandlin – Devon Energy
Joe Leonard – Devon Energy

Attachments:

Attachment A – URS Memo Data
Attachment B – IHS Cera Report – Mismeasuring Methane
Attachment C – Position Paper developed by Devon – EPA Seriously Overstates
Attachment D – Testimony by Devon before EPW Subcommittee
Attachment E – Presentation by Devon, September 13, 2012
Attachment F – Letter to Lisa Jackson, Notice of Intent to Sue
Attachment G – Testimony by Joe Leonard
Attachment H – OCU Technical Paper on Statistical Methods

Attachment A

URS

Revised Attachment 3: Gas Well Completion Emissions Data

January 17, 2012

Summary of New Data on Gas Well Completions

URS has assembled gas well completion data supplied by eight (8) upstream exploration and production companies in the United States. Each of these companies voluntarily provided data in the past two months. URS consolidated, blinded and summarized the data in order to avoid any anti-trust concerns. All supplied data was reviewed and used in this analysis.

This data was provided in response to a request by ANGA for actual current data that could be compared to EPA's assumptions used in the newly proposed "Oil and Natural Gas Air Pollution Standards, Subpart quad O". Some of the key EPA assumptions regarding completions were:

- Amount of flowback venting for fractured unconventional gas wells. *(EPA assumes 7623 Mscf of CH4/event, or 9175 Mscf of total gas/event).* Note: This emission estimate was originally published in the "Background Technical Support Document, Greenhouse Gas Emissions Reporting from the Petroleum and Natural Gas Industry" in support of Subpart W of the EPA's GHG Mandatory Reporting Rule.
- Duration of flowback *(EPA assumes 3-10 days),*
- Percent of completions that are controlled *(EPA assumes 15%),*
- Flaring vs. Venting *(EPA assumes 51% venting).*

Treatment of Data

Data was gathered by distributing an empty template spreadsheet formatted to receive completions data, with a separate tab for "green completion" information and a separate tab for ordinary completion (i.e. "non-green completions").

For non-green completions, the following data was gathered on each well completion reported: date of completion, AAPG basin location, type (horizontal or vertical), formation type, whether it was a recompletion or a new well, flowback duration, choke size, casing pressure, and whether the flowback gas was flared. There were one-hundred and three (103) well completions in the non-green completion dataset from five unique companies. Only five (5) of those were recompletions, the rest were new wells.

For green completions, the following data was gathered on each well completion reported: date of completion, basin, and flowback duration (time). There were 1475 wells in the green completion dataset from six companies.

The data has been scrubbed of company name, company division, and well name, so that there would be no impression of any conflict of interest nor unintended distribution of confidential business information. The resulting detailed data is attached to this memorandum.

Using EPA's recommended method for calculating emissions from gas well completions (as listed in the proposed September 9, 2011 revisions to Subpart W of the Mandatory GHG Reporting Rule), calculations were added to the data spreadsheet, using Equation W-11B for sonic flow conditions. Sonic flow was a reasonable assumption since most upstream pressures were very high (see histogram on casing pressures reported).

$$FR =$$

Where:

FR = Average flow rate in cubic feet per hour, under sonic flow conditions.
A = Cross sectional area of orifice (m^2).
T_u = Upstream temperature (degrees Kelvin).
187.08 = Constant with units of $m^2/(sec^2 * K)$.
1.27*105 = Conversion from m^3/second to ft^3/hour.

Some of the conservative assumptions used in the calculations were as follows:

- *Equation W-11B measures 100% Gas* – The flowback fluid contains a mixture of water, hydrocarbon liquids, and hydrocarbon gas that comes back from the well, and gas flow during a flowback may start and stop. The calculations presented here assume that the flow is all gas, that no water or hydrocarbon liquids exist in this outlet stream.
- *Maximum Choke Size* – Throughout flowback, operators alter choke sizes depending on the percentage of liquid and vapor, flow rate, and pressure of the stream. For the purposes of this analysis, the data gathered was only for the maximum choke size used while the flowback is making gas. This may overpredict gas flow.
- *Maximum Casing Pressure* – Casing pressure varies depending on how long the well has been flowing, due to formation pressure changes and production pipe pressure drops. To be conservative, only the maximum casing pressure found while the flowback is making gas was used. This may overpredict the gas flowrate.
- *Temperature* – A temperature of 200 ^{o}F was assumed for all flowbacks. Equation results are not overly sensitive to temperature.

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Summary of Results

For non-green completions, data was summarized by basin, and then the basins were averaged to produce a national average value. As can be seen in the following attached table, the resulting non-green completion flowback rate, using EPA's methodology, was 765 Mscf of gas. This is only a small fraction (8%) of the 9175 Mscf of gas per flowback that EPA had used as a basis for the subpart quad O - Oil and Natural Gas Air Pollution Standards. There was variability among the basins, which had averages ranging from 340 Mscf to 1160 Mscf. However, all of these averages, and in fact the individual company averages, which ranged from 443 to 1455 Mscf, are far below EPA's assumed value.

The percent of wells in the dataset that were green completions was 93% of 2011 well completions. Even among the 7% that were non-green completed, 54% of those were flared (rather than directly vented). This leaves approximately 3% of the well completions in the dataset that were uncontrolled. This is far lower than EPA's assumed value of 85% of the completions that are uncontrolled, with only 15% being green completed. EPA had also assumed 50% were flared.

The average duration of non-green completions in the dataset was 3.5 days (a histogram of duration distribution is shown), and the average duration of a green completion in the dataset was 7.7 days (again, a histogram of duration distribution is shown). EPA had assumed flowback duration of 3-10 days, but the dataset shows the non-green completions to be much shorter. Only the green completions cover the 3-10 day span that EPA had assumed.

Conclusions

While the dataset is limited to eight companies and just under 1500 wells, there is a reasonable representation across many of the unconventional gas development regions that are being developed in the United States. The attachment shows 2 maps of the locations of the wells in this dataset by AAPG basin. A comparative map from the Energy Information Administration of US Shale gas plays demonstrates a good overlap with many of those developing areas.

It appears that the EPA's 9175 Mscf/completion event for unconventional fractured wells is potentially overestimated by 1200%. The ANGA data may not be robust enough to provide a definitive new national flowback emission factor because of its reliance on conservative assumptions and limited regional data. However, it is far more current, and certainly collected on a far more consistent and transparent basis than any of the data EPA used to generate its 9175 Mscf. According to the Technical Support Document (TSD) for Subpart W of the EPA's GHG Mandatory Reporting Rule the 9175 Mscf was based upon some presentations by companies at

the EPA's voluntary Natural Gas Star program, mostly from a technology transfer session in 2004 (reference http://www.epa.gov/climatechange/emissions/downloads10/Subpart-W_TSD.pdf). While the Natural Gas Star companies presented data on their completions that were now recovered, this data was never meant to represent emissions from average well completions, was never documented with the quality needed for national inventory numbers, and in fact may represent only the subset of wells where the company had implemented their new practice.

Since EPA's proposed New Source Performance Standard for well completions and recompletions is based on a cost effectiveness analysis that was calculated using the Agency's 9175 Mscf estimate, this ANGA data calls into question the economics of requiring green completions and use of reduced-emissions-completion equipment in the newly proposed rules.

Continued dissemination and reliance upon older and less consistent information in Subpart W TSD by the agency raises serious quality concerns wherever the data may be used. The current EPA overestimate is frequently cited in studies and reports, leading to inaccurate conclusions about industry emissions and increasing the potential for federal or state governmental agencies to rely upon the inaccurate data in their decision making.

Thank you for the opportunity to provide this technical support.

Kind Regards,

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ATTACHMENTS

Table 1: Summary of Compiled Data

% of Wells GC		**93%**
% of Non-GC Flared		**54%**
Average Non-GC Flowback - AAPG Basin #160A	19 Samples	1,126 mcf
Non-GC Flowback - AAPG Basin #345	28 Samples	1,031 mcf
Non-GC Flowback - AAPG Basin #360	29 Samples	386 mcf
Non-GC Flowback - AAPG Basin #430	5 Samples	943 mcf
Non-GC Flowback - AAPG Basin #535	17 Samples	340 mcf
Average Flowback of Basins		765.1 mcf
Average total flowback of all non-GC events		765.4 mcf
Estimated emissions from well completions with hydraulic fracturing (Table 4-2, EPA TSD)		**9,175 mcf**
Using Equation W-11B		

Figure 2: Distribution of Single-Event Flowback Volumes (Non-Green Completions only)

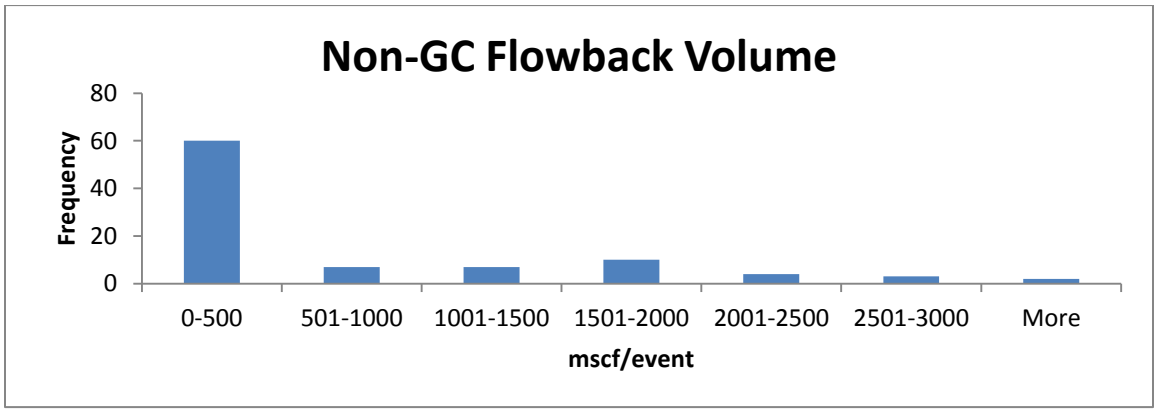


Figure 3: Distribution of Casing Pressures (Non-Green Completions only)

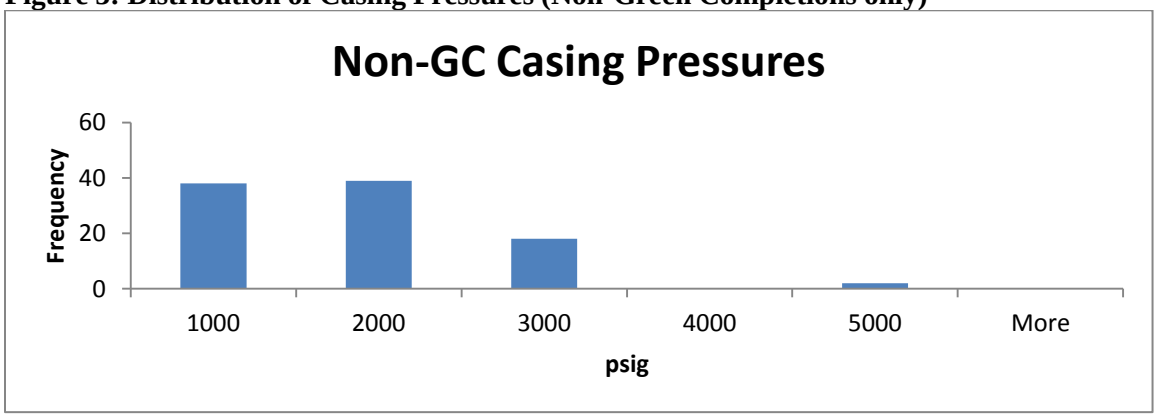


Figure 4: Distribution of Green Completion Durations

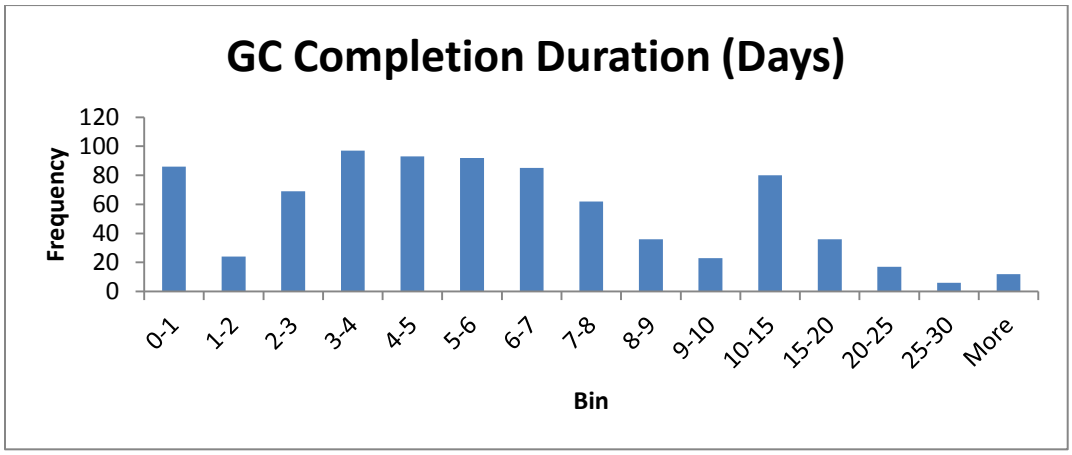


Figure 5: AAPG Basins Represented in Survey Sample (Non-GC Only)

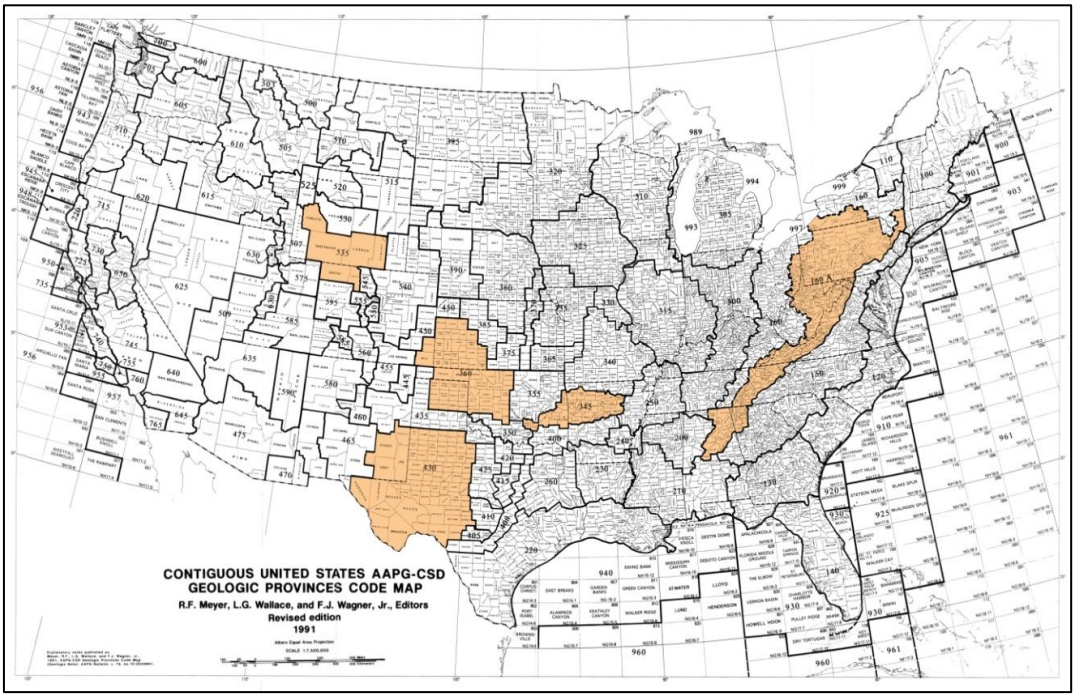
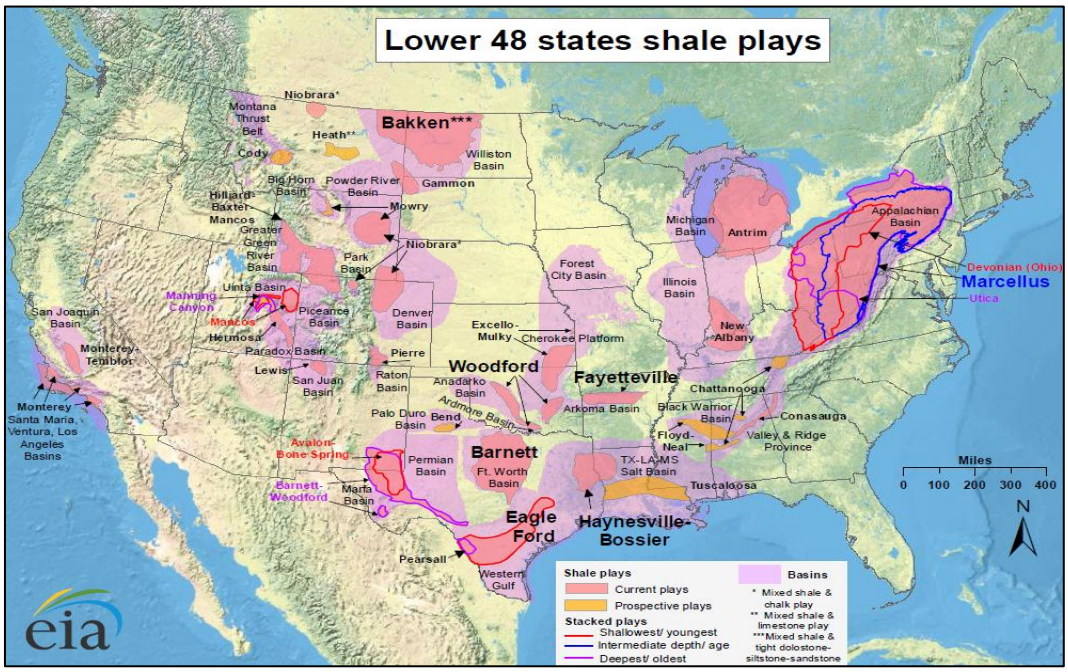


Figure 6: Location of Major Shale Plays in Continental US



Source:
http://www.slb.com/services/industry_challenges/~/media/Files/industry_challenges/unconventional_gas/other/shale_plays_lower_48.ashx

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Table 6: Survey Data (Non-Green Completions, non-GC)

									When Making Gas				
Well Number	Date Well Completed	Basin	Vertical or Horizontal?	Exploration, Appraisal, or Development?	Type of Well: Tight Sand, CBM, or Shale?	New Completion or Re-Completion?	Type of Frac: H_2O, N_2, CO_2, or Other	If No, Flared or Vented?	Flowback Duration (Hours)	MAX Choke Size (64ths)	MAX Casing Pressure (psig)	Flowback (Mscf)	Duration (Days)
R1 - Well 1	6/1/2011	Delaware	Horizontal	Development	Shale	New Completion	H2O	Flared	336	14	4175	271	14.0
R1 - Well 2	2/23/2011	Delaware	Horizontal	Development	Shale	New Completion	H2O	Flared	120	14	4200	97	5.0
R1 - Well 3	6/28/2011	Delaware	Vertical	Exploration	Shale	New Completion	H2O	Flared	257	46	500	2,236	10.7
R1 - Well 4	7/26/2011	Delaware	Horizontal	Exploration	Shale	New Completion	H2O	Flared	758	24	1900	1,795	31.6
R1 - Well 5	5/4/2011	Delaware	Vertical	Exploration	Shale	New Completion	H2O	Flared	192	20	1900	316	8.0
R1 - Well 6	2/4/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	144	24	1100	341	6.0
R1 - Well 7	2/15/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	216	24	1500	511	9.0
R1 - Well 8	2/16/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	48	18	2300	64	2.0
R1 - Well 9	2/24/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	96	18	1900	128	4.0
R1 - Well 10	6/7/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	192	22	1100	382	8.0
R1 - Well 11	6/8/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	48	24	1650	114	2.0
R1 - Well 12	6/9/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	120	20	1300	197	5.0
R1 - Well 13	7/28/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	96	22	2200	191	4.0
R1 - Well 14	7/29/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	72	20	1450	118	3.0
R1 - Well 15	8/2/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	144	64	1250	2,425	6.0
R1 - Well 16	8/27/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	72	22	1350	143	3.0
R1 - Well 17	8/28/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	120	22	1625	239	5.0
R1 - Well 18	8/28/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	96	22	1550	191	4.0
R1 - Well 19	8/30/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	96	24	1600	227	4.0
R1 - Well 20	8/31/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	96	20	700	158	4.0
R1 - Well 21	8/31/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	96	20	1080	158	4.0
R1 - Well 22	8/31/2011	Eastern Green Riv	Vertical	Development	Tight Sand	New Completion	H2O	Flared	120	20	900	197	5.0
R1 - Well 23	5/27/2011	MidCon - Cana	Horizontal	Development	Shale	New Completion	H20	Flared	59	32	2900	248	2.5
R1 - Well 24	5/18/2011	MidCon - Cana	Horizontal	Development	Shale	New Completion	H20	Flared	184	20	2400	303	7.7
R1 - Well 25	5/27/2011	MidCon - Cana	Horizontal	Development	Shale	New Completion	H20	Flared	36	20	4500	59	1.5
R1 - Well 26	6/14/2011	MidCon - Cana	Horizontal	Development	Shale	New Completion	H20	Flared	48	22	2000	96	2.0
R1 - Well 27	1/14/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	15	24	0	36	0.6
R1 - Well 28	2/4/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	118	24	0	279	4.9
R1 - Well 29	2/23/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	15	48	1350	142	0.6
R1 - Well 30	3/3/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	73	48	2025	691	3.0
R1 - Well 31	3/4/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	24	48	1020	227	1.0
R1 - Well 32	3/22/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	99	48	1750	938	4.1
R1 - Well 33	4/8/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	14	48	1380	133	0.6
R1 - Well 34	4/14/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	11	48	1350	104	0.5
R1 - Well 35	4/29/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	32	48	2400	303	1.3
R1 - Well 36	5/13/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Flared	45	48	2750	426	1.9
R1 - Well 37	5/14/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	58	24	0	137	2.4
R1 - Well 38	5/24/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Flared	79	48	2450	748	3.3
R1 - Well 39	6/2/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	23	24	0	54	1.0
R1 - Well 40	6/29/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	109	48	950	1,032	4.5
R1 - Well 41	7/1/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	31	48	650	294	1.3
R1 - Well 42	7/4/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	52	48	700	493	2.2
R1 - Well 43	7/6/2011	Granite Wash	Vertical	Development	Tight Sand	Recompletion	H2O	Vented	52	24	1550	123	2.2
R1 - Well 44	7/11/2011	Granite Wash	Vertical	Development	Tight Sand	Recompletion	H2O	Vented	35	24	0	83	1.5
R1 - Well 45	7/28/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	169	64	490	2,846	7.0
R1 - Well 46	8/2/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	53	40	950	349	2.2
R1 - Well 47	8/5/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	24	48	2100	227	1.0
R1 - Well 48	8/13/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	3	48	1850	28	0.1
R1 - Well 49	8/19/2011	Granite Wash	Horizontal	Development	Tight Sand	New Completion	H2O	Vented	85	48	850	805	3.5
R2 - Well 1	6/2/2011	160A	HORIZONTAL	Appraisal	Shale	New Completion	H2O	Flared	49	48	1675	464	2.0
R2- Well 2	6/2/2011	160A	HORIZONTAL	Appraisal	Shale	New Completion	H2O	Flared	75	48	1460	710	3.1
R2 - Well 3	6/2/2011	160A	HORIZONTAL	Appraisal	Shale	New Completion	H2O	Flared	97	48	1360	919	4.0
R2 - Well 4	1/5/2011	345	HORIZONTAL	Development	Shale	New Completion	H2O	Flared	114	48	1500	1,080	4.8
R2- Well 5	1/15/2011	345	HORIZONTAL	Development	Shale	New Completion	H2O	Flared	70	128	840	4,715	2.9
R2 - Well 6	2/12/2011	345	HORIZONTAL	Development	Shale	New Completion	H2O	Flared	81	64	740	1,364	3.4
R2 - Well 7	2/18/2011	345	HORIZONTAL	Development	Shale	New Completion	H2O	Flared	64	64	520	1,078	2.7
R2- Well 8	3/4/2011	345	HORIZONTAL	Development	Shale	New Completion	H2O	Flared	0	0	0		0.0
R2 - Well 9	3/11/2011	345	HORIZONTAL	Development	Shale	New Completion	H2O	Flared	138	48	480	1,307	5.8
R2 - Well 10	3/17/2011	345	HORIZONTAL	Development	Shale	New Completion	H2O	Flared	0	0	0		
R2- Well 11	1/31/2011	360	VERTICAL	Development		New Completion	N2	Vented	0	0	0		
R2 - Well 12	6/17/2011	360	HORIZONTAL	Development	Tight Sand	New Completion	H2O	Vented	0	0	0		

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Well Number	Date Well Completed	Basin	Vertical or Horizontal?	Exploration, Appraisal, or Development?	Type of Well: Tight Sand, CBM, or Shale?	New Completion or Re-Completion?	Type of Frac: H_2O, N_2, CO_2, or Other	If No, Flared or Vented?	When Making Gas: Flowback Duration (Hours)	When Making Gas: MAX Choke Size (64ths)	When Making Gas: MAX Casing Pressure (psig)	Flowback (Mscf)	Duration (Days)
R3 - Well 1	1/21/2011	Marcellus	Horizontal	Development	Shale	New Completion	H2O	Flared	20	32	1642	84	0.8
R3 - Well 2	1/24/2011	Marcellus	Horizontal	Development	Shale	New Completion	H2O	Flared	10	34	2450	48	0.4
R3 - Well 3	3/26/2011	Marcellus	Horizontal	Development	Shale	New Completion	H2O	Flared	13	30	2275	48	0.5
R3 - Well 4	3/26/2011	Marcellus	Horizontal	Development	Shale	New Completion	H2O	Flared	25	32	2500	105	1.0
R3 - Well 5	6/1/2011	Marcellus	Horizontal	Appraisal	Shale	New Completion	H2O	Flared	301	48	2853	2,851	12.5
R3 - Well 6	6/1/2011	Marcellus	Horizontal	Appraisal	Shale	New Completion	H2O	Flared	198	48	2239	1,875	8.3
R3 - Well 7	6/1/2011	Marcellus	Horizontal	Appraisal	Shale	New Completion	H2O	Flared	262	48	2097	2,482	10.9
R3 - Well 8	6/1/2011	Marcellus	Horizontal	Appraisal	Shale	New Completion	H2O	Flared	291	64	2100	4,900	12.1
R3 - Well 9	6/1/2011	Marcellus	Horizontal	Appraisal	Shale	New Completion	H2O	Flared	271	48	1591	2,567	11.3
R3 - Well 10	6/1/2011	Marcellus	Horizontal	Appraisal	Shale	New Completion	H2O	Flared	172	48	2106	1,629	7.2
R3 - Well 11	7/23/2011	Marcellus	Horizontal	Development	Shale	New Completion	H2O	Flared	152	48	925	1,440	6.3
R3 - Well 12	8/9/2011	Marcellus	Horizontal	Development	Shale	New Completion	H2O	Flared	70	24	2332	166	2.9
R3 - Well 13	8/26/2011	Marcellus	Horizontal	Development	Shale	New Completion	H2O	Flared	39	48	1900	369	1.6
R3 - Well 14	5/18/2011	Marcellus	Horizontal	Development	Shale	New Completion	H2O	Flared	15	48	1581	142	0.6
R3 - Well 15	8/3/2011	Marcellus	Horizontal	Development	Shale	New Completion	H2O	Flared	38	48	268	360	1.6
R3 - Well 16	8/27/2011	Marcellus	Horizontal	Development	Shale	New Completion	H2O	Flared	24	48	1266	227	1.0
R4 - Well 1	1/4/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	64	980	404	1.0
R4 - Well 2	1/7/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	128	920	1,617	1.0
R4 - Well 3	1/13/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	128	570	1,617	1.0
R4 - Well 4	1/17/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	128	491	1,617	1.0
R4 - Well 5	1/26/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	64	925	404	1.0
R4 - Well 6	1/29/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	23.94	64	950	403	1.0
R4 - Well 7	2/1/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	128	1000	1,617	1.0
R4 - Well 8	2/9/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	64	1000	404	1.0
R4 - Well 9	3/8/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	128	1124	1,617	1.0
R4 - Well 10	3/11/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	128	950	1,617	1.0
R4 - Well 11	3/14/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	64	660	404	1.0
R4 - Well 12	4/1/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	128	580	1,617	1.0
R4 - Well 13	4/4/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	32	128	500	2,155	1.3
R4 - Well 14	4/12/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	72	64	1200	1,212	3.0
R4 - Well 15	4/18/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	64	1475	404	1.0
R4 - Well 16	4/23/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	64	1200	404	1.0
R4 - Well 17	4/26/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	35	1050	121	1.0
R4 - Well 18	5/19/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	26	64	1075	438	1.1
R4 - Well 19	5/22/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	23.8	64	590	401	1.0
R4 - Well 20	5/26/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	24	64	1008	404	1.0
R4 - Well 21	5/29/2011	Woodford	Horizontal	Development	Shale	New Completion	H2O	Vented	26	64	985	438	1.1
R5 - Well 1	1/26/2011	East Texas	Vertical	Exploration	Shale	New Completion	H2O	Flared					
R5 - Well 2	1/27/2011	East Texas	Vertical	Exploration	Shale	New Completion	H2O	Flared					
R5 - Well 3	1/13/2011	Arkoma	Vertical	Development	Tight Sant	Re-Completion	N2	Vented					
R5 - Well 4	3/2/2011	Arkoma	Vertical	Development	Tight Sant	Re-Completion	N2	Vented					
R5 - Well 5	1/13/2011	Arkoma	Vertical	Development	Tight Sant	Re-Completion	N2	Vented					

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Table 7: Survey Data (Green Completions GC)

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR1 - Well 1	2/7/11	East Texas	433	18.0
GCR1 - Well 2	5/25/11	East Texas	400	16.7
GCR1 - Well 3	1/11/11	East Texas	422	17.6
GCR1 - Well 4	5/26/11	East Texas	474	19.8
GCR1 - Well 5	3/18/11	East Texas	746	31.1
GCR1 - Well 6	1/3/11	East Texas	634	26.4
GCR1 - Well 7	1/9/11	East Texas	108	4.5
GCR1 - Well 8	4/16/11	East Texas	336	14.0
GCR1 - Well 9	1/9/11	East Texas	120	5.0
GCR1 - Well 10	4/5/11	East Texas	276	11.5
GCR1 - Well 11	3/20/11	East Texas	360	15.0
GCR1 - Well 12	3/19/11	East Texas	324	13.5
GCR1 - Well 13	6/8/11	East Texas	264	11.0
GCR1 - Well 14	2/6/11	East Texas	288	12.0
GCR1 - Well 15	8/5/11	East Texas	420	17.5
GCR1 - Well 16	8/31/11	East Texas	156	6.5
GCR1 - Well 17	8/6/11	East Texas	492	20.5
GCR1 - Well 18	6/1/11	East Texas	288	12.0
GCR1 - Well 19	4/10/11	East Texas	540	22.5
GCR1 - Well 20	3/22/11	East Texas	370	15.4
GCR1 - Well 21	7/1/11	East Texas	216	9.0
GCR1 - Well 22	2/25/11	East Texas	490	20.4
GCR1 - Well 23	2/4/11	Eastern Green River	96	4.0
GCR1 - Well 24	2/15/11	Eastern Green River	72	3.0
GCR1 - Well 25	2/15/11	Eastern Green River	72	3.0
GCR1 - Well 26	2/16/11	Eastern Green River	72	3.0
GCR1 - Well 27	2/17/11	Eastern Green River	96	4.0
GCR1 - Well 28	2/25/11	Eastern Green River	96	4.0
GCR1 - Well 29	2/25/11	Eastern Green River	72	3.0

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Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR1 - Well 30	6/7/11	Eastern Green River	72	3.0
GCR1 - Well 31	6/8/11	Eastern Green River	72	3.0
GCR1 - Well 32	6/8/11	Eastern Green River	48	2.0
GCR1 - Well 33	6/9/11	Eastern Green River	72	3.0
GCR1 - Well 34	6/22/11	Eastern Green River	48	2.0
GCR1 - Well 35	6/22/11	Eastern Green River	72	3.0
GCR1 - Well 36	6/22/11	Eastern Green River	72	3.0
GCR1 - Well 37	6/23/11	Eastern Green River	72	3.0
GCR1 - Well 38	6/23/11	Eastern Green River	72	3.0
GCR1 - Well 39	7/28/11	Eastern Green River	120	5.0
GCR1 - Well 40	7/29/11	Eastern Green River	96	4.0
GCR1 - Well 41	1/4/11	Fort Worth Basin	48	2.0
GCR1 - Well 42	1/10/11	Fort Worth Basin	24	1.0
GCR1 - Well 43	1/10/11	Fort Worth Basin	72	3.0
GCR1 - Well 44	1/10/11	Fort Worth Basin	72	3.0
GCR1 - Well 45	1/12/11	Fort Worth Basin	24	1.0
GCR1 - Well 46	1/13/11	Fort Worth Basin	48	2.0
GCR1 - Well 47	1/17/11	Fort Worth Basin	48	2.0
GCR1 - Well 48	1/18/11	Fort Worth Basin	144	6.0
GCR1 - Well 49	1/21/11	Fort Worth Basin	144	6.0
GCR1 - Well 50	1/21/11	Fort Worth Basin	264	11.0
GCR1 - Well 51	1/24/11	Fort Worth Basin	120	5.0
GCR1 - Well 52	1/24/11	Fort Worth Basin	48	2.0
GCR1 - Well 53	1/25/11	Fort Worth Basin	168	7.0
GCR1 - Well 54	1/26/11	Fort Worth Basin	24	1.0
GCR1 - Well 55	1/26/11	Fort Worth Basin	168	7.0
GCR1 - Well 56	1/26/11	Fort Worth Basin	24	1.0
GCR1 - Well 57	1/26/11	Fort Worth Basin	144	6.0
GCR1 - Well 58	1/26/11	Fort Worth Basin	96	4.0
GCR1 - Well 59	1/27/11	Fort Worth Basin	48	2.0
GCR1 - Well 60	1/28/11	Fort Worth Basin	72	3.0
GCR1 - Well 61	1/28/11	Fort Worth Basin	96	4.0
GCR1 - Well 62	2/7/11	Fort Worth Basin	72	3.0
GCR1 - Well 63	2/7/11	Fort Worth Basin	24	1.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR1 - Well 64	2/9/11	Fort Worth Basin	72	3.0
GCR1 - Well 65	2/12/11	Fort Worth Basin	72	3.0
GCR1 - Well 66	2/12/11	Fort Worth Basin	48	2.0
GCR1 - Well 67	2/12/11	Fort Worth Basin	168	7.0
GCR1 - Well 68	2/13/11	Fort Worth Basin	72	3.0
GCR1 - Well 69	2/15/11	Fort Worth Basin	144	6.0
GCR1 - Well 70	2/16/11	Fort Worth Basin	96	4.0
GCR1 - Well 71	2/16/11	Fort Worth Basin	48	2.0
GCR1 - Well 72	2/17/11	Fort Worth Basin	24	1.0
GCR1 - Well 73	2/18/11	Fort Worth Basin	672	28.0
GCR1 - Well 74	2/18/11	Fort Worth Basin	672	28.0
GCR1 - Well 75	2/25/11	Fort Worth Basin	24	1.0
GCR1 - Well 76	3/18/11	Fort Worth Basin	96	4.0
GCR1 - Well 77	3/18/11	Fort Worth Basin	96	4.0
GCR1 - Well 78	3/26/11	Fort Worth Basin	72	3.0
GCR1 - Well 79	3/26/11	Fort Worth Basin	192	8.0
GCR1 - Well 80	3/26/11	Fort Worth Basin	120	5.0
GCR1 - Well 81	3/28/11	Fort Worth Basin	120	5.0
GCR1 - Well 82	4/1/11	Fort Worth Basin	24	1.0
GCR1 - Well 83	4/2/11	Fort Worth Basin	96	4.0
GCR1 - Well 84	4/3/11	Fort Worth Basin	240	10.0
GCR1 - Well 85	4/3/11	Fort Worth Basin	72	3.0
GCR1 - Well 86	4/4/11	Fort Worth Basin	240	10.0
GCR1 - Well 87	4/6/11	Fort Worth Basin	72	3.0
GCR1 - Well 88	4/9/11	Fort Worth Basin	168	7.0
GCR1 - Well 89	4/10/11	Fort Worth Basin	120	5.0
GCR1 - Well 90	4/11/11	Fort Worth Basin	336	14.0
GCR1 - Well 91	4/11/11	Fort Worth Basin	216	9.0
GCR1 - Well 92	4/13/11	Fort Worth Basin	144	6.0
GCR1 - Well 93	4/26/11	Fort Worth Basin	216	9.0
GCR1 - Well 94	4/26/11	Fort Worth Basin	216	9.0
GCR1 - Well 95	4/29/11	Fort Worth Basin	96	4.0
GCR1 - Well 96	5/1/11	Fort Worth Basin	744	31.0
GCR1 - Well 97	5/2/11	Fort Worth Basin	552	23.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR1 - Well 98	5/3/11	Fort Worth Basin	144	6.0
GCR1 - Well 99	5/3/11	Fort Worth Basin	696	29.0
GCR1 - Well 100	5/15/11	Fort Worth Basin	120	5.0
GCR1 - Well 101	5/21/11	Fort Worth Basin	48	2.0
GCR1 - Well 102	5/26/11	Fort Worth Basin	144	6.0
GCR1 - Well 103	5/26/11	Fort Worth Basin	120	5.0
GCR1 - Well 104	5/27/11	Fort Worth Basin	120	5.0
GCR1 - Well 105	5/28/11	Fort Worth Basin	72	3.0
GCR1 - Well 106	5/28/11	Fort Worth Basin	96	4.0
GCR1 - Well 107	5/31/11	Fort Worth Basin	48	2.0
GCR1 - Well 108	5/31/11	Fort Worth Basin	48	2.0
GCR1 - Well 109	6/2/11	Fort Worth Basin	288	12.0
GCR1 - Well 110	6/2/11	Fort Worth Basin	48	2.0
GCR1 - Well 111	6/9/11	Fort Worth Basin	24	1.0
GCR1 - Well 112	6/18/11	Fort Worth Basin	216	9.0
GCR1 - Well 113	6/18/11	Fort Worth Basin	120	5.0
GCR1 - Well 114	6/23/11	Fort Worth Basin	96	4.0
GCR1 - Well 115	6/23/11	Fort Worth Basin	48	2.0
GCR1 - Well 116	6/24/11	Fort Worth Basin	24	1.0
GCR1 - Well 117	6/25/11	Fort Worth Basin	24	1.0
GCR1 - Well 118	6/28/11	Fort Worth Basin	48	2.0
GCR1 - Well 119	7/11/11	Fort Worth Basin	96	4.0
GCR1 - Well 120	7/19/11	Fort Worth Basin	264	11.0
GCR1 - Well 121	8/1/11	Fort Worth Basin	240	10.0
GCR1 - Well 122	8/1/11	Fort Worth Basin	96	4.0
GCR1 - Well 123	8/1/11	Fort Worth Basin	96	4.0
GCR1 - Well 124	8/1/11	Fort Worth Basin	96	4.0
GCR1 - Well 125	8/1/11	Fort Worth Basin	96	4.0
GCR1 - Well 126	8/2/11	Fort Worth Basin	216	9.0
GCR1 - Well 127	8/9/11	Fort Worth Basin	24	1.0
GCR1 - Well 128	8/15/11	Fort Worth Basin	168	7.0
GCR1 - Well 129	8/17/11	Fort Worth Basin	120	5.0
GCR1 - Well 130	8/19/11	Fort Worth Basin	264	11.0
GCR1 - Well 131	8/19/11	Fort Worth Basin	168	7.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR1 - Well 132	8/23/11	Fort Worth Basin	384	16.0
GCR1 - Well 133	8/23/11	Fort Worth Basin	360	15.0
GCR1 - Well 134	8/23/11	Fort Worth Basin	384	16.0
GCR1 - Well 135	1/12/11	Fort Worth Basin	144	6.0
GCR1 - Well 136	1/12/11	Fort Worth Basin	144	6.0
GCR1 - Well 137	1/13/11	Fort Worth Basin	168	7.0
GCR1 - Well 138	1/14/11	Fort Worth Basin	192	8.0
GCR1 - Well 139	1/17/11	Fort Worth Basin	120	5.0
GCR1 - Well 140	1/18/11	Fort Worth Basin	336	14.0
GCR1 - Well 141	1/18/11	Fort Worth Basin	336	14.0
GCR1 - Well 142	1/18/11	Fort Worth Basin	576	24.0
GCR1 - Well 143	1/20/11	Fort Worth Basin	72	3.0
GCR1 - Well 144	1/21/11	Fort Worth Basin	168	7.0
GCR1 - Well 145	1/25/11	Fort Worth Basin	408	17.0
GCR1 - Well 146	1/26/11	Fort Worth Basin	168	7.0
GCR1 - Well 147	1/26/11	Fort Worth Basin	168	7.0
GCR1 - Well 148	1/27/11	Fort Worth Basin	120	5.0
GCR1 - Well 149	1/27/11	Fort Worth Basin	168	7.0
GCR1 - Well 150	2/6/11	Fort Worth Basin	288	12.0
GCR1 - Well 151	2/8/11	Fort Worth Basin	600	25.0
GCR1 - Well 152	2/8/11	Fort Worth Basin	48	2.0
GCR1 - Well 153	2/9/11	Fort Worth Basin	144	6.0
GCR1 - Well 154	2/9/11	Fort Worth Basin	192	8.0
GCR1 - Well 155	2/12/11	Fort Worth Basin	240	10.0
GCR1 - Well 156	2/12/11	Fort Worth Basin	432	18.0
GCR1 - Well 157	2/14/11	Fort Worth Basin	360	15.0
GCR1 - Well 158	2/15/11	Fort Worth Basin	192	8.0
GCR1 - Well 159	2/16/11	Fort Worth Basin	312	13.0
GCR1 - Well 160	2/17/11	Fort Worth Basin	288	12.0
GCR1 - Well 161	2/19/11	Fort Worth Basin	96	4.0
GCR1 - Well 162	2/23/11	Fort Worth Basin	24	1.0
GCR1 - Well 163	3/12/11	Fort Worth Basin	216	9.0
GCR1 - Well 164	3/21/11	Fort Worth Basin	168	7.0
GCR1 - Well 165	3/22/11	Fort Worth Basin	144	6.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR1 - Well 166	3/23/11	Fort Worth Basin	168	7.0
GCR1 - Well 167	3/23/11	Fort Worth Basin	168	7.0
GCR1 - Well 168	3/23/11	Fort Worth Basin	168	7.0
GCR1 - Well 169	3/24/11	Fort Worth Basin	144	6.0
GCR1 - Well 170	3/25/11	Fort Worth Basin	192	8.0
GCR1 - Well 171	3/26/11	Fort Worth Basin	96	4.0
GCR1 - Well 172	3/27/11	Fort Worth Basin	72	3.0
GCR1 - Well 173	3/28/11	Fort Worth Basin	120	5.0
GCR1 - Well 174	4/5/11	Fort Worth Basin	240	10.0
GCR1 - Well 175	4/12/11	Fort Worth Basin	72	3.0
GCR1 - Well 176	4/14/11	Fort Worth Basin	360	15.0
GCR1 - Well 177	4/15/11	Fort Worth Basin	312	13.0
GCR1 - Well 178	4/16/11	Fort Worth Basin	312	13.0
GCR1 - Well 179	4/17/11	Fort Worth Basin	72	3.0
GCR1 - Well 180	4/17/11	Fort Worth Basin	360	15.0
GCR1 - Well 181	4/18/11	Fort Worth Basin	24	1.0
GCR1 - Well 182	4/18/11	Fort Worth Basin	144	6.0
GCR1 - Well 183	4/18/11	Fort Worth Basin	264	11.0
GCR1 - Well 184	4/19/11	Fort Worth Basin	96	4.0
GCR1 - Well 185	4/19/11	Fort Worth Basin	120	5.0
GCR1 - Well 186	4/19/11	Fort Worth Basin	168	7.0
GCR1 - Well 187	4/20/11	Fort Worth Basin	96	4.0
GCR1 - Well 188	4/22/11	Fort Worth Basin	120	5.0
GCR1 - Well 189	4/23/11	Fort Worth Basin	192	8.0
GCR1 - Well 190	4/26/11	Fort Worth Basin	120	5.0
GCR1 - Well 191	4/29/11	Fort Worth Basin	48	2.0
GCR1 - Well 192	4/30/11	Fort Worth Basin	24	1.0
GCR1 - Well 193	4/30/11	Fort Worth Basin	384	16.0
GCR1 - Well 194	5/2/11	Fort Worth Basin	48	2.0
GCR1 - Well 195	5/8/11	Fort Worth Basin	144	6.0
GCR1 - Well 196	5/10/11	Fort Worth Basin	312	13.0
GCR1 - Well 197	5/10/11	Fort Worth Basin	312	13.0
GCR1 - Well 198	5/11/11	Fort Worth Basin	168	7.0
GCR1 - Well 199	5/11/11	Fort Worth Basin	288	12.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR1 - Well 200	5/12/11	Fort Worth Basin	144	6.0
GCR1 - Well 201	5/12/11	Fort Worth Basin	168	7.0
GCR1 - Well 202	5/12/11	Fort Worth Basin	264	11.0
GCR1 - Well 203	5/13/11	Fort Worth Basin	120	5.0
GCR1 - Well 204	5/13/11	Fort Worth Basin	144	6.0
GCR1 - Well 205	5/16/11	Fort Worth Basin	168	7.0
GCR1 - Well 206	5/17/11	Fort Worth Basin	144	6.0
GCR1 - Well 207	5/18/11	Fort Worth Basin	168	7.0
GCR1 - Well 208	5/23/11	Fort Worth Basin	96	4.0
GCR1 - Well 209	5/24/11	Fort Worth Basin	72	3.0
GCR1 - Well 210	6/3/11	Fort Worth Basin	192	8.0
GCR1 - Well 211	6/3/11	Fort Worth Basin	192	8.0
GCR1 - Well 212	6/6/11	Fort Worth Basin	192	8.0
GCR1 - Well 213	6/9/11	Fort Worth Basin	168	7.0
GCR1 - Well 214	6/14/11	Fort Worth Basin	144	6.0
GCR1 - Well 215	6/14/11	Fort Worth Basin	144	6.0
GCR1 - Well 216	6/14/11	Fort Worth Basin	144	6.0
GCR1 - Well 217	6/15/11	Fort Worth Basin	120	5.0
GCR1 - Well 218	6/20/11	Fort Worth Basin	192	8.0
GCR1 - Well 219	6/20/11	Fort Worth Basin	192	8.0
GCR1 - Well 220	6/21/11	Fort Worth Basin	168	7.0
GCR1 - Well 221	6/27/11	Fort Worth Basin	120	5.0
GCR1 - Well 222	6/28/11	Fort Worth Basin	144	6.0
GCR1 - Well 223	6/30/11	Fort Worth Basin	264	11.0
GCR1 - Well 224	7/1/11	Fort Worth Basin	264	11.0
GCR1 - Well 225	7/26/11	Fort Worth Basin	192	8.0
GCR1 - Well 226	7/27/11	Fort Worth Basin	384	16.0
GCR1 - Well 227	7/27/11	Fort Worth Basin	216	9.0
GCR1 - Well 228	7/27/11	Fort Worth Basin	288	12.0
GCR1 - Well 229	7/27/11	Fort Worth Basin	168	7.0
GCR1 - Well 230	7/29/11	Fort Worth Basin	144	6.0
GCR1 - Well 231	8/9/11	Fort Worth Basin	72	3.0
GCR1 - Well 232	8/9/11	Fort Worth Basin	168	7.0
GCR1 - Well 233	8/9/11	Fort Worth Basin	216	9.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR1 - Well 234	8/10/11	Fort Worth Basin	312	13.0
GCR1 - Well 235	8/15/11	Fort Worth Basin	48	2.0
GCR1 - Well 236	8/18/11	Fort Worth Basin	96	4.0
GCR1 - Well 237	8/21/11	Fort Worth Basin	216	9.0
GCR1 - Well 238	8/22/11	Fort Worth Basin	48	2.0
GCR1 - Well 239	8/22/11	Fort Worth Basin	144	6.0
GCR1 - Well 240	8/25/11	Fort Worth Basin	96	4.0
GCR1 - Well 241	1/16/11	Groesbeck	192	8.0
GCR1 - Well 242	2/23/11	Groesbeck	54	2.3
GCR1 - Well 243	4/19/11	Groesbeck	364	15.2
GCR1 - Well 244	1/21/11	Groesbeck	72	3.0
GCR1 - Well 245	7/13/11	Groesbeck	325	13.5
GCR1 - Well 246	7/14/11	Groesbeck	463	19.3
GCR1 - Well 247	3/18/11	Groesbeck	355	14.8
GCR1 - Well 248	4/12/11	North LA	294	12.3
GCR1 - Well 249	7/8/11	North LA	474	19.8
GCR1 - Well 250	2/21/11	South Texas	377	15.7
GCR1 - Well 251	7/21/11	South Texas	232	9.7
GCR1 - Well 252	3/11/11	South Texas	3	0.1
GCR1 - Well 253	4/5/11	South Texas	130	5.4
GCR1 - Well 254	8/17/11	South Texas	196	8.2
GCR1 - Well 255	8/9/11	STX - Eagleford	344	14.3
GCR1 - Well 256	8/9/11	STX - Eagleford	330	13.8
GCR2 - Well 1	8/29/2011	360		
GCR2 - Well 2	8/18/2011	415		
GCR2 - Well 3	3/23/2011	160A		
GCR2 - Well 4	3/8/2011	360		
GCR2 - Well 5	4/30/2011	360		
GCR2 - Well 6	2/21/2011	415		
GCR2 - Well 7	7/29/2011	415		
GCR2 - Well 8	2/22/2011	345	136	5.7
GCR2 - Well 9	6/1/2011	360		
GCR2 - Well 10	6/20/2011	360		
GCR2 - Well 11	4/6/2011	360		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 12	8/31/2011	415		
GCR2 - Well 13	6/1/2011	360		
GCR2 - Well 14	6/9/2011	360		
GCR2 - Well 15	8/11/2011	415		
GCR2 - Well 16	8/30/2011	415		
GCR2 - Well 17	6/9/2011	360		
GCR2 - Well 18	3/31/2011	360		
GCR2 - Well 19	6/8/2011	360		
GCR2 - Well 20	1/8/2011	415		
GCR2 - Well 21	6/22/2011	415		
GCR2 - Well 22	6/7/2011	220		
GCR2 - Well 23	3/19/2011	360		
GCR2 - Well 24	5/2/2011	360		
GCR2 - Well 25	1/30/2011	415		
GCR2 - Well 26	5/28/2011	220		
GCR2 - Well 27	6/27/2011	415		
GCR2 - Well 28	3/21/2011	415		
GCR2 - Well 29	7/13/2011	220		
GCR2 - Well 30	1/29/2011	345		
GCR2 - Well 31	3/22/2011	360		
GCR2 - Well 32	6/29/2011	160A		
GCR2 - Well 33	4/15/2011	360		
GCR2 - Well 34	1/3/2011	360		
GCR2 - Well 35	3/30/2011	345		
GCR2 - Well 36	3/13/2011	415		
GCR2 - Well 37	5/1/2011	360		
GCR2 - Well 38	7/5/2011	360		
GCR2 - Well 39	7/13/2011	220		
GCR2 - Well 40	7/13/2011	360		
GCR2 - Well 41	4/4/2011	360		
GCR2 - Well 42	2/12/2011	345		
GCR2 - Well 43	8/15/2011	360		
GCR2 - Well 44	1/5/2011	360		
GCR2 - Well 45	7/19/2011	415		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 46	2/9/2011	260		
GCR2 - Well 47	2/11/2011	345		
GCR2 - Well 48	3/15/2011	345		
GCR2 - Well 49	6/6/2011	220		
GCR2 - Well 50	3/28/2011	360		
GCR2 - Well 51	7/1/2011	220		
GCR2 - Well 52	5/10/2011	415		
GCR2 - Well 53	6/2/2011	360		
GCR2 - Well 54	2/24/2011	360		
GCR2 - Well 55	3/17/2011	360		
GCR2 - Well 56	1/28/2011	360		
GCR2 - Well 57	5/17/2011	360		
GCR2 - Well 58	2/26/2011	360		
GCR2 - Well 59	5/22/2011	420		
GCR2 - Well 60	8/15/2011	360		
GCR2 - Well 61	1/28/2011	345		
GCR2 - Well 62	7/11/2011	220		
GCR2 - Well 63	3/13/2011	345		
GCR2 - Well 64	2/23/2011	360		
GCR2 - Well 65	7/20/2011	415		
GCR2 - Well 66	8/29/2011	415		
GCR2 - Well 67	6/14/2011	230		
GCR2 - Well 68	6/15/2011	220		
GCR2 - Well 69	2/21/2011	360		
GCR2 - Well 70	1/8/2011	415		
GCR2 - Well 71	8/12/2011	415		
GCR2 - Well 72	2/27/2011	360		
GCR2 - Well 73	8/24/2011	415	166	6.9
GCR2 - Well 74	4/7/2011	415		
GCR2 - Well 75	7/21/2011	415		
GCR2 - Well 76	7/1/2011	220		
GCR2 - Well 77	3/19/2011	220		
GCR2 - Well 78	5/16/2011	415		
GCR2 - Well 79	3/25/2011	415		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 80	3/24/2011	415		
GCR2 - Well 81	2/23/2011	360		
GCR2 - Well 82	6/20/2011	360		
GCR2 - Well 83	4/15/2011	220		
GCR2 - Well 84	5/8/2011	415		
GCR2 - Well 85	8/28/2011	415		
GCR2 - Well 86	5/2/2011	360		
GCR2 - Well 87	1/8/2011	360		
GCR2 - Well 88	3/14/2011	415		
GCR2 - Well 89	7/6/2011	415		
GCR2 - Well 90	6/29/2011	415		
GCR2 - Well 91	3/4/2011	415		
GCR2 - Well 92	3/12/2011	415		
GCR2 - Well 93	4/6/2011	415		
GCR2 - Well 94	3/10/2011	360		
GCR2 - Well 95	8/1/2011	415		
GCR2 - Well 96	4/3/2011	415		
GCR2 - Well 97	7/22/2011	360		
GCR2 - Well 98	6/29/2011	360		
GCR2 - Well 99	1/30/2011	415		
GCR2 - Well 100	5/22/2011	400		
GCR2 - Well 101	7/6/2011	415		
GCR2 - Well 102	6/6/2011	220		
GCR2 - Well 103	4/17/2011	415		
GCR2 - Well 104	4/8/2011	360		
GCR2 - Well 105	4/23/2011	415		
GCR2 - Well 106	4/23/2011	415		
GCR2 - Well 107	3/20/2011	415		
GCR2 - Well 108	6/15/2011	415		
GCR2 - Well 109	1/7/2011	415		
GCR2 - Well 110	2/1/2011	415		
GCR2 - Well 111	4/29/2011	360		
GCR2 - Well 112	4/17/2011	415		
GCR2 - Well 113	4/28/2011	415		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 114	6/26/2011	415		
GCR2 - Well 115	1/2/2011	415		
GCR2 - Well 116	4/16/2011	415		
GCR2 - Well 117	5/3/2011	415		
GCR2 - Well 118	3/6/2011	345		
GCR2 - Well 119	5/21/2011	350		
GCR2 - Well 120	2/3/2011	360		
GCR2 - Well 121	6/25/2011	415		
GCR2 - Well 122	7/11/2011	415		
GCR2 - Well 123	6/1/2011	415		
GCR2 - Well 124	8/9/2011	360		
GCR2 - Well 125	4/4/2011	360		
GCR2 - Well 126	3/27/2011	415		
GCR2 - Well 127	1/12/2011	415		
GCR2 - Well 128	7/17/2011	415		
GCR2 - Well 129	2/21/2011	345	383	16.0
GCR2 - Well 130	4/20/2011	415		
GCR2 - Well 131	8/28/2011	415		
GCR2 - Well 132	7/21/2011	360		
GCR2 - Well 133	7/27/2011	415		
GCR2 - Well 134	1/12/2011	415		
GCR2 - Well 135	5/3/2011	415		
GCR2 - Well 136	5/4/2011	160A		
GCR2 - Well 137	7/12/2011	360		
GCR2 - Well 138	8/26/2011	415		
GCR2 - Well 139	7/13/2011	415		
GCR2 - Well 140	2/25/2011	415		
GCR2 - Well 141	1/30/2011	415		
GCR2 - Well 142	6/26/2011	415		
GCR2 - Well 143	4/29/2011	415		
GCR2 - Well 144	3/4/2011	415		
GCR2 - Well 145	8/19/2011	415		
GCR2 - Well 146	2/25/2011	415		
GCR2 - Well 147	2/25/2011	415		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 148	4/4/2011	360		
GCR2 - Well 149	3/15/2011	230		
GCR2 - Well 150	7/20/2011	415		
GCR2 - Well 151	6/16/2011	360		
GCR2 - Well 152	2/16/2011	415		
GCR2 - Well 153	1/20/2011	415		
GCR2 - Well 154	4/15/2011	220		
GCR2 - Well 155	8/2/2011	415		
GCR2 - Well 156	5/4/2011	360		
GCR2 - Well 157	6/21/2011	415		
GCR2 - Well 158	2/21/2011	360		
GCR2 - Well 159	8/19/2011	415		
GCR2 - Well 160	2/24/2011	415		
GCR2 - Well 161	2/15/2011	415		
GCR2 - Well 162	6/7/2011	415		
GCR2 - Well 163	7/30/2011	415		
GCR2 - Well 164	2/23/2011	415		
GCR2 - Well 165	8/30/2011	415		
GCR2 - Well 166	1/27/2011	415		
GCR2 - Well 167	3/21/2011	415		
GCR2 - Well 168	4/2/2011	415		
GCR2 - Well 169	4/23/2011	415		
GCR2 - Well 170	6/12/2011	360		
GCR2 - Well 171	3/25/2011	415		
GCR2 - Well 172	4/1/2011	415		
GCR2 - Well 173	1/27/2011	415		
GCR2 - Well 174	5/12/2011	260		
GCR2 - Well 175	7/1/2011	415		
GCR2 - Well 176	6/25/2011	415		
GCR2 - Well 177	3/20/2011	415		
GCR2 - Well 178	2/16/2011	415		
GCR2 - Well 179	6/26/2011	415		
GCR2 - Well 180	4/22/2011	415		
GCR2 - Well 181	3/21/2011	415		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 182	4/30/2011	415		
GCR2 - Well 183	2/8/2011	415		
GCR2 - Well 184	5/22/2011	415		
GCR2 - Well 185	8/7/2011	160A		
GCR2 - Well 186	6/25/2011	415		
GCR2 - Well 187	2/15/2011	415		
GCR2 - Well 188	3/29/2011	360		
GCR2 - Well 189	6/14/2011	415		
GCR2 - Well 190	7/28/2011	415		
GCR2 - Well 191	1/22/2011	415		
GCR2 - Well 192	4/27/2011	415		
GCR2 - Well 193	5/8/2011	415		
GCR2 - Well 194	4/3/2011	360		
GCR2 - Well 195	1/30/2011	415		
GCR2 - Well 196	3/26/2011	415		
GCR2 - Well 197	6/28/2011	415		
GCR2 - Well 198	6/27/2011	415		
GCR2 - Well 199	3/1/2011	415		
GCR2 - Well 200	3/23/2011	415		
GCR2 - Well 201	6/30/2011	220		
GCR2 - Well 202	6/28/2011	415		
GCR2 - Well 203	4/11/2011	360		
GCR2 - Well 204	1/29/2011	360		
GCR2 - Well 205	1/27/2011	360		
GCR2 - Well 206	1/22/2011	415		
GCR2 - Well 207	5/2/2011	415		
GCR2 - Well 208	7/21/2011	415		
GCR2 - Well 209	5/10/2011	415		
GCR2 - Well 210	2/16/2011	360		
GCR2 - Well 211	2/17/2011	415		
GCR2 - Well 212	4/4/2011	415		
GCR2 - Well 213	1/9/2011	415		
GCR2 - Well 214	3/31/2011	345		
GCR2 - Well 215	4/26/2011	415		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 216	4/8/2011	415		
GCR2 - Well 217	6/25/2011	415		
GCR2 - Well 218	4/13/2011	415		
GCR2 - Well 219	1/25/2011	260		
GCR2 - Well 220	2/21/2011	345		
GCR2 - Well 221	1/27/2011	415		
GCR2 - Well 222	8/21/2011	415		
GCR2 - Well 223	3/23/2011	415		
GCR2 - Well 224	6/14/2011	415		
GCR2 - Well 225	6/25/2011	415		
GCR2 - Well 226	6/27/2011	160A		
GCR2 - Well 227	4/8/2011	415		
GCR2 - Well 228	7/11/2011	415		
GCR2 - Well 229	7/27/2011	415		
GCR2 - Well 230	4/15/2011	230		
GCR2 - Well 231	6/3/2011	415		
GCR2 - Well 232	3/8/2011	415		
GCR2 - Well 233	8/21/2011	415		
GCR2 - Well 234	1/9/2011	415		
GCR2 - Well 235	4/22/2011	415		
GCR2 - Well 236	6/6/2011	415		
GCR2 - Well 237	3/21/2011	415		
GCR2 - Well 238	1/21/2011	260		
GCR2 - Well 239	4/18/2011	415		
GCR2 - Well 240	1/27/2011	400		
GCR2 - Well 241	1/26/2011	415		
GCR2 - Well 242	8/5/2011	415		
GCR2 - Well 243	4/22/2011	415		
GCR2 - Well 244	2/16/2011	415		
GCR2 - Well 245	8/19/2011	415		
GCR2 - Well 246	1/4/2011	360		
GCR2 - Well 247	6/16/2011	415		
GCR2 - Well 248	4/28/2011	415		
GCR2 - Well 249	4/8/2011	415		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 250	1/27/2011	415		
GCR2 - Well 251	4/28/2011	400		
GCR2 - Well 252	3/5/2011	415		
GCR2 - Well 253	6/22/2011	415		
GCR2 - Well 254	2/18/2011	415		
GCR2 - Well 255	6/29/2011	415		
GCR2 - Well 256	3/26/2011	415		
GCR2 - Well 257	8/24/2011	415		
GCR2 - Well 258	6/13/2011	415		
GCR2 - Well 259	7/10/2011	415		
GCR2 - Well 260	5/7/2011	160A		
GCR2 - Well 261	4/16/2011	415		
GCR2 - Well 262	2/26/2011	160A		
GCR2 - Well 263	3/6/2011	415		
GCR2 - Well 264	5/6/2011	415		
GCR2 - Well 265	6/17/2011	415		
GCR2 - Well 266	1/6/2011	415		
GCR2 - Well 267	5/23/2011	360		
GCR2 - Well 268	2/21/2011	415		
GCR2 - Well 269	2/13/2011	415		
GCR2 - Well 270	7/13/2011	415		
GCR2 - Well 271	5/4/2011	400		
GCR2 - Well 272	8/16/2011	160A		
GCR2 - Well 273	6/7/2011	415		
GCR2 - Well 274	5/10/2011	415	244	10.2
GCR2 - Well 275	3/14/2011	360		
GCR2 - Well 276	2/11/2011	360		
GCR2 - Well 277	3/1/2011	415		
GCR2 - Well 278	3/15/2011	415		
GCR2 - Well 279	8/29/2011	415		
GCR2 - Well 280	6/19/2011	415		
GCR2 - Well 281	6/16/2011	230		
GCR2 - Well 282	7/11/2011	415		
GCR2 - Well 283	2/19/2011	415		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 284	6/24/2011	360		
GCR2 - Well 285	5/13/2011	415		
GCR2 - Well 286	6/17/2011	415		
GCR2 - Well 287	8/9/2011	160A		
GCR2 - Well 288	8/23/2011	415		
GCR2 - Well 289	7/23/2011	415		
GCR2 - Well 290	3/8/2011	230		
GCR2 - Well 291	7/10/2011	415		
GCR2 - Well 292	1/26/2011	360		
GCR2 - Well 293	2/22/2011	415		
GCR2 - Well 294	8/18/2011	360		
GCR2 - Well 295	8/26/2011	230		
GCR2 - Well 296	5/14/2011	160A		
GCR2 - Well 297	4/15/2011	415		
GCR2 - Well 298	4/29/2011	400		
GCR2 - Well 299	4/4/2011	415		
GCR2 - Well 300	8/10/2011	220		
GCR2 - Well 301	6/30/2011	220		
GCR2 - Well 302	4/18/2011	415		
GCR2 - Well 303	4/28/2011	415		
GCR2 - Well 304	8/17/2011	415		
GCR2 - Well 305	2/20/2011	415		
GCR2 - Well 306	3/11/2011	360		
GCR2 - Well 307	3/14/2011	230		
GCR2 - Well 308	8/29/2011	415		
GCR2 - Well 309	3/23/2011	415		
GCR2 - Well 310	5/17/2011	415		
GCR2 - Well 311	7/15/2011	415		
GCR2 - Well 312	8/29/2011	415		
GCR2 - Well 313	5/25/2011	415		
GCR2 - Well 314	6/13/2011	415		
GCR2 - Well 315	3/23/2011	415		
GCR2 - Well 316	5/23/2011	400		
GCR2 - Well 317	6/12/2011	230		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 318	5/3/2011	220		
GCR2 - Well 319	8/11/2011	360		
GCR2 - Well 320	8/18/2011	415		
GCR2 - Well 321	4/13/2011	415		
GCR2 - Well 322	5/9/2011	230		
GCR2 - Well 323	2/26/2011	415		
GCR2 - Well 324	4/8/2011	230		
GCR2 - Well 325	8/15/2011	160A		
GCR2 - Well 326	3/31/2011	230		
GCR2 - Well 327	1/4/2011	360		
GCR2 - Well 328	7/9/2011	415		
GCR2 - Well 329	1/28/2011	360		
GCR2 - Well 330	5/1/2011	415		
GCR2 - Well 331	6/15/2011	220		
GCR2 - Well 332	4/22/2011	230		
GCR2 - Well 333	8/31/2011	415		
GCR2 - Well 334	6/20/2011	415		
GCR2 - Well 335	8/15/2011	415		
GCR2 - Well 336	2/17/2011	230		
GCR2 - Well 337	1/11/2011	415		
GCR2 - Well 338	1/28/2011	415		
GCR2 - Well 339	6/21/2011	230		
GCR2 - Well 340	6/20/2011	415		
GCR2 - Well 341	2/22/2011	415		
GCR2 - Well 342	3/2/2011	415		
GCR2 - Well 343	7/16/2011	415		
GCR2 - Well 344	6/30/2011	230		
GCR2 - Well 345	6/7/2011	360		
GCR2 - Well 346	2/24/2011	360		
GCR2 - Well 347	7/29/2011	360		
GCR2 - Well 348	3/21/2011	415		
GCR2 - Well 349	2/1/2011	260		
GCR2 - Well 350	5/14/2011	360		
GCR2 - Well 351	5/13/2011	230		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 352	5/17/2011	360		
GCR2 - Well 353	3/8/2011	415		
GCR2 - Well 354	4/18/2011	230	114	
GCR2 - Well 355	6/14/2011	230		
GCR2 - Well 356	2/20/2011	415		
GCR2 - Well 357	5/20/2011	230		
GCR2 - Well 358	7/28/2011	360		
GCR2 - Well 359	2/17/2011	230		
GCR2 - Well 360	8/8/2011	160A		
GCR2 - Well 361	5/10/2011	160A		
GCR2 - Well 362	3/27/2011	415		
GCR2 - Well 363	6/22/2011	415		
GCR2 - Well 364	3/11/2011	415		
GCR2 - Well 365	3/4/2011	230		
GCR2 - Well 366	2/23/2011	230		
GCR2 - Well 367	4/8/2011	360		
GCR2 - Well 368	2/13/2011	220		
GCR2 - Well 369	5/4/2011	400		
GCR2 - Well 370	8/5/2011	415		
GCR2 - Well 371	5/24/2011	415		
GCR2 - Well 372	4/4/2011	230		
GCR2 - Well 373	8/25/2011	415		
GCR2 - Well 374	5/24/2011	415		
GCR2 - Well 375	7/17/2011	415		
GCR2 - Well 376	6/22/2011	415		
GCR2 - Well 377	7/15/2011	415		
GCR2 - Well 378	6/7/2011	415		
GCR2 - Well 379	3/23/2011	230		
GCR2 - Well 380	8/25/2011	415		
GCR2 - Well 381	3/2/2011	230		
GCR2 - Well 382	5/2/2011	415		
GCR2 - Well 383	5/13/2011	415		
GCR2 - Well 384	8/22/2011	360		
GCR2 - Well 385	7/22/2011	160A		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 386	2/9/2011	230		
GCR2 - Well 387	4/27/2011	360		
GCR2 - Well 388	5/27/2011	360		
GCR2 - Well 389	7/11/2011	220		
GCR2 - Well 390	1/30/2011	415		
GCR2 - Well 391	4/15/2011	160A		
GCR2 - Well 392	3/17/2011	230		
GCR2 - Well 393	2/24/2011	230		
GCR2 - Well 394	3/10/2011	230		
GCR2 - Well 395	7/18/2011	230		
GCR2 - Well 396	1/17/2011	360		
GCR2 - Well 397	1/24/2011	230		
GCR2 - Well 398	3/10/2011	415		
GCR2 - Well 399	3/1/2011	230		
GCR2 - Well 400	7/25/2011	230		
GCR2 - Well 401	1/10/2011	230		
GCR2 - Well 402	6/23/2011	230		
GCR2 - Well 403	8/12/2011	360		
GCR2 - Well 404	1/15/2011	400		
GCR2 - Well 405	6/3/2011	415		
GCR2 - Well 406	1/27/2011	415		
GCR2 - Well 407	7/5/2011	230		
GCR2 - Well 408	7/25/2011	230		
GCR2 - Well 409	5/31/2011	230		
GCR2 - Well 410	7/1/2011	360		
GCR2 - Well 411	6/7/2011	415		
GCR2 - Well 412	4/26/2011	160A	186	
GCR2 - Well 413	3/26/2011	415		
GCR2 - Well 414	7/15/2011	415		
GCR2 - Well 415	6/23/2011	230		
GCR2 - Well 416	5/26/2011	160A		
GCR2 - Well 417	8/1/2011	230		
GCR2 - Well 418	1/10/2011	230		
GCR2 - Well 419	8/20/2011	230		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 420	3/11/2011	230		
GCR2 - Well 421	1/31/2011	360		
GCR2 - Well 422	7/13/2011	415		
GCR2 - Well 423	7/22/2011	230		
GCR2 - Well 424	1/25/2011	260		
GCR2 - Well 425	7/10/2011	415		
GCR2 - Well 426	3/1/2011	415		
GCR2 - Well 427	6/10/2011	230		
GCR2 - Well 428	3/8/2011	415		
GCR2 - Well 429	7/25/2011	230		
GCR2 - Well 430	2/13/2011	415		
GCR2 - Well 431	3/2/2011	230		
GCR2 - Well 432	4/26/2011	230		
GCR2 - Well 433	4/21/2011	230		
GCR2 - Well 434	6/27/2011	230		
GCR2 - Well 435	7/15/2011	415		
GCR2 - Well 436	3/1/2011	415		
GCR2 - Well 437	6/29/2011	415		
GCR2 - Well 438	5/31/2011	230		
GCR2 - Well 439	3/9/2011	230		
GCR2 - Well 440	5/9/2011	230		
GCR2 - Well 441	3/23/2011	230		
GCR2 - Well 442	3/9/2011	230		
GCR2 - Well 443	6/14/2011	415		
GCR2 - Well 444	2/18/2011	230		
GCR2 - Well 445	1/21/2011	230		
GCR2 - Well 446	3/27/2011	415		
GCR2 - Well 447	6/4/2011	415		
GCR2 - Well 448	3/13/2011	415		
GCR2 - Well 449	8/6/2011	230		
GCR2 - Well 450	4/1/2011	415		
GCR2 - Well 451	8/8/2011	160A		
GCR2 - Well 452	7/15/2011	230		
GCR2 - Well 453	7/22/2011	160A		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 454	1/7/2011	360		
GCR2 - Well 455	4/11/2011	230		
GCR2 - Well 456	3/31/2011	360		
GCR2 - Well 457	5/17/2011	230		
GCR2 - Well 458	2/23/2011	230		
GCR2 - Well 459	5/25/2011	230		
GCR2 - Well 460	7/5/2011	230		
GCR2 - Well 461	7/21/2011	230		
GCR2 - Well 462	8/25/2011	230		
GCR2 - Well 463	3/22/2011	230		
GCR2 - Well 464	6/10/2011	230		
GCR2 - Well 465	4/12/2011	230		
GCR2 - Well 466	6/10/2011	415		
GCR2 - Well 467	2/28/2011	230		
GCR2 - Well 468	5/18/2011	230		
GCR2 - Well 469	8/18/2011	230		
GCR2 - Well 470	7/21/2011	160A		
GCR2 - Well 471	4/20/2011	160A		
GCR2 - Well 472	1/7/2011	230		
GCR2 - Well 473	7/20/2011	160A		
GCR2 - Well 474	4/14/2011	230		
GCR2 - Well 475	6/23/2011	220		
GCR2 - Well 476	4/30/2011	230		
GCR2 - Well 477	6/29/2011	230		
GCR2 - Well 478	5/25/2011	360		
GCR2 - Well 479	1/19/2011	230		
GCR2 - Well 480	8/29/2011	230		
GCR2 - Well 481	1/7/2011	230		
GCR2 - Well 482	4/13/2011	230		
GCR2 - Well 483	3/10/2011	230		
GCR2 - Well 484	8/2/2011	230		
GCR2 - Well 485	1/22/2011	230		
GCR2 - Well 486	6/6/2011	230		
GCR2 - Well 487	2/8/2011	230		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 488	6/25/2011	160A		
GCR2 - Well 489	7/15/2011	230		
GCR2 - Well 490	1/17/2011	230		
GCR2 - Well 491	2/25/2011	230		
GCR2 - Well 492	4/16/2011	230		
GCR2 - Well 493	8/10/2011	230		
GCR2 - Well 494	5/24/2011	160A	178	
GCR2 - Well 495	7/28/2011	415		
GCR2 - Well 496	2/27/2011	260		
GCR2 - Well 497	3/12/2011	230		
GCR2 - Well 498	8/12/2011	230		
GCR2 - Well 499	5/28/2011	230		
GCR2 - Well 500	6/21/2011	230		
GCR2 - Well 501	4/8/2011	230		
GCR2 - Well 502	1/7/2011	230		
GCR2 - Well 503	8/15/2011	230		
GCR2 - Well 504	6/6/2011	230		
GCR2 - Well 505	3/18/2011	230		
GCR2 - Well 506	2/23/2011	415		
GCR2 - Well 507	3/1/2011	415		
GCR2 - Well 508	1/3/2011	230		
GCR2 - Well 509	4/27/2011	230		
GCR2 - Well 510	7/2/2011	160A		
GCR2 - Well 511	7/28/2011	415		
GCR2 - Well 512	1/12/2011	230		
GCR2 - Well 513	7/15/2011	230		
GCR2 - Well 514	3/17/2011	230		
GCR2 - Well 515	7/27/2011	230		
GCR2 - Well 516	3/15/2011	230		
GCR2 - Well 517	3/2/2011	415		
GCR2 - Well 518	1/8/2011	230		
GCR2 - Well 519	7/6/2011	230		
GCR2 - Well 520	6/25/2011	230		
GCR2 - Well 521	7/22/2011	160A		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 522	7/21/2011	160A	139	
GCR2 - Well 523	6/24/2011	230		
GCR2 - Well 524	8/9/2011	230		
GCR2 - Well 525	5/5/2011	230		
GCR2 - Well 526	1/21/2011	230		
GCR2 - Well 527	8/16/2011	230		
GCR2 - Well 528	8/3/2011	230		
GCR2 - Well 529	4/13/2011	230		
GCR2 - Well 530	7/29/2011	230		
GCR2 - Well 531	7/28/2011	230		
GCR2 - Well 532	4/9/2011	230		
GCR2 - Well 533	3/18/2011	260		
GCR2 - Well 534	6/13/2011	260		
GCR2 - Well 535	1/8/2011	230		
GCR2 - Well 536	1/31/2011	230		
GCR2 - Well 537	3/23/2011	230		
GCR2 - Well 538	5/19/2011	230		
GCR2 - Well 539	4/4/2011	230		
GCR2 - Well 540	7/14/2011	415		
GCR2 - Well 541	8/1/2011	230		
GCR2 - Well 542	1/27/2011	230		
GCR2 - Well 543	6/17/2011	260		
GCR2 - Well 544	5/31/2011	230		
GCR2 - Well 545	6/29/2011	230		
GCR2 - Well 546	8/29/2011	260		
GCR2 - Well 547	5/14/2011	230		
GCR2 - Well 548	8/27/2011	230		
GCR2 - Well 549	6/9/2011	230		
GCR2 - Well 550	6/24/2011	230		
GCR2 - Well 551	3/4/2011	230		
GCR2 - Well 552	3/2/2011	415		
GCR2 - Well 553	8/31/2011	160A		
GCR2 - Well 554	3/26/2011	415		
GCR2 - Well 555	6/1/2011	230		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 556	8/25/2011	415		
GCR2 - Well 557	8/12/2011	230		
GCR2 - Well 558	8/8/2011	160A		
GCR2 - Well 559	3/26/2011	415		
GCR2 - Well 560	8/10/2011	230		
GCR2 - Well 561	8/8/2011	160A		
GCR2 - Well 562	8/12/2011	230		
GCR2 - Well 563	2/26/2011	230		
GCR2 - Well 564	8/8/2011	160A		
GCR2 - Well 565	1/21/2011	230		
GCR2 - Well 566	7/5/2011	230		
GCR2 - Well 567	5/17/2011	230		
GCR2 - Well 568	4/30/2011	230		
GCR2 - Well 569	2/25/2011	230		
GCR2 - Well 570	2/9/2011	230		
GCR2 - Well 571	7/12/2011	230		
GCR2 - Well 572	7/1/2011	230	139	5.8
GCR2 - Well 573	8/15/2011	230		
GCR2 - Well 574	1/12/2011	230		
GCR2 - Well 575	8/4/2011	230		
GCR2 - Well 576	7/15/2011	230		
GCR2 - Well 577	8/13/2011	230		
GCR2 - Well 578	8/29/2011	230		
GCR2 - Well 579	7/6/2011	230		
GCR2 - Well 580	8/29/2011	230		
GCR2 - Well 581	8/18/2011	230		
GCR2 - Well 582	7/19/2011	230		
GCR2 - Well 583	8/24/2011	230		
GCR2 - Well 584	7/11/2011	230		
GCR2 - Well 585	7/22/2011	230		
GCR2 - Well 586	1/18/2011	230		
GCR2 - Well 587	8/10/2011	230		
GCR2 - Well 588	8/30/2011	230		
GCR2 - Well 589	2/24/2011	230		

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 590	8/18/2011	230		
GCR2 - Well 591	6/20/2011	160A		
GCR2 - Well 592	6/10/2011	230		
GCR2 - Well 593	8/9/2011	160A		
GCR2 - Well 594	8/10/2011	230		
GCR2 - Well 595	1/7/2011	360		
GCR2 - Well 596	3/30/2011	220		
GCR2 - Well 597	3/19/2011	230		
GCR2 - Well 598	4/23/2011	230		
GCR2 - Well 599	2/22/2011	230		
GCR2 - Well 600	2/18/2011	230		
GCR2 - Well 601	5/3/2011	230		
GCR2 - Well 602	3/19/2011	230		
GCR2 - Well 603	5/31/2011	230		
GCR2 - Well 604	8/8/2011	160A		
GCR2 - Well 605	6/2/2011	230		
GCR2 - Well 606	5/13/2011	230		
GCR2 - Well 607	5/10/2011	230		
GCR2 - Well 608	4/6/2011	160A		
GCR2 - Well 609	6/20/2011	230		
GCR2 - Well 610	8/14/2011	230		
GCR2 - Well 611	8/12/2011	230		
GCR2 - Well 612	7/27/2011	230		
GCR2 - Well 613	4/4/2011	230		
GCR2 - Well 614	8/26/2011	230		
GCR2 - Well 615	7/14/2011	230		
GCR2 - Well 616	2/22/2011	230		
GCR2 - Well 617	3/4/2011	160A		
GCR2 - Well 618	4/23/2011	230		
GCR2 - Well 619	6/28/2011	230		
GCR2 - Well 620	7/30/2011	230		
GCR2 - Well 621	7/1/2011	160A		
GCR2 - Well 622	3/4/2011	160A		
GCR2 - Well 623	6/20/2011	160A		

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Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR2 - Well 624	6/22/2011	160A		
GCR2 - Well 625	3/2/2011	415		
GCR2 - Well 626	6/11/2011	160A		
GCR2 - Well 627	6/20/2011	160A		
GCR2 - Well 628	2/7/2011	160A	795	33.1
GCR2 - Well 629	4/6/2011	160A		
GCR2 - Well 630	6/21/2011	160A		
GCR2 - Well 631	2/11/2011	160A		
GCR2 - Well 632	6/22/2011	160A		
GCR2 - Well 633	8/9/2011	160A		
GCR2 - Well 634	2/7/2011	160A		
GCR2 - Well 635	2/22/2011	160A		
GCR2 - Well 636	4/10/2011	160A		
GCR2 - Well 637	2/27/2011	160A		
GCR2 - Well 638	5/1/2011	160A		
GCR2 - Well 639	2/7/2011	160A		
GCR2 - Well 640	3/2/2011	360		
GCR2 - Well 641	2/11/2011	160A		
GCR2 - Well 642	2/27/2011	160A		
GCR2 - Well 643	8/17/2011	160A		
GCR2 - Well 644	4/10/2011	160A		
GCR2 - Well 645	2/20/2011	160A		
GCR2 - Well 646	6/11/2011	160A		
GCR2 - Well 647	2/20/2011	160A		
GCR2 - Well 648	1/14/2011	160A		
GCR2 - Well 649	6/30/2011	160A		
GCR2 - Well 650	3/20/2011	345		
GCR2 - Well 651	3/21/2011	345		
GCR3 - Well 1	3/17/2011	Green River Basin - Pinedale	63	2.6
GCR3 - Well 2	3/16/2011	Green River Basin - Pinedale	111	4.6
GCR3 - Well 3	3/22/2011	Green River Basin - Pinedale	63	2.6
GCR3 - Well 4	3/21/2011	Green River Basin - Pinedale	63	2.6
GCR3 - Well 5	3/26/2011	Green River Basin - Pinedale	89	3.7
GCR3 - Well 6	3/27/2011	Green River Basin - Pinedale	89	3.7

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR3 - Well 7	4/7/2011	Green River Basin - Pinedale	46	1.9
GCR3 - Well 8	4/2/2011	Green River Basin - Pinedale	55	2.3
GCR3 - Well 9	4/6/2011	Green River Basin - Pinedale	72	3.0
GCR3 - Well 10	4/1/2011	Green River Basin - Pinedale	65	2.7
GCR3 - Well 11	4/11/2011	Green River Basin - Pinedale	109	4.5
GCR3 - Well 12	4/12/2011	Green River Basin - Pinedale	111	4.6
GCR3 - Well 13	4/16/2011	Green River Basin - Pinedale	108	4.5
GCR3 - Well 14	4/17/2011	Green River Basin - Pinedale	111	4.6
GCR3 - Well 15	4/22/2011	Green River Basin - Pinedale	113	4.7
GCR3 - Well 16	4/21/2011	Green River Basin - Pinedale	86	3.6
GCR3 - Well 17	4/26/2011	Green River Basin - Pinedale	132	5.5
GCR3 - Well 18	5/1/2011	Green River Basin - Pinedale	89	3.7
GCR3 - Well 19	4/27/2011	Green River Basin - Pinedale	87	3.6
GCR3 - Well 20	5/2/2011	Green River Basin - Pinedale	86	3.6
GCR3 - Well 21	5/6/2011	Green River Basin - Pinedale	87	3.6
GCR3 - Well 22	5/7/2011	Green River Basin - Pinedale	92	3.8
GCR3 - Well 23	5/11/2011	Green River Basin - Pinedale	89	3.7
GCR3 - Well 24	5/12/2011	Green River Basin - Pinedale	67	2.8
GCR3 - Well 25	5/16/2011	Green River Basin - Pinedale	81	3.4
GCR3 - Well 26	5/17/2011	Green River Basin - Pinedale	94	3.9
GCR3 - Well 27	5/21/2011	Green River Basin - Pinedale	74	3.1
GCR3 - Well 28	5/22/2011	Green River Basin - Pinedale	88	3.7
GCR3 - Well 29	5/27/2011	Green River Basin - Pinedale	81	3.4
GCR3 - Well 30	5/26/2011	Green River Basin - Pinedale	109	4.5
GCR3 - Well 31	5/31/2011	Green River Basin - Pinedale	101	4.2
GCR3 - Well 32	5/31/2011	Green River Basin - Pinedale	64	2.7
GCR3 - Well 33	6/6/2011	Green River Basin - Pinedale	101	4.2
GCR3 - Well 34	6/5/2011	Green River Basin - Pinedale	110	4.6
GCR3 - Well 35	6/10/2011	Green River Basin - Pinedale	111	4.6
GCR3 - Well 36	6/16/2011	Green River Basin - Pinedale	88	3.7
GCR3 - Well 37	6/11/2011	Green River Basin - Pinedale	85	3.5
GCR3 - Well 38	6/17/2011	Green River Basin - Pinedale	68	2.8
GCR3 - Well 39	6/21/2011	Green River Basin - Pinedale	132	5.5
GCR3 - Well 40	6/26/2011	Green River Basin - Pinedale	153	6.4

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR3 - Well 41	6/22/2011	Green River Basin - Pinedale	102	4.3
GCR3 - Well 42	6/27/2011	Green River Basin - Pinedale	135	5.6
GCR3 - Well 43	7/1/2011	Green River Basin - Pinedale	112	4.7
GCR3 - Well 44	7/5/2011	Green River Basin - Pinedale	60	2.5
GCR3 - Well 45	7/10/2011	Green River Basin - Pinedale	96	4.0
GCR3 - Well 46	7/6/2011	Green River Basin - Pinedale	66	2.8
GCR3 - Well 47	7/11/2011	Green River Basin - Pinedale	72	3.0
GCR3 - Well 48	7/16/2011	Green River Basin - Pinedale	65	2.7
GCR3 - Well 49	7/15/2011	Green River Basin - Pinedale	87	3.6
GCR3 - Well 50	7/21/2011	Green River Basin - Pinedale	92	3.8
GCR3 - Well 51	7/20/2011	Green River Basin - Pinedale	88	3.7
GCR3 - Well 52	7/25/2011	Green River Basin - Pinedale	96	4.0
GCR3 - Well 53	7/26/2011	Green River Basin - Pinedale	90	3.8
GCR3 - Well 54	7/30/2011	Green River Basin - Pinedale	89	3.7
GCR3 - Well 55	7/31/2011	Green River Basin - Pinedale	86	3.6
GCR3 - Well 56	8/7/2011	Green River Basin - Pinedale	90	3.8
GCR3 - Well 57	8/6/2011	Green River Basin - Pinedale	108	4.5
GCR3 - Well 58	8/11/2011	Green River Basin - Pinedale	129	5.4
GCR3 - Well 59	8/12/2011	Green River Basin - Pinedale	118	4.9
GCR3 - Well 60	8/16/2011	Green River Basin - Pinedale	113	4.7
GCR3 - Well 61	8/15/2011	Green River Basin - Pinedale	122	5.1
GCR3 - Well 62	8/20/2011	Green River Basin - Pinedale	111	4.6
GCR3 - Well 63	8/21/2011	Green River Basin - Pinedale	90	3.8
GCR3 - Well 64	8/24/2011	Green River Basin - Pinedale	111	4.6
GCR3 - Well 65	8/29/2011	Green River Basin - Pinedale	90	3.8
GCR3 - Well 66	8/25/2011	Green River Basin - Pinedale	89	3.7
GCR3 - Well 67	8/30/2011	Green River Basin - Pinedale	88	3.7
GCR3 - Well 68	1/6/2011	TX-LA Salt Basin - Haynesville	113	4.7
GCR3 - Well 69	1/14/2011	TX-LA Salt Basin - Haynesville	118	4.9
GCR3 - Well 70	1/28/2011	TX-LA Salt Basin - Haynesville	100	4.2
GCR3 - Well 71	1/27/2011	TX-LA Salt Basin - Haynesville	115	4.8
GCR3 - Well 72	2/5/2011	TX-LA Salt Basin - Haynesville	78	3.3
GCR3 - Well 73	2/7/2011	TX-LA Salt Basin - Haynesville	77	3.2
GCR3 - Well 74	2/15/2011	TX-LA Salt Basin - Haynesville	150	6.3

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Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR3 - Well 75	2/14/2011	TX-LA Salt Basin - Haynesville	149	6.2
GCR3 - Well 76	3/2/2011	TX-LA Salt Basin - Haynesville	123	5.1
GCR3 - Well 77	3/9/2011	TX-LA Salt Basin - Haynesville	103	4.3
GCR3 - Well 78	3/10/2011	TX-LA Salt Basin - Haynesville	103	4.3
GCR3 - Well 79	4/9/2011	TX-LA Salt Basin - Haynesville	114	4.8
GCR3 - Well 80	4/18/2011	TX-LA Salt Basin - Haynesville	141	5.9
GCR3 - Well 81	4/19/2011	TX-LA Salt Basin - Haynesville	138	5.8
GCR3 - Well 82	4/20/2011	TX-LA Salt Basin - Haynesville	142	5.9
GCR3 - Well 83	4/23/2011	TX-LA Salt Basin - Haynesville	172	7.2
GCR3 - Well 84	5/1/2011	TX-LA Salt Basin - Haynesville	116	4.8
GCR3 - Well 85	5/2/2011	TX-LA Salt Basin - Haynesville	115	4.8
GCR3 - Well 86	5/14/2011	TX-LA Salt Basin - Haynesville	159	6.6
GCR3 - Well 87	5/15/2011	TX-LA Salt Basin - Haynesville	153	6.4
GCR3 - Well 88	6/1/2011	TX-LA Salt Basin - Haynesville	111	4.6
GCR3 - Well 89	6/9/2011	TX-LA Salt Basin - Haynesville	117	4.9
GCR3 - Well 90	6/7/2011	TX-LA Salt Basin - Haynesville	118	4.9
GCR3 - Well 91	6/30/2011	TX-LA Salt Basin - Haynesville	106	4.4
GCR3 - Well 92	7/1/2011	TX-LA Salt Basin - Haynesville	108	4.5
GCR3 - Well 93	7/29/2011	TX-LA Salt Basin - Haynesville	120	5.0
GCR3 - Well 94	7/28/2011	TX-LA Salt Basin - Haynesville	120	5.0
GCR3 - Well 95	8/21/2011	TX-LA Salt Basin - Haynesville	120	5.0
GCR3 - Well 96	8/22/2011	TX-LA Salt Basin - Haynesville	115	4.8
GCR3 - Well 97	8/30/2011	TX-LA Salt Basin - Haynesville	136	5.7
GCR3 - Well 98	8/29/2011	TX-LA Salt Basin - Haynesville	138	5.8
GCR4 - Well 1	1/11/2011	Anadarko	10	0.4
GCR4 - Well 2	02/20/11	Anadarko	10	0.4
GCR4 - Well 3	1/18/2011	Anadarko	10	0.4
GCR4 - Well 4	03/26/11	Anadarko	10	0.4
GCR4 - Well 5	2/9/2011	Anadarko	10	0.4
GCR4 - Well 6	04/11/11	Anadarko	10	0.4
GCR4 - Well 7	2/16/2011	Anadarko	10	0.4
GCR4 - Well 8	3/16/2011	Anadarko	10	0.4
GCR4 - Well 9	03/08/11	Anadarko	10	0.4
GCR4 - Well 10	4/1/2011	Anadarko	10	0.4

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Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR4 - Well 11	07/05/11	Anadarko	10	0.4
GCR4 - Well 12	7/12/2011	Anadarko	10	0.4
GCR4 - Well 13	04/27/11	Anadarko	10	0.4
GCR4 - Well 14	8/2/2011	Anadarko	10	0.4
GCR4 - Well 15	07/19/11	Anadarko	10	0.4
GCR4 - Well 16	6/20/2011	Anadarko	10	0.4
GCR4 - Well 17	08/09/11	Anadarko	10	0.4
GCR4 - Well 18	8/16/2011	Anadarko	10	0.4
GCR5 - Well 1	1/1/2011	Haynesville	6	0.3
GCR5 - Well 2	1/4/2011	Haynesville	10	0.4
GCR5 - Well 3	1/12/2011	Haynesville	15	0.6
GCR5 - Well 4	1/13/2011	Haynesville	15	0.6
GCR5 - Well 5	1/14/2011	Haynesville	11	0.5
GCR5 - Well 6	1/15/2011	Haynesville	11	0.5
GCR5 - Well 7	1/28/2011	Haynesville	4	0.2
GCR5 - Well 8	1/29/2011	Haynesville	4	0.2
GCR5 - Well 9	2/8/2011	Haynesville	14	0.6
GCR5 - Well 10	2/19/2011	Haynesville	5	0.2
GCR5 - Well 11	2/20/2011	Haynesville	14	0.6
GCR5 - Well 12	2/21/2011	Haynesville	9	0.4
GCR5 - Well 13	3/2/2011	Haynesville	16	0.7
GCR5 - Well 14	3/2/2011	Haynesville	12	0.5
GCR5 - Well 15	3/3/2011	Haynesville	12	0.5
GCR5 - Well 16	3/5/2011	Haynesville	12	0.5
GCR5 - Well 17	3/5/2011	Haynesville	12	0.5
GCR5 - Well 18	3/22/2011	Haynesville	13	0.5
GCR5 - Well 19	3/24/2011	Haynesville	19	0.8
GCR5 - Well 20	3/24/2011	Haynesville	16	0.7
GCR5 - Well 21	3/29/2011	Haynesville	13	0.5
GCR5 - Well 22	4/4/2011	Haynesville	11	0.5
GCR5 - Well 23	4/12/2011	Haynesville	13	0.5
GCR5 - Well 24	4/14/2011	Haynesville	15	0.6
GCR5 - Well 25	4/14/2011	Haynesville	14	0.6
GCR5 - Well 26	4/18/2011	Haynesville	15	0.6

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Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR5 - Well 27	4/26/2011	Haynesville	22	0.9
GCR5 - Well 28	4/25/2011	Haynesville	14	0.6
GCR5 - Well 29	5/4/2011	Haynesville	10	0.4
GCR5 - Well 30	5/6/2011	Haynesville	8	0.3
GCR5 - Well 31	5/12/2011	Haynesville	11	0.5
GCR5 - Well 32	5/20/2011	Haynesville	10	0.4
GCR5 - Well 33	6/1/2011	Haynesville	7	0.3
GCR5 - Well 34	6/5/2011	Haynesville	13	0.5
GCR5 - Well 35	6/13/2011	Haynesville	13	0.5
GCR5 - Well 36	6/17/2011	Haynesville	3	0.1
GCR5 - Well 37	6/24/2011	Haynesville	5	0.2
GCR5 - Well 38	7/4/2011	Haynesville	15	0.6
GCR5 - Well 39	7/10/2011	Haynesville	13	0.5
GCR5 - Well 40	7/14/2011	Haynesville	14	0.6
GCR5 - Well 41	7/23/2011	Haynesville	13	0.5
GCR5 - Well 42	7/23/2011	Haynesville	17	0.7
GCR5 - Well 43	8/4/2011	Haynesville	11	0.5
GCR5 - Well 44	8/13/2011	Haynesville	12	0.5
GCR5 - Well 45	8/13/2011	Haynesville	12	0.5
GCR5 - Well 46	9/28/2011	Haynesville	11	0.5
GCR5 - Well 47	8/31/2011	Haynesville	11	0.5
GCR5 - Well 48	8/31/2011	Haynesville	11	0.5
GCR5 - Well 49	9/15/2011	Haynesville		0.0
GCR5 - Well 50	10/6/2011	Haynesville	8	0.3
GCR5 - Well 51	10/14/2011	Haynesville	8	0.3
GCR5 - Well 52	10/21/2011	Haynesville	7	0.3
GCR5 - Well 53	11/3/2011	Haynesville	3	0.1
GCR6 - Well 1	6/22/2011	Appalachia		
GCR6 - Well 2	6/3/2011	Appalachia		
GCR6 - Well 3	4/16/2011	Appalachia		
GCR6 - Well 4	4/14/2011	Appalachia		
GCR6 - Well 5	4/12/2011	Appalachia		
GCR6 - Well 6	6/6/2011	Appalachia		
GCR6 - Well 7	6/4/2011	Appalachia		

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Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 8	2/15/2011	Appalachia		
GCR6 - Well 9	2/13/2011	Appalachia		
GCR6 - Well 10	2/11/2011	Appalachia		
GCR6 - Well 11	12/29/2010	Arkoma	72	3.0
GCR6 - Well 12	12/22/2010	Arkoma	288	12.0
GCR6 - Well 13	12/23/2010	Arkoma	288	12.0
GCR6 - Well 14	12/22/2010	Arkoma	312	13.0
GCR6 - Well 15	12/23/2010	Arkoma	312	13.0
GCR6 - Well 16	12/27/2010	Arkoma	216	9.0
GCR6 - Well 17	12/28/2010	Arkoma	192	8.0
GCR6 - Well 18	12/29/2010	Arkoma	168	7.0
GCR6 - Well 19	12/31/2010	Arkoma	192	8.0
GCR6 - Well 20	12/31/2010	Arkoma	192	8.0
GCR6 - Well 21	1/6/2011	Arkoma	144	6.0
GCR6 - Well 22	1/1/2011	Arkoma	264	11.0
GCR6 - Well 23	12/30/2010	Arkoma	312	13.0
GCR6 - Well 24	1/1/2011	Arkoma	288	12.0
GCR6 - Well 25	1/1/2011	Arkoma	312	13.0
GCR6 - Well 26	1/2/2011	Arkoma	288	12.0
GCR6 - Well 27	12/30/2010	Arkoma	360	15.0
GCR6 - Well 28	12/29/2010	Arkoma	384	16.0
GCR6 - Well 29	12/29/2010	Arkoma	384	16.0
GCR6 - Well 30	1/7/2011	Arkoma	240	10.0
GCR6 - Well 31	1/7/2011	Arkoma	312	13.0
GCR6 - Well 32	1/6/2011	Arkoma	336	14.0
GCR6 - Well 33	1/8/2011	Arkoma	288	12.0
GCR6 - Well 34	12/29/2010	Arkoma	552	23.0
GCR6 - Well 35	1/17/2011	Arkoma	120	5.0
GCR6 - Well 36	1/18/2011	Arkoma	96	4.0
GCR6 - Well 37	1/18/2011	Arkoma	96	4.0
GCR6 - Well 38	1/12/2011	Arkoma	288	12.0
GCR6 - Well 39	1/13/2011	Arkoma	264	11.0
GCR6 - Well 40	1/12/2011	Arkoma	288	12.0
GCR6 - Well 41	1/15/2011	Arkoma	264	11.0

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Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 42	1/14/2011	Arkoma	288	12.0
GCR6 - Well 43	1/21/2011	Arkoma	144	6.0
GCR6 - Well 44	1/19/2011	Arkoma	192	8.0
GCR6 - Well 45	1/21/2011	Arkoma	168	7.0
GCR6 - Well 46	1/22/2011	Arkoma	144	6.0
GCR6 - Well 47	1/17/2011	Arkoma	264	11.0
GCR6 - Well 48	1/24/2011	Arkoma	96	4.0
GCR6 - Well 49	1/15/2011	Arkoma	312	13.0
GCR6 - Well 50	1/12/2011	Arkoma	528	22.0
GCR6 - Well 51	1/26/2011	Arkoma	216	9.0
GCR6 - Well 52	1/27/2011	Arkoma	192	8.0
GCR6 - Well 53	1/31/2011	Arkoma	120	5.0
GCR6 - Well 54	2/1/2011	Arkoma	144	6.0
GCR6 - Well 55	2/2/2011	Arkoma	120	5.0
GCR6 - Well 56	2/2/2011	Arkoma	144	6.0
GCR6 - Well 57	2/1/2011	Arkoma	192	8.0
GCR6 - Well 58	1/31/2011	Arkoma	264	11.0
GCR6 - Well 59	2/2/2011	Arkoma	240	10.0
GCR6 - Well 60	2/1/2011	Arkoma	264	11.0
GCR6 - Well 61	1/31/2011	Arkoma	288	12.0
GCR6 - Well 62	2/3/2011	Arkoma	240	10.0
GCR6 - Well 63	2/4/2011	Arkoma	216	9.0
GCR6 - Well 64	2/3/2011	Arkoma	240	10.0
GCR6 - Well 65	2/4/2011	Arkoma	216	9.0
GCR6 - Well 66	12/4/2010	Arkoma	1728	72.0
GCR6 - Well 67	1/28/2011	Arkoma	408	17.0
GCR6 - Well 68	2/7/2011	Arkoma	192	8.0
GCR6 - Well 69	2/2/2011	Arkoma	336	14.0
GCR6 - Well 70	2/13/2011	Arkoma	96	4.0
GCR6 - Well 71	2/14/2011	Arkoma	72	3.0
GCR6 - Well 72	2/12/2011	Arkoma	120	5.0
GCR6 - Well 73	1/24/2011	Arkoma	576	24.0
GCR6 - Well 74	2/12/2011	Arkoma	144	6.0
GCR6 - Well 75	2/13/2011	Arkoma	120	5.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 76	2/14/2011	Arkoma	96	4.0
GCR6 - Well 77	1/25/2011	Arkoma	576	24.0
GCR6 - Well 78	1/26/2011	Arkoma	552	23.0
GCR6 - Well 79	1/25/2011	Arkoma	576	24.0
GCR6 - Well 80	2/20/2011	Arkoma	72	3.0
GCR6 - Well 81	2/18/2011	Arkoma	120	5.0
GCR6 - Well 82	2/17/2011	Arkoma	144	6.0
GCR6 - Well 83	2/20/2011	Arkoma	72	3.0
GCR6 - Well 84	2/18/2011	Arkoma	120	5.0
GCR6 - Well 85	8/20/2010	Arkoma	4608	192.0
GCR6 - Well 86	2/23/2011	Arkoma	144	6.0
GCR6 - Well 87	2/22/2011	Arkoma	168	7.0
GCR6 - Well 88	2/21/2011	Arkoma	192	8.0
GCR6 - Well 89	2/23/2011	Arkoma	144	6.0
GCR6 - Well 90	2/22/2011	Arkoma	168	7.0
GCR6 - Well 91	2/21/2011	Arkoma	192	8.0
GCR6 - Well 92	2/24/2011	Arkoma	144	6.0
GCR6 - Well 93	2/24/2011	Arkoma	144	6.0
GCR6 - Well 94	2/24/2011	Arkoma	144	6.0
GCR6 - Well 95	2/23/2011	Arkoma	168	7.0
GCR6 - Well 96	2/22/2011	Arkoma	192	8.0
GCR6 - Well 97	2/21/2011	Arkoma	240	10.0
GCR6 - Well 98	2/22/2011	Arkoma	216	9.0
GCR6 - Well 99	2/25/2011	Arkoma	168	7.0
GCR6 - Well 100	2/26/2011	Arkoma	144	6.0
GCR6 - Well 101	2/23/2011	Arkoma	240	10.0
GCR6 - Well 102	2/24/2011	Arkoma	216	9.0
GCR6 - Well 103	3/2/2011	Arkoma	120	5.0
GCR6 - Well 104	3/7/2011	Arkoma	48	2.0
GCR6 - Well 105	3/5/2011	Arkoma	96	4.0
GCR6 - Well 106	3/5/2011	Arkoma	96	4.0
GCR6 - Well 107	3/6/2011	Arkoma	96	4.0
GCR6 - Well 108	3/11/2011	Arkoma	120	5.0
GCR6 - Well 109	3/9/2011	Arkoma	192	8.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 110	3/9/2011	Arkoma	192	8.0
GCR6 - Well 111	3/10/2011	Arkoma	168	7.0
GCR6 - Well 112	3/10/2011	Arkoma	168	7.0
GCR6 - Well 113	3/11/2011	Arkoma	144	6.0
GCR6 - Well 114	3/4/2011	Arkoma	312	13.0
GCR6 - Well 115	3/12/2011	Arkoma	144	6.0
GCR6 - Well 116	3/11/2011	Arkoma	168	7.0
GCR6 - Well 117	3/10/2011	Arkoma	192	8.0
GCR6 - Well 118	3/14/2011	Arkoma	120	5.0
GCR6 - Well 119	3/15/2011	Arkoma	96	4.0
GCR6 - Well 120	3/11/2011	Arkoma	216	9.0
GCR6 - Well 121	3/12/2011	Arkoma	216	9.0
GCR6 - Well 122	3/4/2011	Arkoma	408	17.0
GCR6 - Well 123	1/28/2011	Arkoma	1272	53.0
GCR6 - Well 124	1/29/2011	Arkoma	1248	52.0
GCR6 - Well 125	1/29/2011	Arkoma	1248	52.0
GCR6 - Well 126	3/5/2011	Arkoma	408	17.0
GCR6 - Well 127	3/16/2011	Arkoma	168	7.0
GCR6 - Well 128	3/15/2011	Arkoma	192	8.0
GCR6 - Well 129	3/20/2011	Arkoma	72	3.0
GCR6 - Well 130	3/11/2011	Arkoma	288	12.0
GCR6 - Well 131	3/17/2011	Arkoma	168	7.0
GCR6 - Well 132	3/18/2011	Arkoma	144	6.0
GCR6 - Well 133	3/17/2011	Arkoma	192	8.0
GCR6 - Well 134	3/18/2011	Arkoma	168	7.0
GCR6 - Well 135	3/19/2011	Arkoma	144	6.0
GCR6 - Well 136	3/7/2011	Arkoma	480	20.0
GCR6 - Well 137	3/8/2011	Arkoma	456	19.0
GCR6 - Well 138	3/7/2011	Arkoma	480	20.0
GCR6 - Well 139	3/7/2011	Arkoma	480	20.0
GCR6 - Well 140	3/6/2011	Arkoma	504	21.0
GCR6 - Well 141	3/25/2011	Arkoma	144	6.0
GCR6 - Well 142	3/26/2011	Arkoma	120	5.0
GCR6 - Well 143	3/26/2011	Arkoma	120	5.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 144	3/26/2011	Arkoma	120	5.0
GCR6 - Well 145	3/27/2011	Arkoma	96	4.0
GCR6 - Well 146	3/24/2011	Arkoma	168	7.0
GCR6 - Well 147	3/25/2011	Arkoma	144	6.0
GCR6 - Well 148	3/22/2011	Arkoma	216	9.0
GCR6 - Well 149	3/27/2011	Arkoma	120	5.0
GCR6 - Well 150	3/28/2011	Arkoma	96	4.0
GCR6 - Well 151	3/23/2011	Arkoma	264	11.0
GCR6 - Well 152	3/24/2011	Arkoma	240	10.0
GCR6 - Well 153	4/2/2011	Arkoma	96	4.0
GCR6 - Well 154	4/2/2011	Arkoma	96	4.0
GCR6 - Well 155	4/1/2011	Arkoma	144	6.0
GCR6 - Well 156	4/4/2011	Arkoma	72	3.0
GCR6 - Well 157	4/1/2011	Arkoma	144	6.0
GCR6 - Well 158	3/31/2011	Arkoma	168	7.0
GCR6 - Well 159	4/1/2011	Arkoma	144	6.0
GCR6 - Well 160	3/27/2011	Arkoma	288	12.0
GCR6 - Well 161	3/29/2011	Arkoma	240	10.0
GCR6 - Well 162	3/28/2011	Arkoma	264	11.0
GCR6 - Well 163	3/31/2011	Arkoma	192	8.0
GCR6 - Well 164	4/5/2011	Arkoma	72	3.0
GCR6 - Well 165	4/4/2011	Arkoma	96	4.0
GCR6 - Well 166	3/31/2011	Arkoma	192	8.0
GCR6 - Well 167	4/5/2011	Arkoma	168	7.0
GCR6 - Well 168	4/5/2011	Arkoma	168	7.0
GCR6 - Well 169	4/4/2011	Arkoma	192	8.0
GCR6 - Well 170	4/9/2011	Arkoma	120	5.0
GCR6 - Well 171	4/10/2011	Arkoma	120	5.0
GCR6 - Well 172	4/9/2011	Arkoma	144	6.0
GCR6 - Well 173	4/11/2011	Arkoma	96	4.0
GCR6 - Well 174	4/9/2011	Arkoma	144	6.0
GCR6 - Well 175	4/10/2011	Arkoma	120	5.0
GCR6 - Well 176	4/11/2011	Arkoma	96	4.0
GCR6 - Well 177	4/10/2011	Arkoma	144	6.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 178	4/11/2011	Arkoma	120	5.0
GCR6 - Well 179	4/11/2011	Arkoma	120	5.0
GCR6 - Well 180	4/12/2011	Arkoma	120	5.0
GCR6 - Well 181	3/20/2011	Arkoma	696	29.0
GCR6 - Well 182	4/13/2011	Arkoma	144	6.0
GCR6 - Well 183	4/12/2011	Arkoma	168	7.0
GCR6 - Well 184	4/12/2011	Arkoma	192	8.0
GCR6 - Well 185	4/16/2011	Arkoma	96	4.0
GCR6 - Well 186	4/13/2011	Arkoma	192	8.0
GCR6 - Well 187	4/13/2011	Arkoma	192	8.0
GCR6 - Well 188	4/16/2011	Arkoma	168	7.0
GCR6 - Well 189	4/13/2011	Arkoma	312	13.0
GCR6 - Well 190	4/14/2011	Arkoma	288	12.0
GCR6 - Well 191	4/13/2011	Arkoma	312	13.0
GCR6 - Well 192	4/17/2011	Arkoma	240	10.0
GCR6 - Well 193	4/18/2011	Arkoma	216	9.0
GCR6 - Well 194	4/17/2011	Arkoma	240	10.0
GCR6 - Well 195	4/22/2011	Arkoma	144	6.0
GCR6 - Well 196	4/23/2011	Arkoma	144	6.0
GCR6 - Well 197	4/25/2011	Arkoma	96	4.0
GCR6 - Well 198	4/23/2011	Arkoma	144	6.0
GCR6 - Well 199	4/26/2011	Arkoma	96	4.0
GCR6 - Well 200	4/25/2011	Arkoma	120	5.0
GCR6 - Well 201	4/25/2011	Arkoma	144	6.0
GCR6 - Well 202	4/25/2011	Arkoma	144	6.0
GCR6 - Well 203	4/22/2011	Arkoma	264	11.0
GCR6 - Well 204	4/22/2011	Arkoma	264	11.0
GCR6 - Well 205	4/27/2011	Arkoma	192	8.0
GCR6 - Well 206	4/29/2011	Arkoma	168	7.0
GCR6 - Well 207	4/29/2011	Arkoma	168	7.0
GCR6 - Well 208	4/27/2011	Arkoma	216	9.0
GCR6 - Well 209	4/27/2011	Arkoma	216	9.0
GCR6 - Well 210	5/2/2011	Arkoma	192	8.0
GCR6 - Well 211	5/3/2011	Arkoma	168	7.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 212	5/2/2011	Arkoma	192	8.0
GCR6 - Well 213	5/5/2011	Arkoma	168	7.0
GCR6 - Well 214	5/6/2011	Arkoma	144	6.0
GCR6 - Well 215	5/6/2011	Arkoma	144	6.0
GCR6 - Well 216	5/6/2011	Arkoma	144	6.0
GCR6 - Well 217	5/7/2011	Arkoma	144	6.0
GCR6 - Well 218	5/8/2011	Arkoma	120	5.0
GCR6 - Well 219	5/6/2011	Arkoma	168	7.0
GCR6 - Well 220	5/4/2011	Arkoma	216	9.0
GCR6 - Well 221	5/5/2011	Arkoma	192	8.0
GCR6 - Well 222	5/5/2011	Arkoma	192	8.0
GCR6 - Well 223	5/9/2011	Arkoma	144	6.0
GCR6 - Well 224	5/10/2011	Arkoma	120	5.0
GCR6 - Well 225	5/13/2011	Arkoma	144	6.0
GCR6 - Well 226	5/17/2011	Arkoma	72	3.0
GCR6 - Well 227	5/13/2011	Arkoma	168	7.0
GCR6 - Well 228	5/14/2011	Arkoma	144	6.0
GCR6 - Well 229	4/15/2011	Arkoma	840	35.0
GCR6 - Well 230	4/15/2011	Arkoma	840	35.0
GCR6 - Well 231	5/18/2011	Arkoma	72	3.0
GCR6 - Well 232	5/18/2011	Arkoma	72	3.0
GCR6 - Well 233	5/16/2011	Arkoma	120	5.0
GCR6 - Well 234	5/17/2011	Arkoma	96	4.0
GCR6 - Well 235	5/16/2011	Arkoma	168	7.0
GCR6 - Well 236	5/17/2011	Arkoma	144	6.0
GCR6 - Well 237	5/16/2011	Arkoma	168	7.0
GCR6 - Well 238	5/17/2011	Arkoma	168	7.0
GCR6 - Well 239	5/19/2011	Arkoma	144	6.0
GCR6 - Well 240	5/19/2011	Arkoma	144	6.0
GCR6 - Well 241	5/22/2011	Arkoma	120	5.0
GCR6 - Well 242	5/23/2011	Arkoma	96	4.0
GCR6 - Well 243	5/22/2011	Arkoma	120	5.0
GCR6 - Well 244	5/24/2011	Arkoma	72	3.0
GCR6 - Well 245	5/23/2011	Arkoma	96	4.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 246	5/24/2011	Arkoma	72	3.0
GCR6 - Well 247	5/2/2011	Arkoma	624	26.0
GCR6 - Well 248	5/9/2011	Arkoma	528	22.0
GCR6 - Well 249	5/25/2011	Arkoma	192	8.0
GCR6 - Well 250	5/26/2011	Arkoma	168	7.0
GCR6 - Well 251	5/25/2011	Arkoma	192	8.0
GCR6 - Well 252	5/25/2011	Arkoma	192	8.0
GCR6 - Well 253	5/26/2011	Arkoma	168	7.0
GCR6 - Well 254	5/25/2011	Arkoma	192	8.0
GCR6 - Well 255	5/27/2011	Arkoma	168	7.0
GCR6 - Well 256	5/27/2011	Arkoma	192	8.0
GCR6 - Well 257	5/28/2011	Arkoma	168	7.0
GCR6 - Well 258	5/27/2011	Arkoma	192	8.0
GCR6 - Well 259	5/28/2011	Arkoma	168	7.0
GCR6 - Well 260	6/1/2011	Arkoma	168	7.0
GCR6 - Well 261	5/31/2011	Arkoma	192	8.0
GCR6 - Well 262	6/2/2011	Arkoma	144	6.0
GCR6 - Well 263	6/1/2011	Arkoma	168	7.0
GCR6 - Well 264	5/31/2011	Arkoma	192	8.0
GCR6 - Well 265	6/3/2011	Arkoma	144	6.0
GCR6 - Well 266	6/2/2011	Arkoma	168	7.0
GCR6 - Well 267	6/2/2011	Arkoma	168	7.0
GCR6 - Well 268	6/1/2011	Arkoma	192	8.0
GCR6 - Well 269	6/3/2011	Arkoma	144	6.0
GCR6 - Well 270	6/3/2011	Arkoma	144	6.0
GCR6 - Well 271	6/7/2011	Arkoma	72	3.0
GCR6 - Well 272	6/6/2011	Arkoma	96	4.0
GCR6 - Well 273	6/6/2011	Arkoma	96	4.0
GCR6 - Well 274	6/6/2011	Arkoma	96	4.0
GCR6 - Well 275	6/6/2011	Arkoma	120	5.0
GCR6 - Well 276	6/7/2011	Arkoma	96	4.0
GCR6 - Well 277	1/26/2011	Arkoma	3336	139.0
GCR6 - Well 278	6/6/2011	Arkoma	192	8.0
GCR6 - Well 279	6/7/2011	Arkoma	168	7.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 280	6/5/2011	Arkoma	240	10.0
GCR6 - Well 281	6/4/2011	Arkoma	264	11.0
GCR6 - Well 282	6/5/2011	Arkoma	240	10.0
GCR6 - Well 283	6/4/2011	Arkoma	264	11.0
GCR6 - Well 284	6/13/2011	Arkoma	72	3.0
GCR6 - Well 285	6/15/2011	Arkoma	168	7.0
GCR6 - Well 286	6/14/2011	Arkoma	192	8.0
GCR6 - Well 287	6/20/2011	Arkoma	72	3.0
GCR6 - Well 288	3/28/2011	Arkoma	2088	87.0
GCR6 - Well 289	6/16/2011	Arkoma	168	7.0
GCR6 - Well 290	6/17/2011	Arkoma	144	6.0
GCR6 - Well 291	6/15/2011	Arkoma	192	8.0
GCR6 - Well 292	6/16/2011	Arkoma	168	7.0
GCR6 - Well 293	6/20/2011	Arkoma	96	4.0
GCR6 - Well 294	6/24/2011	Arkoma	96	4.0
GCR6 - Well 295	6/25/2011	Arkoma	72	3.0
GCR6 - Well 296	6/27/2011	Arkoma	120	5.0
GCR6 - Well 297	6/27/2011	Arkoma	120	5.0
GCR6 - Well 298	6/28/2011	Arkoma	96	4.0
GCR6 - Well 299	6/24/2011	Arkoma	192	8.0
GCR6 - Well 300	6/23/2011	Arkoma	216	9.0
GCR6 - Well 301	6/28/2011	Arkoma	96	4.0
GCR6 - Well 302	6/22/2011	Arkoma	264	11.0
GCR6 - Well 303	6/19/2011	Arkoma	336	14.0
GCR6 - Well 304	6/14/2011	Arkoma	456	19.0
GCR6 - Well 305	7/1/2011	Arkoma	48	2.0
GCR6 - Well 306	6/27/2011	Arkoma	216	9.0
GCR6 - Well 307	6/28/2011	Arkoma	192	8.0
GCR6 - Well 308	6/27/2011	Arkoma	216	9.0
GCR6 - Well 309	6/28/2011	Arkoma	192	8.0
GCR6 - Well 310	7/6/2011	Arkoma	72	3.0
GCR6 - Well 311	7/6/2011	Arkoma	72	3.0
GCR6 - Well 312	7/7/2011	Arkoma	48	2.0
GCR6 - Well 313	7/6/2011	Arkoma	168	7.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 314	7/8/2011	Arkoma	120	5.0
GCR6 - Well 315	7/6/2011	Arkoma	168	7.0
GCR6 - Well 316	7/7/2011	Arkoma	144	6.0
GCR6 - Well 317	7/8/2011	Arkoma	120	5.0
GCR6 - Well 318	7/7/2011	Arkoma	144	6.0
GCR6 - Well 319	6/25/2011	Arkoma	456	19.0
GCR6 - Well 320	7/8/2011	Arkoma	144	6.0
GCR6 - Well 321	7/11/2011	Arkoma	96	4.0
GCR6 - Well 322	7/16/2011	Arkoma	120	5.0
GCR6 - Well 323	7/15/2011	Arkoma	144	6.0
GCR6 - Well 324	7/14/2011	Arkoma	168	7.0
GCR6 - Well 325	7/20/2011	Arkoma	72	3.0
GCR6 - Well 326	7/27/2011	Arkoma	72	3.0
GCR6 - Well 327	7/27/2011	Arkoma	96	4.0
GCR6 - Well 328	7/22/2011	Arkoma	288	12.0
GCR6 - Well 329	7/23/2011	Arkoma	264	11.0
GCR6 - Well 330	7/21/2011	Arkoma	312	13.0
GCR6 - Well 331	7/25/2011	Arkoma	240	10.0
GCR6 - Well 332	8/1/2011	Arkoma	96	4.0
GCR6 - Well 333	8/2/2011	Arkoma	72	3.0
GCR6 - Well 334	8/1/2011	Arkoma	96	4.0
GCR6 - Well 335	8/2/2011	Arkoma	96	4.0
GCR6 - Well 336	7/30/2011	Arkoma	192	8.0
GCR6 - Well 337	7/31/2011	Arkoma	168	7.0
GCR6 - Well 338	7/31/2011	Arkoma	168	7.0
GCR6 - Well 339	7/29/2011	Arkoma	216	9.0
GCR6 - Well 340	7/30/2011	Arkoma	216	9.0
GCR6 - Well 341	8/6/2011	Arkoma	168	7.0
GCR6 - Well 342	8/4/2011	Arkoma	216	9.0
GCR6 - Well 343	8/5/2011	Arkoma	192	8.0
GCR6 - Well 344	8/6/2011	Arkoma	168	7.0
GCR6 - Well 345	8/5/2011	Arkoma	192	8.0
GCR6 - Well 346	8/8/2011	Arkoma	120	5.0
GCR6 - Well 347	8/9/2011	Arkoma	96	4.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 348	8/8/2011	Arkoma	120	5.0
GCR6 - Well 349	8/8/2011	Arkoma	168	7.0
GCR6 - Well 350	8/5/2011	Arkoma	240	10.0
GCR6 - Well 351	8/5/2011	Arkoma	240	10.0
GCR6 - Well 352	8/9/2011	Arkoma	168	7.0
GCR6 - Well 353	8/14/2011	Arkoma	72	3.0
GCR6 - Well 354	8/13/2011	Arkoma	96	4.0
GCR6 - Well 355	8/14/2011	Arkoma	96	4.0
GCR6 - Well 356	8/15/2011	Arkoma	72	3.0
GCR6 - Well 357	8/13/2011	Arkoma	120	5.0
GCR6 - Well 358	8/13/2011	Arkoma	144	6.0
GCR6 - Well 359	8/4/2011	Arkoma	384	16.0
GCR6 - Well 360	7/28/2011	Arkoma	552	23.0
GCR6 - Well 361	7/28/2011	Arkoma	552	23.0
GCR6 - Well 362	7/31/2011	Arkoma	480	20.0
GCR6 - Well 363	8/17/2011	Arkoma	72	3.0
GCR6 - Well 364	8/3/2011	Arkoma	408	17.0
GCR6 - Well 365	8/17/2011	Arkoma	168	7.0
GCR6 - Well 366	8/18/2011	Arkoma	144	6.0
GCR6 - Well 367	8/17/2011	Arkoma	168	7.0
GCR6 - Well 368	8/16/2011	Arkoma	192	8.0
GCR6 - Well 369	8/16/2011	Arkoma	192	8.0
GCR6 - Well 370	8/22/2011	Arkoma	96	4.0
GCR6 - Well 371	8/23/2011	Arkoma	72	3.0
GCR6 - Well 372	8/22/2011	Arkoma	96	4.0
GCR6 - Well 373	8/24/2011	Arkoma	72	3.0
GCR6 - Well 374	8/23/2011	Arkoma	96	4.0
GCR6 - Well 375	8/23/2011	Arkoma	120	5.0
GCR6 - Well 376	8/22/2011	Arkoma	144	6.0
GCR6 - Well 377	8/21/2011	Arkoma	168	7.0
GCR6 - Well 378	8/20/2011	Arkoma	192	8.0
GCR6 - Well 379	8/8/2011	Arkoma	504	21.0
GCR6 - Well 380	8/10/2011	Arkoma	456	19.0
GCR6 - Well 381	8/11/2011	Arkoma	432	18.0

URS

Well Number	Date Well Completed	Basin	Flowback Duration (Hours)	Duration Days
GCR6 - Well 382	8/25/2011	Arkoma	216	9.0
GCR6 - Well 383	8/25/2011	Arkoma	216	9.0
GCR6 - Well 384	8/25/2011	Arkoma	216	9.0
GCR6 - Well 385	8/26/2011	Arkoma	192	8.0
GCR6 - Well 386	9/1/2011	Arkoma	144	6.0
GCR6 - Well 387	8/31/2011	Arkoma	168	7.0
GCR6 - Well 388	9/1/2011	Arkoma	144	6.0
GCR6 - Well 389	8/31/2011	Arkoma	168	7.0
GCR6 - Well 390	8/29/2011	Arkoma	240	10.0
GCR6 - Well 391	8/30/2011	Arkoma	216	9.0
GCR6 - Well 392	8/30/2011	Arkoma	216	9.0
GCR6 - Well 393	8/30/2011	Arkoma	216	9.0
GCR6 - Well 394	8/29/2011	Arkoma	240	10.0
GCR6 - Well 395	8/29/2011	Arkoma	264	11.0
GCR6 - Well 396	1/2/2011	East Texas	386	16.1
GCR6 - Well 397	1/28/2011	East Texas	451	18.8
GCR6 - Well 398	2/24/2011	East Texas	402	16.8
GCR6 - Well 399	4/11/2011	East Texas		

Attachment B

Mismeasuring Methane

Estimating Greenhouse Gas Emissions from Upstream Natural Gas Development

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ABOUT THE AUTHORS

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MISMEASURING METHANE: ESTIMATING GREENHOUSE GAS EMISSIONS FROM UPSTREAM NATURAL GAS DEVELOPMENT

KEY IMPLICATIONS

Although natural gas is acknowledged to be the cleanest-burning fossil fuel owing to its low carbon content, attention has recently focused on upstream emissions of methane during well drilling, testing, and completion operations. Because methane is a much more potent greenhouse gas (GHG) than carbon dioxide (CO_2), methane that leaks or is purposely vented into the atmosphere is more harmful than the CO_2 that is produced when methane is flared. With the increase in natural gas production in recent years, primarily from shale gas, some sources, including the US Environmental Protection Agency (EPA), have suggested that upstream methane emissions are increasing.

- **EPA's current methodology for estimating gas field methane emissions is not based on methane *emitted* during well completions, but paradoxically is based on a data sample of methane *captured* during well completions.**

- **The assumptions underlying EPA's methodology do not reflect current industry practices.** As a result, its estimates of methane emissions are dramatically overstated and it would be unwise to use them as a basis for policymaking. The recent Howarth study on methane emissions makes similar errors.

- **If methane emissions were as high as EPA and Howarth assume, extremely hazardous conditions would be created at the well site.** Such conditions would not be permitted by industry or regulators. For this reason, if no other, the estimates are not credible.

- **EPA has proposed additional regulation of hydraulically fractured gas wells under the Clean Air Act.** For the most part, the proposed regulations are already standard industry practice and are unlikely to significantly reduce upstream GHG emissions. However, measured emissions could be significantly lower than EPA-inflated estimates. The greatest benefit of the proposed regulations is likely to be better documentation of actual GHG emissions from upstream natural gas development.

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MISMEASURING METHANE: ESTIMATING GREENHOUSE GAS EMISSIONS FROM UPSTREAM NATURAL GAS DEVELOPMENT

by Mary Lashley Barcella, Samantha Gross, and Surya Rajan

METHANE: THE NEW FOCUS OF UPSTREAM EMISSIONS

Natural gas is widely recognized as the cleanest-burning fossil fuel. After processing, natural gas combustion emits no particulates and only half as much carbon dioxide (CO_2) as coal. Recently, however, attention has focused on the question of methane emissions from gas wells, processing plants, pipelines, and distribution networks. Methane is the largest component of natural gas, and methane emissions are of particular concern as it is a much more potent greenhouse gas (GHG) than CO_2, with a global warming potential (GWP) estimated at 25 times that of CO_2.*

Methane and CO_2 are the most important GHGs emitted from upstream natural gas operations. Methane is sometimes released to the atmosphere in small quantities before the well has been connected to a pipeline. Direct release of methane to the atmosphere is called *venting*. More often, methane is burned off at the well site, releasing CO_2 into the atmosphere in an operation known as *flaring*.

Production of natural gas from unconventional formations, including shale and tight sands, is increasing rapidly in North America. A single unconventional well typically produces much more gas (both initially and over its lifetime) than a conventional well, raising concerns that methane is being released into the atmosphere in greater quantities than in the past. Although emissions downstream of the wellhead are also of concern, much of the recent controversy has centered on emissions during well drilling, testing, and completion, and these operations are the focus of this Private Report.

SOURCES OF GHG EMISSIONS DURING WELL DRILLING AND COMPLETION

Understanding potential GHG emissions from well drilling and completion requires an understanding of the basic procedures of natural gas development. This section summarizes the process and the potential for emissions throughout.

During the process of drilling and completing a well, producers have three fundamental concerns:

- **Safety.** Natural gas is highly flammable. In the presence of ignition sources, such as electric devices, operating engines and machinery, or sparks, it can ignite. In certain concentrations mixed with air or in an enclosed space it can even explode. Any stray gas escaping to the atmosphere presents an imminent safety hazard to all people and equipment on location.

*The Intergovernmental Panel on Climate Change has increased its estimates of the GWP of methane from 21 times that of CO_2 in its second scientific assessment report published in 1995 to 25 times that of CO_2 in its fourth SAR published in 2008. The US Environmental Protection Agency (EPA) results discussed in this report still use a GWP of 21.

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- **Health.** Natural gas poses health risks. Some constituents, such as ethane and propane, are heavier than air and can pool in shallow depressions. If natural gas is inhaled, reduced oxygen content can cause dizziness, fatigue, nausea, headache, and irregular breathing, and in severe cases loss of consciousness through asphyxia or even death. For humans and wildlife around a well location, the presence of natural gas in the atmosphere presents a serious health hazard.

- **Economics.** Millions of dollars are invested in drilling and completing an oil or gas well—as much as $10 million for a shale gas well. All produced hydrocarbons represent potential return on that investment. Whenever possible, a producer will monetize every bit of produced gas by diverting to sales rather than allowing potential earnings to be lost.

In addition, owing to the higher GWP of methane, reducing methane emissions serves an important environmental goal as well the immediate goals of protecting people and property.

For all these reasons, releases of natural gas are carefully managed and minimized throughout the process of drilling and completing a well.

- **Drilling.** Very little gas makes it to the surface during the drilling process, and that gas is captured and flared off. The drilling "mud" that cools the bit and lifts cuttings to the surface is also designed to prevent high-pressure reservoir gas and oil from entering the wellbore and migrating up the annular space of the well, by virtue of the weight of the mud column in the wellbore. If there were accidental oil and gas inflow into the wellbore from the reservoir, it would be dangerous if any oil and gas were released on surface. To prevent this from happening, a blowout preventer (BOP) is installed on the surface. A BOP stack is designed to contain any pressure that does reach the surface, and this pressure is relieved by diverting stray gas to a flare stack. A controlled flame at the flare stack releases CO_2, but not methane, to the atmosphere.

- **Well completion.** Once the well is drilled, proper installation of casing and cement ensures that nothing enters the well except from the targeted gas-containing formation. During the process of hydraulic fracturing (also called fraccing), fraccing fluid (water, sand, and small amounts of chemicals) is pumped at high pressure into the target formation to create fissures that allow the gas contained in the formation to flow into the well. Unconventional gas wells are typically fracced in multiple stages, with a plug placed in the well between the stages. After the fraccing process is finished, these plugs and any other debris left in the well are drilled out.

- **Flowback.** After the well is cleaned up, the flowback process begins. Fraccing fluid flows from the wellbore to the surface, where it is diverted to an open pit or enclosed tank. Initially the flowback stream is primarily fluid, but over time this flow brings increasing fractions of reservoir gas as well. Gas contained in the flowback stream is flared, either through an igniter at the outflow of an open pit or a tank open at the top or by a flare stack attached to an enclosed tank. As soon as the gas flow is in

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sufficient quantity and of adequate quality, it is sent by pipeline to processing facilities and then on to sales.

This process describes the ideal situation, minimizing venting and flaring and maximizing the amount of gas that goes to sale. A number of circumstances and inefficiencies can arise that result in greater GHG emissions.

Under some conditions, natural gas produced during flowback cannot be diverted to sales lines. Early production may contain high proportions of CO_2 or nitrogen that were injected during fraccing or well cleanup or at flow kickoff. These and other contaminants may make the gas stream unacceptable for transportation pipelines. In such cases the gas may have to be flared off until the flow stream meets pipeline specifications. When the flow of natural gas is sporadic and in very small proportions it may be hard to sustain a flame on a flare stack. In less common instances when flaring itself may be difficult, an operator may elect to avoid the overhead of flaring equipment and "cold vent" gas until the proportion and quality of gas in the flow stream improves and consistent sustained flaring is possible (see the box "Cold Venting").

Sometimes scheduling delays occur in construction of the tie-in pipeline connections that would carry produced gas to gathering and sales pipelines. When the well has been completed and is flowing, shutting in the well can be harmful to its productivity. Therefore

Cold Venting

The term *cold venting* describes the controlled release of small quantities of unflared natural gas to the atmosphere. Most of the fluid that flows out of the wellbore immediately after hydraulic fracturing is water. After the wellbore has purged itself of the initial column of fluid it contained at the end of pumping, a milestone referred to as "bottoms-up" in industry jargon, additional flow coming out of the wellhead is typically still mostly water that was pumped in for the frac treatment, but some traces of formation fluid—including water, natural gas, and liquid hydrocarbons—may also begin to appear at the surface. Typically these pockets of gas are small volumes, contain poor quality natural gas in very small concentrations, and contain large proportions of inert gases such as CO_2 or nitrogen that were used during the fraccing process.

In cold venting, the flow stream is directed to a device called a gas-buster—essentially a cylinder perforated on the outside and containing a series of baffle trays on the inside. The baffle trays help separate gas from the water, and the perforations on the cylinder then allow the gas to dissipate into the air outside.

Cold venting is no longer industry standard practice in oil and gas operations, although it was common as recently as a decade ago. A few operators have continued to use it during drilling and production in spite of the safety risk it poses, mainly to save on rental charges associated with separation equipment and flare stacks. There have been reported instances where, close to populated settlements, flaring was considered aesthetically unacceptable, and cold venting was adopted as a preferred alternative. In oil and gas processing, cold venting may be used to release unexpected pressures from enclosed storage vessels that could otherwise pose a critical safety hazard. Awareness of the harmful effects of cold venting has caused the practice to fall out of favor. EPA's proposed regulation of completion of fracced gas wells would prohibit the practice in most cases.

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an operator may prefer to allow gas flow to continue but flare the gas until pipeline tie-in can be established. This is certainly not an ideal case for the operator, and operators make every effort to have tie-in lines completed by the time a well is producing.

The flaring process converts methane into CO_2, a much less potent GHG. However, small amounts of methane may escape into the atmosphere during flaring because the combustion efficiency of flares is not 100 percent. Citing a Gas Resources Institute (GRI) study, EPA assumes that 2 percent of the methane sent to flare escapes into the atmosphere.

In addition, flowback water contains some dissolved methane. Methane has a very low solubility in water, about 35 milligrams per liter at surface temperature and pressure conditions. When flowback water is pumped into open pits, dissolved methane can evaporate into the atmosphere. Although these emissions are very small, open-pit flowback has been losing favor as more and more operators move toward enclosed tanks.

In addition to emissions at the well site, most of the CO_2 contained in natural gas must be removed to bring the gas up to pipeline quality. Generally this is done at the processing plant, where natural gas liquids (NGLs) contained in the gas stream are also removed. Data from both EPA and the US Energy Information Administration (EIA) suggest that approximately twice as much CO_2 is removed from gas at processing plants than is released in the field (primarily) during flaring.

METHANE AND CO_2 EMISSIONS FROM UNCONVENTIONAL GAS PRODUCTION

Initial production rates (IPs) for shale wells are many times greater than those for conventional wells. Some observers suspect that the growth in shale gas production may have been accompanied by an increase in methane emissions.

In the Background Technical Support Document *Greenhouse Gas Emissions Reporting from the Petroleum and Natural Gas Industry* released in 2010, EPA greatly increased its estimate of methane emissions from various upstream gas activities. Earlier estimates were based on a 1996 study conducted jointly with GRI. For methane emissions during well completions, EPA created separate categories for conventional and unconventional well completions and increased estimated emissions for both categories. EPA's previous emissions estimate was 0.02 metric tons of methane per well completion. EPA now proposes a much higher estimate of 0.71 metric tons per conventional well and 177 metric tons per unconventional well completion.

EPA used these new emissions factors to revise historical GHG emissions estimates. As a result EPA's estimate of 2006 total upstream GHG emissions from the natural gas and petroleum industries more than doubled, from 90.2 million metric tons of CO_2-equivalent ($mtCO_2e$) to 198 $mtCO_2e$.*

*US Environmental Protection Agency, *Greenhouse Gas Emissions Reporting from the Petroleum and Natural Gas Industry: Background Technical Support Document, 2010,* pp. 9–10.

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In addition to methane, CO_2 and small amounts of other GHGs are also emitted during gas well completions and other upstream operations. However, EPA has not proposed revisions to the methodology for estimating upstream emissions of these GHGs.

New EPA Methodology Overstates Methane Emissions

EPA's new methodology estimates that each unconventional gas well completion emits 9,175 thousand cubic feet (Mcf) of methane, of which 51 percent is assumed to be flared and the rest vented. But here is the basic problem: EPA's analysis relies on assumptions that are at odds with industry practice and with health and safety considerations at the well site. IHS CERA believes that EPA's methodology for estimating these emissions lacks rigor and should not be used as a basis for analysis and decision making.

Where did this higher estimate come from? EPA derived the emissions factor from two slide presentations at Natural Gas STAR technology transfer workshops, one in 2004 and one in 2007.* These two presentations primarily describe methane that was captured during "green" well completions, not methane emissions. EPA assumes that all methane captured during these green completions would have been emitted in all other completions. This assumption does not reflect industry practice.

In addition to the inappropriate use of the Natural Gas STAR reports, the EPA estimate of methane emissions essentially averages four data points, each of which was generated on the basis of multiple assumptions and rounded to the nearest hundred, thousand, or ten thousand Mcf prior to averaging. As EPA explains in its *Background Technical Support Document,*

- "One presentation reported that the emissions from all unconventional well completions were approximately 45 Bcf [billion cubic feet] using 2002 data…. The…high pressure, tight-formation wells emitted…44.7 Bcf. Since there is great variability in the natural gas sector and the resulting emission rates have high uncertainty; the emission rate per unconventional (high-pressure tight formation) wells were **rounded to the nearest thousand Mcf …6,000 Mcf/completion"** [emphasis added].** EPA's derivation of this result is unclear but appears to rest on a sequence of assumptions about wells drilled in 2002 that seem to be inconsistent with EIA data.

- "The same Natural Gas STAR presentation provides a Partner experience which shares its recovered volume of methane per well…. Again, because of the high variability and uncertainty associated with different completion flowbacks in the gas industry, this was **estimated only to the nearest thousand Mcf—10,000 Mcf/completion**" [emphasis added].*** This data point is based on 30 wells drilled in the Fort Worth Basin**.**

- In the same presentation, "a vendor/service provider [reported] the total recovered volume of gas for 3 completions…. Again, because of the high variability and uncertainty associated with different completion flowbacks in the gas industry, this was **rounded**

*EPA, "Green Completions," Natural Gas STAR Producers' Technology Transfer Workshop, September 21, 2004; and EPA, "Reducing Methane Emissions During Completion Operations," Natural Gas STAR Producers' Technology Transfer Workshop, September 11, 2007.
**EPA, Background Technical Support Document, page 86.
***EPA Background Technical Support Document, page 87.

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to the nearest hundred Mcf—700 Mcf/completion" [emphasis added].* This data point is based on three coalbed methane wells drilled in the Fruitland Formation in Durango, Colorado.

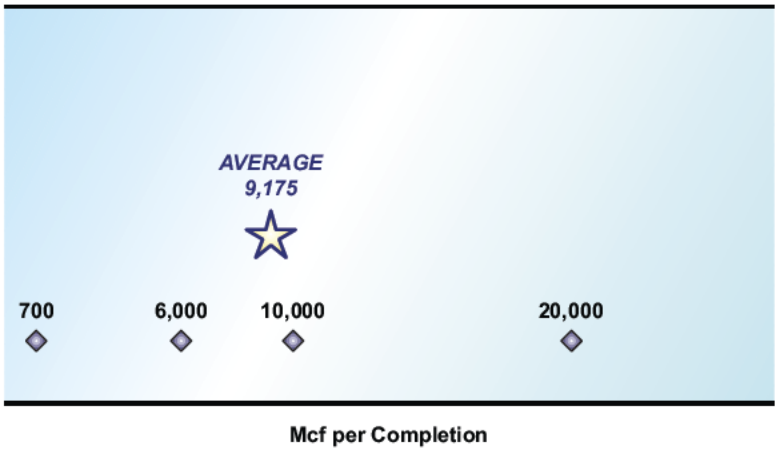
- "The final Natural Gas STAR presentation with adequate data to determine an average emission rate also presented the total flowback and total completions and recompletions. Because of the high variability and uncertainty associated with different completion flowbacks in the gas industry, this was **rounded to the nearest 10,000 Mcf—20,000 Mcf/completion**" [emphasis added]).** This data point is based on 1,064 wells completed from 2002 through 2006 in the Piceance Basin.

- "This analysis takes the simple average of these completion flowbacks for the unconventional well completion emission factor: **9,175 Mcf/completion**" [emphasis added] (see Figure 1).***

To summarize the math, the final emissions factor of 9,175 Mcf per completion that is assumed to apply to all unconventional wells completed in the United States was calculated as the simple average of four (unaudited) data points. EPA rounded each data point to the nearest hundred, thousand, or ten thousand Mcf as a way of handling the "high variability and uncertainty" in the industry. These four data points represent very different sample sizes (from three to thousands) and underlying data quality. A simple average of these points does not provide a rigorous estimate of industry emissions.

Figure 1

EPA's Analysis to Determine Methane Emissions



Source: EPA.
10802 4

*Ibid.
**Ibid.
***Ibid.

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Moreover the second and third data points do not refer to methane emissions at all. Rather they represent the amount of gas that was recovered during green completions of natural gas wells—operations designed to capture as much methane as possible during the well completion process. The fourth data point describes operations in which more than 90 percent of flowback gas was recovered and sold. In other words, well completions described in three of the four data points used to derive the average emission factor of 9,175 Mcf per completion emitted little or no methane. EPA's assumption that all methane recovered from these wells would otherwise have been flared or vented is questionable at best, given the industry practices described earlier and operators' financial interest in sending gas to sale as soon as possible.

EPA's assumption that 49 percent of gas is vented and 51 percent is flared is also based on a number of assumptions that do not reflect current industry practice. EPA calculated this ratio as follows.

> "Some states regulate that completion and re-completion (workover) flowbacks must be flared or recovered. Industry representatives have shared with EPA that flaring of completions and workovers is required in Wyoming; however, it is not required in Texas, New Mexico, and Oklahoma. EPA assumed that no completions were flared in the Texas, New Mexico, and Oklahoma [sic], and then took the ratio of unconventional wells in Wyoming to the unconventional wells in all four sample states to estimate the percentage of well completions and workovers that are flared. EPA assumed that this sample was indicative of the rest of the U.S. This ratio was estimated to be approximately 51%."*

In other words, the assumed ratio of methane flared versus vented is based on the ratio of unconventional wells in Wyoming (where flaring is required) to wells in Texas, New Mexico, and Oklahoma (where flaring is not required) and extrapolated to the entire United States, a questionable assumption. Even more questionable is the use of a ratio of *wells* to make inferences about the production of *volumes*. The implicit assumption is that production per well is approximately equal not only across the states of Wyoming, Texas, New Mexico, and Oklahoma, but indeed also across the entire United States. Finally, EPA assumed that flaring did not take place if it was not required and that pure methane was vented to the atmosphere. This assumption is clearly at odds with the industry practices described above. The State of Texas has since passed regulations that require monitoring and control of fugitive emissions including methane, ethane, and volatile organic compounds (VOCs) in the Barnett Shale area. Use of equipment to capture and reclaim VOCs is required, any fugitive emissions must be monitored and reported, and any violations must be corrected under the new Texas Commission on Environmental Quality (TCEQ) regulations.**

In summary EPA made two crucial errors in its estimate of methane emissions.

*EPA Background Technical Support Document, page 88.

**"Texas implements new emissions rules for Barnett Shale play," Platts news report January 28, 2011; TCEQ Barnett Shale Area website; see the IHS CERA Private Report *Texas Positions Barnett Shale as Role Model for Air Quality Regulations.*

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- **EPA based the estimate on a simple average of four data points taken from presentations at technical conferences in 2004 and 2007.** Three of these data points describe methane captured for sale, not methane emitted.
- **EPA assumes that gas produced during completion is vented, rather than flared, unless flaring is required by state regulation.** This assumption is at odds with industry practice and with safe operation of drilling sites.

As a result of these questionable assumptions, the overall amount of methane that EPA assumes is emitted during well completion activities does not pass a basic test of reasonableness. Methane emissions of 9,175 Mcf per well, if vented during a few days of well completion procedures, would create a toxic and hazardous environment around the well site. That serious accidents are rare in gas plays suggests that upstream emissions do not regularly rise to such dangerous levels. EPA's estimate certainly does not represent the *average* level of emissions from well completions.

The EPA calculations also ignore that any emissions occurring during flowback do so only in the first few days of the life of the well. Once completed, no further fugitive emissions occur for the 20- to 40-year life of the well except during extraordinary maintenance events such as workovers, which may be undertaken to address productivity issues. In any given year only about 20 percent of the total gas supply in the United States comes from newly drilled wells.

IHS CERA estimates that in 2010 a total 10.7 Bcf per day of gas was produced from gas wells drilled that year. This is about 18 percent of the 58.2 Bcf per day of total gas produced in the US Lower 48. Even if each well had vented all of its eventual daily production of methane during a ten-day flowback period—which, as indicated previously, was not the case—the total methane emitted during flowback procedures in 2010 would have been 107 Bcf. Not only is this only 0.5 percent of the more than 21 trillion cubic feet (Tcf) of gas produced in the US Lower 48 in 2010, it represents only 43 $mtCO_2e$ of methane emissions—far lower than EPA's estimated level of 130 million tons of methane emissions from natural gas field production in 2009. And for reasons already discussed, this is a gross overestimate, because first, wells in flowback do not contain methane in quantities equal to their post-completion daily production, and second, most of the methane in flowback is flared, if not captured for sale.

Finally it should be noted that owing to the greater productivity of shale gas wells, fewer wells now have to be drilled to produce a given quantity of natural gas. EIA reports that 33,331 gas wells were drilled in the United States in 2008 and total US gas production that year was 55.1 billion cubic feet (Bcf) per day.* In 2010 only 18,672 gas wells were drilled, but production rose to 59.1 Bcf per day. The reduction in total wells drilled at least partially offsets any increase in emissions per well that may result from the shift to shale gas development.

*Includes the US Lower 48 and Alaska.

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A Cornell Study also Overestimates Methane Emissions

A controversial paper in the journal *Climatic Change Letters* by Robert W. Howarth, Renee Santoro, and Anthony Ingraffea of Cornell University also argues that emissions of methane during flowback from unconventional gas wells is much greater than previously estimated.*

This paper follows and extends the analysis of the EPA study. It considers methane emissions during flowback from five unconventional gas basins. Data for two of these basins (Barnett and Piceance) are the same as those used in EPA's analysis—the second and fourth data points described above. The paper uses similar data from presentations at EPA Natural Gas STAR workshops for two additional basins (Uinta and Denver-Julesburg).** Data for the fifth basin (Haynesville) is attributed to an IHS report.***

IHS data for the Haynesville Shale was misused and severely distorted in the Howarth paper. The analysis included wells that were not in the flowback phase at all; double-counted a particularly prolific well; and in the single case of a well tested during the flowback process, assumed that methane was emitted when in fact it was captured for sale, as clearly stated in the IHS report. Appendix 1 contains a letter sent to the editor of *Climatic Change Letters* in response to the misuse of IHS data. Appendix 2 contains an excerpt of the IHS report cited in the Howarth paper. Data for three of the other four basins were estimates of gas recovered from green completions, similar to the methodology used in the EPA analysis. Again, the assumption that *all* of this gas would otherwise have been vented or flared is unwarranted.

The Howarth paper states that methane emissions from unconventional gas wells average nearly 2 percent of the ultimate recovery of natural gas over the lifetime of the well (typically 20 years or more). By contrast, the authors estimate that flowback methane emissions from a conventional gas well average only 0.01 percent of ultimate recovery. They attribute the greater amount of methane emissions from unconventional wells to the large volume of fraccing fluids that flow back from these wells and the methane that accompanies the fraccing fluid.

The Howarth estimates assume that daily methane emissions throughout the flowback period actually exceed the wells' IP at completion. This is a fundamental error, since the gas stream builds up slowly during flowback.

Compounding this error is the assumption that *all* flowback methane is vented, when industry practice is to capture and market as much as possible, flaring much of the rest. Vented

*Robert W. Howarth, Renee Santoro, and Anthony Ingraffea. "Methane and the Greenhouse-gas Footprint of Natural Gas from Shale Formations," *Climatic Change Letters,* March 13, 2011.
**J. Samuels, *Emission Reduction Strategies in the Greater Natural Buttes.* Anadarko Petroleum Corporation. EPA Gas STAR, Producers Technology Transfer Workshop Vernal, Utah, 23 March 2010, http://www.epa.gov/gasstar/documents/workshops/vernal-2010/03_anadarko.pdf and K. Bracken (2008) "Reduced Emission Completions in DJ Basin and Natural Buttes." Presentation given at EPA Gas STAR Producers Technology Transfer Workshop. Rock Springs Wyoming, 1 May 2008. http://www.epa.gov/gasstar/documents/workshops/2008-tech-transfer/rocksprings5.pdf
***M. Eckhardt, B. Knowles, E. Maker, P. Stark, *IHS US Industry Highlights, February–March 2009.* (IHS) Houston, Texas.

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emissions of the magnitudes estimated by Howarth would be extremely dangerous and subject to ignition. The simple fact that fires are rare in all gas-producing areas suggests that this analysis grossly overestimates the quantities of methane that are leaking uncontrolled into the atmosphere at the well site.

PROPOSED EPA REGULATIONS LARGELY FOLLOW INDUSTRY PRACTICE

On July 28, 2011, EPA proposed new source performance standards under the Clean Air Act that would regulate air emissions during the completion phase of hydraulically fractured gas wells. The proposed regulations require green completion techniques—recovery of gas for sale as soon as technically feasible—and flaring of any produced gas that is not suitable for sale. The regulations also require advance notification of well completions and annual reports that include the details of each well completed during the year and the duration of gas recovery, flaring, and venting at each well.

These proposed standards do not directly regulate emissions of methane or other GHGs. Instead they focus on emissions of sulfur dioxide and VOCs. However, the measures that reduce emissions of these pollutants have the additional benefit of reducing methane emissions as well.

The benefits of the proposed standards are based on EPA's overstated estimate of gas vented during well completion operations and are therefore also overstated in terms of reducing air pollution and emissions of GHG. However, many operators already follow the practices that the standard requires. Common industry practice is to capture gas for sale as soon as it is technically feasible. Gas that cannot be sold is generally flared rather than vented for safety reasons.

The proposed standards have the potential to codify good operating practice in the gas drilling industry. The data collection requirement could also provide much more reliable data on methane emissions from gas well completions, a potential benefit to all who seek to better understand GHG emissions from the industry.

A QUESTION OF VOLUME

The volume of gas vented or flared is a very small percentage of total gas production each year, and IHS CERA believes that EPA has greatly overestimated these volumes. Nonetheless even relatively minute amounts of gas emissions can have an environmental impact. Because the GWP of methane is so much greater than that of CO_2, it is important to develop better data on the amount of gas vented versus flared during well completions. The data collection portion of EPA's proposed regulations has the potential to be an important step in the right direction.

The environmental impacts of unconventional gas production have become a controversial public issue. Given the rapid growth of unconventional production, rigorous analysis of these effects is important. Such an analysis must be based on facts and clear understanding of industry practices. Recent estimates of the GHG emissions from drilling and completion of

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unconventional gas wells do not meet this standard. EPA would do better to rely on a new, more appropriate data-driven methodology in addressing GHG emissions.

APPENDIX 1

COMMENT ON "METHANE AND THE GREENHOUSE GAS FOOTPRINT OF NATURAL GAS FROM SHALE FORMATIONS"

Philip H. "Pete" Stark, Vice President, IHS

It has come to my attention that an IHS report, of which I was a co-author, was mis-used and seriously distorted in an article published in *Climatic Change Letters*, "Methane and the Greenhouse Gas Footprint of Natural Gas from Shale Formations" by Robert W. Howarth, Renee Santoro, and Anthony Ingraffea. The article cites our report, *US Industry Highlights, February–March, 2009* (attached below), as the basis for their claim that 6,800 thousand cubic meters (Mcm)—or 240 million cubic feet (MMcf) of methane—is released to the atmosphere during a ten-day flow-back period from the Haynesville shale gas play. They go on to conclude that

> "…the methane from shale-gas production escapes to the atmosphere in venting and leaks over the lifetime of a well. These methane emissions are at least 30% more than and perhaps more than twice as great as those from conventional gas. The higher emissions from shale gas occur at the time wells are hydraulically fractured—as methane escapes from flow-back return fluids—and during drill out following the fracturing."

Our report does not support their conclusion at all. Only one of the Haynesville wells in our report was measured during flow-back—the several days after drilling and fracking but before completion, during which time the drilling and fracking fluids are pushed back out of the well ahead of the gas. That well produced 14 MMcf of natural gas per day, *none of which was released to the atmosphere.* Our report clearly states that the well was "producing to sales." In other words, the natural gas production was being captured and marketed. Here is the relevant excerpt from our report:

> "Also in Woodardville field, Forest Oil said it completed its first horizontal Haynesville/Bossier Shale well in Red Rive Parish. The 1 Moseley "14H" was reported ***producing to sales*** at the daily rate of 14 million cu ft of gas equivalent through perforations at 12,800–15,260 ft while the operator was still cleaning up frac load." (Emphasis added)

No methane from this well was emitted to the atmosphere, nor does the IHS report present any evidence of such methane emissions from any other well.

A copy of our full report is attached below.

Other serious, but less egregious misrepresentations of our report in the Howarth team's article include

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- An improper calculation of the average of the individual well flow rates discussed in our report.
- An improper attribution of the (improperly calculated) average flow rates from all the wells as occurring during flow-back operations. In fact, only one of the ten wells reported was measured during flow-back. The others were measured while the wells were being completed (capped and connected to pipelines).

We reported the results of nine gas well completion tests and one well tested during flow-back in the Haynesville Shale during late 2008. In calculating the average flow rates from the ten wells, the Howarth team made a simple error of double-counting the results from the most prolific well in our report. Specifically, we stated that

> "The 5 Laxson was tested flowing almost 33.8 million cu ft of gas per day through fracture-treated perforations at 15,416–15,691 ft. Daily absolute open flow was calculated at more than 39.49 million cu ft."

The average production from the 10 well tests was 18.4 MMcf per day, but if you include both the 33.8 MMcf per day Laxson test and the 39.49 MMcf per day open flow calculation for the Laxson well you get the 24 MMcf per day (or 680 Mcm per day) figure cited in the Howarth article. So the Howarth team apparently counted two production tests from a single well in calculating their average for the Haynesville. (By the way, the Laxson well is in the Bossier shale play, not the Haynesville, although the two plays overlap geographically to some extent.)

It is clear to me that Professor Howarth and his co-authors have not only misinterpreted our data but they have also claimed that the data support conclusions that in fact the data do not support. As I have documented in this comment, the IHS report referenced as the source of their data on methane emissions from the Haynesville only supports a conclusion that one Haynesville well tested during flow-back produced 14 MMcf per day, none of which was emitted into the atmosphere.

APPENDIX 2

EXCERPT FROM *IHS US INDUSTRY HIGHLIGHTS, FEBRUARY–MARCH, 2009*

Marc Eckhardt, Bob Knowles, Ed Marker, and Pete Stark.

Haynesville Shale: Numerous high-volume completions continue to be reported in the Haynesville Shale play of northwestern Louisiana, including a horizontal KCS Resources well that flowed nearly 19.1 million cu ft of gas daily. Located in Elm Grove field in the southern portion of North Louisiana's Bossier Parish, the 6 Woodley "8" was tested through fracture-stimulated perforations at 11,384–15,450 ft. Less than a half-mile to the east in the same section is the company's 3-Alt Osborne "8" which previously flowed 18.7 million cu ft of gas per day. Also nearby are the recently completed KCS-operated 4 Mack Hogan (14.7 million cu ft daily), 5 Roos "A" (14.6 million cu ft), 5-Alt Goodwin "9" (21.1 million cu ft) and 13 Elm Grove Plantation "30" (20.3 million cu ft).

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In western Bienville Parish, Questar Exploration & Production has completed two horizontal Haynesville Shale wells in Woodardville field. The 1 Wiggins "36H" was tested flowing 7.2 million cu ft of gas per day through perforations at 12,695–16,182 ft. Just over two miles to the east is the operator's 1 Golson "32H," which flowed 20.9 million cu ft of gas daily through perforations at 12,590–16,577 ft. Questar is active at another Haynesville Shale test a mile and a half west of the 1 Golson. The 1 Shelby Interests "31H" was being production tested at last report.

Also in Woodardville field, Forest Oil said it completed its first horizontal Haynesville/Bossier Shale well in Red River Parish. The 1 Moseley "14H" was reported producing to sales at the daily rate of 14 million cu ft of gas equivalent through perforations at 12,800–15,260 ft while the operator was still cleaning up frac load. Forest holds approximately 2,800 net acres around the drillsite and approximately 140,000 gross (106,000 net) acres in the Haynesville/Bossier Shale play and intends to operate a two-rig program to drill 10–12 Haynesville/Bossier Shale wells and participate in two to three nonoperated wells during 2009.

St. Mary Land & Exploration also announced that it reached total depth at its first operated horizontal Haynesville Shale well. The company has a 90 percent working interest in the 2 Johnson Trust "1" in Spider field in DeSoto Parish. It was drilled to 15,264 ft, with a 3300-ft lateral. The company said its next planned Haynesville well is expected to be in Shelby County (RRC Dist. 6), where it has a sizeable acreage position.

Far from the Haynesville core in northwestern Louisiana, a high-volume Bossier well was recently completed by EnCana Oil & Gas in the eastern portion of East Texas' Robertson County (RRC Dist. 5). The 5 Laxson was tested flowing almost 33.8 million cu ft of gas per day through fracture-treated perforations at 15,416–15,691 ft. Daily absolute open flow was calculated at more than 39.49 million cu ft. The new vertical producer was placed in John Amoruso field, which was opened by the operator in 2006. More than 50 Bossier wells were onstream at the end of 2008. ■

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Attachment C

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EPA seriously overstates well emissions

Incorrect estimates have critical policy implications

EPA's 2011 recalculation of methane, volatile organic compound (VOC) and hazardous air pollutant (HAP) emission estimates from natural gas wells are overstated by orders of magnitude and are undermining other research work and policy consideration.

Background

In 2010, EPA issued a background technical support document titled, "Greenhouse gas emissions reporting from the petroleum and natural gas industry." In the report, EPA altered the methodology it had previously used to estimate methane emissions from natural gas production.

Before 2010, EPA estimated 0.02 metric tons of methane were emitted per well completion. In 2010, EPA made dramatic changes to its estimates. The new estimates hold that conventional natural gas wells emit 0.71 metric tons of methane, and shale gas wells emit 177 metric tons of methane per well completion. As a result of these new estimates, EPA adjusted prior-year U.S. greenhouse gas emission reports retroactively as far back as 1990 to reflect the new estimates.

> "EPA's faulty estimates have led researchers, financial analysts and other governmental bodies to rely on inaccurate statistics in a number of research reports and in policy consideration."

Problem

A report exploring the inaccuracies in EPA's methodology in determining methane emissions from natural gas production was released in August 2011. IHS CERA, a highly respected research firm with specific expertise in the oil and natural gas production sector, released a report titled, "Mismeasuring Methane: Estimating greenhouse gas emissions from upstream natural gas development." In the analysis, IHS CERA points out specific flaws EPA made in its analysis, including:

- The misuse and inaccurate application of Natural Gas STAR program data collected from a small number of wells to assume industry-wide emission rates — based on the erroneous assumption that methane reported as captured through "green completions" would otherwise be vented to the atmosphere when a green completion is not performed.

- EPA's flawed rounding of data points to the nearest hundredth, thousandth, and even ten thousandth Mcf to overcome the "high variability and uncertainty" in the industry — masking a lack of consistent and reliable data that would undermine the EPA conclusions.

- Developing an assumption that producers in Texas, New Mexico and Oklahoma vent to the atmosphere during flowback, rather than commonly flaring or capturing emissions, simply because those states do not mandate flaring or recovery.

As a follow-on to the IHS-CERA study, Devon conducted its own investigation that revealed that EPA emission estimates were 1400 percent greater than Devon's actual emissions. Subsequently, URS Corporation conducted a survey that revealed EPA emission estimates as much as 1200 percent greater than emissions of the seven companies that participated in the study.

The work by URS Corporation in November 2011 involved gathering and analyzing U.S. well data completed in more than 10 different basins across the country. Using an EPA-endorsed flow equation with assumptions that provide high estimates, URS found that methane emissions among the seven companies represent less than eight percent of the EPA estimates. This means actual production-related emissions of associated volatile organic compounds and hazardous air pollutants in the gas stream are also less than eight percent of what the EPA believes.

EPA's faulty estimates have led researchers, financial analysts and other governmental bodies to rely on inaccurate statistics in a number of research reports and in policy consideration. For example, Dr. Robert Howarth of Cornell University led a team that released a study this past spring questioning whether natural gas is truly a cleaner fuel than coal. Certainly Dr. Howarth's study included several inaccurate assumptions of his own making, but a key basis for his review lies in the overestimation of methane emissions developed by EPA.

The Cornell study and EPA's methane emission estimates are also finding voice in other government studies. The U.S. Department of Energy SEAB Natural Gas Subcommittee report even mentions the "pessimistic conclusion about the greenhouse gas footprint of shale gas production and use."

Perhaps most important, critical policy initiatives and discussions are being based on EPA's flawed estimates. Currently the proposed new source performance standards for the oil and natural gas industry are founded in part on what are now seen to be seriously inflated estimates of VOCs, HAPs and methane emissions as calculated by EPA. In addition, those concerned about broad global climate change policy see the revised EPA methane emission numbers as calling into question the clean advantage of natural gas.

Finally, the EPA emission estimates fly in the face of sound business and economic principles. Producers have every incentive to capture as much valuable methane as possible, as early as possible, in the well completion and production process. That is a key driver in the use of advanced early production processes (AEPP) that ensure early methane capture, even during initial well flowback (with the environmental benefits leading to the term "green completions"). This is important because if EPA's estimates were true, Devon would have lost more than $305 million to the atmosphere in a single year. No business would tolerate this type of waste.

Solution
To prevent further unintended consequences by use of seriously flawed EPA emission estimates, EPA should return to its time-tested methodology and previous estimates.

11-30-11 / Contact: Darren Smith 405 228 8584
Bill Whitsitt 405 552 3556

Attachment D

Testimony of Darren Smith, Environmental Manager, Devon Energy Corporation

Before the EPW Subcommittee on Clean Air and Nuclear Safety

Washington, D.C. June 19th, 2012.

Dear Mr. Chairman and members of the Subcommittee. Thank you for the opportunity to be here today.

My name is Darren Smith, and I am the Environmental Manager for Devon Energy.

Devon is a leading independent oil and natural gas company focused onshore in the United States and Canada. The company's portfolio of oil and gas properties provides stable, environmentally responsible production. We work hard to conduct operations in an environmentally responsible way, reducing impact on land, water and air. This is good for the environment and is good for business. It is important to note that Devon supports reasonable regulation of the industry; however, we oppose inappropriate regulations that are based on unsound science.

My testimony this morning will describe EPA's misperception of initial production from gas wells. I will describe how this misperception has led to a drastic overestimate of methane emissions from hydraulically fractured natural gas wells. This overestimate has allowed EPA to justify the promulgation of new air standards for the natural gas industry. More important, we continue to see new policy research being based on a foundation of this bad data - guaranteeing that the wrong conclusions are reached.

It was when researchers from Cornell University released their "natural gas is dirtier than coal study" that Devon first became aware that EPA had dramatically changed its emissions estimate for hydraulically fractured gas wells. EPA now asserts, and has reported to the United Nations Intergovernmental Panel on Climate Change, that each unconventional gas well emits over 9 million standard cubic feet of natural gas to the atmosphere and has done so since 1990.

Devon became suspicious of EPA's new estimate because if true, it would mean that Devon alone wastes over 40 million dollars of natural gas to the atmosphere annually. Clearly, a successful company like Devon could not tolerate this level of waste.

When we investigated the basis of the estimate change we learned that EPA staff had used industry data reported to it under the voluntary EPA Natural Gas Star Program to generate the new factor. The data used came from only 3 companies.

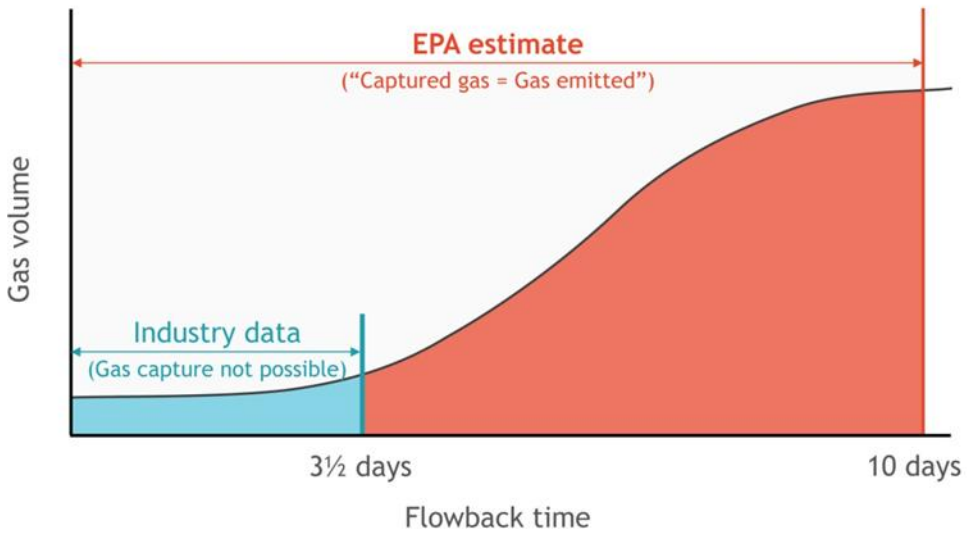
This finding represents the most significant flaw in EPA's method. Simply put, the Natural Gas Star Data represents gas captured, not gas emitted. Moreover, the data reported into the Natural Gas Star program was never intended to represent emissions.

Devon has informed EPA of this error numerous times. We have brought actual data from Devon's operation and met face to face, we have supplied comments and data from a broader set of Oil and Gas Operators to the oil and gas rule docket, we have followed up by email and telephone, and we have supplied a report from IHS CERA confirming our findings. The US Chamber of Commerce has petitioned for a correction under the Data Quality Act.

Despite all of this, EPA has failed to acknowledge its mistake much less correct it.

I would now like to turn to the graphic contained in your copy of my testimony. It will help illustrate EPA's misconception and how it has resulted in a dramatic overestimate of emissions from our industry.

Well Emissions: Actual vs. Perceived by EPA



EPA's fundamental misperception of initial gas production from natural gas wells leads to dramatic overestimates of methane emissions.

First I want to draw your attention to the curve. After a well is hydraulically fractured, it undergoes what is called flowback. In simple terms, Flowback is necessary to remove water from the well so it can produce gas.

The left side of the curve represents the beginning of flowback where water production is highest and gas production is lowest. Progressing right - as water is removed from the well, gas production increases until at the far right side, gas production reaches its maximum rate and levels off.

Now, EPA believes that the period of flowback is up to 10 days because that is what has been reported to the Natural Gas Star program. In Natural Gas Star, Operators report the volume of gas that they capture while operating specialized capture equipment. Since gas is being captured and not wasted it is not uncommon to operate this capture equipment for 10 days or more. Remember Natural Gas Star is for gas captured not gas emitted.

10 days of gas capture is on the far right side of the curve and equates to 9 million cubic feet according to how EPA averaged the Natural Gas Star data.

This contrasts significantly with the scenario where gas cannot be captured from the flowback stream – the blue shaded area.

Actual data from 8 operators has demonstrated that flowback lasts on average only 3.5 days when gas capture is not possible. An operator will flow the well back only as long as needed to remove the bulk of the water – when steady gas flow is established, the well is shut off until the pipeline is laid.

Clearly, captured gas volumes reported to Natural Gas Star, from 10 day flowback periods, are significantly higher that gas volumes released from flowback over 3 and a half days.

EPA has erred by assuming that the volume of gas captured under the Natural Gas Star program is the same volume of gas that would be emitted when gas capture is not possible.

To conclude, the error must be corrected now. We have already seen its misuse to justify air quality rules for fracking. It will continue to fuel bad public policy and research that overshadows the benefits of natural gas. Studies like the recent one from the Environmental Defense Fund that used the overestimate to suggest that Natural Gas powered vehicles are no cleaner than gasoline vehicles will continue until such time as EPA revises its published emissions data. And this will take several years.

This concludes my testimony. Thank you.

Attachment E

Realistic Completion Emissions

Stakeholder Workshop on Natural Gas in the Inventory of U.S. Greenhouse Gas Emissions and Sinks

Jesse Sandlin - Devon Energy

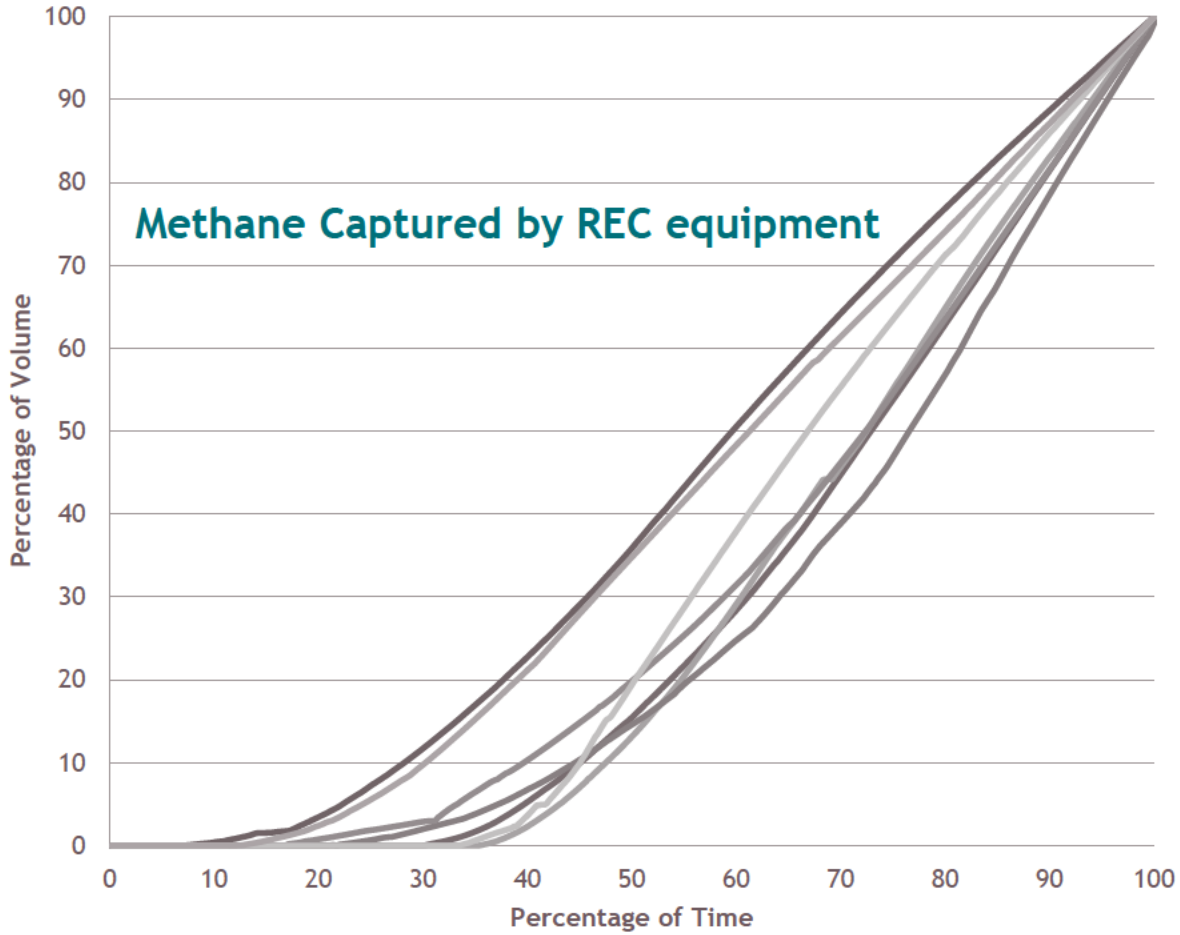
September 13, 2012

devon

Preface

- EPA's estimates that 9.175 MMCF of natural gas is released per well completion[1]
- These estimates are based on Natural Gas Star data, which measured gas **captured** by REC equipment during flowback
- Flowback with REC equipment is typically 8 to 12 days
- Without this equipment, industry averages 3.5 days of flowback[2]
- Wells typically increase methane production during flowback over time
- EPA therefore significantly overestimates methane releases from completion activities[3]

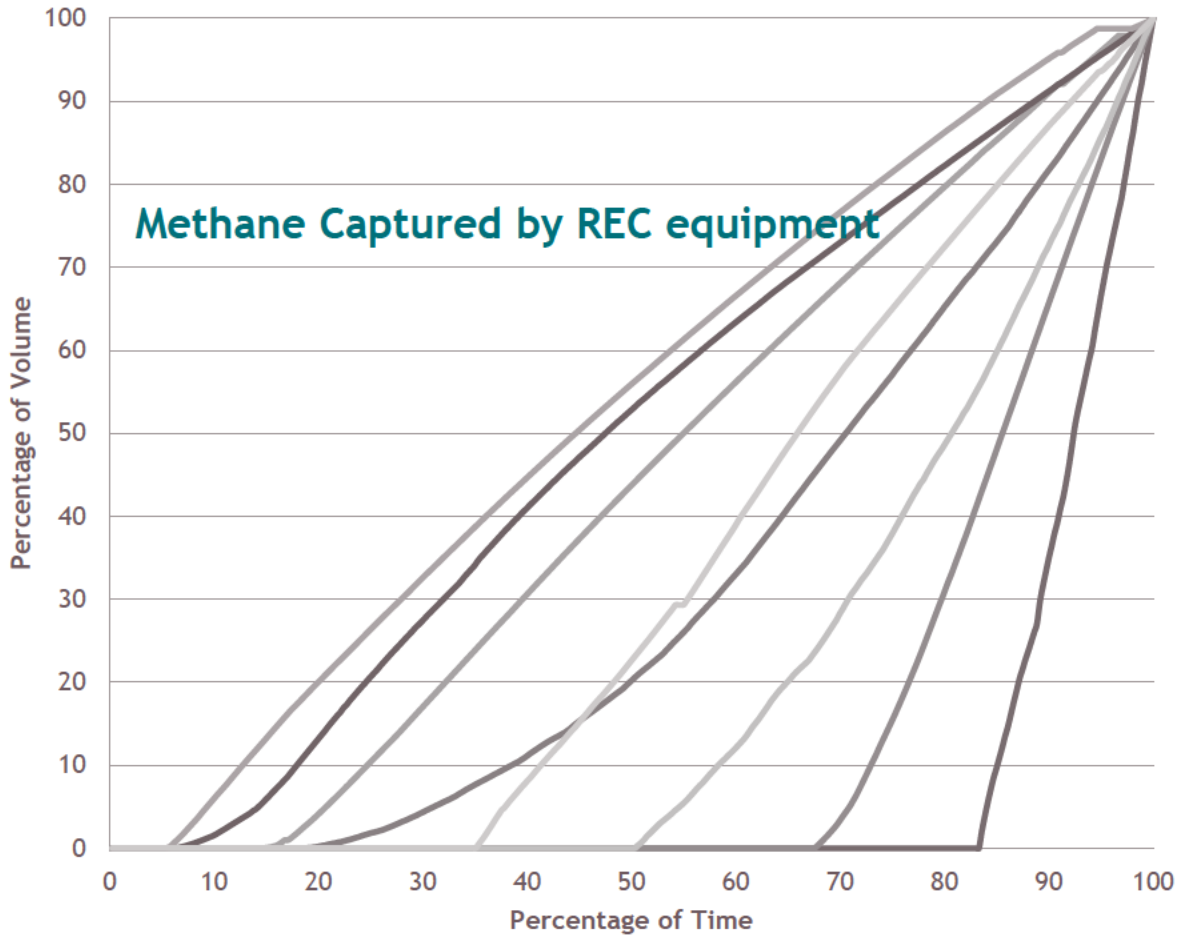
Area 1 – Cotton Valley



	MMscf		
Well	3.5 Day	10 Day	Gas Star Reported
No. 1	0	7.9	120.8
No. 2	0.0	0	160
No. 3	0.2	16.5	48
No. 4	1.4	22.1	99.3
No. 5	0.7	20.5	53.0
No. 6	0.0	5.7	63.8
No. 7	0.7	29.3	118.7
Avg*	**0.3**	**14.5**	**91.1**

*Average does not contain highest and lowest numbers of each set

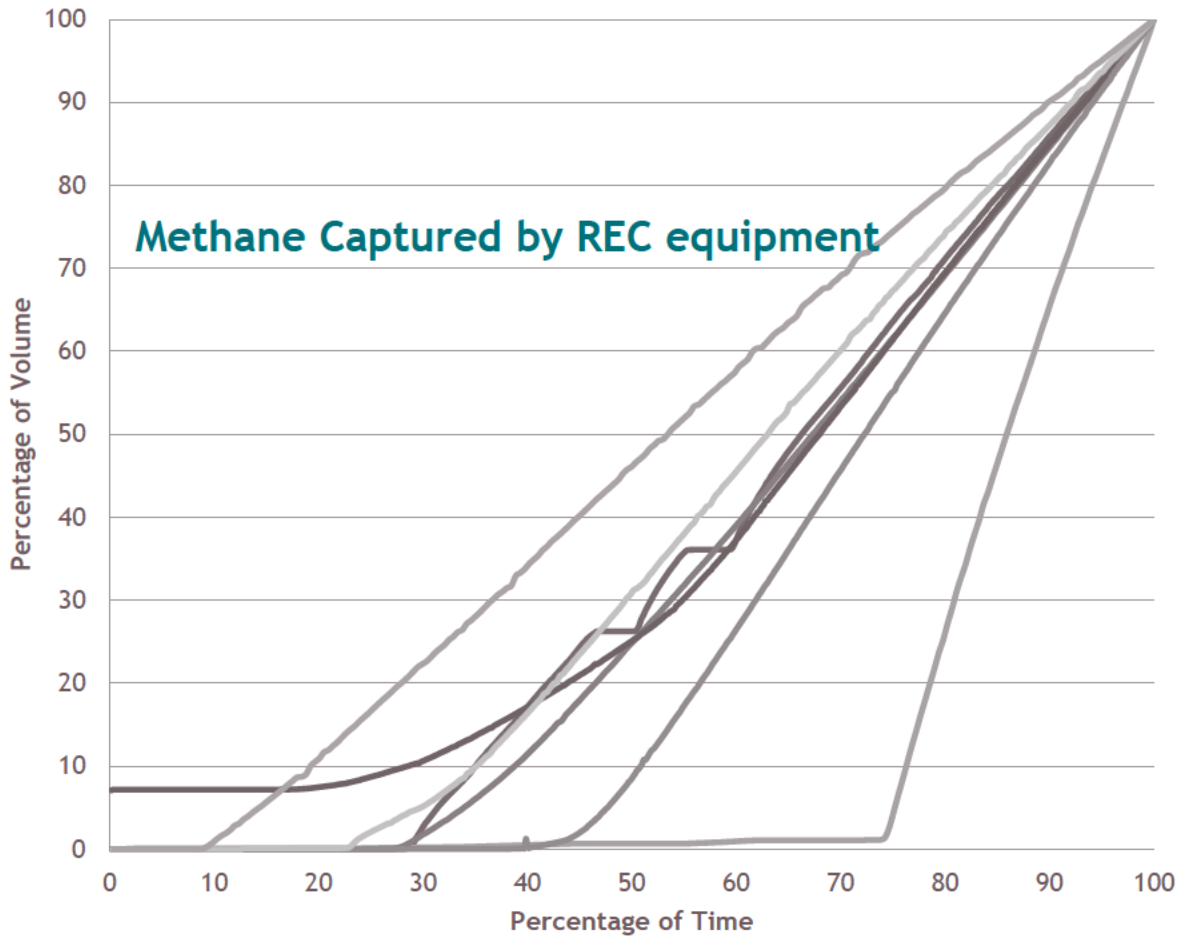
Area 2 – Western Oklahoma



	MMscf		
Well	3.5 Day	10 Day	Gas Star Reported
No. 1	0.0	0.0	0.9
No. 2	0.0	28.1	119.8
No. 3	0.0	2.1	40.8
No. 4	6.8	24.5	32.9
No. 5	0.0	0.0	27.8
No. 6	0.0	1.9	6.2
No. 7	17.8	56.7	90.9
No. 8	0.0	17.2	44.9
Avg*	3.1	16.3	45.5

*Average does not contain highest and lowest numbers of each set

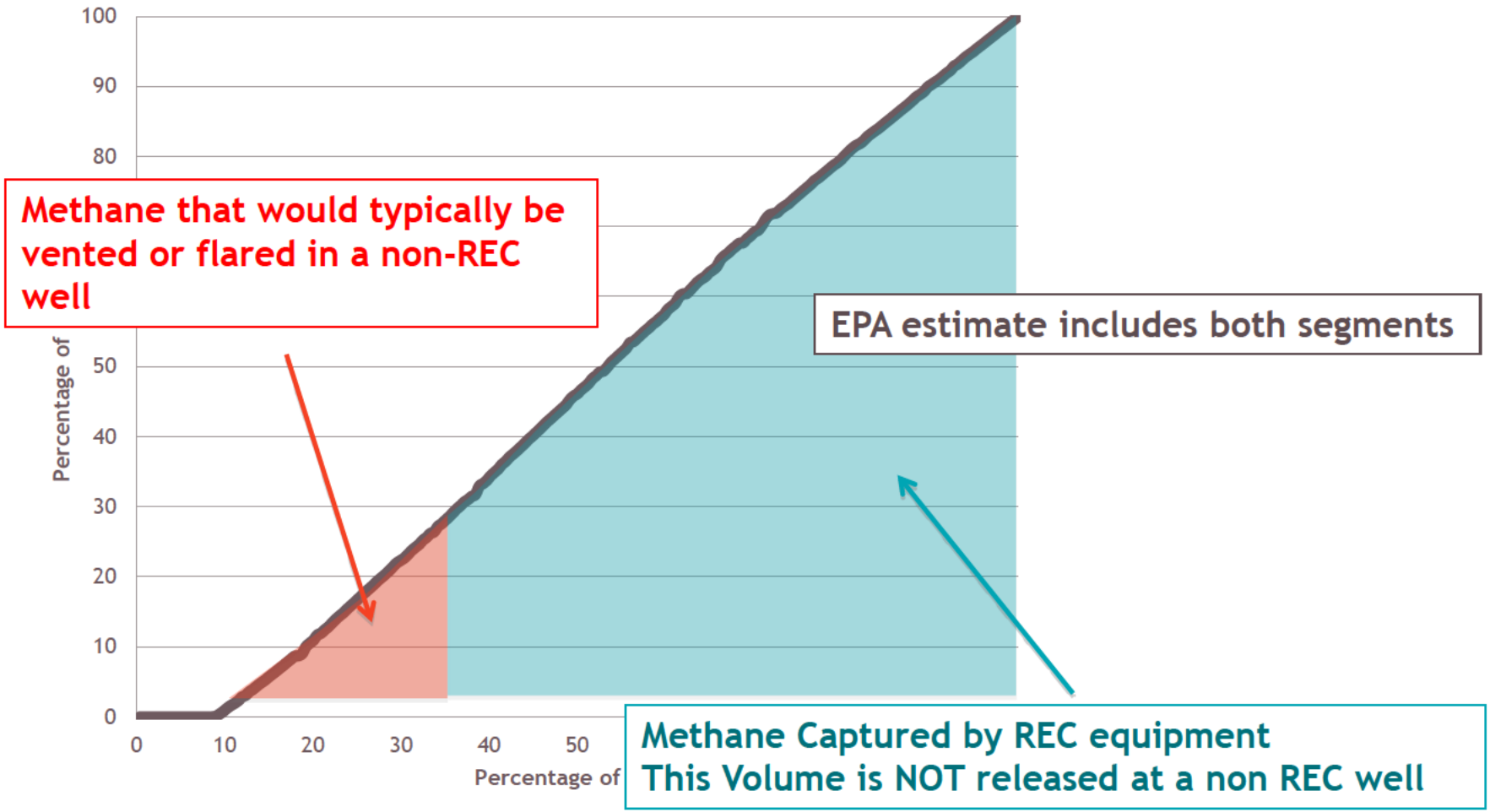
Area 3 – Barnett Shale



	MMscf		
Well	3.5 Day	10 Day	Gas Star Reported
No. 1	0.0	6.9	21.0
No. 2	0.0	5.3	5.3
No. 3	1.8	0.0	28.1
No. 4	4.3	8.1	59.5
No. 5	0.0	38.5	38.5
No. 6	0.6	14.3	22.0
No. 7	4.9	16.8	16.8
Avg*	**1.6**	**11.4**	**27.3**

*Average does not contain highest and lowest numbers of each set

Data mock-up


100
90
80
50
40
30
20
10
0
Percentage of
0
10
20
30
40
50
Percentage of
Methane that would typically be vented or flared in a non-REC well
EPA estimate includes both segments
Methane Captured by REC equipment
This Volume is NOT released at a non REC well

Thank you!

Questions?

Thank You.

devon

References

1. EPA Greenhouse gas emission inventory sources and sinks, 2011 - http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2012-Annex-3-Additional-Source-or-Sink-Categories.pdf2.
2. URS Study, Commissioned by Devon Energy - http://anga.us/media/241555/anga-axpc%20nsps%20memo%20revised.pdf
3. See also the API/ANGA Report for additional data and evidence - not yet released

Attachment F

BY CERTIFIED MAIL
RETURN RECEIPT REQUESTED

New York Attorney General Eric T. Schneiderman
Connecticut Attorney General George Jepsen
Delaware Attorney General Joseph R. Biden, II
Maryland Attorney General Douglas F. Gansler
Massachusetts Attorney General Martha Coakley
Rhode Island Attorney General Peter Kilmartin
Vermont Attorney General William H. Sorrell

December 11, 2012

Lisa P. Jackson
Administrator
Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N. W.
Washington, DC 20460

RE: Clean Air Act Notice of Intent to Sue for Failure to Determine Whether Standards of Performance Are Appropriate for Methane Emissions from Oil and Gas Operations, and to Establish Such Standards and Related Guidelines for New and Existing Sources

Dear Administrator Jackson:

The States of New York, Connecticut, Delaware, Maryland, Rhode Island, and Vermont, and the Commonwealth of Massachusetts, respectfully request that the Environmental Protection Agency remedy its failure under the Clean Air Act to set performance standards for new sources and guidelines for existing sources that curb emissions of methane from the oil and gas sector. EPA has determined that emissions of this potent greenhouse gas endanger public health and welfare, and that processes and equipment in the oil and gas sector emit vast quantities of methane. Moreover, EPA has compelling data, including from 18 years of experience administering the Natural Gas Star Program, demonstrating that many measures to avoid (or reduce) methane emissions from new and existing oil and gas operations are available and cost-effective. Despite these findings, EPA has missed the applicable deadline for determining whether standards and guidelines limiting methane emissions from oil and gas operations under section 111 of the Clean Air Act are appropriate and for issuing such standards. EPA's ongoing failure to address the sector's methane emissions violates the Clean Air Act and harms the health and welfare of our residents.

I. Background

From severe droughts and heat waves to a string of devastating storms in the northeast over the last two years, it is becoming ever more apparent that increasing greenhouse gas pollution contributes to climate disruption in the U.S. and around the globe. Methane is a very potent greenhouse gas -- pound for pound, it warms the climate about 25 times more than carbon dioxide. EPA has found that the impacts of climate change caused by methane include "increased air and ocean temperatures, changes in

precipitation patterns, melting and thawing of global glaciers and ice, increasingly severe weather events, such as hurricanes of greater intensity and sea level rise." 77 Fed. Reg. 49,490, 49,535 (Aug. 23, 2011). Oil and gas systems are the largest source of methane emissions in the U.S. and the second largest industrial source of U.S. greenhouse gas emissions behind only electric power plants. For example, methane emissions from this sector make almost one-fifth of the contribution to climate change that carbon dioxide emissions from coal-fired power plants do. EPA must fully comply with its legal obligations under the Clean Air Act to regulate emissions that endanger public health and welfare by controlling this significant source of dangerous greenhouse gas pollution.

Section 111 of the Clean Air Act requires EPA to establish standards of performance governing the emission of air pollutants from new sources in the oil and gas sector and to review, and if appropriate, revise, those standards at least every 8 years. *See* 42 U.S.C. § 7411(b)(1)(B). As part of this 8-year review, EPA had a mandatory duty (1) to make a determination whether standards covering methane emissions are "appropriate," and, (2) if it is appropriate, to promulgate standards. The Act and EPA's regulations also require EPA to issue emission guidelines covering the release of methane from any existing oil and gas operations for which standards of performance have been issued. *See id.* § 7411(d); 40 C.F.R. § 60.22(a).

EPA originally promulgated standards of performance for the oil and gas sector in 1985. The 8-year deadline for reviewing these standards expired in 1993. EPA finally signed a rule to complete the mandated review for oil and gas operations on April 17, 2012. 77 Fed. Reg. 49,490 (Aug. 16, 2012). However, although the agency revised the standards for several pollutants, EPA did not make the required appropriateness determination regarding methane, nor did EPA establish performance standards or emission guidelines for methane emissions from this industrial sector.

Consequently, unless you promptly correct these failures, we intend to file suit in federal district court against you as EPA administrator and EPA for failures to timely:

(1) make the required determination whether standards of performance limiting methane emissions from oil and gas sources are appropriate and, if so, failing to timely issue revised performance standards limiting methane emissions from this source category; and

(2) issue emissions guidelines for the control of methane emissions from existing oil and gas sources.

Jurisdiction to adjudicate and enforce the Administrator's failure to carry out non-discretionary duties lies with the district court under section 304 of the Act. *See Environmental Defense Fund v. Thomas*, 870 F.2d 892, 897 (2d Cir. 1989); *Portland Cement Ass'n v. EPA*, 665 F.3d 177, 194 (D.C. Cir. 2011). This letter provides notice as required under section 304 of the Clean Air Act, 42 U.S.C. § 7604, and 40 C.F.R. part 54. Unless EPA takes the required actions by the end of the applicable notice period, we intend to bring a suit for EPA's failure to perform the non-discretionary duties outlined in 42 U.S.C. §§ 7411(b)(1)(B), 7411(d), and 40 C.F.R. § 60.22(a), and for the agency's unreasonable delay in the performance of these duties. The suit will seek injunctive and declaratory relief, the costs of litigation, and may seek other relief.

II. EPA Failed to Perform Its Non-Discretionary Duties to Determine Whether Standards of Performance for Methane Are Appropriate and, if so, to Establish Such Standards and Related Emissions Guidelines.

Section 111 of the Clean Air Act requires EPA to establish "standards of performance" for emissions of air pollutants from categories of new, modified, and existing sources. After EPA sets initial

standards of performance for a listed category, section 111(b)(1)(B) imposes a timetable for EPA to review and revise those standards: "The Administrator shall, at least every 8 years, review and, if appropriate, revise such standards following the procedure required by the subsection for promulgation of such standards." 42 U.S.C. § 7411(b)(1)(B). EPA failed timely to review the standards of performance that it initially established in 1985 for sources in the oil and gas sector, leading multiple groups to file suit in 2009 to compel such review. That case, *Wild Earth Guardians v. EPA*, No. 1:09-CV-00089 (D.D.C.), resulted in a consent decree setting forth a schedule for proposing any final revisions by November 30, 2011.

In August 2011, EPA proposed revisions to the oil and gas NSPS. 76 Fed. Reg. 52,738 (Aug. 23, 2011). EPA did not propose any standards for methane emissions, despite previously determining that methane and other greenhouse gases endanger public health and welfare. 74 Fed. Reg. 66,496 (Dec. 15, 2009). Numerous organizations submitted comments on the proposed rule stating that EPA was required, as part of its mandated 8-year statutory review, to determine whether it was "appropriate" to add standards of performance for additional, previously-unregulated pollutants, such as methane, and, if so, to revise them accordingly.

EPA signed a final rule revising some aspects of the oil and gas standards on April 17, 2012, which was published in the Federal Register on August 16, 2012. 77 Fed. Reg. 49,490. EPA failed to determine whether it is appropriate to establish methane standards. Instead, EPA stated that "[i]n this rule, we are not taking final action with respect to regulation of methane. Rather, we intend to continue to evaluate the appropriateness of regulating methane with an eye toward taking additional steps if appropriate." *Id.* at 49,513. The agency further stated that "over time," it would assess emissions data received pursuant to the recently implemented greenhouse gas emissions reporting program, but set forth no timetable for taking final action to address methane emissions. *Id.*

EPA's failure to decide one way or another within the 8-year statutory review deadline whether it is appropriate to revise the oil and gas NSPS to regulate methane emissions violates section 111(b)(1)(B) of the Clean Air Act. That section imposes a clear-cut nondiscretionary duty of timeliness that requires EPA to make a decision within the 8-year review period whether it is "appropriate" to revise the standards to regulate methane, regardless of whether the substance of that decision is discretionary. The Second Circuit Court of Appeals in *Thomas*, 870 F.2d at 900, held that substantially similar language contained in section 109(d) of the Clean Air Act -- which provides that, at five-year intervals, EPA "shall complete a thorough review" and "promulgate such new standards as may be appropriate"-- imposed a nondiscretionary duty to make a decision. In that case, like here, EPA had declined to make any formal decision to either revise or decline to revise the standards for a specific pollutant. EPA argued that its non-decision was unreviewable by the D.C. Circuit under section 307 because it involved no decision or other agency "action" and was also not subject to challenge in district courts under section 304 because it was discretionary." *Id.* at 896. The Court rejected EPA's argument, holding that EPA may not leave the matter "in a bureaucratic limbo subject neither to review in the District of Columbia Circuit nor to challenge in the district court. *Id.* at 900. While the Court agreed that the "as may be appropriate" language of section 109(d) provided EPA with discretion to determine whether revision was appropriate and what the substance of those revisions should be, the presence of the language "shall complete" and "required" in that section implied that the district court "has jurisdiction to compel the Administrator to make *some* formal decision whether or not to revise the [standards]." *Id.*

Here, section 111(b)(1)(B) contains the mandatory term "shall" -- which applies to both of the verbs "review" and "revise"-- and a clear-cut statutory deadline of "at least every 8 years." Because EPA cannot make any revisions without first completing its review, the language requires EPA to both complete the review and make the revisions within the 8-year review period. Therefore, a district court

has jurisdiction to compel EPA to make a determination one way or another as to whether revision of the oil and gas NSPS is appropriate and to issue any revision it determines is appropriate.

In addition, EPA has a mandatory duty to include in its 8-year review new pollutants like methane that it has not previously regulated, but that it has since determined endanger public health and welfare. It would be wholly inconsistent with the mandatory nature of section 111 if EPA could refuse to address, as part of its 8-year review, air pollutants that are emitted by an already-listed source category and that EPA has already determined endanger public health and welfare. Rather, the structure of the Act demonstrates Congress' intent that EPA thoroughly review and revise NSPS for a source category at least every 8 years and not limit such review to making changes to existing standards, but instead require EPA to enact more stringent air pollution requirements as circumstances change, as new information becomes available regarding the adverse public health and welfare effects of air pollutants, and as new technologies become available to control emissions of such pollutants. Congress contemplated the 8-year review to encompass EPA's revision of the standards to address other air pollutants, particularly those emitted by a source category that, based on current information, are now determined to significantly contribute to that source's endangerment of public health and welfare and/or for which there is demonstrated control technology available. Further, EPA's past practice confirms that the agency must consider during its 8-year review all of the air pollutants emitted by the source category under review and set NSPS for any of those pollutants that cause or contribute significantly to that source's endangerment of public health and welfare and for which there is demonstrated control technology. *See* 41 Fed. Reg. 3826-27 (Jan. 26, 1976) (addition of standards for SO_2 and CO in NSPS for primary aluminum reduction plants); 42 Fed. Reg. 22506-07 (May 3, 1977) (addition of standards for NO_X, SO_2, and CO in NSPS for lime manufacturing plants); 49 Fed. Reg. 25,106-07 (June 19, 1984) (addition of standards for PM, CO, and hydrocarbon emissions in NSPS for fossil fuel-fired industrial steam generating units).

EPA failed to act on regulation of methane under section 111 despite possessing extensive information that adding methane standards for oil and gas operations is "appropriate." In prior 8-year reviews of standards of performance under section 111, EPA has consistently applied two criteria in determining whether it is appropriate to include a standard for a health- and welfare-endangering air pollutant: (i) the extent of the source category's contribution to the emissions of the pollutant, and (ii) the availability of methods to reduce those emissions. *See, e.g.*, 75 Fed. Reg. 54,970 (Sept. 9, 2010) (finalizing new NO_x standard for cement plants). Applying these criteria to the oil and gas sector demonstrates that methane standards are appropriate at this time.

First, EPA has recognized that "processes in the Oil and Natural Gas source category emit significant amounts of methane." 76 Fed. Reg. at 52,756/1. Indeed, the proposal stated that the sector's methane emissions are equivalent to more than 328 million metric tons of carbon dioxide per year. *Id.* at 52,756/2. As a result, oil and gas operations are the second largest industrial source of U.S. greenhouse gas emissions, behind only electric power plants. *Cf.* 74 Fed. Reg. 16,448, 16,597 Table VIII-1 (April 10, 2009) (showing 2009 estimates of greenhouse gas emissions from other industrial source categories). As EPA explained in the 2012 final rule, "methane emissions from the oil and gas industry represent about 40 percent of the total methane emissions from all sources and account for about 5 percent of all CO_2e [carbon dioxide equivalent] emissions in the United States, with natural gas systems being the single largest contributor to United States anthropogenic methane emissions." 77 Fed. Reg. at 49,535/2. Although EPA projects that the standards adopted in the 2012 final rule for emissions of volatile organic compounds (VOCs) and hazardous air pollutants will have the incidental benefit of also reducing annual methane emissions by about 19 million metric tons CO_2e, *id.* at 49,535/3, the vast majority of methane emissions from this sector will remain uncontrolled.

EPA's failure even to consider directly controlling methane emissions through standards and guidelines resulted in the omission of controls for certain operations that emit large amounts of methane.

For example, EPA declined to establish standards for compressors and pneumatic controllers in the natural gas transmission and distribution segment asserting that, although this equipment emits large quantities of methane, much of the VOCs already have been removed by the time the natural gas stream reaches these sources. *See* 77 Fed. Reg. at 49,522-23 (declining to regulate transmission and distribution compressors because of "the relatively low level of VOC emitted from these sources").

Second, there are readily available methods to reduce methane emissions. In fact, the high methane content of these currently uncontrolled emissions means that adopting standards and guidelines that require methane emissions controls would be cost-effective (or even profitable) at many of these additional emission points. In the final rule, EPA recognized the economic value of emissions control measures for oil and gas equipment that lead to the recovery of hydrocarbon products, including methane, "that can be used on-site as fuel or reprocessed within the production process for sale." 77 Fed. Reg. at 49,534/1. Indeed, EPA found that the rule "will result in net annual costs savings of about $11 million (in 2008 dollars)." *Id.* By ending the waste of methane at sources of emissions not covered by the standards for VOCs, standards of performance that address methane emissions directly likely would add to the economic benefits of the rule. For instance, although compressors located at a wellhead or in the transmission, storage, and distribution segment are not covered under the rule, 77 Fed. Reg. at 49,492/2, EPA has determined that the payback period for compressor maintenance activities that reduce methane emissions is a mere 1 to 3 months. *See* EPA, "Reducing Methane Emissions from Compressor Rod Packing Systems" (Oct. 2006) at 1 (indicating payback periods from 1 to 3 months for compressor maintenance activities that reduce methane emissions). In addition, through EPA's voluntary Natural Gas Star Program, EPA has worked with oil and gas companies to identify more than 100 cost-effective technologies and practices to reduce methane emissions from sources of emissions not covered by the rule. *See* http://www.epa.gov/gasstar/tools/recommended.html.

Section 111(d) of the Clean Air Act also requires EPA to address methane emissions from existing sources, as well as from new and modified facilities. 42 U.S.C. § 7411(d)(1)(A). The Act requires EPA to establish procedures under which each state submits to the agency a plan to adopt, implement, and enforce standards of performance for existing sources for certain pollutants, and to promulgate standards of performance under such plans. *Id.* § 7411(d). The existing source requirements apply to those pollutants, such as methane, that have not been identified as criteria pollutants or hazardous air pollutants, but that are regulated under the new source performance standards for a category of sources. *Id.* § 7411(d)(1). Thus, the Act creates a direct connection between the new source standards and those to be developed for existing sources.

EPA's regulations require the agency to publish "emissions guidelines" "which reflect[] the degree of emission reduction achievable through the application of the best system of emission reduction which (taking into account the cost of such reduction) the Administrator has determined has been adequately demonstrated for designated facilities." 40 C.F.R. §§ 60.21(e), 60.22(a, b). These guidelines are implemented by state agencies who develop and submit to EPA plans to curb emissions of designated pollutants from existing sources. *Id.* § 60.23(a); 42 U.S.C. § 7411(d)(1). EPA has issued emission guidelines at the same time as new source standards for a listed category. *See* 62 Fed. Reg. 48,348 (Sept. 15, 1997) (standards of performance and emissions guidelines for hospital/medical/infectious waste incinerators); 61 Fed. Reg. 9905 (Mar. 12, 1996) (same for municipal solid waste landfills); 60 Fed. Reg. 65,387 (Dec. 19, 1995) (same for municipal waste combustors).

In sum, EPA has failed to review and update as necessary the existing oil and gas standards. EPA's continuing failure to make a final appropriateness determination during its 8-year review and to make the necessary revisions is contrary to section 111(b)(1)(B) of the Clean Air Act. *See* 42 U.S.C. § 7411(b)(1)(B). EPA's failure to make an appropriateness determination also has prevented EPA from fulfilling its duty to publish emissions guidelines covering methane emissions from existing facilities in

the oil and gas sector. EPA's continuing failure to publish these guidelines is contrary to section 111(d) of the Clean Air Act and the regulations implementing that section. *See* 42 U.S.C. § 7411(d); 40 C.F.R. § 60.22(a). We are therefore providing notice that, as of 60 days from the date of this letter, we intend to sue you as EPA administrator and EPA for EPA's failure to take these non-discretionary actions.

III. EPA Has Unreasonably Delayed Determining Whether Standards of Performance for Oil and Gas Operations Are Appropriate and, if so, Establishing Such Standards and Related Emissions Guidelines.

As set forth above, section 111(b)(1)(B) imposes a non-discretionary duty on EPA to review and, if appropriate, revise the NSPS for each category of sources, and section 111(d) and 40 C.F.R. § 60.22(a) impose a non-discretionary duty to establish emissions guidelines covering existing sources. Even if those provisions can be read to contain any ambiguity as to the deadline for these mandatory duties, EPA has unreasonably delayed taking action on methane emissions from the oil and gas sector.

EPA has long known the significance of the oil and gas sector's contribution to methane emissions and the availability and cost-effectiveness of measures for reducing those emissions. EPA's knowledge that oil and gas operations are one of the nation's largest methane sources dates to at least 1997, as the agency has published annual sector-by-sector inventories of U.S. greenhouse gas emissions since 1997, covering emissions since 1990.[1] Similarly, EPA has long had ample data on measures for controlling methane emissions. For example, in 2008, EPA explained that because of its experience implementing the agency's Natural Gas STAR Program, a voluntary public-private partnership with the oil and gas industry initiated in 1993, "many of [the] technologies and management practices" available to control methane emissions from the sector "have been well documented (including information on cost, benefits and reduction potential) and implemented in oil and gas systems throughout the U.S." EPA, Office of Air and Radiation, Technical Support Document for the Advanced Notice of Proposed Rulemaking for Greenhouse Gases; Stationary Sources, Section VII at 30 (June 2008).

EPA has been actively engaged in rulemaking to revise the oil and gas sector standards of performance at least since April 2010, when the agency began sending requests to visit regulated facilities to gather information. *See, e.g.*, Letter from K.C. Hustvedt, EPA, to Tom Monahan, ExxonMobil Production Co. (Apr. 30, 2010) Docket No. EPA–HQ–OAR–2010–0505-0053. In response to the 2009 litigation discussed above, EPA proposed revisions to the standards of performance for oil and gas operations in August 2011. 76 Fed. Reg. at 52,738. However, instead of drawing on the successes of the Natural Gas Star Program to propose a course of action, or even soliciting comment on the issue, the agency chose to ignore the problem. The proposal stated only that "[a]lthough this proposed rule does not include standards for regulating [methane emissions], we continue to assess these significant emissions and evaluate appropriate actions for addressing these concerns." *Id.* at 52,756/2. Multiple parties filed comments in November 2011 objecting to the failure to propose methane standards for this source category. Commenters argued that EPA had abundant evidence that uncontrolled methane emissions from oil and gas operations significantly contribute to atmospheric greenhouse gas pollution, that control measures are available and cost-effective, and that methane standards therefore are appropriate and legally required. *See, e.g.*, Comments of Sierra Club et al. at 74-80 (Nov. 30, 2011) Docket No. EPA–HQ–OAR–2010–0505-4240.

Notwithstanding these comments and the detailed information EPA already had in its possession, the agency has failed to make any appropriateness determination regarding the oil and gas sector's

[1] Links to each annual GHG emissions inventory are at http://www.epa.gov/climatechange/emissions/usgginv_archive.html.

methane emissions, or to propose or promulgate performance standards to meet its obligations under section 111(b)(1)(B) of the Act with regard to the oil and gas sector's methane emissions. EPA's failure to complete the rulemaking required under section 111(b)(1)(B) to address methane emissions from new and modified oil and gas operations has also resulted in an unreasonable delay in establishing emissions guidelines for the controlling methane emissions from existing oil and gas sector sources. EPA's unreasonable delay in issuing these guidelines in turn delays both the date by which states must submit plans for the control of methane from existing oil and gas operations, 40 C.F.R. § 60.23(a), and the date by which existing sources must comply with approved pollution control standards, *see id.* § 60.24(c). Therefore, we are also providing 180-day notice that we intend to sue you as EPA administrator and EPA for EPA's unreasonably delaying final agency action to determine whether standards for methane emissions from oil and gas operations are appropriate, to make the necessary revisions to 40 C.F.R. Part 60, and to issue emissions guidelines for methane emissions from existing oil and gas operations.

IV. Conclusion

EPA's acknowledgement that oil and gas operations account for a large share of methane emissions points to the urgent need to reduce these emissions. The agency's long experience with control strategies that recover methane emissions from oil and gas operations for productive uses confirms that there are cost-effective measures for this source category that would provide an appropriate basis for establishing a standard of performance for methane emissions. But EPA's failure to make progress in deciding whether standards are appropriate demonstrates that litigation may be needed to prompt the required agency action. Accordingly, the States of New York, Connecticut, Delaware, Maryland, Rhode Island, and Vermont, and the Commonwealth of Massachusetts, submit this notice of intent to sue for EPA's failure to complete the review of the standards of performance for oil and gas operations as mandated by section 111(b)(1)(B) of the Clean Air Act and for the agency's unreasonable delay in the completion of that action. The States of New York, Connecticut, Delaware, Maryland, Rhode Island, and Vermont, and the Commonwealth of Massachusetts, also give notice of their intent to sue for EPA's failure to complete the emissions guidelines for existing sources required by section 111(d) of the Clean Air Act and EPA's regulations at 40 C.F.R. § 60.22(a) and for the agency's unreasonable delay in the completion of that action.

We are willing to explore any effective means of resolving this matter without the need for litigation. However, if we do not hear from you within the applicable time periods provided in section 304 of the Act, we intend to file suit in United States District Court.

Very truly yours,

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Attachment G

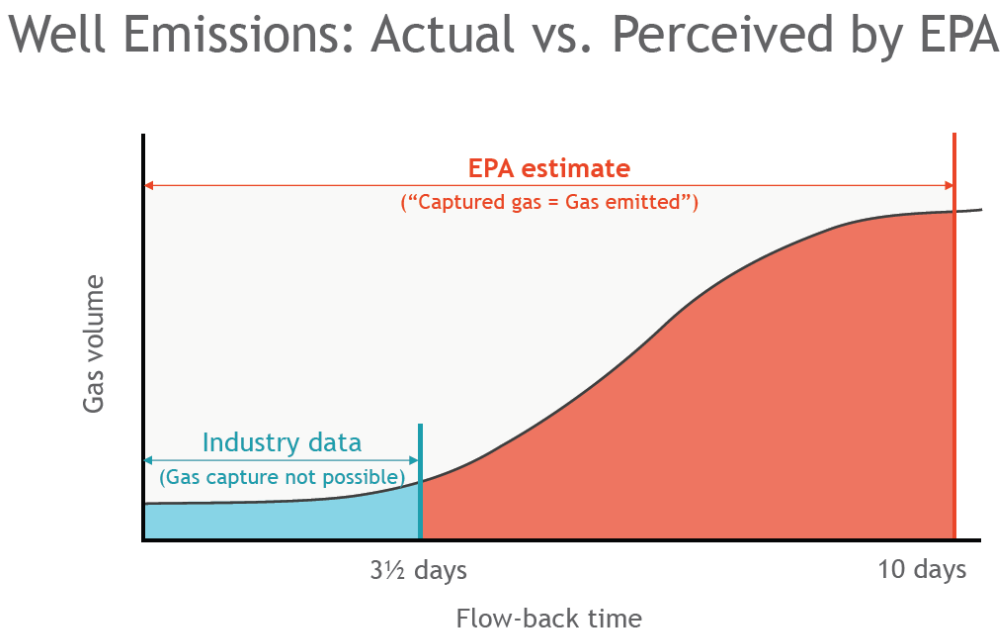
Testimony for *America's Energy Future, Part I: A Review of Unnecessary and Burdensome Regulations* presented by Joe Leonard, Devon Energy Corporation

Before The Committee on Oversight and Government Reform on July 13, 2012, Edmond, OK

Good morning and thank you for providing the opportunity to testify on such an important issue. My name is Joe Leonard, and I am the Environmental, Health and Safety Engineer for Devon Energy with a particular technical expertise in air quality.

EPA's unreasonable and inappropriate misuse of industry data and bad science leads to unnecessary and burdensome air quality regulations on the oil and gas industry. I would like to focus on two examples of this today.

First, I would like to address EPA's development of an emission factor for well completions by improperly using Natural Gas STAR data. In short, the EPA assumes that gas recovered would have otherwise been flared or vented. However, industry data shows that reduced emission completions account for significantly more gas produced and sold than would be flared or vented during older and less common completion processes. The below figure depicts the comparison between what EPA perceives and what industry data actually shows.



EPA's fundamental misperception of initial gas production from natural gas wells leads to dramatic overestimates of methane emissions.

Second, EPA Region 6 recently designated Wise County in the State of Texas, a significant gas production and transmission area, to be in "nonattainment" for ozone. Region 6's argument can best be described as arbitrary and capricious. Their stance rests on only two data points and their attempt to link Barnett Shale gas production development. The science behind the designation is lackluster, and relies on methods rejected by other EPA regions.

<u>EPA's flawed methane emission estimates continue to mischaracterize natural gas</u>

In regards to flawed completion emissions, EPA continues to state that reduced emission completion estimates are reasonable estimates for gas that would have otherwise been flared or vented – despite a wealth of data showing that those estimates are dramatically overstated. This overstatement is consistent with the latest industry study from API/ANGA of more than 90,000 wells that demonstrated estimates were at least 100% too high across upstream processes. This work follows similar industry work that shows even greater errors.

This is outrageous because EPA, using incorrect assumptions, applying inappropriate data, and then analyzing it improperly, has not only changed its emission estimates for completion operations on a forward-looking basis, but revised all oil and gas completion estimates back to 1990 – a period before the combined use of horizontal drilling and hydraulic facturing. Since revising its estimates, EPA submitted those estimates as part of the US input to the UN Intergovernmental Panel on Climate Change, giving it a worldwide audience.

The effect of the revision has allowed for the mischaracterization of natural gas. Non-governmental organizations and university studies have claimed that (on a life-cycle basis) gas-fired electricity generation is no cleaner than coal-fired, and that natural gas-powered vehicles are no cleaner than those running on gasoline. The ripple effects like these will continue until EPA acknowledges and corrects this inaccurate data. Severe damage has been inflicted on the many benefits of using natural gas as a clean fuel that will last for years to come. EPA must exercise more scrutiny in their methods for calculating such factors if the oil and gas industry is to be represented fairly. This issue proves that casual efforts on the part of the EPA can have such a strong and negative impact to our industry.

Wise County, TX nonattainment ruling is based on analysis rejected by other regions

As I mentioned earlier, EPA has recently designated Wise County, TX, as an ozone non-attainment area contributor. An area is considered "nonattainment" when it exceeds a national air standard, in this case ozone. The area must then take steps to come to "attain" the standard, or come into "attainment".

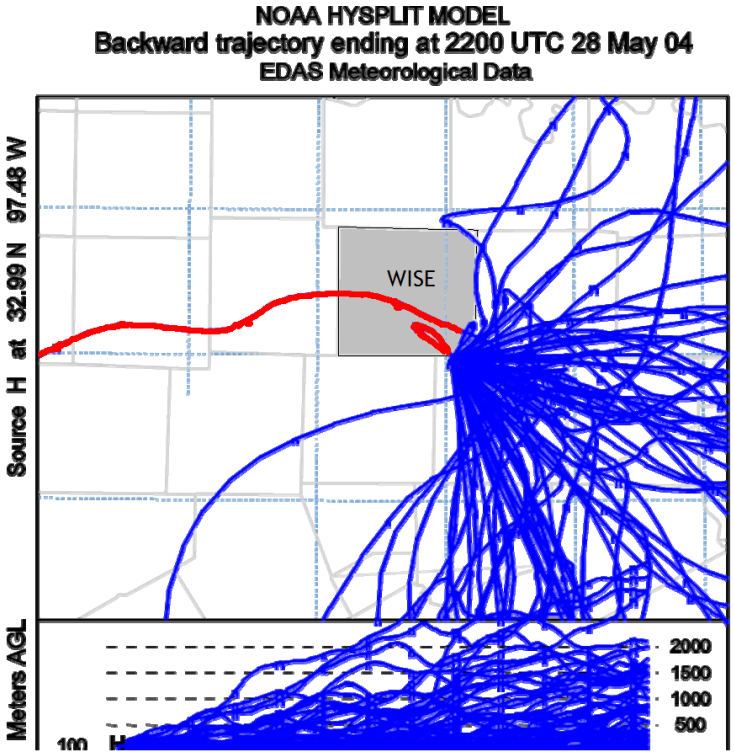
That action, in Region 6, was initiated under a since-resigned regional administrator who once likened enforcement action approaches to the oil and gas industry to what might be described as examples-by-crucifixion. There are several other concerns when analyzing their justification for nonattainment.

Concern 1: The model used by Region 6 is inadequate for modeling ozone formation and transport. Other regions specifically refused to use this method because of its unreliability.

Concern 2: The model only traced two events over four years passing through Wise County, one of which originated in the notoriously nonattainment Tarrant County, which is coincidently the same county of the only monitor that EPA provided results for. Data shows that winds blow from Wise County into Tarrant County less than three percent of the time. Other EPA regions denied nonattainment considerations based solely on wind occurrences of less than 20% of the time.

Concern 3: We do not know the results from other monitors downstream of the prevailing wind from Wise County. If the EPA Region 6 wanted to justify Wise County as a contributor of ozone, why did they not provide results from more representative monitors? As the Texas Commission of Environmental Quality described, the presented data seems to be "cherry-picked".

The below figure contained in this handout shows a composite of all modeling results done by EPA Region 6, with the two Wise County events highlighted in red.



If Wise County is in fact nonattainment, then Devon will diligently comply with the regulations, but we do not believe the EPA's argument, or the data supporting their decision.

In conclusion, it is difficult to adequately capture all of the unnecessary and burdensome air regulations imposed on our industry. I hope that the examples of completion emission estimates and Wise County Nonattainment provide at least some insight into this issue.

This concludes my testimony. Thank you.

Joe Leonard – Devon Energy Corporation – 405.552.4740 or joe.leonard@dvn.com

Bio for Joe Leonard:

Joe Leonard is the Environmental, Health, and Safety Engineer for Devon Energy Corporation, and has been with the company in that position since January of 2010. As an EHS Engineer for the company, Joe is responsible for supporting all areas regarding air quality calculations as well as state and federal regulation interpretation. He also acts as a technical air quality expert in both Devon Energy and among several trade organizations.

He received his Bachelor of Science degree in Chemical Engineering at Oklahoma State University, and has a brief work background in oil and gas processing and transmission.

Committee on Oversight and Government Reform
Witness Disclosure Requirement – "Truth in Testimony"
Required by House Rule XI, Clause 2(g)(5)

Name: Joe Leonard

1. Please list any federal grants or contracts (including subgrants or subcontracts) you have received since October 1, 2009. Include the source and amount of each grant or contract.

None

2. Please list any entity you are testifying on behalf of and briefly describe your relationship with these entities.

Devon Energy Corporation - I am an employee

3. Please list any federal grants or contracts (including subgrants or subcontracts) received since October 1, 2009, by the entity(ies) you listed above. Include the source and amount of each grant or contract.

None

I certify that the above information is true and correct.
Signature:

Date: 7/11/12

Attachment H

A Brief Review of Statistical Methods and Procedures Contained in EPA Document "Evaluation of the Emission Factor for Hydraulically Fractured Gas Well Completions and Recompletions"

Executive Summary

- The EPA report uses summary data collected through programs designed for other purposes to investigate the possibility of shifting emission factors
- The result of this approach is a data set that is ill-defined, highly aggregated, and limited in usable observations
- The starting point of analysis is a simple ordinary least squares regression, resulting in an estimated average emission factor of 8900 Mcf with a standard error of 4168.5
- The smallest level of statistical significance at which the null hypothesis that the true emission factor is zero (as opposed to the estimated 8900) can be rejected is 0.122
- The lack of statistical significance is underscored by the inclusion of zero in the confidence interval constructed as
    - $8900 \pm 3.182 * 4168.5 = (-4366.13\,, 22166.1)$
- In order to achieve a statistically meaningful result, the researcher must justify a smaller value of the distributional parameter (3.182) and/or estimated standard error (4168.5)
- The first is accomplished with the assumption that the emissions variance is known, which changes the distributional assumptions of the interval estimate such that 3.182 (from the t-distribution) is replaced by 1.96 (from the normal distribution. This single assumption alone makes a previously insignificant result significant
- The second is accomplished by imposing a very tight prior belief on the variance of the mean emissions (based on GasStar summary data), which reduces estimated standard error from 4168.5 (OLS) to 1416.3 (Bayesian)
- The combined effect of the assumption of a known variance and imposition of a tight prior belief result in a final interval estimate of (6123, 11676)

- The crux of the concern lies in identifying the more appropriate interval estimate – the original and not statistically significant (-4366.13, 22166.1) or the alternative (6123, 11676)
- Based on the evidence provided in the technical document, we are uncomfortable with the assumption of a known variance. Not only is it unsubstantiated in the report, but it is unnecessary. Derivation of Bayesian interval estimates can proceed without this assumption
- We are similarly uncomfortable with the choice of such a tight prior belief of the mean variance. Given the small number of data points in the original analysis (4), using such a tight prior exerts considerable influence over the posterior distribution. Allowing the prior to dominate the information contained in the data is a practice Bayesian statisticians generally try to avoid[1]

[1] EPA's primary objection will more than likely be that the prior is based on data.

Discussion

The comments contained in this review of "Evaluation of the Emission Factor for Hydraulically Fractured Gas Well Completions and Recompletions" reflect the initial thoughts and concerns of Jacob Dearmon, Ph. D, associate professor of economics, and Russell Evans, Ph. D, executive director of the Steven C. Agee Economic Research and Policy Institute, in the Meinders School of Business at Oklahoma City University. All comments expressed herein should be viewed as preliminary, with the authors reserving the right to expand, edit, or abridge their thoughts as time and access to data inform their positions.

The basic premise of the EPA document is that data on gas emissions from well completions and recompletions submitted voluntarily and through programs not designed explicitly to update estimated emission factors can be used to accomplish just that – updating EPA emission factors. The analysis centers on the aggregate level data associated with four data sets. Neither well level observations nor a full description of the underlying data sets are made available. Instead, inferences are limited to the information contained in the mean emissions per completion reported from these four sources. The table below summarizes the relevant information and is a re-creation of table 1-8 on page 1-16 of the report.

Data Source	Whole Gas, Average Emissions per Completion (Mcf)	Modified, Average Methane Emissions per Completion (Mcf)[2]	Rounded, Average Methane Emissions per Completion (Mcf)
Weatherford	667	555	600
Industry Data Set #1	5,820	4,844	5,000
Devon	11,900	9,905	10,000
William	24,449	20,351	20,000

Rounded values of whole gas emissions are used on page 1-3 of the report to estimate emissions per completion of 9,175 Mcf while rounded values of methane emissions per completion[3] are used to estimate average methane emissions per completion of 8,900 Mcf (page 1-16 of EPA report). The EPA analysis begins with what is essentially an ordinary least squares (OLS) regression of methane emissions on a constant and vector of unit scalars, the results of which are

[2] Modified emissions are calculated using a methane content value of 0.8324

[3] There is a mistake on the top of page 1-3. Summation operators are missing from the formula being used to calculate the average gas emissions.

reported below. The variable of interest in this case is the intercept of the regression equation which gives the average emissions across the four data points.

Model 2: OLS, using observations 1-4
Dependent variable: Emissions

	Coefficient	*Std. Error*	*t-ratio*	*p-value*
Const	**8900**	**4168.53**	2.1350	0.12243

Mean dependent var	8900.000	S.D. dependent var	**8337.066**
Sum squared resid	2.09e+08	S.E. of regression	8337.066
R-squared	0.000000	Adjusted R-squared	0.000000
Log-likelihood	-41.21426	Akaike criterion	84.42851
Schwarz criterion	83.81481	Hannan-Quinn	83.08178

The values in bold format are those reported in table 1-9 of the report, with the variance of the coefficient given by the square of the standard deviation, or 8337.066^2 or 69,506,666.7 (6.95+07 in table 1-9).

The regression tests the hypothesis that the true coefficient value is statistically different from zero. That is, the model asks whether or not there is sufficient information contained in the data points to reject the hypothesis that the true average methane emissions per completion – estimated to be 8,900 Mcf – is zero against the alternative hypothesis that average emissions is not zero. The null hypothesis, that the true value of average emissions per completion is zero, cannot be rejected at the 1%, 5%, or 10% significance levels.

The lack of statistical information contained in the data points is underscored by the fact that the corresponding interval estimate for the average methane emissions coefficient contains the value of zero. The 95% confidence interval is given by:

$$t\,(3,0.025) = 3.182$$

Variable	Coefficient	95% confidence interval
const	8900.00	(-4366.13, 22166.1)

This confidence interval differs from the confidence interval reported on page 1-17 of the EPA document. It appears that the authors of the EPA document have either incorrectly constructed or reported the 95% confidence interval. Regardless, note that both intervals contain the value of zero, suggesting insufficient evidence to conclude that the true value of average methane emissions per completion is statistically different from zero.

At this point in the analysis, the authors of the EPA report have two options. The first, and most prudent option in our opinion, is to conclude the analysis with the determination that a robust dataset of well-specific observations would be required to investigate further the possibility of shifting emissions factors due to alternative drilling techniques and exploration in non-traditional geologic formations. The second option, and that chosen by the authors of the EPA report, is to pursue a Bayesian approach in order to <u>narrow</u> the interval estimate of average methane emissions per completion. [4]

The Bayesian approach combines the data (the likelihood function) with the prior beliefs of the researcher (prior density) to arrive at a distribution that is proportional to the posterior density.

$$p(\theta|y) \propto p(y|\theta) * p(\theta)$$

where $p(y|\theta)$ is the likelihood function and $p(\theta)$ is the prior density and θ is the parameter to be estimated (which is μ in the EPA report). Thus, the posterior density represents a combination of data and prior beliefs. Depending on how the model is set-up and defined, there is a wide range of possible outcomes for the posterior density. On one extreme, a vague and uninformative prior combined with a likelihood function using a substantial amount of data results in a very data-driven posterior. On the other extreme, a very tight or restrictive prior combined with a data-poor likelihood function produces a prior-driven posterior, which would reflect the researcher's prior beliefs rather than the data. It is our opinion that the posterior distribution calculated in the EPA's report is driven by the prior rather than the data.

[4] The fundamental difference between the authors of the EPA report and the authors of this comment is in regards to the width of the interval estimate. The authors of the EPA report believe that the interval is narrow based on very tight prior beliefs and the assumption of a known variance. The authors of the comment believe that the true interval estimate should be wider based on uninformative prior beliefs, data and an unknown variance.

In Figure 1, both the prior and OLS distribution for mean methane emissions are displayed. Both distributions are centered about the mean of 8,900. The spread of possible outcomes for the two distributions are very different, however. The OLS data-driven results have a very wide spread about the mean with a significant portion of that distribution's support falling on the negative part of the real line. In contrast, the prior has a very tight fit with most of its support restricted to a small range about the mean. Given that we have such a tight prior and such a limited amount of data (just 4 observations), we would expect that the prior rather than the data would be the defining influence on the posterior.

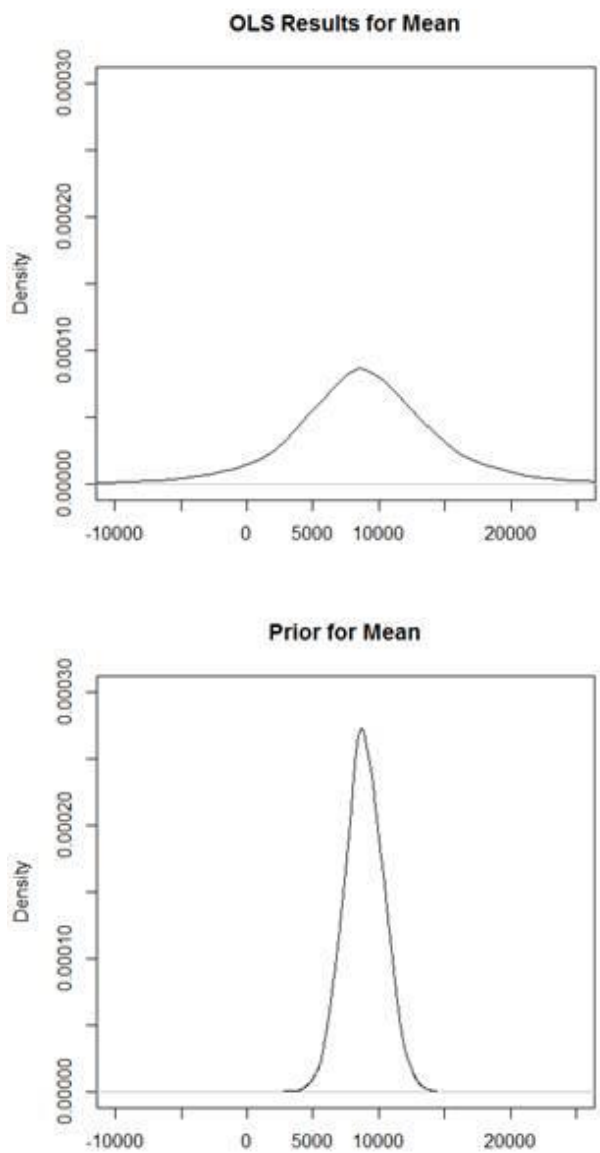


Figure 1. Distribution of Mean Methane Gas per Completion (Mcf)

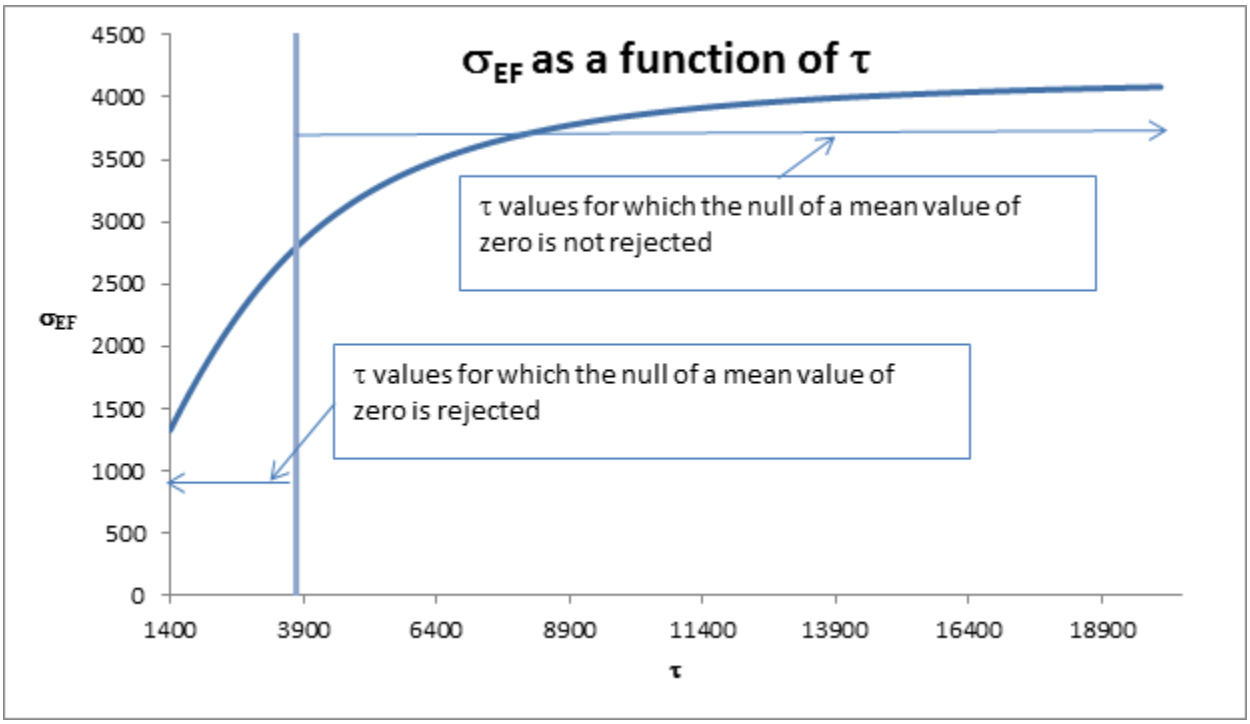
Just how sensitive is the interval to the choice of prior in this case? The following formula is found on p. 1-16 of the EPA's document

$$\sigma_{EF}^2 = \frac{1}{\frac{1}{\tau^2} + \frac{4}{\sigma^2}}$$

where σ^2 is $6.95 * 10^7$ and τ^2 is the variance associated with the prior for the mean. Lower values for τ imply a tighter prior and reduce σ_{EF} leading to a more narrow interval and tighter distribution (such as the prior in Figure 1). Higher values for τ imply a more uninformative prior that increases σ_{EF}, widens the interval estimate, and produces a broader distribution.

To model this trade-off between τ and σ_{EF} more explicitly, we conduct a sensitivity analysis. Holding σ constant, we can calculate how σ_{EF} varies as τ changes. When $\tau = 1506$, σ_{EF} is equal to the EPA's posterior estimate of 1416.35.[5] When τ is increased to $75{,}000$, σ_{EF} (= 4,162.1) becomes nearly equal to the OLS estimate of 4,168.5. In Figure 2 below, τ is varied from the EPA's proposed value of 1,506 to 20,000. As τ increases, the prior becomes less informative and σ_{EF} increases which serves to widen the associated interval. At $\tau = 20{,}000$, the prior is relatively uninformative and more weight is placed on the data such that σ_{EF} (=4081) is much closer to the original OLS estimate. The green line indicates the minimum τ value at which the null hypothesis zero mean emissions cannot be rejected at the 5% level if a t distribution is assumed. Given that the EPA's choice of τ drops the standard deviation of the posterior estimate 66% from the OLS estimate, we can conclude that the prior in this model seems to be exerting a considerable amount of influence over the posterior; a practice that Bayesian statisticians or econometricians usually try to avoid.

[5] Please note that the EPA's first usage of σ_{EF} (1416.3) on page 1-18 differs slightly from their second usage of that variable (which is 1416.5)).



In addition to the choice of a very tight prior, there is also another questionable modeling choice. In particular, the authors of the EPA document assume that the variance is known. From p. 1-16, "*The four observations of the emission factors data are assumed to be normally distributed with a mean of μ and a known variance of σ^2, set equal to the sample variance.*" If there is a reason, statistical or otherwise, to believe that the variance is known and is in fact equal to the sample variance, it is not presented in the text. The implication of the assumption of known variance is to allow the distributional parameter used in the construction of the confidence intervals to shrink from the 3.182 associated with the t-distribution to the 1.96 associated with the normal distribution (see formula on page 1-18 of the report). This single, unsupported assumption alone would shift the lower bound of the confidence interval from -4366.13 to 729.74. Again, to underscore the importance of this assumption, note that where the variance is assumed to be unknown, the hypothesis that the true value of methane emissions per completion is zero could not be rejected at the 10% level of significance. If one adopts the assumption of known variance – without any other changes in the analysis – the hypothesis of zero emissions can be rejected at 5% significance level! Like magic, a statistically insignificant result is made significant with a single assumption!

Further, the assumption of a known variance for the mean seems to be very strong, especially in light of the substantial differences in these amounts across datasets. Therefore, the modeling approach employed should account for the fact that both the mean and the variance are unknown. Fortunately, estimating such a model within a Bayesian context is relatively straightforward. This model would be better able to account for this high degree of uncertainty and would serve to increase the interval. A commonly used Bayesian technique for linear regression where both the mean and the variance are unknown has a normal gamma for its posterior distribution. In this case, after having integrated out the variance, the marginal posterior density for the mean is distributed as a t rather than as a normal.

The issue of an unknown variance and tight prior are not unrelated. The degrees of freedom associated with this marginal posterior density depend on both the sample size and the weight applied to the prior. A prior that is too tight or restrictive will increase the degrees of freedom leading to a distribution that more closely approximates the normal distribution shrinking the intervals, ceteris paribus. Consequently, a tight prior with limited amount of data could still affect a model where the variance is unknown.

Conclusion

The reviewed report uses traditional techniques on a very small data set of gas emissions to derive an interval estimate of mean emissions per completion. The interval estimate is quite wide and includes zero, suggesting an inability to reject a null hypothesis that the true emissions value is zero. The report then moves to an alternative interval estimate based on simple Bayesian techniques. We identify several significant statistical objections to the manner in which the Bayesian methodology is employed in this report. First, a tight prior belief of the variance of the mean methane emission is imposed on very small data set, effectively imposing the researcher's beliefs on the outcome. This practice is generally discouraged by Bayesian statisticians who prefer data driven posterior density functions when constructing credible confidence intervals. Second, assuming a known variance where no such assumption is warranted further narrows the resultant interval estimate. Ultimately, we find no reason to accept the narrow interval estimate as more credible than the original, given its construction is heavily dependent on the prior beliefs and assumptions of the researchers.

Attachment H

A Brief Review of Statistical Methods and Procedures Contained in EPA Document "Evaluation of the Emission Factor for Hydraulically Fractured Gas Well Completions and Recompletions"

Executive Summary

- The EPA report uses summary data collected through programs designed for other purposes to investigate the possibility of shifting emission factors
- The result of this approach is a data set that is ill-defined, highly aggregated, and limited in usable observations
- The starting point of analysis is a simple ordinary least squares regression, resulting in an estimated average emission factor of 8900 Mcf with a standard error of 4168.5
- The smallest level of statistical significance at which the null hypothesis that the true emission factor is zero (as opposed to the estimated 8900) can be rejected is 0.122
- The lack of statistical significance is underscored by the inclusion of zero in the confidence interval constructed as
    - $8900 \pm 3.182 * 4168.5 = (-4366.13\,, 22166.1)$
- In order to achieve a statistically meaningful result, the researcher must justify a smaller value of the distributional parameter (3.182) and/or estimated standard error (4168.5)
- The first is accomplished with the assumption that the emissions variance is known, which changes the distributional assumptions of the interval estimate such that 3.182 (from the t-distribution) is replaced by 1.96 (from the normal distribution. This single assumption alone makes a previously insignificant result significant
- The second is accomplished by imposing a very tight prior belief on the variance of the mean emissions (based on GasStar summary data), which reduces estimated standard error from 4168.5 (OLS) to 1416.3 (Bayesian)
- The combined effect of the assumption of a known variance and imposition of a tight prior belief result in a final interval estimate of (6123, 11676)

- The crux of the concern lies in identifying the more appropriate interval estimate – the original and not statistically significant (-4366.13, 22166.1) or the alternative (6123, 11676)
- Based on the evidence provided in the technical document, we are uncomfortable with the assumption of a known variance. Not only is it unsubstantiated in the report, but it is unnecessary. Derivation of Bayesian interval estimates can proceed without this assumption
- We are similarly uncomfortable with the choice of such a tight prior belief of the mean variance. Given the small number of data points in the original analysis (4), using such a tight prior exerts considerable influence over the posterior distribution. Allowing the prior to dominate the information contained in the data is a practice Bayesian statisticians generally try to avoid[1]

[1] EPA's primary objection will more than likely be that the prior is based on data.

Discussion

The comments contained in this review of "Evaluation of the Emission Factor for Hydraulically Fractured Gas Well Completions and Recompletions" reflect the initial thoughts and concerns of Jacob Dearmon, Ph. D, associate professor of economics, and Russell Evans, Ph. D, executive director of the Steven C. Agee Economic Research and Policy Institute, in the Meinders School of Business at Oklahoma City University. All comments expressed herein should be viewed as preliminary, with the authors reserving the right to expand, edit, or abridge their thoughts as time and access to data inform their positions.

The basic premise of the EPA document is that data on gas emissions from well completions and recompletions submitted voluntarily and through programs not designed explicitly to update estimated emission factors can be used to accomplish just that – updating EPA emission factors. The analysis centers on the aggregate level data associated with four data sets. Neither well level observations nor a full description of the underlying data sets are made available. Instead, inferences are limited to the information contained in the mean emissions per completion reported from these four sources. The table below summarizes the relevant information and is a re-creation of table 1-8 on page 1-16 of the report.

Data Source	Whole Gas, Average Emissions per Completion (Mcf)	Modified, Average Methane Emissions per Completion (Mcf)[2]	Rounded, Average Methane Emissions per Completion (Mcf)
Weatherford	667	555	600
Industry Data Set #1	5,820	4,844	5,000
Devon	11,900	9,905	10,000
William	24,449	20,351	20,000

Rounded values of whole gas emissions are used on page 1-3 of the report to estimate emissions per completion of 9,175 Mcf while rounded values of methane emissions per completion[3] are used to estimate average methane emissions per completion of 8,900 Mcf (page 1-16 of EPA report). The EPA analysis begins with what is essentially an ordinary least squares (OLS) regression of methane emissions on a constant and vector of unit scalars, the results of which are

[2] Modified emissions are calculated using a methane content value of 0.8324

[3] There is a mistake on the top of page 1-3. Summation operators are missing from the formula being used to calculate the average gas emissions.

reported below. The variable of interest in this case is the intercept of the regression equation which gives the average emissions across the four data points.

Model 2: OLS, using observations 1-4
Dependent variable: Emissions

	Coefficient	*Std. Error*	*t-ratio*	*p-value*
Const	**8900**	**4168.53**	2.1350	0.12243

Mean dependent var	8900.000	S.D. dependent var	**8337.066**
Sum squared resid	2.09e+08	S.E. of regression	8337.066
R-squared	0.000000	Adjusted R-squared	0.000000
Log-likelihood	-41.21426	Akaike criterion	84.42851
Schwarz criterion	83.81481	Hannan-Quinn	83.08178

The values in bold format are those reported in table 1-9 of the report, with the variance of the coefficient given by the square of the standard deviation, or 8337.066^2 or 69,506,666.7 (6.95+07 in table 1-9).

The regression tests the hypothesis that the true coefficient value is statistically different from zero. That is, the model asks whether or not there is sufficient information contained in the data points to reject the hypothesis that the true average methane emissions per completion – estimated to be 8,900 Mcf – is zero against the alternative hypothesis that average emissions is not zero. The null hypothesis, that the true value of average emissions per completion is zero, cannot be rejected at the 1%, 5%, or 10% significance levels.

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The Bayesian approach combines the data (the likelihood function) with the prior beliefs of the researcher (prior density) to arrive at a distribution that is proportional to the posterior density.

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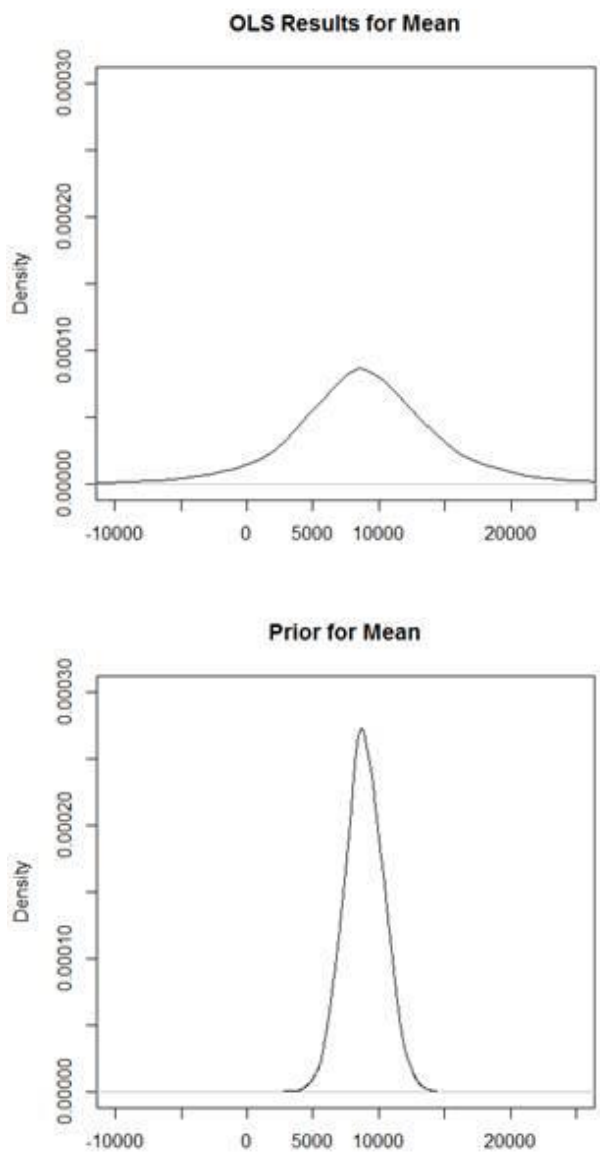

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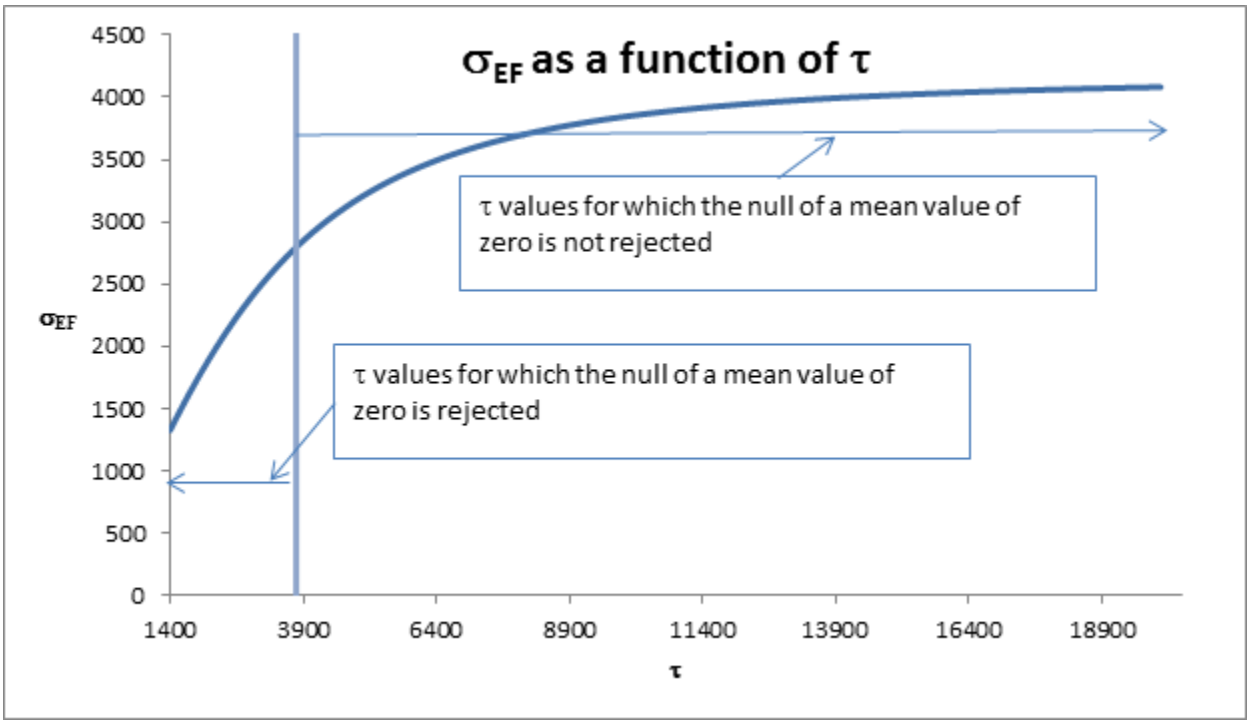

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Re: Fw: EP-B12H-00130 Modification 1
Melissa Weitz to: Marty Wolf 01/17/2013 12:28 PM
Cc: "Paula Fields"

Thanks Marty,

For the GasSTAR data, we are very interested in figuring out [redacted] (b)(5) deliberative [redacted]

The documents requested are attached below. Do you have time for a check in call this afternoon? We can walk through the recommended actions.

[redacted] (b)(5) deliberative [redacted] (b)(5) deliberative

ERG SUMMARY_API_comments_011713 mw.xlsx Weitz.epa

"Marty Wolf"	Melissa,	01/17/2013 11:47:15 AM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 01/17/2013 11:47 AM
Subject: Re: Fw: EP-B12H-00130 Modification 1

Melissa,

Thanks for sending this along. I spoke with Dickran in our Contracts Department and they gave us the go ahead to start work.

I let Jessica and Casey know that they can get started on the well counts punch list.

For right now, I am going to start updating at the 2011 Gas STAR numbers.

Can you send us your latest spreadsheet with all of the comments? The version that you sent us earlier only has comments from API, WRI, and EIA.

Also, can you send us all of the Word files from the Expert Review version, so we can start modifying the text in response to comments? All of our changes going forward will stay in redline/strike-out.

We will also start updating the calculation spreadsheet from the Expert Review version going

forward to the Public Review version.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 1/17/2013 7:25 AM >>>
The cost modification is complete!

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 01/17/2013 10:25AM -----
To: Melissa Weitz/DC/USEPA/US@EPA, RTPReceiving@EPA, Brian.Guzzone@erg.com, Dickran.Babigian@erg.com, Gail.Schubert@erg.com, Mae.Thomas@erg.com, Ruth.Mead@erg.com
From: Rachel Schwartz/DC/USEPA/US
Date: 01/17/2013 09:56AM
Cc: Gloria DeBolt/DC/USEPA/US@EPA, Jeffrey Martin/DC/USEPA/US@EPA
Subject: EP-B12H-00130 Modification 1

The subject modification increasing the ceiling and adding funding is attached.

(See attached file: EPB12H00130Mod1.pdf)

Rachel Schwartz
Contracting Officer
OAR Team Leader
Phone: 202-564-1053
Fax: 202-565-2554
=

Re: Fw: EP-B12H-00130 Modification 1
Marty Wolf to: Melissa Weitz 01/17/2013 01:07 PM
Cc: "Fields, Paula"

History: This message has been forwarded.

It might slip a bit. I have a brief call with our GasSTAR person around that time. I'll keep you posted.

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 1/17/2013 10:04 AM >>>

That'd be great--thank you!

>>> "Marty Wolf" ---01/17/2013 12:50:27 PM---Melissa, Other than an hour call beginning at 2 pm Eastern, I am open. Would you like me to call you

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Fields, Paula" <Paula.Fields@erg.com>
Date: 01/17/2013 12:50 PM
Subject: Re: Fw: EP-B12H-00130 Modification 1

Melissa,

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marty.wolf@erg.com>>>
<Weitz.Melissa@epamail.epa.gov> 1/17/2013 7:25 AM >>>
The cost modification is complete!

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----Forwarded by Melissa Weitz/DC/USEPA/US on 01/17/2013 10:25AM -----
To: Melissa Weitz/DC/USEPA/US@EPA, RTPReceiving@EPA, Brian.Guzzone@erg.com, Dickran.Babigian@erg.com, Gail.Schubert@erg.com, Mae.Thomas@erg.com, Ruth.Mead@erg.com
From: Rachel Schwartz/DC/USEPA/US
Date: 01/17/2013 09:56AM
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Rachel Schwartz
Contracting Officer
OAR Team Leader
Phone: 202-564-1053
Fax: 202-565-2554
=

Fw: summary info on CATF's LU comments

Melissa Weitz to: Suzanne Waltzer 01/17/2013 04:57 PM

Some of the numbers from CATF's LU comments. Let's discuss tomorrow whether CATF has correctly interpreted the GasSTAR data.

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/17/2013 04:56 PM -----

From: Melissa Weitz/DC/USEPA/US
To: Paula Fields <Paula.Fields@erg.com>, Marty Wolf <Marty.Wolf@erg.com>
Date: 01/17/2013 04:56 PM
Subject: summary info on CATF's LU comments

I tried to figure out where CATF's numbers were coming from. Please see attached.

[redacted] (b)(5) deliberative [redacted]

From there, we can figure out what to do for the GHG Inventory. I will also check in with the GasSTAR team to see if they have any insight.

[redacted] (b)(5) deliberative [redacted]

LU Analysis from CATF comments.docx

Call with Melissa
Marty Wolf to: Paula Fields 01/17/2013 05:33 PM
Cc: Melissa Weitz

History: This message has been forwarded.

Paula,

I just got off the phone with Melissa and we were discussing the comments. She identified 4 specific areas that need some technical work - and should be given priority.

[redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

[redacted].

Melissa - did I forget anything important here?

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

Re: ?s on GHG Inventory comments

Melissa Weitz to: Suzanne Waltzer 01/18/2013 09:46 AM

I'll have some other random questions, but those two are the main focus.

Suzanne Waltzer	Just confirming, I am focussing on these co...	01/18/2013 09:03:07 AM

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/18/2013 09:03 AM
Subject: Re: ?s on GHG Inventory comments

Just confirming, I am focussing on these comments and will review them in advance of our meeting this am. Anything else I should review/focus on before our 10:00?

Thanks!

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Suzanne Waltzer/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 01/16/2013 01:34PM
Subject: ?s on GHG Inventory comments

Hi Suzie,

There are two comments that I am particularly interested in getting your input on. I can walk you through these when we talk at 3.

Melissa

1. Clean Air Task Force Comment on Liquids Unloading-- See pages 1-4. I want to be sure I understand what they are saying about the earlier BP data.

(See attached file: CATF - 2013 Inventory Draft Expert Review.doc)

2. Devon's comment on HF completions/workovers-- see pages 3-9.

(See attached file: ENV - GHG - Devon Comment Letter 1-11-13 with Attachments.pdf)

[attachment "CATF - 2013 Inventory Draft Expert Review.doc" removed by Suzanne Waltzer/DC/USEPA/US]
[attachment "ENV - GHG - Devon Comment Letter 1-11-13 with Attachments.pdf" removed by Suzanne

Waltzer/DC/USEPA/US]

Subpart W data request

Melissa Weitz to: Mark DeFigueiredo, David Jacobson 01/18/2013 02:14 PM

Hi,

There are a few pieces of info from subpart W that I'd be interested in seeing to help evaluate some of the comments received on the GHG Inventory expert review draft, on liquids unloading and compressors. In the attached spreadsheet, I have the Inventory values, and in the case of compressors, the values provided in the comments, and also columns for the Subpart W data we'd like for evaluation of the comments.

Please let me know if you could provide the numbers and/or if we can talk about it today. I'm not sure that it is possible to answer all of these questions with the Subpart W data, so just let me know if it is not, or if anything doesn't make sense.

Also, I'm happy to try to sort this out myself if you could provide me with the updated data and if we could spend a few minutes talking through how I would go about finding the values.

Thanks!
Melissa

(b)(5) deliberative [redacted]

GHGRP compressors and LU.xlsx

Re: Subpart W data request

Melissa Weitz to: David Jacobson 01/18/2013 02:36 PM

Cc: Mark DeFigueiredo

From: Melissa Weitz/DC/USEPA/US
To: David Jacobson/DC/USEPA/US@EPA,
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA

Thanks David,

I'm free all afternoon if you have time to discuss compressors. Are you free at 3?

On liquids unloading, the NEMS/basin mapping is attached.

Thanks!
Melissa

(b)(5) deliberative [redacted]

NEMS-basins.xlsx

David Jacobson Maybe we should talk later. [redacted] (b)(5) deliberative [redacted] 01/18/2013 02:28:08 PM

From: David Jacobson/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 01/18/2013 02:28 PM
Subject: Re: Subpart W data request

Maybe we should talk later. [redacted] (b)(5) deliberative [redacted]

David

Melissa Weitz	Hi, There are a few pieces of info from subpart W that I'd be interested in seein...	01/18/2013 02:14:12 PM

From: Melissa Weitz/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA, David Jacobson/DC/USEPA/US@EPA
Date: 01/18/2013 02:14 PM
Subject: Subpart W data request

Hi,

There are a few pieces of info from subpart W that I'd be interested in seeing to help evaluate some of the comments received on the GHG Inventory expert review draft, on liquids unloading and compressors. In the attached spreadsheet, I have the Inventory values, and in the case of compressors, the values provided in the comments, and also columns for the Subpart W data we'd like for evaluation of the comments.

Please let me know if you could provide the numbers and/or if we can talk about it today. I'm not sure that it is possible to answer all of these questions with the Subpart W data, so just let me know if it is not, or if anything doesn't make sense.

Also, I'm happy to try to sort this out myself if you could provide me with the updated data and if we could spend a few minutes talking through how I would go about finding the values.

Thanks!
Melissa

[attachment "GHGRP compressors and LU.xlsx" deleted by David Jacobson/DC/USEPA/US]

Re: quick questions on natural gas GHG Inventory

Melissa Weitz to: Bill Irving 01/18/2013 02:58 PM

Sounds good. It sounded like it will just be Jesse, but I'll make sure beforehand.

Bill Irving	I think both are ok. You need to get a list of...	01/18/2013 02:52:15 PM

From: Bill Irving/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/18/2013 02:52 PM
Subject: Re: quick questions on natural gas GHG Inventory

I think both are ok. You need to get a list of Devon participants from Jesse. If Bill W is going to be involved, then Paul or I also need to be involved. They can't surprise you. When you talk with any stakeholders at this point, do commit to any particular action

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

-----Melissa Weitz/DC/USEPA/US wrote: -----
To: Bill Irving/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US
Date: 01/18/2013 02:25PM
Subject: quick questions on natural gas GHG Inventory

First, thank you very much for speaking with Gloria the other day to expedite the cost mod award. Everything is in place and we are working through the expert review comments.

I have two questions on contacting industry about the expert review draft--

CATF's comments contained a lengthy comment on liquids unloading, citing a few GasSTAR resources showing very high, presumably measured, emissions from liquids unloading from a set of BP wells. Suzie W. and I would like to call Reid Smith to get this thoughts on this, since he provided the earlier GasSTAR data, and also the more recent API/ANGA data. We just wanted to run this by you to see if you think it would be appropriate for Suzie and me to call Reid about this.

Also, Jesse from Devon called and offered to walk us through their comments. I'm assuming this is fine and will try to set up something for Tuesday and will involve ERG.

Does this sound okay? I'll set up a quick check in meeting with you on Tuesday to get your thoughts on how we are planning to address comments (most will be through expanded text in the GHG Inventory).

In unrelated but very important news, the Dunkin Donuts is open.

Melissa

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Re: calling Reid
Suzanne Waltzer to: Melissa Weitz 01/22/2013 10:11 AM

History: This message has been replied to and forwarded.

Hi Melissa,

Here is the summary from the web cast in case you cant locate it in Lisas files. The only thing I found so far is this statement

"Per Reid Smith's comments, EPA corrected Figure 1 in the background memo for Gas Wells Liquids Unloading Reductions beyond those Reported to Natural Gas STAR" Again, this may be a different topic entirely but it would be good to dig up the referenced memo if possible to see if it cites the same data cited in the comments.

Either way, I agree that calling Reid is a good idea.

Suzie

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

(b)(5) deliberative
[redacted]
Webcast Summary 081711.pdf

Melissa Weitz	Hi Suzie, I checked in with Bill and he thinks...	01/18/2013 03:07:56 PM

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 01/18/2013 03:07 PM
Subject: calling Reid

Hi Suzie,

I checked in with Bill and he thinks it's a good idea to call Reid.

I'll try to track down Lisa's notes from the webinar soon.

Melissa

Re: Natural Gas Schedule
Melissa Weitz to: Marty Wolf 01/22/2013 11:13 AM
Cc: "Paula Fields"

The official deadline is today, but I assume we can't make that. I would like them as soon as possible. We'll need to consider where are we with well counts, how long will the GasSTAR fix will take, how long the analysis on the centrifugal compressors will take, and what if anything needs to be done with the CATF comment on liquids unloading. I know it is a lot, but we need the numbers ASAP, and we can probably get them in the GHG Inventory without holding up the rest of the Inventory too much if we can get the numbers by Thursday COB.

On the CATF comment, Suzie W and I are thinking of having a quick call with BP to get their input, since most of the GasSTAR data CATF cites is from BP. We may try to schedule that call for later today or early tomorrow. Can you send me your availability for today and tomorrow?

Melissa

"Marty Wolf"	Melissa,	01/21/2013 10:55:54 AM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Paula Fields" <Paula.Fields@erg.com>
Date: 01/21/2013 10:55 AM
Subject: Natural Gas Schedule

Melissa,

We wanted to check in with you regarding schedule. We have started addressing the natural gas comments, but we need to know what your "drop dead" dates are.

I assume that you will need the revised spreadsheet first, followed by the revised text and revised annex a couple of days later. However, what dates are you specifically looking at?

Thanks,
Marty

Fw: Draft Inventory of U.S. Greenhouse Gases and Sinks: 1990-2011 for Expert Review

Melissa Weitz to: Bill Irving 01/22/2013 02:52 PM

The liquids unloading comment runs from pages 1 to 4.

The comment cites 3 data points (2 BP, 1 Mobil) available on documents and slides on the GasSTAR website showing emission rates from liquids unloading to be higher than in the Inventory.

CATF also comments that the API/ANGA survey is likely biased.

CATF's suggested actions are (EPA response in parentheses):

[redacted] b(5) delib

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/22/2013 02:44 PM -----

From:	David McCabe <dmccabe@catf.us>
To:	GHGInventory@EPA
Cc:	Leif Hockstad/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date:	01/12/2013 12:05 AM
Subject:	Re: Draft Inventory of U.S. Greenhouse Gases and Sinks: 1990-2011 for Expert Review

Dear Melissa and Leif,

Please find enclosed my comments on the draft of the 2013 US GHG Inventory.

Thank you for your hard work on making this inventory as accurate as possible, and for considering my comments. Please let me know if I can be of any help in clarifying or discussing these comments further.

Cheers, David

David McCabe
dmccabe@catf.us
+1 626 710 6542

On Dec 17, 2012, at 5:04 PM, ghginventory@epa.gov wrote:

> Dear Colleagues,
>
> Attached you will find, for your review, a cover letter and files containing the Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011 . As an expert in this field, we are again requesting technical comments from you, particularly on those parts of the inventory which are new or have changed since last year. I wanted to take this opportunity to thank you for your comments in the past, and to encourage you to take a fresh look at this year's document. The expert review process has been a vital part of maintaining the high quality of

the U.S. national greenhouse gas inventory.

We are including updated sections for natural gas systems separately from the full draft report. Due to timing constraints in compiling the full draft report, we were not able to integrate these updated calculations and materials on natural gas systems in the full draft report for the expert review, but we would like you to review these separate natural gas systems sections as you review the full draft report. We have additionally attached an updated summary table of total U.S. greenhouse gas emissions which includes the updated emissions calculations for natural gas systems to better provide you context.

There are other sections of the report that are highlighted in gray for source categories for which updated emissions calculations were not able to be performed, due to delays in data collection necessary to conduct our latest calculations. These sections will be updated for the next draft report that we will release in early 2013 for its public comment period, and all sections will be compiled in a full, complete draft report for that distribution.

Also, as a reminder, due to formatting constraints, you will find the figures referenced within each chapter at the end of that chapter (except for the maps in the Agriculture and Land Use, Land-Use Change and Forestry chapters, which are either not available for this draft or provided separately).

The attached Adobe Acrobat file containing the GHG Inventory report is a very large file, so please contact us if you are having any problems with the file size. Also due to size considerations, there will be an email immediately following this one with the Annex files and large figures for the draft report.

Our deadline for comments this year will be **Friday, January 11, 2013**. As always, there will be an additional opportunity to provide comments during the public review phase which will begin in February, 2013, and we encourage you to provide comments then if you are unable to do so now or are awaiting the full updates to all source categories. You may send comments via email, to hockstad.leif@epa.gov or weitz.melissa@epa.gov. If you have any questions please do not hesitate to call me at (202) 343-9432, or Melissa Weitz at (202) 343-9897.

Best regards,
Leif Hockstad & Melissa Weitz

(See attached file: US GHG Inventory 90-11 Expert Review-Letter.pdf)

(See attached file: DRAFT US GHG Inventory 90-11-ER - Full Report.pdf)

(See attached file: Supplement on Natural Gas in the GHG Inventory.pdf)

(See attached file: DRAFT US GHG Inventory 90-11 Table ES-2_with natl gas sys updates.pdf)

****

Leif Hockstad
Climate Change Division
OAR - Office of Atmospheric Programs
U.S. Environmental Protection Agency
Phone: 202 343 9432
Fax: 202 343 2359
hockstad.leif@epa.gov

****

<US GHG Inventory 90-11 Expert Review-Letter.pdf><DRAFT US GHG Inventory 90-11-ER - Full Report.pdf><Supplement on Natural Gas in the GHG Inventory.pdf><DRAFT US GHG Inventory 90-11 Table ES-2_with natl gas sys updates.pdf>CATF - 2013 Inventory Draft Expert Review.doc

Re: Fw: Draft slides **- G**HGRP petroleum an**d n**atural g**as s**ystems **d**ata

Mark DeFigueiredo to: Bill Irving 01/22/2013 03:33 PM

Cc: Anhar Karimjee, Melissa Weitz

From: Mark DeFigueiredo/DC/USEPA/US

To: Bill Irving/DC/USEPA/US@EPA,

Cc: Anhar Karimjee/DC/USEPA/US, Melissa Weitz/DC/USEPA/US@EPA

History: This message has been forwarded.

Thanks Bill - I just talked about these with Melissa.

(b)(5) deliberative

Bill Irving Thanks - looks good. Some comments/thoughts. Nothing major, in case you d... 01/22/2013 03:08:39 PM

From: Bill Irving/DC/USEPA/US
To: Anhar Karimjee/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 01/22/2013 03:08 PM
Subject: Re: Fw: Draft slides - GHGRP petroleum and natural gas systems data

Thanks - looks good.

Some comments/thoughts. Nothing major, in case you don't have time to respond.

(b)(5) deliberative

[redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

Bill

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Anhar Karimjee	Bill - Let us know if you have any comments. Pre-brief for Sarah is at 4pm. Ple...	01/22/2013 11:57:18 AM

From: Anhar Karimjee/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA
Cc: Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 01/22/2013 11:57 AM
Subject: Fw: Draft slides - GHGRP petroleum and natural gas systems data

Bill - Let us know if you have any comments. Pre-brief for Sarah is at 4pm. Please join us. I'll forward that invite. Thanks, Anhar

Anhar Karimjee
Branch Chief, Greenhouse Gas Reporting Program
Climate Change Division
(202) 343-9260

----- Forwarded by Anhar Karimjee/DC/USEPA/US on 01/22/2013 11:56 AM -----

From: Mark DeFigueiredo/DC/USEPA/US
To: Sarah Dunham/DC/USEPA/US@EPA
Cc: Paul Gunning/DC/USEPA/US@EPA, Anhar Karimjee/DC/USEPA/US, Jackie Krieger/DC/USEPA/US@EPA
Date: 01/22/2013 10:56 AM
Subject: Draft slides - GHGRP petroleum and natural gas systems data

[attachment "GHGRP_SubpartWrollout_1-22-13.pptx" deleted by Bill Irving/DC/USEPA/US]

Hi Sarah -

Attached please find draft slides on petroleum and natural gas systems data in the GHGRP. We'll plan to go over these with you at this afternoon's GHGRP weekly.

Thanks,
Mark

Mark de Figueiredo, J.D., Ph.D.
Climate Change Division
U.S. Environmental Protection Agency
(202) 343-9928

Re: Fw: Draft Inventory of U.S. Greenhouse Gases and Sinks: 1990-2011 for Expert Review

Melissa Weitz to: Bill Irving 01/22/2013 04:54 PM

Sorry--was lost in the GasSTAR spreadsheet and didn't see this until now.

Bill Irving	From: Bill Irving/DC/USEPA/US To: Melissa...	01/22/2013 04:24:26 PM

From: Bill Irving/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/22/2013 04:24 PM
Subject: Re: Fw: Draft Inventory of U.S. Greenhouse Gases and Sinks: 1990-2011 for Expert Review

What is API's issue with well counts?

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

-----Melissa Weitz/DC/USEPA/US@EPA wrote: -----

==========
To: Bill Irving/DC/USEPA/US@EPA
From: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/22/2013 02:52PM
Subject: Fw: Draft Inventory of U.S. Greenhouse Gases and Sinks: 1990-2011 for Expert Review
==========

The liquids unloading comment runs from pages 1 to 4.

The comment cites 3 data points (2 BP, 1 Mobil) available on documents and slides on the GasSTAR website showing emission rates from liquids unloading to be higher than in the Inventory.

CATF also comments that the API/ANGA survey is likely biased.

CATF's suggested actions are (EPA response in parentheses):

(b)(5) deliberative

(b)(5) deliberative

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/22/2013 02:44 PM -----

From: David McCabe <dmccabe@catf.us>
To: GHGInventory@EPA
Cc: Leif Hockstad/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA
Date: 01/12/2013 12:05 AM
Subject: Re: Draft Inventory of U.S. Greenhouse Gases and Sinks: 1990-2011 for Expert Review

Dear Melissa and Leif,

Please find enclosed my comments on the draft of the 2013 US GHG Inventory.

Thank you for your hard work on making this inventory as accurate as possible, and for considering my comments. Please let me know if I can be of any help in clarifying or discussing these comments further.

Cheers, David

David McCabe
dmccabe@catf.us
+1 626 710 6542

On Dec 17, 2012, at 5:04 PM, ghginventory@epa.gov wrote:

Dear Colleagues,

Attached you will find, for your review, a cover letter and files containing the Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011 . As an expert in this field, we are again requesting technical comments from you, particularly on those parts of the inventory which are new or have changed since last year. I wanted to take this opportunity to thank you for your comments in the past, and to encourage you to take a fresh look at this year's document. The expert review process has been a vital part of maintaining the high quality of the U.S. national greenhouse gas inventory.

We are including updated sections for natural gas systems separately from the full draft report. Due to timing constraints in compiling the full draft report, we were not able to integrate these updated calculations and materials on natural gas systems in the full draft report for the expert review, but we would like you to review these separate natural gas systems sections as you review the full draft report. We have additionally attached an updated summary table of total U.S. greenhouse gas emissions which includes the updated emissions calculations for natural gas systems to better provide you context.

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Best regards,
Leif Hockstad & Melissa Weitz

(See attached file: US GHG Inventory 90-11 Expert Review-Letter.pdf)

(See attached file: DRAFT US GHG Inventory 90-11-ER - Full Report.pdf)

(See attached file: Supplement on Natural Gas in the GHG Inventory.pdf)

(See attached file: DRAFT US GHG Inventory 90-11 Table ES-2_with natl gas sys updates.pdf)

****
Leif Hockstad
Climate Change Division
OAR - Office of Atmospheric Programs
U.S. Environmental Protection Agency
Phone: 202 343 9432
Fax: 202 343 2359
hockstad.leif@epa.gov
****
<US GHG Inventory 90-11 Expert Review-Letter.pdf><DRAFT US GHG Inventory 90-11-ER - Full Report.pdf><Supplement on Natural Gas in the GHG Inventory.pdf><DRAFT US GHG Inventory 90-11 Table ES-2_with natl gas sys updates.pdf>
[attachment(s) ATTT1OTL.doc removed by Bill Irving/DC/USEPA/US]

Updated Summary of Comments
Marty Wolf to: Melissa Weitz 01/22/2013 04:54 PM
Cc: "Paula Fields"

History: This message has been forwarded.

Melissa,

Here is the updated summary of comments. In general, your summaries were fine. However, please take a look at the Devon tab. One of those wasn't quite right.

Also, I am not finding the CATF comments in my e-mail inbox or files. I do have summary info on CATF's LU comment that you developed, but not their actual comments. Could you please send that along?

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)

marty.wolf@erg.com

(b)(5) deliberative [redacted]

ERG SUMMARY_API_comments_012213.xlsx

W Files
David Jacobson to: Melissa Weitz 01/22/2013 06:16 PM

History: This message has been forwarded.

5 files are attached:

Centrifugal compressor file: [redacted] (b)(5) deliberative [redacted]

NONCBI_W_CENFGCMPS_1-22-13.xls

Reciprocating compressor file: Unfortunately old since the database view is currently kaput. Look at last 3 columns for emissions by compressor.

(b)(5) deliberative

MV_NONCBI_W_RECICMPRS_OTHER_10-25-12.xls

Liquids unloading method 1: Generally columns should be clear. [redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

NONCBI_W_LIQUIDSUNLOADING_METHOD1_1-22-13.xls

Liquids unloading method 2: should be self explanatory.

(b)(5) deliberative

NONCBI_W_LIQUIDSUNLOADING_METHOD3_1-22-13.xls

Liquids unloading method 3: should be self explanatory.

(b)(5) deliberative

NONCBI_W_LIQUIDSUNLOADING_METHOD2_1-22-13.xls

Let me know if you have any questions on any of this. Sorry I couldn't be of additional help.

David

Hide Details

Subpart W/Inventory Follow-up - Compressors adn Liquids Unloading

Thu 01/24/2013 2:00 PM - 2:30 PM

Attendance is **required** for Melissa Weitz

Chair: **Suzanne Waltzer/DC/USEPA/US**

Location: Mark's office

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: David Jacobson/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA

Description

Personal Notes

Gas STAR reductions

Melissa Weitz to: Paula Fields, Marty Wolf 01/23/2013 01:25 PM

Hello,

Suzie and I reviewed the Gas STAR spreadsheet and labeled every entry with a GHG Inventory category, in the column "Inventory source". In many cases, reduction cannot be matched with certainty, and the category is still "Other reductions." We have also included a category labeled "Category for W comparison." In several cases where we've labeled the entry "Other," we have included a more specific entry in the W comparison column. We do not believe it is possible to match up the reduction with a specific Inventory line item, but do believe that it will be useful to have information for the more specific entry for analysis of subpart W data.

Priorities for the Gas Star data are:

To be completed for public review draft:

(b)(5) deliberative

Let me know if you are free to discuss this afternoon.

Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/23/2013 12:50 PM -----

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/23/2013 12:02 PM
Subject:

(b)(5) deliberative [redacted]

GasSTAR_reductions_012113_SW MW.xlsx

Re: Gas STAR reductions
Melissa Weitz to: Marty Wolf 01/23/2013 01:55 PM
Cc: "Paula Fields", Suzanne Waltzer

Hi Marty,

I'm not sure I follow the question on Table A-12. My thought was, (b)(5) deliberative

(b)(5) deliberative

Let's discuss later.

Later this afternoon, Suzie and I will look into the other categories, and the issues of one-time versus repeating reductions.

"Marty Wolf"	Melissa,	01/23/2013 01:47:34 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA, "Paula Fields" <Paula.Fields@erg.com>
Cc: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 01/23/2013 01:47 PM
Subject: Re: Gas STAR reductions

Melissa,

I am available to talk any time, but I do want to discuss with Paula a bit before calling. She is on a call right now.

I did have two quick questions.

(b)(5) deliberative

(b)(5) deliberative

I sent those over yesterday in a separate e-mail (not in the spreadsheet) and I don't think you made assignments.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 1/23/2013 10:25 AM >>>

Hello,

Suzie and I reviewed the Gas STAR spreadsheet and labeled every entry with a GHG Inventory category, in the column "Inventory source". In many cases, reduction cannot be matched with certainty, and the category is still "Other reductions." We have also included a category labeled "Category for W comparison." In several cases where we've labeled the entry "Other," we have included a more specific entry in the W comparison column. We do not believe it is possible to match up the reduction with a specific Inventory line item, but do believe that it will be useful to have information for the more specific entry for analysis of subpart W data.

Priorities for the Gas Star data are:

To be completed for public review draft:

(b)(5) deliberative

(b)(5) deliberative

Let me know if you are free to discuss this afternoon.

Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/23/2013 12:50 PM -----

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/23/2013 12:02 PM
Subject:

(See attached file: GasSTAR_reductions_012113_SWMW.xlsx)

Re: Gas STAR reductions
Marty Wolf to: Melissa Weitz 01/23/2013 03:04 PM
Cc: "Paula Fields"

History: This message has been forwarded.

Melissa,

Just a follow-up on this. I spoke with Allison about checking the assignment of reductions and she agreed to do so.

I will not have this from her until tomorrow AM, but she thought that it would be OK to start on steps 1-3 and then make some quick tweaks if she finds anything that is off.
Please send me the assignments on the BMPs, so we can get those included as well.

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
1/23/2013 10:25 AM >>>

Hello,

Suzie and I reviewed the Gas STAR spreadsheet and labeled every entry with a GHG Inventory category, in the column "Inventory source". In many cases, reduction cannot be matched with certainty, and the category is still "Other reductions." We have also included a category labeled "Category for W comparison." In several cases where we've labeled the entry "Other," we have included a more specific entry in the W comparison column. We do not believe it is possible to match up the reduction with a specific Inventory line item, but do believe that it will be useful to have information for the more specific entry for analysis of subpart W data.

Priorities for the Gas Star data are:

To be completed for public review draft:
[redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Let me know if you are free to discuss this afternoon.

Melissa

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/23/2013 12:50 PM -----

From: Suzanne Waltzer/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/23/2013 12:02 PM
Subject:

(See attached file: GasSTAR_reductions_012113_SW MW.xlsx)

Re: basin numbers, and call with Reid
Melissa Weitz to: Marty Wolf 01/24/2013 11:32 AM

Hi Marty,

I thought I sent all of the comments the day I received them. If you do not have them all, please let me know.

The call-in number for today is (b)(6) personal privacy

Melissa

CATF - 2013 Inventory Draft Expert Review.doc

"Marty Wolf"	Melissa,	01/24/2013 10:56:34 AM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/24/2013 10:56 AM
Subject: Re: basin numbers, and call with Reid

Melissa,

Sorry, but I just missed this message yesterday.

I do not have an AAPG basin names/numbers list.

I could be a call at 1 pm Eastern regarding BP/CATF. Could you send me all of CATF's comment? I don't think that I have it all. I asked for this previously, but I did not hear back from you.

Thanks,
Marty

>>> <Weitz.Melissa@epamail.epa.gov> 1/23/2013 3:17 PM >>>

Do you happen to have anywhere a list matching AAPG basin names with AAPG basin numbers? I'm checking also with some of the folks from GHGRP who will probably have it.

Are you free at 1EST tomorrow? Reid Smith is available then to talk about the BP liquids unloading data from CATF's comment.

Fw: links for today's call

Melissa Weitz to: Marty Wolf 01/24/2013 11:46 AM

What we sent to Reid about today's call--

----- Forwarded by Melissa Weitz/DC/USEPA/US on 01/24/2013 11:46 AM -----

From: Melissa Weitz/DC/USEPA/US
To: gordon-reid.smith@bp.com
Cc: Suzanne Waltzer/DC/USEPA/US@EPA
Date: 01/24/2013 09:16 AM
Subject: links for today's call

Hi Reid,

Suzie W.and I are available to speak at 1PM (EST) today. Are you still free at 1PM (EST)?

We can use the following call-in: (b)(6) personal privacy

As I mentioned yesterday, we received a comment on the expert review draft related to the update to the liquids unloading estimates that cited BP data which were included in GasSTAR materials.

The three resources cited in the comment we received are listed below:

1. EPA. *Natural Gas STAR Partner Update: Spring 2004* . Available online at: http://epa.gov/gasstar/documents/partner-updates/spring2004.pdf.

2. G.P. Desaulniers, "Plunger Well Vent Reduction Project," Presentation at the 2006 Natural Gas Star Workshop. Available online at: http://www.epa.gov/gasstar/documents/desaulniers.pdf

3. EPA. *Installing Plunger Lift Systems in Gas Wells: Lessons Learned from Natural Gas STAR Partners* . October, 2003. Available online at: <http://epa.gov/gasstar/documents/ll_plungerlift.pdf>.

The commenter writes:

"....one of datasets was based on a very substantial number of wells: ~2200 wells BP operates in the South San Juan (SSJ) Basin of New Mexico. The emissions from these wells have been described in at least two reports.

These wells emitted about 4.8 billion cubic feet (Bcf) of natural gas in 2000, although plunger lifts had already been installed on 1000 of them. Smart automation of those plunger lifts substantially reduced the emissions from those wells, so that they were emitting less than 1 Bcf by 2006. The ~4 Bcf emissions reduction was all from automating the plunger lifts, so in 2000 at least 4 Bcf was emitted by just the 1000 wells with plunger lifts.

Assuming that this gas was 79% methane by volume (using a national average; coal-bed natural gas is usually considerably higher in methane content), 4 Bcf of natural gas would contain 61.4 Gg of methane. These figures are actual emissions, as measured and presented by the well owners.

The second report which EPA used for its previous estimate of emissions during liquids unloading, from Wyoming, was based on a far smaller number of wells, but reported emissions per well in a similar range (about half of that per well for the wells from the SSJ Basin)."

The commenter then goes on to compare the BP data with the US GHG Inventory estimates:

"For 2011, EPA estimates that total emissions were 149 Gg of methane. For comparison, BP reports that the 1000 wells with plunger lifts in the SSJ basin were emitting at least 4 Bcf (61.4 Gg methane) in 2000. **EPA's estimate for 2011 for the entire nation is only 2.4 times larger than the reported emissions from just 1000 wells in 2000.** Smart automation can dramatically reduce these emissions, as BP demonstrated, but we are not aware of any evidence that smart automation has been so widely adopted that nationwide emissions would be expected to have dropped so dramatically."

Thanks,
Melissa

Can we meet in Marks office at 2:10?

Suzanne Waltzer to: Mark DeFigueiredo, David Jacobson 01/24/2013 02:04 PM
Cc: Melissa Weitz

History: This message has been forwarded.

Suzie Waltzer
Natural Gas STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW (6207J)
Phone: 202-343-9544
Web: www.epa.gov/gasstar

----- Forwarded by Suzanne Waltzer/DC/USEPA/US on 01/24/2013 02:03 PM -----

Subpart W/Inventory Follow-up - Compressors adn Liquids Unloading

Thu 01/24/2013 2:00 PM - 2:30 PM
Location: Mark's office

Required:	David Jacobson/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA, Melissa Weitz/DC/USEPA/US@EPA

Description

Re: Re: gas star RECs reductions, public review draft, API comments

Melissa Weitz to: Paula Fields 01/25/2013 10:02 AM
Cc: "Marty Wolf"

How about we set up a call to talk through the responses on Monday, and then have the call with API on Tuesday or later? Do not delay the actual updates to the spreadsheet to do this. Perhaps as you're updating text you can just cut and paste the relevant text into the comment/response spreadsheet and we can work from that?

Most of their comments seemed to be very technical and are addressed through the updates to well counts, reviewing the regional differences with the Liquids Unloading data,etc. I don't recall seeing much in their comments that we'd need to be careful in responding to.

I think the most detail will be needed in well counts, and for that we should tell them about the changes we made between expert review and final, respond to their specific comments, and then be prepared to respond to more questions. It might be good to have Casey/Jessica walk through these responses and then answer any other questions we get on the phone.

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

-----"Paula Fields" <Paula.Fields@erg.com> wrote: -----
To: Melissa Weitz/DC/USEPA/US@EPA, "Marty Wolf" <Marty.Wolf@erg.com>
From: "Paula Fields" <Paula.Fields@erg.com>
Date: 01/25/2013 09:31AM
Subject: Re: gas star RECs reductions, public review draft, API comments

Marty - you summarized everything well.

Melissa - again, our biggest concern with having the call on Monday, or even Tuesday, is giving enough time to work with you to craft all of our responses. While we have these generally in mind, we don't want to say something that commits you to something you don't agree with. We will need to draft our comment responses in more detail and have you review them. It seems that will take a day of back and forth. Let us know you thoughts about the amount of review/approval you will want on our responses.

Thanks!
-Paula

****
Paula G. Fields Simms
Principal Air Quality Engineer

ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185

>>> Marty Wolf 01/24/13 4:06 PM >>>
Melissa,

Regarding the RECs, understood. It looks like the 2011 dropoff that we discussed is a bit problematic.

Got the well counts data. I'm still QAing at this point. These will be ready tomorrow afternoon.

For the updated natural gas spreadsheet, I will be shooting for the end of tomorrow. I can't guarantee it, but I think it is doable. I need to incorporate the revised GasSTAR data and the new well counts. Need to make sure that we have the GasSTAR reduction calculation correct. We also have some external calculations using the well counts to get the plunger lifts revised. Might be a possibility that this slips into Monday AM, but I will be trying to get this finished tomorrow.
For the API call, we could do this, but our biggest concern is how "scripted" you want our responses to be. I am assuming that if we are responding to some comments in the text, then we can say that we are discussing in the text without going into a detailed explanation of the text. There are some comments that need to be addressed by EPA. Also, you need to review our responses before the call. If possible, we would like to have the call on Wednesday so we can make sure that we have our bases covered.

I discussed this with Paula, but she might have an additional comment that she wants to add.

Thanks,
Marty

Martinus (Marty) E. Wolf
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10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
1/24/2013 3:31 PM >>>

--I spoke about this with a few others at EPA, and for now, for RECs only, we'd like to use the expert review draft Gas STAR number for for 2011 for the public review draft. For all of the other Gas STAR reductions, you should proceed as planned with the updates.

--Can you give me a quick update on well counts? And an updated

estimate on timing for the updated spreadsheet?

--I'm going to arrange a call with API where API will walk us through their comments. We'll need to have responses prepared, and I'd like ERG to provide responses to the comments on the call. I know almost all of the work for this has already been completed in your review of comments/update of the GHG Inventory. Would you be prepared to provide responses if we held the call Monday? If not, would Tuesday work?

I'll be working from home tomorrow and you can call me at (b)(6) personal privacy if something comes up. And I'm sure something will!

Thanks!
Melissa

Natural Gas Spreadsheets
Marty Wolf to: Melissa Weitz 01/25/2013 06:01 PM
Cc: "Paula Fields"

History: This message has been forwarded.

Melissa,

Attached is the natural gas spreadsheet, the GasSTAR spreadsheet (for all four stages), and the final well counts.

It will probably take you awhile to digest everything.

In the spreadsheet itself, I did the following:

(b)(5) deliberative

I am assuming that this will not be "set in stone" and that there will be some tweaking going on next week.

I'm sure that you'll have some other questions.

Marty

Martinus (Marty) E. Wolf

Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)

marty.wolf@erg.com

(b)(5) deliberative [redacted]

FINAL Gas Well Counts.2013.01.24_rev.xlsx

(b)(5) deliberative [redacted]

NaturalGasSystems_1990-2011_012513.xlsx

(b)(5) deliberative [redacted]

Revised_GasSTAR_reductions_012513.xlsx

Re: qs for ERG

Melissa Weitz to: Melissa Weitz 01/28/2013 01:32 PM

Melissa Weitz	(b)(5) deliberative	01/28/2013 12:58:11 PM

From: Melissa Weitz/DC/USEPA/US
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/28/2013 12:58 PM
Subject: qs for ERG

(b)(5) deliberative

Re: can you remind me what is the final GHGRP # for CH4 from liquids unloading?

David Jacobson to: Melissa Weitz 01/29/2013 12:49 PM

History: This message has been forwarded.

Not really final, and I don't think these numbers are going to be publically available until late February so they may still change.

[redacted] (b)(5) deliberative [redacted]

David

(b)(5) deliberative [redacted]

noncbi_w_emission_type_1-29-12.xls

Melissa Weitz	Melissa M. Weitz U.S. Environmental Protec...	01/29/2013 11:43:42 AM

From: Melissa Weitz/DC/USEPA/US
To: David Jacobson/DC/USEPA/US@EPA
Date: 01/29/2013 11:43 AM
Subject: can you remind me what is the final GHGRP # for CH4 from liquids unloading?

Melissa M. Weitz
U.S. Environmental Protection Agency
Climate Change Division
(202) 343-9897
Weitz.Melissa@epa.gov

Liquids Unloading
Melissa Weitz to: **Bill Irving** 01/29/2013 01:01 PM

Below is a summary-level information and comments on Liquids Unloading in the GHG Inventory

Note--We found a potential issue with well counts yesterday. If it turns out that there are still corrections to make to the well count that would impact the LU numbers, I will let you know in a few hours.

Liquids Unloading

(b)(5) deliberative

[redacted]

Re: Natural Gas Spreadsheet and Well Counts

Marty Wolf to: Melissa Weitz 01/29/2013 05:48 PM

History: This message has been forwarded.

Melissa,

Easy question!

This was from a code change in the well counts methodology. 2011 completions went from 8,513 down to 8,077.

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
1/29/2013 2:26 PM >>>

Comparing the expert and public review draft, it looks like potential emissions for well completions with hydraulic fracturing dropped across the time series. Can you explain what's causing the drop?
Thanks!
Melissa

"Marty Wolf" ---11/29/2012 04:00:02 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Cc: "Gopi Manne" <Gopi.Manne@erg.com>, "Paula Fields" <Paula.Fields@erg.com>
Date: 11/29/2012 04:00 PM
Subject: Natural Gas Spreadsheet and Well Counts

Melissa,

Attached is the Natural Gas Systems spreadsheet, as well as our latest well counts. For reference, I am also including a table that describes the changes that we made to the

spreadsheet in response to ICF's comments.

(b)(5) deliberative

At this point, please send over the text and I will make redline/strike-out changes based upon this version of the spreadsheet. I should be able to send the text back to you later this afternoon.

We will send you the annex tomorrow - we need to spend more time QAing all of the involved tables.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
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USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com[attachment "NaturalGasSystems_1990-2011_112912.xlsx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "response to icf comments_112912.docx" deleted by Melissa Weitz/DC/USEPA/US] [attachment "DRAFT Gas Well Counts_112812.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Re: changes from ER draft to PR draft estimates
Marty Wolf to: Melissa Weitz 01/30/2013 12:24 PM

History: This message has been replied to and forwarded.

Melissa,

After working on this a bit, I realized that it was kind of pointless to

(b)(5) deliberative

I hope to have my revised text to you by 1 pm Pacific - no money-back guarantee, but that is what I am shooting for.

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>

1/30/2013 8:44 AM >>>

Net please, thanks!

"Marty Wolf" ---01/30/2013 10:50:10 AM---Do you want potential or net?

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/30/2013 10:50 AM
Subject: Re: changes from ER draft to PR draft estimates

Do you want potential or net?

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 1/30/2013 7:15 AM >>>

HI Marty,

Could you provide me with a list of the top 4-5 sources with the largest changes in CH4 emissions from the ER draft to the PR draft, and a for each a brief explanation of why the number changed?

(b)(5) deliberative

[redacted]

Melissa change_summary_013013.xlsx

Re: changes from ER draft to PR draft estimates
Melissa Weitz to: Marty Wolf 01/30/2013 12:55 PM

That's fine. I'm still working on my pieces of the text, which I'll add into your version when I receive it.

"Marty Wolf"	OK - I sent the HF completions issue on to J...	01/30/2013 12:54:20 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/30/2013 12:54 PM
Subject: Re: changes from ER draft to PR draft estimates

OK - I sent the HF completions issue on to Jess and Casey, because that is coming from the revised well counts. They mentioned a coding change, but I will get some more specifics.

I will look into the Gas STAR revisions. I will focus on the production stage only.

Please note that the text revisions may be delayed since we are chasing this information down.

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 1/30/2013 9:44 AM >>>

Look at this more, my question is more related to [redacted] (b)(5) deliberative [redacted]

"Marty Wolf" ---01/30/2013 12:24:36 PM---Melissa, After working on this a bit, I realized that it was [redacted] (b)(5) deliberative

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/30/2013 12:24 PM
Subject: Re: changes from ER draft to PR draft estimates

Melissa,

After working on this a bit, I realized that [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

I hope to have my revised text to you by 1 pm Pacific - no money-back guarantee, but that is what I am shooting for.

Marty

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marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 1/30/2013 8:44 AM >>>

Net please, thanks!

"Marty Wolf" ---01/30/2013 10:50:10 AM---Do you want potential or net?

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/30/2013 10:50 AM
Subject: Re: changes from ER draft to PR draft estimates

Do you want potential or net?

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 1/30/2013 7:15 AM >>>

HI Marty,

Could you provide me with a list of the top 4-5 sources with the largest changes in CH4 emissions from the ER draft to the PR draft, and a for each a brief explanation of why the number changed?

Melissa[attachment "change_summary_013013.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Re: Analysis of Reduction Components

Melissa Weitz to: Marty Wolf 01/30/2013 02:05 PM

Are we having our check in call? I'm on the line.

For dehydrators, is it at all possible to pull the reductions back out and correct the GasSTAR calculations and see if the net value is still negative? If the numbers now look reasonable, we could add them into table 6.

"Marty Wolf"	Melissa, Here is what I have regarding the G...	01/30/2013 01:39:28 PM

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/30/2013 01:39 PM
Subject: Analysis of Reduction Components

Melissa,

Here is what I have regarding the Gas STAR revisions (all units are Mg).

(b)(5) deliberative

[redacted]

A couple of comments now.

(b)(5) deliberative

[redacted]

(b)(5) deliberative

Hope this works for you.

Marty

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USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 1/30/2013 9:44 AM >>>

Look at this more, my question is more related to (b)(5) deliberative

"Marty Wolf" ---01/30/2013 12:24:36 PM---Melissa, After working on this a bit, I realized that it was kind of pointless to look at net emissi

From: "Marty Wolf" <Marty.Wolf@erg.com>

To: Melissa Weitz/DC/USEPA/US@EPA
Date: 01/30/2013 12:24 PM
Subject: Re: changes from ER draft to PR draft estimates

Melissa,

After working on this a bit, I realized that it [redacted] (b)(5) deliberative [redacted]

[redacted]

[redacted]

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Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov> 1/30/2013 8:44 AM >>>

Net please, thanks!

"Marty Wolf" ---01/30/2013 10:50:10 AM---Do you want potential or net?

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA

Date: 01/30/2013 10:50 AM

Subject: Re: changes from ER draft to PR draft estimates

Do you want potential or net?

Marty

>>> <Weitz.Melissa@epamail.epa.gov> 1/30/2013 7:15 AM >>>

HI Marty,

Could you provide me with a list of the top 4-5 sources with the largest changes in CH4 emissions from the ER draft to the PR draft, and a for each a brief explanation of why the number changed?

Melissa[attachment "change_summary_013013.xlsx" deleted by Melissa Weitz/DC/USEPA/US]

Hide Details

graphs on liquids unloading

Thu 02/07/2013 3:00 PM - 3:30 PM

No Location Information

This entry has an alarm. The alarm will go off 30 minutes before the entry starts.

Required: Suzanne Waltzer/DC/USEPA/US@EPA

Description

Re: liquids unloading
Marty Wolf to: Melissa Weitz 02/04/2013 04:11 PM

History: This message has been forwarded.

Melissa,

Here is what I found.

(b)(5) deliberative

[redacted]

I hope this works for you.

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275

Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> <Weitz.Melissa@epamail.epa.gov>
2/4/2013 9:54 AM >>>

By the end of the day would be great. Thanks!

"Marty Wolf" ---02/04/2013 12:21:45 PM---Melissa,

From: "Marty Wolf" <Marty.Wolf@erg.com>
To: Melissa Weitz/DC/USEPA/US@EPA
Date: 02/04/2013 12:21 PM
Subject: Re: liquids unloading

Melissa,

When do you need this by?

This will probably take 2-4 hours - mainly because I need to go back into the API/ANGA data and make sure that we're getting the right data
Thanks,
Marty

>>> <Weitz.Melissa@epamail.epa.gov> 2/4/2013 8:52 AM >>>

Hi Marty,

[redacted] (b)(5) deliberative [redacted]

(b)(5) deliberative

Melissa

Re: updated GHGRP numbers
Mark DeFigueiredo to: Melissa Weitz 02/06/2013 12:01 PM

History: This message has been forwarded.

Yes you can [redacted] (b)(5) deliberative

Mark de Figueiredo, J.D., Ph.D.
Climate Change Division
U.S. Environmental Protection Agency
(202) 343-9928

Melissa Weitz	Hl Mark, At the briefing yesterday, Paul requ...	02/06/2013 11:38:23 AM

From: Melissa Weitz/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 02/06/2013 11:38 AM
Subject: updated GHGRP numbers

Hl Mark,

At the briefing yesterday, Paul requested that we add a column on the corrected numbers to the table on LU, HF, and production totals.

My understanding is that [redacted] (b)(5) deliberative [redacted]

Thanks!
Melissa

[redacted] (b)(5) deliberative [redacted]

quick review of text related to GHGRP

Melissa Weitz to: Bill Irving 02/06/2013 03:45 PM

Hi Bill,

I added more info on GHGRP #s for liquids unloading and HF. Can you give this a quick review? It is about 5 sentences, highlighted in yellow.

(b)(5) deliberative

public_review_text_2.1(Bl) 2.6.docx

quick review of GHGRP/NSPS issues in Inventory text

Melissa Weitz to: Suzanne Waltzer, Mark DeFigueiredo 02/06/2013 03:49 PM

Hello,

I added some info on the GHGRP numbers for liquids unloading/hydraulic fracturing. It'd be great to get your quick review by COB today. It is about 5 sentences, highlighted in yellow in the QA/QC and Verification Discussion section.

Also, I highlighted a sentence on improvements for hydraulic fracturing, that I'd like Suzie's review on to be sure it is not an issue with NSPS. The highlighted sentence is in the Planned Improvements section.

Let me know if you're able to take a look at these.

Thank you!!

Melissa

(b)(5) deliberative

[redacted]

public_review_text_2.1(BI) 2.6.docx

Re: updated slides for Sarah briefing

Bill Irving to: Melissa Weitz

(b)(5) deliberative

History: This message has been forwarded.

Looks good. Comments below. Also, I will check with Paul on presenting to Sarah.

[redacted]

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Melissa Weitz	These should take into account comments fr...	02/06/2013 12:10:52 PM

From: Melissa Weitz/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA
Date: 02/06/2013 12:10 PM
Subject: updated slides for Sarah briefing

These should take into account comments from yesterday, but let me know if I missed anything, and let me know if there is any information that I can drop from the briefing to make it less text-heavy.

[attachment "Slides on Public Review Draft_for Sarah.pptx" deleted by Bill Irving/DC/USEPA/US]

Re: quick review of text related to GHGRP

Bill Irving to: Melissa Weitz 02/06/2013 04:33 PM

History: This message has been forwarded.

Looks ok.

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Melissa Weitz	Hi Bill, I added more info on GHGRP #s for li...	02/06/2013 03:45:54 PM

From: Melissa Weitz/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA
Date: 02/06/2013 03:45 PM
Subject: quick review of text related to GHGRP

Hi Bill,

I added more info on GHGRP #s for liquids unloading and HF. Can you give this a quick review? It is about 5 sentences, highlighted in yellow.

[attachment "public_review_text_2.1(BI) 2.6.docx" deleted by Bill Irving/DC/USEPA/US]

Fw: quick review of GHGRP/NSPS issues in Inventory text

Mark DeFigueiredo to: Melissa Weitz 02/06/2013 04:56 PM

History: This message has been replied to and forwarded.

Looks ok

----- Forwarded by Mark DeFigueiredo/DC/USEPA/US on 02/06/2013 04:56 PM -----

From: David Jacobson/DC/USEPA/US
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 02/06/2013 04:14 PM
Subject: Re: Fw: quick review of GHGRP/NSPS issues in Inventory text

Checking against current numbers: [redacted] (b)(5) deliberative [redacted]

Mark DeFigueiredo	Could you take a look at a few sentences hi...	02/06/2013 04:07:59 PM

From: Mark DeFigueiredo/DC/USEPA/US
To: David Jacobson/DC/USEPA/US@EPA
Date: 02/06/2013 04:07 PM
Subject: Fw: quick review of GHGRP/NSPS issues in Inventory text

Could you take a look at a few sentences highlighted on page 6-7. They look fine to me, but would be good to get a second set of eyes.

----- Forwarded by Mark DeFigueiredo/DC/USEPA/US on 02/06/2013 04:07 PM -----

From: Melissa Weitz/DC/USEPA/US
To: Suzanne Waltzer/DC/USEPA/US@EPA, Mark DeFigueiredo/DC/USEPA/US@EPA
Date: 02/06/2013 03:49 PM
Subject: quick review of GHGRP/NSPS issues in Inventory text

Hello,

I added some info on the GHGRP numbers for liquids unloading/hydraulic fracturing. It'd be great to get your quick review by COB today. It is about 5 sentences, highlighted in yellow in the QA/QC and Verification Discussion section.

Also, I highlighted a sentence on improvements for hydraulic fracturing, that I'd like Suzie's review on to be sure it is not an issue with NSPS. The highlighted sentence is in the Planned Improvements section.

Let me know if you're able to take a look at these.

Thank you!!

Melissa

[attachment "public_review_text_2.1(BI) 2.6.docx" deleted by David Jacobson/DC/USEPA/US]

Re: FAQ's

Bill Irving to: Melissa Weitz 02/06/2013 05:14 PM

History: This message has been forwarded.

I think this is it for what i owe. I tried to shorten some because they were a bit dense.

You should consider re-ordering the questions so that the most general ones appear first, and the specific ones (e.g., how did LU change?) go last.

(b)(5) deliberative

INTERNAL FAQs 2.5 BI.docx

Chief - Climate Policy Branch,
Climate Change Division , USEPA
tel +1 202 343-9065 - mobile +1 202 341 3384

Melissa Weitz	And I think this should be everything for toda...	02/06/2013 02:53:17 PM

From: Melissa Weitz/DC/USEPA/US
To: Bill Irving/DC/USEPA/US@EPA
Date: 02/06/2013 02:53 PM
Subject: FAQ's

And I think this should be everything for today. Though I may run a few edits to the inventory text by you.

Melissa

[attachment "INTERNAL FAQs 2.5.docx" deleted by Bill Irving/DC/USEPA/US]

Accepted: graphs on liquids unloading

Thu 02/07/2013 3:00 PM - 3:30 PM

No Location Information

Suzanne Waltzer has accepted this meeting invitation	
Required:	Suzanne Waltzer/DC/USEPA/US@EPA

reordered chart

Suzanne Waltzer to: Suzanne Kocchi 02/07/2013 03:27 PM

Cc: Melissa Weitz

History: This message has been forwarded.

(b)(5) deliberative

[redacted]

Natural Gas Breakdown.xls

Reordered starting with NSPS sources, though this still groups liquids unloading (not regulated) and completions (regulated).

Gotta get on the 3:30 call. Melissa, do you happen to know a quick rough way to break those out?

2 more edits to NG text

Melissa Weitz to: MVanPelt 02/11/2013 11:04 AM

Cc: Leif Hockstad

Both in QA/QC and Verification Discussion.

Please add the text in bold.

Thank you!!

Melissa

(b)(5) deliberative

Re: Request to EPA

Mark DeFigueiredo to: Harrison, Matt 02/12/2013 05:14 PM
Cc: Melissa Weitz

History: This message has been forwarded.

Matt -

Thanks for your note. We're actually prioritizing the petroleum and natural gas systems data set ahead of the other source categories in the GHGRP. We're working as quickly as we can and hope to make available all of the non-confidential data on the GHGRP website in the coming weeks (rather than months). Hopefully it should make it easier for you to do detailed analyses of emission sources.

Best wishes,
Mark

Mark de Figueiredo, J.D., Ph.D.
Climate Change Division
U.S. Environmental Protection Agency
(202) 343-9928

"Harrison, Matt"	Dear Mark, (cc: Melissa)	02/08/2013 08:07:57 PM

From: "Harrison, Matt" <matt.harrison@urs.com>
To: Mark DeFigueiredo/DC/USEPA/US@EPA
Cc: Melissa Weitz/DC/USEPA/US@EPA
Date: 02/08/2013 08:07 PM
Subject: Request to EPA

Dear Mark,
(cc: Melissa)

Matt Harrison here from URS. I have a request.

On the stakeholder webinar on Feb 7, the EPA said that the natural gas systems eGGRT information will be available in an excel downloadable format "in the coming months". I also know EPA is planning additional webinar for Feb 27th to discuss further the emissions associated with petroleum and natural gas systems. We have a request for EPA in the meantime, to see if we might be able to possibly get some expedited data. Here's some background on the request.

As you may know, The University Of Texas, nine (9) oil&gas companies, and EDF have performed field measurements of certain upstream events and equipment. In publishing our results in the immediate future, we would prefer to use national activity factor data compiled from the RY2011 eGGRT data, instead of from our own scaled up data on activity estimates or from the EPA GHGEI National Inventory estimate. We are wondering if EPA can help us obtain this eGGRT data in the short term, either directly through your own data queries and analysis, or by allowing us access to the EPA database.

Ideally, we would like for the "Onshore Petroleum and Natural Gas Systems" in Sub W the following **National totals**:

- Total gas well completion counts
  - Completion events with HF
  - Completion events without HF

- Gas well Unloadings
  - Total national count of unloading events *(this may only be available for method 1 reporters)*
    - Events With Plunger
    - Events Without plunger
  - Total count of gas wells with any unloading events
    - Wells With Plunger that unload
    - Wells without plunger that unload

- Gas Well workovers
  - Events with HF
  - Events without HF

Much Less importantly, but also on our wishlist are:

- Counts of Pneumatic devices (by type)
- Counts of Chemical Injection Pumps
- Ultimately, having wells and production rates by basin would be useful as well.

If we could discuss these needs with you, that would be ideal. We are very happy to work with any database to extract the information. If you are able to discuss this, just let me know some times when we might be able to call.

Kind Regards,
Matt Harrison

Matthew R. Harrison, P.E.
Sr. Certified Project Manager
Client Account Manager
GHG National Practice Lead
URS Corporation - Austin, Texas
matt.harrison@urs.com
830-708-2832

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Weitz, Melissa

From: DeLuca, Isabel
Sent: Friday, February 15, 2013 1:38 PM
To: Hockstad, Leif; Irving, Bill; Weitz, Melissa
Cc: Gunning, Paul; Kocchi, Suzanne
Subject: Inventory comms materials

Hi all,
OAR Comms. had a couple of questions on the Internal Q&As for the draft inventory release. I've suggested some very slight edits to address the comments, attached. I do agree with John that [redacted] (b)(5) deliberative [redacted] I'm trying to think of other obvious questions--let me know if you have others.

ALSO--OAR Comms would like to put the Fact Sheet and the Internal Q&As in Gina's briefing book the night before the PR. I wanted to see if folks are ok with that.

(b)(5) deliberative [redacted]

Internal Q&As Draft GHG Invent...

Isabel DeLuca
Climate Change Division
USEPA
202-343-9247 (phone)
202-343-2290 (fax)

Weitz, Melissa

From: DeLuca, Isabel
Sent: Wednesday, February 20, 2013 1:02 PM
To: Hockstad, Leif; Irving, Bill; Weitz, Melissa
Subject: OAR Comms revisions to Fact sheet
Attachments: Fact sheet - oil and gas estimates in draft Inventory 2-19-13.[redacted]

Hi all,
OAR comms. suggested the following revisions to the fact sheet on the draft Inventory/oil and gas emissions estimates—see attached. They seem fine to me—just want to make sure you're comfortable with them.

Best,
Isabel

Weitz, Melissa

From: DeLuca, Isabel
Sent: Thursday, February 21, 2013 11:51 AM
To: Weitz, Melissa
Subject: latest fact sheet
Attachments: Fact sheet - oil and gas estimates in draft Inventory 2-20[redacted]

Attached. Thanks!

Weitz, Melissa

From: Weitz, Melissa
Sent: Thursday, February 21, 2013 12:06 PM
To: DeLuca, Isabel
Cc: Irving, Bill
Subject: RE: latest fact sheet
Attachments: Fact sheet - oil and gas estimates in draft Inventory 2-20-1 MW[redacted]

Does this edit work?

From: DeLuca, Isabel
Sent: Thursday, February 21, 2013 11:51 AM
To: Weitz, Melissa
Subject: latest fact sheet

Attached. Thanks!

Weitz, Melissa

From: DeLuca, Isabel
Sent: Thursday, February 21, 2013 12:16 PM
To: Weitz, Melissa
Subject: RE: March 24th (PR comment deadline) is a Sunday
Attachments: Fact sheet - oil and gas estimates in draft Inventory 2-20-1 MW-id(b)(5) deliber[redacted]

That looks great, thanks! I took out the part that is now repetitive at the bottom, and pulled the sub bullet (b)(5) deliberative [redacted] up in to previous bullet (in parentheses) so it wouldn't be a lonely orphan. I'll send it to OAR Comms and get a clean version to ICF for PDF-ing and posting.

From: Weitz, Melissa
Sent: Thursday, February 21, 2013 12:07 PM
To: Hockstad, Leif; DeLuca, Isabel
Subject: RE: March 24th (PR comment deadline) is a Sunday

Sounds good.

From: Hockstad, Leif
Sent: Thursday, February 21, 2013 12:04 PM
To: Weitz, Melissa; DeLuca, Isabel
Subject: Re: March 24th (PR comment deadline) is a Sunday

I think we should [redacted] (b)(5) deliberative [redacted]

- Leif

From: Weitz, Melissa
Sent: Thursday, February 21, 2013 9:49:05 AM
To: Hockstad, Leif; DeLuca, Isabel
Subject: March 24th (PR comment deadline) is a Sunday

Should we move it to the 25th?

Weitz, Melissa

From: DeLuca, Isabel
Sent: Thursday, February 21, 2013 12:54 PM
To: Hockstad, Leif; Weitz, Melissa; Kocchi, Suzanne; DeFigueiredo, Mark; Irving, Bill
Subject: Final fact sheet "Overview of Updates to the Natural Gas Sector Emissions Calculations for the Inventory..."
Attachments: Fact sheet - oil and gas estimates in draft Inventory 2-20-Final, Clean [redacted]

Hi all,
OAR Comms. suggested some small edits to the fact sheet (attached). I worked with Melissa to incorporate them. The largest edit was rearranging some text in the last section ("Next Steps").

I am sending this to ICF now to turn into a PDF and post on the web. If you have any concerns, let me know.

Thanks,
Isabel

Weitz, Melissa

From: Robert Pickering [Robert.Pickering@erg.com]
Sent: Friday, March 29, 2013 6:39 PM
To: Weitz, Melissa; Paula Fields
Cc: Marty Wolf
Subject: RE: response to Pioneer comments about pet systems/pneumatic chemical injection pumps
Attachments: Methodology for Estimating CH4and CO2 Emissions from Petro_29Mar13[redacted]Petroleum Systems_29Mar13[redacted]

Melissa,

Attached is the updated petroleum systems text and associated methodology sections. Minor updates to the references were made to the methodology section. For the petroleum systems text, I included the more detailed information we had dug up based on Pioneer's comments. I included it in track changes so you are aware what changed. Let me know if there is anything else you'd like me to update.

Have a good weekend.

Robbie

Environmental Engineer, E.I.T.
Eastern Research Group, Inc.
14555 Avion Parkway, Suite 200
Chantilly, VA 20151
703-633-1653
>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 3/28/2013 5:23 PM >>>

Yes, please add the info—thanks! I haven't made any edits to the petroleum systems text, so you can use the version that Marty sent yesterday.

Regarding the API comment on associated gas, can we double check that with the ERG subpart W group? My understanding is that (b)(5) deliberative [redacted] Does this make sense/sound okay?

Melissa

From: Paula Fields [mailto:Paula.Fields@erg.com]
Sent: Thursday, March 28, 2013 5:04 PM
To: Weitz, Melissa
Cc: Marty Wolf; Robert Pickering
Subject: response to Pioneer comments about pet systems/pneumatic chemical injection pumps

Hi Melissa -

Here are our response to comments from Pioneer on the pneumatic chemical injection pumps used in the petroleum systems inventory. These refer to the 2 comments on page 4 of the Pioneer letter.

(b)(5) deliberative

Let us know if you have additional questions. Also, let us know if you'd like us to add this detail about the info from the Radian and GRI/EPA reports to the text in the Petroleum Systems section.

-Paula

Paula G. Fields Simms
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185

Weitz, Melissa

From: DeFigueiredo, Mark
Sent: Monday, March 04, 2013 10:29 AM
To: DeLuca, Isabel
Cc: Weitz, Melissa; Jacobson, David
Subject: Webinar documents
Attachments: Webpage changes [redacted] Webinar slides 2 28 [redacted] GHGRP_SubpartWDataSummary 2-27-13 FINAL for web [redacted] SubpartW_2011DataSummary Final for Web [redacted]

Hi Isabel – Here are the webpage changes, powerpoint slides, and Subpart W document for the webinar webpage. The powerpoints should be posted as PDFs of the slides only (i.e. don't include the speaker notes).

Let me know if you have any questions or comments. Also, let us know once they get posted so that I can make conforming changes to the GHGRP website.

Thanks!
Mark

Weitz, Melissa

From: Weitz, Melissa
Sent: Thursday, March 07, 2013 9:53 AM
To: Marty Wolf
Subject: FW: Text and Comment Response
Attachments: expert_comment_responses_013013[redacted]

Hi Marty,

We're now planning to post the expert review comment responses on our webpage.

Could you go through the spreadsheet and make sure we have all of the comments included and that we've also included the final responses?

I'd like to get this by next Wednesday, if possible.

Thanks,

Melissa

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Wednesday, January 30, 2013 6:40 PM
To: Weitz, Melissa
Subject: Text and Comment Response

Melissa,

Here is the text. Tables A-E have all been updated and I have also revised any numerical references in the text.

As I mentioned, I will be trying to wrap up the Annex (text and tables) tonight. If I finish, I will send it tonight. If I don't get it finished, I will give you an e-mail update. I'm going to try really, really hard to wrap it up.

Also, attached are the comments and the associated responses. Per your instruction, I focused on the API comments. You will probably want to check all of the others to see if we have them covered.

Almost there...

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)

916-859-0185 (fax)
marty.wolf@erg.com

Weitz, Melissa

From: Weitz, Melissa
Sent: Wednesday, March 13, 2013 1:13 PM
To: Marty Wolf
Subject: RE: Responses to Expert Review Comments
Attachments: expert_comment_responses_031213 MW[redacted]

Hi Marty,

Thanks for sending these over. I've edited some of the responses a bit.

There are 2 responses in the API tab that we'll need to add a bit to.

For the tabs other than API, I'd like you to expand on the comments so that they are of similar detail to API. When the TO was out of money, I had just quickly noted some of the key points from other groups' comments, and they need to be updated to the same level of detail as API's.

Let me know if you have any questions. We can discuss on our call today.

Melissa

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Tuesday, March 12, 2013 3:24 PM
To: Weitz, Melissa
Subject: Responses to Expert Review Comments

Melissa,

Here is my attempt at developing responses to the expert review comments. I think that the documentation addresses them all (more or less). The CATF responses are probably the most shaky, so you might want to spend a bit of time with those refining what I wrote.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

Weitz, Melissa

From: Marty Wolf [Marty.Wolf@erg.com]
Sent: Thursday, March 14, 2013 5:19 PM
To: Weitz, Melissa
Subject: Revised Response to Comments
Attachments: expert_comment_responses_031413_erg_rev[redacted]

Melissa,

I think that this will work. Please note that I split the comment into two (reciprocating and centrifugal), so the responses would not get overly long.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

Weitz, Melissa

From: Weitz, Melissa
Sent: Thursday, March 14, 2013 5:49 PM
To: Hockstad, Leif
Subject: expert review comment responses
Attachments: expert_comment_responses_031413_erg_rev MW [redacted]

Weitz, Melissa

From: Hockstad, Leif
Sent: Monday, March 18, 2013 2:30 PM
To: Chinery, Leslie; Van Pelt, Marian
Cc: Weitz, Melissa
Subject: FW: public review comments response for last year's inventory
Attachments: PR_Comment_Log_5 4 2012 - natural gas-v2 mw 3.18.13 [redacted]

Marian & Leslie –

A second version of the natural gas responses to last year's public review comments. Please replace the version I just sent you with this one.

Thanks,
Leif

From: Weitz, Melissa
Sent: Monday, March 18, 2013 2:14 PM
To: Hockstad, Leif
Subject: public review comments response for last year's inventory

Weitz, Melissa

From: Weitz, Melissa
Sent: Monday, March 18, 2013 6:25 PM
To: Marty Wolf
Cc: Paula Fields
Subject: FW: Petroleum Systems and Natural Gas Systems Text and Spreadsheets
Attachments: Methodology for Estimating CH4 and CO2 Emissions from Petroleum Systems[redacted]; Natural Gas Systems[redacted]; Petroleum Systems[redacted]; Methodology for Estimating CH4 and CO2 Emissions from Natural Gas System.docx; PetroleumSystems1990-2011 2_8_13[redacted]; NaturalGasSystems_1990-2011_2_8_13[redacted]

The text and spreadsheets from the public review draft are attached. It sounds like ICF may have already updated the CRF tables?

From: Chinery, Leslie [mailto:Leslie.Chinery@icfi.com]
Sent: Monday, March 18, 2013 6:20 PM
To: Weitz, Melissa
Cc: Hockstad, Leif; Van Pelt, Marian; Pederson, Lauren
Subject: Petroleum Systems and Natural Gas Systems Text and Spreadsheets

Hi Melissa,
Attached please find the spreadsheets and text for petroleum and natural gas systems. Please note, the spreadsheets are the versions we received for PR with updated CRF tabs, hence the date of the file.
Best,
Leslie

Leslie Chinery | Senior Associate | 202.862.1233 (p) | 202.862.1144 (f)| leslie.chinery@icfi.com
ICF International | 1725 I Street NW, Suite 1000, Washington, DC 20006 | icfi.com

Weitz, Melissa

From: Weitz, Melissa
Sent: Monday, March 25, 2013 10:01 AM
To: Hockstad, Leif
Subject: FW: ANGA 2013 GHG Inventory Comments
Attachments: ANGA_2013 GHG Inventory comments.pdf

Hi Leif,

ANGA's comments are mostly on the EF for well completions and workovers.

(b)(5) deliberative

(b)(5) deliberative

?

Melissa

From: Jason Smith [mailto:jsmith@anga.us]
Sent: Sunday, March 24, 2013 6:44 PM
To: Hockstad, Leif; Weitz, Melissa
Subject: ANGA 2013 GHG Inventory Comments

Mr. Hockstad and Ms. Weitz,
Please consider this attachment ANGA's submission of comments on the Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011 (February 2013). Please let me know if you have any questions.
Thank you,

Jason Smith
America's Natural Gas Alliance
Coordinator, Research and Regulatory Affairs
(o) 202-715-1713
(c) 703-409-5169
701 Eighth Street NW, Suite 800
Washington, DC 20001

March 24, 2013

By E-Mail

Mr. Leif Hockstad and Ms. Melissa Weitz
Environmental Protection Agency
Climate Change Division (6207J)
1200 Pennsylvania Ave., NW
Washington, DC 20460
hockstad.leif@epa.gov
weitz.melissa@epa.gov

Re: Comments of America's Natural Gas Alliance on the Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011 (February 2013)

Dear Mr. Hockstad and Ms. Weitz:

America's Natural Gas Alliance (ANGA) appreciates the opportunity to submit these comments on the U.S. Environmental Protection Agency's (EPA) Draft Inventory of Greenhouse Gas Emissions and Sinks: 1990-2011 (2013 Draft GHG Inventory).

ANGA is an educational and advocacy organization dedicated to increasing appreciation for the environmental, economic, and national security benefits of North American natural gas. ANGA's members include the leading North American independent natural gas exploration and production companies.

The safe and environmentally-responsible development of our domestic stores of natural gas has been, and increasingly will be, an important component of America's energy supply and economic health. Natural gas is a clean-burning, efficient, and cost-effective fuel that offers the potential for both significantly decreasing air pollution emissions and promoting America's energy independence.

While ANGA appreciates the significant changes EPA has made in developing the 2013 Draft GHG Inventory, we continue to be concerned that EPA's methodologies for estimating emissions from well completions and workovers rely on fundamentally flawed data and analysis. In order for an inventory to be useful, it must be based on a complete understanding of what the currently available data represents.

ANGA submitted comments in March 2011 and March 2012 on EPA's 2011 and 2012 Draft GHG Inventories, respectively. Included in these comments were concerns with the Agency's well

completions and workovers estimates (both the activity and emission factor components) in the context of EPA's Oil and Gas Sector New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants (O&G NSPS/NESHAP).[1] In addition, ANGA member companies and staff participated in an EPA webcast on July 14, 2011 and an EPA stakeholder workshop on September 13 and 14, 2012 where stakeholders discussed potential changes to the methodology for these and other Natural Gas Systems emissions estimates. During the webcast and the workshop, EPA Staff appropriately recognized that the estimates of methane emissions from Natural Gas Systems in the 2011 and 2012 GHG Inventories did not accurately reflect emissions from the industry and acknowledged the need to update their emission methodologies. We appreciate the steps EPA has taken to adjust the assumptions for the re-fracture rate at unconventional wells and emissions from liquids unloading. However, we continue to have concerns about EPA's methodologies for estimating emissions from well completions and workovers.

Methodologies for Estimating the Frequency of Re-fracture and Emissions from Liquids Unloading

ANGA supports EPA's change to the re-fracture rate used to estimate emissions from unconventional gas wells. In the 2013 Draft Inventory, EPA uses a re-fracture rate of one percent. Previous inventories used a re-fracture rate of 10 percent, which overestimated the actual number of wells being re-fractured. While the one percent re-fracture rate is much closer to actual practices, we believe that it is still an overestimation. A September 2012, API/ANGA study characterizing pivotal sources of methane emissions from natural gas production[2] concluded that 0.5 percent was a more representative national re-fracture rate, while our preliminary assessment of the Greenhouse Gas Reporting Program suggests a re-fracture rate of 0.4 percent for wells with hydraulic fracturing. In addition, we agree it is appropriate for EPA to revise the estimates of emissions from liquids unloading. Per ANGA's previous comments, the methodology used to estimate emissions from liquids unloading in previous inventories resulted in estimates that were

[1] Comment submitted by Amy Farrell, Vice President of Regulatory Affairs, America's Natural Gas Alliance (ANGA) and Bruce Thompson, President, American Exploration and Petroleum Council (AXPC). Comment on Proposed Rule: *Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews; Proposed Rule*. Document ID: EPA-HQ-OAR-2010-0505-4474. Submitted January 19, 2012.

[2] Shires, Terri (URS) and Miriam Lev-On (The LEVON Group). *Characterizing Pivotal Sources of Methane Emissions from Natural Gas Production: Summary and Analysis of API and ANGA Survey Responses*. Prepared for API and ANGA, Final Report, September 21, 2012. http://anga.us/media/press/CA5D12D3-CFB5-F2B6-3989B7E2306C8C06/files/task%202%20api%20anga%20survey%20report%20final%2021sept12%20clean2%20ae.pdf.

significantly higher than actual emissions.[3] For the 2013 Draft Inventory, EPA incorporated data from an API/ANGA study that better characterizes emissions from liquid unloading.[4] These data, which showed wider use of plunger lifts and other control technology than assumed in previous inventories, led EPA to change its emission calculation methodology. As a result of these changes, EPA dramatically reduced its estimate of 2010 emission from liquids unloading from 85.7 million metric tons of carbon dioxide equivalent (mmtCO_2e) in the 2012 Inventory to 5.4 mmtCO_2e in the 2013 Draft Inventory, a reduction of 94 percent.

The two changes described above along with other changes result in a reduction in estimated 2010 Field Production emissions from Natural Gas Systems of 54 percent. We appreciate EPA's engagement with stakeholders on these topics and look forward to continuing to work with EPA to improve the Agency's methodologies for estimating emissions from Natural Gas Systems.

Methodologies for Estimating Emissions from Well Completions and Workovers

ANGA and its members continue to disagree with EPA's methodologies concerning estimates of emissions from well completions and workovers. Despite repeated requests for correction – including submittals of additional data – and offers of engagement, EPA has not changed the methodologies for estimating emissions from well completions and workovers (with the exception of the change in assumed frequency of re-fractures discussed above). As discussed with the Agency over the last several years, ANGA has serious concerns that until such time as appropriate methodologies are adopted and implemented, those who rely on the national inventory for analysis and regulatory action will be using inaccurate emissions estimates that are based on a faulty methodology. ANGA continues to be concerned that EPA's release of these emissions data does not meet the Information Quality Act requirement that information disseminated by the Agency be accurate, complete, reliable and unbiased.[5]

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[3] Comments submitted by Amy Farrell to Mr. Leif Hockstad and Mr. Brian Cook. *Comments of America's Natural Gas Alliance on the Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010*, March 28, 2012. http://www.anga.us/media/content/F7BDA298-DFF6-686B-2DF23939F9838B75/files/anga%20ghg%20inventory%20comments.pdf

[4] Shires, Terri (URS) and Miriam Lev-On (The LEVON Group). Characterizing Pivotal Sources of Methane Emissions from Natural Gas Production: Summary and Analysis of API and ANGA Survey Responses. Prepared for API and ANGA, Final Report, September 21, 2012. http://anga.us/media/press/CA5D12D3-CFB5-F2B6-3989B7E2306C8C06/files/task%202%20api%20anga%20survey%20report%20final%2021sept12%20clean2%20ae.pdf

[5] Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by Federal Agencies, 67 Fed.Reg. 8452, 8453 (Feb. 22, 2002).

EPA's estimate that 9,000 thousand cubic feet (Mcf) of natural gas is released per well completion is fundamentally flawed due to its reliance on data from the Natural Gas STAR program. Under this program, companies voluntarily use reduced emission completions (RECs) to capture gas that would otherwise escape into the atmosphere. As noted in a presentation during the GHG Inventory workshop hosted by EPA in September 2012, when RECs are deployed, a well's flowback process or period is typically 8 to 12 days, compared to an industry average flowback period of 3.5 days for completions without RECs.[6] In addition, while there is variation from well to well and play to play, the rate at which gas is produced generally increases over time during the flowback process. The flowback process begins with 100% produced water and no gas. Over time (this could be hours or days) the gas increases and the produced water decreases until the well has sufficient rate and pressure to establish production. This means that the cumulative volume of gas captured over an 8 day flowback period is exponentially greater than that which would be released during 3 days from a non-REC completion at the same well. This reality compounds EPA's overestimate.

Furthermore, EPA is improperly assigning the emission factor of 9,000 Mcf per completion to a large number of well completions and workovers. The 2013 Draft Inventory underestimates the number of green completions and workovers currently being carried out at wells across the country. In the Draft Inventory, EPA states that it applies a capture rate of 14 percent for well completions and recompletions conducted from 2009 through 2011, based on a review of state regulatory requirements, before accounting for voluntary reductions reported through the Natural Gas STAR program.[7] The remaining gas is assumed to be vented to the atmosphere. This methodology ignores the fact that many production companies, including those operating in states without green completion requirements and those that do not participate in or report REC data to Natural Gas STAR, are performing RECs on their own accord for economic reasons. A study by researchers at MIT published in November 2012 and cited by EPA on page 3-62 of the 2013 Draft Inventory found that even with a conservative long-term wellhead gas price of $4 per Mcf and a REC cost of $3,000 per day, 64 percent of wells would generate positive revenue selling gas captured during green completions.[8] Wells profiting from RECs would jump to 83 percent and 95

[6] Sandlin, Jesse (Devon Energy). *Realistic Completion Emission*. Presented at EPA Stakeholder Workshop on Natural Gas in the Inventory of U.S. Greenhouse Gas Emissions and Sinks, September 13, 2012. http://www.epa.gov/climatechange/Downloads/ghgemissions/2012Workshop/Devon_Sandlin.pdf

[7] U.S. Environmental Protection Agency. *Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011*. February 2013. See p 3-64.

[8] O'Sullivan, Francis and Sergey Paltsev (MIT). "Shale gas production: potential versus actual greenhouse gas emissions," Environ. Res. Lett. 7 (2012) 044030.

percent with REC costs of $2,000 and $1,000 per day, respectively.[9] As supplementary material posted for the MIT study notes "regulation is only part of the gas-handling picture."[10] These findings reinforce the results of a 2011 survey that ANGA submitted to EPA as part of a previous round of comments.[11] That survey found that 93 percent of the roughly 1500 wells reported by survey participants used RECs, four percent flared and only three percent vented gas during the flowback process. A third data source, EPA's GHGRP, also indicates that the draft inventory overestimates emissions from this source. As stated in the Draft Inventory, "The GHGRP data indicate that the Inventory activity data on well completions and use of RECs compare well with the industry-reported activity data, but that substantial flaring of completion and re-fracturing emissions may be occurring that is not captured in the GHG Inventory (3-63)." The information in these three independent works provides EPA with information of sufficient quality to construct a time series representation of the significant gas capture that occurs in addition to what is depicted by regulations and Natural Gas STAR reports.

Given the number of uncertainties with respect to the accuracy of the calculations of estimated emissions from well completions and recompletions, including the underlying data and assumptions, and the fact that EPA has not followed its own procedures in development of emissions factors for these activities,[12] ANGA believes that it is inappropriate for EPA to continue to use these emissions methodologies. EPA must develop accurate, peer-reviewed emissions estimations that are based on valid data, assumptions and calculations. ANGA stands ready to continue to work with EPA to develop valid emission factors and estimates for well completions and recompletions that can serve as the basis for more accurate emissions estimates.

Conclusion

Given the magnitude of the changes that the Agency has made over the past three years both increasing and decreasing estimated emissions from natural gas production, the underlying data and assumptions must be rigorous and well supported. While ANGA welcomes and

[9] O'Sullivan, Francis and Sergey Paltsev (MIT). "Shale gas production: potential versus actual greenhouse gas emissions," Online supplementary data (November 2012). http://iopscience.iop.org/1748-9326/7/4/044030/media/erl437454suppdata.pdf
[10] *Ibid.* p 26.
[11] *Ibid.* Farrell and Thompson at Appendix 3.
[12] *See* EPA, *Procedures for Preparing Emissions Factor Documents*, November 1997, available at:http://www.epa.gov/ttn/chief/efdocs/procedur.pdf, and EPA, *Recommend Procedures for Development of Emissions Factors and Use of the WebFIRE Emissions Factor Database: REVISED DRAFT*, December 17, 2010, available at:http://www.epa.gov/ttn/chief/efpac/procedures/procedures_draft122010.pdf.

appreciates the changes EPA has made to its methodology for estimating emissions from liquids unloading and its estimate of the frequency of workovers, we continue to disagree with the emission factors and control technology assumptions for well completions and workovers.

For the past two years, we have noted that if the significant flaws in the methodologies were not corrected, the resulting emissions estimates would provide inaccurate information to those who rely on the national inventory as a basis for comparative analysis and policy decisions, including regulatory action, and undermine the purpose and credibility of the national inventory program. This warning has borne out as a number of researchers have used the 2011 and 2012 GHG Inventories as the basis for lifecycle analyses of natural gas without acknowledging the clear shortcomings in EPA's methodologies. We appreciate the steps that EPA has taken to highlight changes in its methodologies and steps it has acknowledged it will take in the future, however, given the magnitude of potential changes to estimated emissions from well completions, EPA should **either** update the emissions estimates for unconventional well completions and workovers before finalizing this draft **or** exclude them from the inventory until more robust data and methodologies have been developed and subjected to public comment. The updates proposed herein are straightforward to implement and supported by the credible body of work already published. At an absolute minimum, EPA should include a statement at the beginning of Chapter 3 of the inventory, and in a footnote to every table and figure that includes emissions from Natural Gas Systems, to the effect:

The Agency is in the process of revising its methodologies. Until such time as the methodologies have been revised and implemented and new emissions estimates are available, the emissions estimates presented herein should not be relied upon or otherwise used as the basis for any analysis or regulatory action.

If you have any questions, please contact Erica Bowman at ebowman@anga.us or Amy Farrell at afarrell@anga.us or (202) 789-2642.

Sincerely,

Erica Bowman
Vice President and Chief Economist
America's Natural Gas Alliance

Amy Farrell
Vice President, Regulatory Affairs
America's Natural Gas Alliance

Weitz, Melissa

From: Marty Wolf [Marty.Wolf@erg.com]
Sent: Tuesday, March 26, 2013 11:12 AM
To: Weitz, Melissa
Subject: Reductions and Net
Attachments: reductions_and_net_032613[redacted]

Melissa,

Here are the reductions and net emissions - corresponding to Table A-129 and Table A-135 in the Annex.

I will be starting modifications to all tables. Changes will mainly be for these two tables, but the bottom line summary emissions for some of the other tables will also change a bit. Due to the revised GasSTAR data, the amount of voluntary reductions did change a little bit. Previously, we thought that the quantity of reductions would be constant and that we would only be disaggregating specific sources. However, the overall quantity has also shifted.

I'm sure that we'll be talking later today.

Marty

Martinus (Marty) E. Wolf
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916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

Weitz, Melissa

From: Weitz, Melissa
Sent: Tuesday, March 26, 2013 2:44 PM
To: Hockstad, Leif
Subject: FW: public review comment information for our meeting today

FYI

From: Weitz, Melissa
Sent: Tuesday, March 26, 2013 2:43 PM
To: DeFigueiredo, Mark
Cc: Jacobson, David
Subject: public review comment information for our meeting today

Hello,

We received 6 sets of comments on the Inventory public review draft (API, AGA, CATF, ANGA, Pioneer, WEA). Most of the comments supported updates we made, though CATF has some concerns with the update to liquids unloading.

I've posted all of the comments to [redacted] (b)(6) personal privacy

Below are the comments related to GHGRP

- General requests to use GHGRP
  - In 2014 Inventory (API, AGA)
  - In 2013 Inventory (Pioneer, WEA)
- HF Completions and Workovers
  - Investigate discrepancies and use GHGRP to update Inventory (Pioneer, WEA)
  - Include more details on analysis in 2013 inventory (API)
  - GHGRP shows 2,244 mscf for completions, 962 mscf for workovers, versus Inventory average 3,841 mscf (API)
  - GHGRP shows refrac rate of 0.4% (ANGA)
- Liquids Unloading
  - GHGRP data will overstate emissions (Pioneer)
    - Method assumes full wellbore volume of gas is vented, and an hour of venting with full production volume, inconsistent with industry practice
  - Large use of BAMM (~1/4 of LU-reporting facilities) should be evaluated when considering incorporating GHGRP into inventory (API)
  - San Juan Basin outlier indicative of need to further investigate GHGRP data (API)
  - Analyze whether there is a distinction between measured and calculated LU emissions in GHGRP (CATF)
  - Examine whether CBM wells have significantly different LU emissions, based on GHGRP (CATF)
- Associated Gas Venting and Flaring
  - Add this category to Inventory so GHGRP data can be compared (API)

Below are some potential actions to address comments, using GHGRP data, between this year's and next year's inventory

- (b)(5) deliberative
  - [redacted]
  - [redacted]

- (b)(5) deliberative
  - [redacted]
  - [redacted]
- [redacted]
  - [redacted]
- [redacted]
  - [redacted]

Weitz, Melissa

From: Weitz, Melissa
Sent: Tuesday, March 26, 2013 2:48 PM
To: Hockstad, Leif
Subject: public review comments
Attachments: public review draft oil and gas comments (b)(5) delibera[redacted]

Below are some slides on the public review comments. Not that we necessarily have a need for slides on public review comments, it was just the easiest way for me to organize my thoughts.

Weitz, Melissa

From: Marty Wolf [Marty.Wolf@erg.com]
Sent: Wednesday, March 27, 2013 11:10 AM
To: Weitz, Melissa
Subject: Public Review Comments - API and Pioneer
Attachments: public_comment_responses_032713_erg[redacted]

Melissa,

Here is what I have for API and Pioneer. Please look over these closely. Pioneer's comments in particular get fairly technical and in some cases are in response to material that EPA (and not ERG) added to the text. We may need to have EPA respond to these.

While I am waiting to hear back from you, I will move forward with the summary of the other 4 commentors.

Marty

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marty.wolf@erg.com

Weitz, Melissa

From: Marty Wolf [Marty.Wolf@erg.com]
Sent: Wednesday, March 27, 2013 4:52 PM
To: Weitz, Melissa
Subject: Revised Response to Comments
Attachments: public_comment_responses_032713_erg_ver2[redacted]

Melissa,

Here is where we stand.

We have addressed all of the API and Pioneer comments with the exception of: 2 Petroleum Systems comments (should be answered Thursday AM - our petroleum systems expert was out in the field today) and 1 API comment (dependent upon EPA's internal decision regarding the revision to reductions). Completed responses in yellow; outstanding responses in red.

I have summarized the comments for the other 5 commenters under separate tabs.

I have revised versions of Natural Gas Systems and Petroleum Systems report and annex files (4 files total). I can pass these on to you later, but I think we need to know about the revision to the reductions.

I will be in-and-out a bit tomorrow. [redacted] I'll be working from home before then and I'll be coming into the office afterwards.

Marty

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Weitz, Melissa

From: Marty Wolf [Marty.Wolf@erg.com]
Sent: Wednesday, March 27, 2013 5:11 PM
To: Weitz, Melissa
Subject: RE: Revised Response to Comments
Attachments: Natural Gas Systems_032713_erg[redacted]; Petroleum Systems_032713_erg[redacted] Methodology for Estimating CH4 and CO2 Emissions from Natural Gas System_032713 _erg[redacted]; Methodology for Estimating CH4 and CO2 Emissions from Petroleum Systems_ 032713_erg.[redacted]

OK - here is what we have right now.

You might want to look at our long responses to API's well count and completion comments - we did not add any of that to the text. As you said, it seemed pretty clear, but maybe a piece or two out of our response might help.

Does it look good that we will have the revised reductions OKed?

Does that put the final timetable to COB Friday?

Marty

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10860 Gold Center Drive, Suite 275
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916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 3/27/2013 2:05 PM >>>

Sounds good Marty! Can you pass your version of the text to me now so I can start (and maybe finish) making my edits to the text tomorrow? I'll have a final okay on the numbers tomorrow afternoon hopefully, and I'll send the text back to you before I leave for the day tomorrow.

(b)(6) personal privacy

Melissa

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Wednesday, March 27, 2013 4:52 PM
To: Weitz, Melissa
Subject: Revised Response to Comments

Melissa,

Here is where we stand.

We have addressed all of the API and Pioneer comments with the exception of: 2 Petroleum Systems comments (should be answered Thursday AM - our petroleum systems expert was out in the field today) and 1 API comment (dependent upon EPA's internal decision regarding the revision to reductions). Completed responses in yellow; outstanding responses in red.

I have summarized the comments for the other 5 commenters under separate tabs.

I have revised versions of Natural Gas Systems and Petroleum Systems report and annex files (4 files total). I can pass these on to you later, but I think we need to know about the revision to the reductions.

I will be in-and-out a bit tomorrow. [redacted] (b)(6) personal privacy [redacted] I'll be working from home before then and I'll be coming into the office afterwards.

Marty

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916-859-0185 (fax)
marty.wolf@erg.com

Weitz, Melissa

From: DeLuca, Isabel
Sent: Wednesday, March 27, 2013 5:18 PM
To: Hockstad, Leif; Weitz, Melissa
Cc: Irving, Bill
Subject: comms materials for the Inventory release
Attachments: Draft PR 2013 Inventory 3-27-13 [redacted]; GHG Inventory Rollout Plan 3.26.13 [redacted]; Internal Q&As Draft GHG Inventory 2.15.13 - clean [redacted]; Q-A_2013 EPA GHG Inventory-DRAFT [redacted]

Hi all,
We need to submit our communications materials for the final Inventory up the chain (formally) early next week. Attached are a draft press release and communications plan, as well as the Q&As developed for the release of the draft inventory. Could you please review these for updates (and specifically check all the #s and fix/update where needed). Are there any additional materials that you are considering developing for the release?

As you might recall, the press office was very interested in [redacted] (b)(5) deliberative [redacted] They may come back with similar questions this time, but I though I'd start with our usual template.

Thanks for reviewing,
Isabel

Isabel DeLuca
Climate Change Division
U.S. EPA
tel: (202) 343-9247

Weitz, Melissa

From: Weitz, Melissa
Sent: Thursday, March 28, 2013 6:05 PM
To: Marty Wolf
Cc: Paula Fields
Subject: inventory text
Attachments: Natural Gas Systems_032713_erg MW[redacted] Methodology for Estimating CH4 and CO2 Emissions from Natural Gas System_032713_erg MW[redacted]

These are the two files I edited today—

Weitz, Melissa

From: Weitz, Melissa
Sent: Friday, March 29, 2013 2:40 PM
To: Hockstad, Leif
Subject: inventory slides
Attachments: Slides on Final Inventory (b)(5) deliber[redacted]

Weitz, Melissa

From: Marty Wolf [Marty.Wolf@erg.com]
Sent: Friday, March 29, 2013 3:20 PM
To: Weitz, Melissa
Subject: Natural Gas Systems Files
Attachments: Natural Gas Systems_032913_erg[redacted]; NaturalGasSystems_1990-2011_032913[redacted]; Methodology for Estimating CH4 and CO2 Emissions from Natural Gas System_032913 _erg[redacted]

Melissa,

Here are the two Word files and then the spreadsheet.

I looked into the uncertainty issue a bit and I really can't add anything - if we need to we can talk when you get back on Tuesday.

Marty

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marty.wolf@erg.com

Weitz, Melissa

From: Hockstad, Leif
Sent: Friday, March 29, 2013 3:23 PM
To: Weitz, Melissa
Subject: RE: inventory slides
Attachments: Slides on Final Inventory_lh[redacted]

See if this looks OK.

From: Weitz, Melissa
Sent: Friday, March 29, 2013 2:40 PM
To: Hockstad, Leif
Subject: inventory slides

Weitz, Melissa

From: Paula Fields [Paula.Fields@erg.com]
Sent: Friday, March 29, 2013 3:24 PM
To: Weitz, Melissa; Marty Wolf
Subject: RE: How are things?
Attachments: Petroleum Systems_28Mar13 (b)(5) delibera

Melissa -
I sent pet systems yesterday, but here it is again. Robbie will send the revised text file later today.

Tx,
Paula

>>> Marty Wolf 03/29/13 12:03 PM >>>
Melissa,

I will send natural gas spreadsheets and text shortly. Paula will need to send over the petroleum stuff.

Marty

>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 3/29/2013 12:01 PM >>>
Hi,

I just realized that I don't have the final spreadsheets for natural gas and petroleum. Can you send them to me so I can send them on to Leif today?

Thanks!
Melissa

From: Weitz, Melissa
Sent: Thursday, March 28, 2013 9:56 AM
To: 'Marty Wolf'
Cc: Paula Fields
Subject: RE: How are things?

Yes. The numbers are already done and we need them by Friday so I'll just give Leif whichever spreadsheet (with updated reductions or without) we've decided on.

My plan is the finish my edits to the text today and then send it over to you all for review. We can wait to input the new numbers until next Tuesday so we don't need to undo it later.

I think this is consistent with the schedule we discussed over the phone, but I can't find it in my notes, so let me know if it's not.

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Thursday, March 28, 2013 9:50 AM
To: Weitz, Melissa
Cc: Paula Fields
Subject: RE: How are things?

OK - sounds good.

Are we still trying to have everything wrapped up by COB Friday? Are we still on schedule?

Thanks,
Marty

>>> "Weitz, Melissa" 03/28/13 5:38 ?? >>>
Hi?

Nothing is new at this point. I?m meeting with some others about the comments later this a.m. and then I?ll give you an update when I send you back all of the text tonight before I leave the office.

Melissa

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Thursday, March 28, 2013 9:36 AM
To: Weitz, Melissa
Cc: Paula Fields
Subject: How are things?

Melissa,

I wanted to check in with you this morning about how things are going.

At this point, everything is in your hands (with the exception of our two comment responses for petroleum systems).

Please let me know when/if the reduction revisions are approved. I will need the latest Natural Gas Systems text and annex, so I can drop the latest numbers in.

I will be working at home this morning until noon Eastern and then in the office around 2:30 or 3 pm Eastern. Sorry about the unavailability in the middle of the day, but [redacted]

Marty

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10860 Gold Center Drive, Suite 275
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916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

Weitz, Melissa

From: Paula Fields [Paula.Fields@erg.com]
Sent: Friday, March 29, 2013 3:30 PM
To: Weitz, Melissa; Marty Wolf
Subject: RE: How are things?
Attachments: PetroleumSystems1990-2011_28Mar13[redacted]

Attached!

>>> "Weitz, Melissa" 03/29/13 12:27 PM >>>
We just need the numbers today. Can you send me the spreadsheet so I am sure that we're using the most recent?

Thanks!

From: Paula Fields [mailto:Paula.Fields@erg.com]
Sent: Friday, March 29, 2013 3:24 PM
To: Weitz, Melissa; Marty Wolf
Subject: RE: How are things?

Melissa -
I sent pet systems yesterday, but here it is again. Robbie will send the revised text file later today.

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Paula

>>> Marty Wolf 03/29/13 12:03 PM >>>
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From: Weitz, Melissa
Sent: Thursday, March 28, 2013 9:56 AM
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I think this is consistent with the schedule we discussed over the phone, but I can't find it in my notes, so let me know if it's not.

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Thursday, March 28, 2013 9:50 AM
To: Weitz, Melissa
Cc: Paula Fields
Subject: RE: How are things?

OK - sounds good.

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>>> "Weitz, Melissa" 03/28/13 5:38 ?? >>>
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Melissa

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Sent: Thursday, March 28, 2013 9:36 AM
To: Weitz, Melissa
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Marty

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916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

Weitz, Melissa

From: Weitz, Melissa
Sent: Friday, March 29, 2013 3:45 PM
To: Hockstad, Leif
Subject: Petroleum systems numbers
Attachments: PetroleumSystems1990-2011_28Mar13 [redacted]

Weitz, Melissa

From: Weitz, Melissa
Sent: Friday, March 29, 2013 4:30 PM
To: Hockstad, Leif
Subject: natural gas spreadsheet
Attachments: NaturalGasSystems_1990-2011_032913[redacted]

Weitz, Melissa

From: Weitz, Melissa
Sent: Friday, March 29, 2013 5:53 PM
To: Irving, Bill
Cc: Hockstad, Leif
Subject: inventory slides for Paul's review on Monday
Attachments: Slides on Final Inventory 3.29[redacted]

Hi Bill,

Attached are the slides on the Inventory (for the Wednesday Sarah briefing) for you to share with Paul on Monday.

Melissa

Weitz, Melissa

From: Weitz, Melissa
Sent: Tuesday, April 02, 2013 11:56 AM
To: Kocchi, Suzanne
Subject: RE: draft Inventory comms materials
Attachments: Internal QAs Draft GHG Inventory 2 15 13 - clean (3) MW. (b)(5) deliberative [redacted]

Hi Suzie,

[redacted] (b)(5) deliberative [redacted]. I updated the number in the attachment.

Melissa

From: Kocchi, Suzanne
Sent: Tuesday, April 02, 2013 11:11 AM
To: Weitz, Melissa
Subject: FW: draft Inventory comms materials
Importance: High

Can you look at the comment OAR comms put in about [redacted] (b)(5) deliberative [redacted]?

From: Dennis, Allison
Sent: Tuesday, April 02, 2013 11:05 AM
To: Kocchi, Suzanne
Subject: FW: draft Inventory comms materials

Two more q's (I'm sorry)...Did we get any major comments during this year's 30 day public review period? Also, I had one question on the internal Q&As pg 1 (see attached).

From: Dennis, Allison
Sent: Tuesday, April 02, 2013 10:34 AM
To: Kocchi, Suzanne
Subject: FW: draft Inventory comms materials

Hi Suzi,

One more q for you on the roll out plan. Isabel added a note in track changes on pg 1 that said: Numbers are still being confirmed.

Are they still being confirmed? If not, I'll remove that note to avoid confusion with OPA.

From: DeLuca, Isabel
Sent: Wednesday, March 27, 2013 5:23 PM
To: Dennis, Allison
Subject: draft Inventory comms materials

Hi Allison,

Attached for your initial review are the draft comms materials for the Inventory release April 15. The Inventory folks are checking the #s, so some things may change, but the general story will stay the same.

I haven't tried to anticipate all the potential questions from the press office on the press release, but have stuck to our usual template and thought we could pick it up afresh. ☺

Thanks,
Isabel

Isabel DeLuca
Climate Change Division
U.S. EPA
tel: (202) 343-9247

Weitz, Melissa

From: Kocchi, Suzanne
Sent: Tuesday, April 02, 2013 11:57 AM
To: Dennis, Allison
Cc: Weitz, Melissa; Irving, Bill; Hockstad, Leif
Subject: FW: draft Inventory comms materials
Attachments: Internal QAs Draft GHG Inventory 2 15 13 - clean (3) MW.[redacted] (b)(5) deliberative

Allison, please see below. The number you flagged did not change but we caught an error and made a change to a different number related to oil and gas.

From: Weitz, Melissa
Sent: Tuesday, April 02, 2013 11:56 AM
To: Kocchi, Suzanne
Subject: RE: draft Inventory comms materials

Hi Suzie,

[redacted] (b)(5) deliberative [redacted]. I updated the number in the attachment.

Melissa

From: Kocchi, Suzanne
Sent: Tuesday, April 02, 2013 11:11 AM
To: Weitz, Melissa
Subject: FW: draft Inventory comms materials
Importance: High

Can you look at the comment OAR comms put in [redacted] (b)(5) deliberative [redacted]?

From: Dennis, Allison
Sent: Tuesday, April 02, 2013 11:05 AM
To: Kocchi, Suzanne
Subject: FW: draft Inventory comms materials

Two more q's (I'm sorry)...Did we get any major comments during this year's 30 day public review period? Also, I had one question on the internal Q&As pg 1 (see attached).

From: Dennis, Allison
Sent: Tuesday, April 02, 2013 10:34 AM
To: Kocchi, Suzanne
Subject: FW: draft Inventory comms materials

Hi Suzi,

One more q for you on the roll out plan. Isabel added a note in track changes on pg 1 that said: Numbers are still being confirmed.

Are they still being confirmed? If not, I'll remove that note to avoid confusion with OPA.

From: DeLuca, Isabel
Sent: Wednesday, March 27, 2013 5:23 PM
To: Dennis, Allison
Subject: draft Inventory comms materials

Hi Allison,
Attached for your initial review are the draft comms materials for the Inventory release April 15. The Inventory folks are checking the #s, so some things may change, but the general story will stay the same.

I haven't tried to anticipate all the potential questions from the press office on the press release, but have stuck to our usual template and thought we could pick it up afresh. ☺

Thanks,
Isabel

Isabel DeLuca
Climate Change Division
U.S. EPA
tel: (202) 343-9247

Weitz, Melissa

From: Weitz, Melissa
Sent: Tuesday, April 02, 2013 4:34 PM
To: Paula Fields
Subject: FW: response to Pioneer comments about pet systems/pneumatic chemical injection pumps
Attachments: Methodology for Estimating CH4and CO2 Emissions from Petro_29Mar13[redacted]; Petroleum Systems_29Mar13[redacted]

Hi Paula,

Can you please review the text added to the main body of the petroleum systems text, and relocate it to the annex? I think it might make sense to add it as a footnote to one of the tables but I'm not sure exactly where. It just looks a bit strange on the first page of the main inventory text. Also, we'll need to add a reference to the reference section for the Dresser contact that was added to the text.

Thanks!

Melissa

From: Robert Pickering [mailto:Robert.Pickering@erg.com]
Sent: Friday, March 29, 2013 6:39 PM
To: Weitz, Melissa; Paula Fields
Cc: Marty Wolf
Subject: RE: response to Pioneer comments about pet systems/pneumatic chemical injection pumps

Melissa,

Attached is the updated petroleum systems text and associated methodology sections. Minor updates to the references were made to the methodology section. For the petroleum systems text, I included the more detailed information we had dug up based on Pioneer's comments. I included it in track changes so you are aware what changed. Let me know if there is anything else you'd like me to update.

Have a good weekend.

Robbie

Environmental Engineer, E.I.T.
Eastern Research Group, Inc.
14555 Avion Parkway, Suite 200
Chantilly, VA 20151
703-633-1653
>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 3/28/2013 5:23 PM >>>

Yes, please add the info—thanks! I haven't made any edits to the petroleum systems text, so you can use the version that Marty sent yesterday.

(b)(5) deliberative

Does this make sense/sound okay?

Melissa

From: Paula Fields [mailto:Paula.Fields@erg.com]
Sent: Thursday, March 28, 2013 5:04 PM
To: Weitz, Melissa
Cc: Marty Wolf; Robert Pickering
Subject: response to Pioneer comments about pet systems/pneumatic chemical injection pumps

Hi Melissa -
Here are our response to comments from Pioneer on the pneumatic chemical injection pumps used in the petroleum systems inventory. These refer to the 2 comments on page 4 of the Pioneer letter.

(b)(5) deliberative

Let us know if you have additional questions. Also, let us know if you'd like us to (b)(5) deliberative

-Paula

Paula G. Fields Simms
Principal Air Quality Engineer
ERG
10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593

Cell phone: 916-835-0341
Fax: 916-859-0185

Weitz, Melissa

From: Weitz, Melissa
Sent: Tuesday, April 02, 2013 5:55 PM
To: Waltzer, Suzanne; DeFigueiredo, Mark; Jacobson, David
Subject: review of inventory text
Attachments: Natural Gas Systems_4.2 clear[redacted]; Methodology for Estimating CH4 and CO2 Emissions from Natural Gas System_032913_erg[redacted]

Hello,

Attached below is the updated inventory main body text and annex for natural gas systems. Please note that the numbers in the report have not yet been updated.

I've highlighted in yellow all of the text that changed. It's not a lot.

In the main text, see pages 7-12.

In the annex, see pages 1-3, 14-16, and 24-25.

Changes specific to GHGRP can be found on pages 7, 8, 11, and 12 of the main text.

Sorry for getting this over to you later than expected.

If it'd be possible to get any edits by tomorrow COB, that'd be great.

Melissa

Weitz, Melissa

From: Paula Fields [Paula.Fields@erg.com]
Sent: Tuesday, April 02, 2013 5:53 PM
To: Weitz, Melissa
Cc: Robert Pickering
Subject: Re: Fwd: FW: response to Pioneer comments about pet systems/pneumatic chemical injection pumps
Attachments: PetroleumSystems1990-2011_2Apr13[redacted]; Petroleum Systems_2Apr13[redacted]; Methodology for Estimating CH4and CO2 Emissions from Petro_2Apr13[redacted]

Hi Melissa. Robbie's changes are attached. I think it may be too late to change the spreadsheet; if so, just ignore it.

Let us know if you have more questions.

Paula

>>>

From: Robert Pickering
To: Fields, Paula
Date: 4/2/2013 2:50 PM
Subject: Re: Fwd: FW: response to Pioneer comments about pet systems/pneumatic chemical injection pumps

Here you go. I didn't track my changes, but they are as follows:

(b)(5) deliberative

Let me know if there is anything else.

Robbie
>>> Paula Fields 04/02/13 4:40 PM >>>
Robbie -
Can you please make the changes Melissa asks for below...today? Please let me know if you can, or cannot.

Thanks,
Paula

>>>

From: "Weitz, Melissa"
To:Paula Fields
Date: 4/2/2013 1:34 PM
Subject: FW: response to Pioneer comments about pet systems/pneumatic chemical injection pumps

Hi Paula,
Can you please review the text added to the main body of the petroleum systems text, and relocate it to the annex? I think [redacted]

(b)(5) deliberative

(b)(5) deliberative

(b)(5) deliberative

Thanks!
Melissa

From: Robert Pickering [mailto:Robert.Pickering@erg.com]
Sent: Friday, March 29, 2013 6:39 PM
To: Weitz, Melissa; Paula Fields
Cc: Marty Wolf
Subject: RE: response to Pioneer comments about pet systems/pneumatic chemical injection pumps

Melissa,

Attached is the updated petroleum systems text and associated methodology sections. Minor updates to the references were made to the methodology section. For the petroleum systems text, I included the more detailed information we had dug up based on Pioneer's comments. I included it in track changes so you are aware what changed. Let me know if there is anything else you'd like me to update.

Have a good weekend.

Robbie

Environmental Engineer, E.I.T.

Eastern Research Group, Inc.

14555 Avion Parkway, Suite 200

Chantilly, VA 20151

703-633-1653

>>> "Weitz, Melissa" 3/28/2013 5:23 PM >>>

Yes, please add the info—thanks! I haven't made any edits to the petroleum systems text, so you can use the version that Marty sent yesterday.

(b)(5) deliberative

(b)(5) deliberative

Does this

make sense/sound okay?
Melissa

From: Paula Fields [mailto:Paula.Fields@erg.com]
Sent: Thursday, March 28, 2013 5:04 PM
To: Weitz, Melissa
Cc: Marty Wolf; Robert Pickering
Subject: response to Pioneer comments about pet systems/pneumatic chemical injection pumps

Hi Melissa -

Here are our response to comments from Pioneer on the pneumatic chemical injection pumps used in the petroleum systems inventory. These refer to the 2 comments on page 4 of the Pioneer letter.

(b)(5) deliberative

[redacted]

Let us know if you have additional questions. Also, let us know if you'd like (b)(5) deliberative
(b)(5) deliberative

-Paula

Paula G. Fields Simms
Principal Air Quality Engineer
ERG

10860 Gold Center Dr., #275
Rancho Cordova, CA 95670
Office phone: 916-635-6593
Cell phone: 916-835-0341
Fax: 916-859-0185

Weitz, Melissa

From: Hockstad, Leif
Sent: Wednesday, April 03, 2013 10:44 AM
To: DeLuca, Isabel
Cc: Weitz, Melissa
Subject: RE: draft Inventory comms materials
Attachments: Draft PR 2013 Inventory 4-3-13[redacted] Internal QAs Draft GHG Inventory 2 15 13 - clean (3) MW[redacted]; GHG Inventory Rollout Plan 4-3-13[redacted]; Q-A_2013 EPA GHG Inventory-DRAFT 4-3-13[redacted]

Isabel –

Here are the revised communication materials, which now include the final numbers as they will appear in the report that we send to the UNFCCC in a week+.

I've edited the text to reflect some of the changes in the final report, but there was one piece I highlighted in the "rollout plan" document. [redacted] (b)(5) deliberative [redacted].

I'm in the middle of a bunch of work for the final report, so Melissa has volunteered to help me help you. She knows what's going on with the final Inventory, so please check in with her if there is something else you need, or if there are any OPA questions that come in today.

Thanks,
Leif

From: Kocchi, Suzanne
Sent: Tuesday, April 02, 2013 11:59 AM
To: Dennis, Allison
Cc: Hockstad, Leif; Irving, Bill; Weitz, Melissa
Subject: RE: draft Inventory comms materials

Allison – Here is where it stands on the numbers. Melissa made an update to hydraulic fracturing which you saw in an email we just sent on the Q&A. Here is the note from Leif:

We are QA/QC on the final numbers, so I should have them later today to update things. Basic drivers remain true, however.

-Leif

From: Dennis, Allison
Sent: Tuesday, April 02, 2013 11:40 AM
To: Kocchi, Suzanne
Cc: Hockstad, Leif; Irving, Bill
Subject: RE: draft Inventory comms materials

Ok I will send roll out plan along but let me know if all of the numbers referenced in the roll out plan and 2 Q&A docs are final.

And, thanks for letting me know about the comments rec'd during the review period.

From: Kocchi, Suzanne
Sent: Tuesday, April 02, 2013 11:10 AM
To: Dennis, Allison
Cc: Hockstad, Leif; Irving, Bill
Subject: RE: draft Inventory comms materials
Importance: High

Adding Bill and Leif to answer your questions.

My quick answer based on my understanding is nothing too major or even really substantive on comments – there were less than 20 total, I think. The area of most interest is natural gas systems and we have responses and plenty of q&A on those.

I believe they have locked down the numbers now (as of last week) but Leif/Bill would need to confirm. I think it is safe to remove the note.

From: Dennis, Allison
Sent: Tuesday, April 02, 2013 11:05 AM
To: Kocchi, Suzanne
Subject: FW: draft Inventory comms materials

Two more q's (I'm sorry)...Did we get any major comments during this year's 30 day public review period? Also, I had one question on the internal Q&As pg 1 (see attached).

From: Dennis, Allison
Sent: Tuesday, April 02, 2013 10:34 AM
To: Kocchi, Suzanne
Subject: FW: draft Inventory comms materials

Hi Suzi,

One more q for you on the roll out plan. Isabel added a note in track changes on pg 1 that said: Numbers are still being confirmed.

Are they still being confirmed? If not, I'll remove that note to avoid confusion with OPA.

From: DeLuca, Isabel
Sent: Wednesday, March 27, 2013 5:23 PM
To: Dennis, Allison
Subject: draft Inventory comms materials

Hi Allison,
Attached for your initial review are the draft comms materials for the Inventory release April 15. The Inventory folks are checking the #s, so some things may change, but the general story will stay the same.

I haven't tried to anticipate all the potential questions from the press office on the press release, but have stuck to our usual template and thought we could pick it up afresh. ☺

Thanks,
Isabel

Isabel DeLuca
Climate Change Division
U.S. EPA
tel: (202) 343-9247

Weitz, Melissa

From: Weitz, Melissa
Sent: Wednesday, April 03, 2013 1:52 PM
To: Marty Wolf
Subject: updating #s in text
Attachments: Natural Gas Systems_4.2 clear[redacted] Methodology for Estimating CH4 and CO2 Emissions from Natural Gas System_032913_erg[redacted]

Hi Marty,

I have not finished receiving comments from others around here, but, we can now go ahead and update the numbers in the text and annex.

I'll need these by early Friday afternoon so that I can then make any final edits.

Does that work for you?

Melissa

Weitz, Melissa

From: Jacobson, David
Sent: Wednesday, April 03, 2013 4:01 PM
To: Weitz, Melissa
Subject: Accepted: Call with API on API inventory comments

Weitz, Melissa

From: DeFigueiredo, Mark
Sent: Wednesday, April 03, 2013 4:16 PM
To: Weitz, Melissa
Subject: Accepted: Call with API on API inventory comments

Weitz, Melissa

From: Marty Wolf [Marty.Wolf@erg.com]
Sent: Wednesday, April 03, 2013 4:31 PM
To: Weitz, Melissa
Subject: RE: updating #s in text

It might be - but I'll go check.

Marty

>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 4/3/2013 1:25 PM >>>
Ah okay—update that also then, please. I thought it was already updated.

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Wednesday, April 03, 2013 4:16 PM
To: Weitz, Melissa
Subject: RE: updating #s in text

I was just checking because the reference section was still marked.

Marty

>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 4/3/2013 1:07 PM >>>
Well, you should update the numbers in the uncertainty analysis table to the final inventory numbers and then apply the uncertainty range to that. I'm getting some more information to add to the uncertainty analysis write up and I'll update it on Friday.

Did any of the references change?

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Wednesday, April 03, 2013 4:04 PM
To: Weitz, Melissa
Subject: RE: updating #s in text

You only need the numbers changed, correct?

So I do not need to look at the uncertainty analysis or references.

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 4/3/2013 12:55 PM >>>
Hi Marty,

I may not have a chance to call today. What is the concern?

Melissa

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Wednesday, April 03, 2013 3:50 PM
To: Weitz, Melissa
Subject: Re: updating #s in text

Melissa,

Please call to discuss.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 4/3/2013 10:51 AM >>>
Hi Marty,

I have not finished receiving comments from others around here, but, we can now go ahead and update the numbers in the text and annex.

I'll need these by early Friday afternoon so that I can then make any final edits.

Does that work for you?

Melissa

Weitz, Melissa

From: Waltzer, Suzanne
Sent: Thursday, April 04, 2013 4:14 PM
To: Weitz, Melissa
Subject: Accepted: check in on inventory comments/responses

Weitz, Melissa

From: Marty Wolf [Marty.Wolf@erg.com]
Sent: Thursday, April 04, 2013 4:38 PM
To: Weitz, Melissa
Subject: Revised Text and Annex
Attachments: Methodology for Estimating CH4 and CO2 Emissions from Natural Gas System_040413 _erg[redacted], Natural Gas Systems_4.2_040413_erg[redacted] NaturalGasSystems_1990-2011_ 040413[redacted]

Melissa,

Here is the revised text and annex.

The version of the text that you sent me had the old references in it for some reason. I cut those and added what we had from the Public Review draft. There might still be a reference or two that you'll need to add - I think Petron was one that I spotted.

Let me know if you need any last minute help tomorrow (or Monday?).

I also am sending the latest version of the inventory spreadsheet. Nothing changed except the labeling of some of the table tabs. Also the file name matches the revised text and annex file names.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

Weitz, Melissa

From: DeFigueiredo, Mark
Sent: Thursday, April 04, 2013 6:03 PM
To: Weitz, Melissa; Waltzer, Suzanne; Jacobson, David
Subject: RE: review of inventory text
Attachments: Natural Gas Systems_4 2 cleandocx - md[redacted]

Here are comments on GHGRP from David and me. Sorry for the delay. I think [redacted] (b)(5) deliberative [redacted], correct? We made changes to both of those numbers, as well as an editorial comment to define the "BAMM" acronym. Thanks!

From: Weitz, Melissa
Sent: Tuesday, April 02, 2013 5:55 PM
To: Waltzer, Suzanne; DeFigueiredo, Mark; Jacobson, David
Subject: review of inventory text

Hello,

Attached below is the updated inventory main body text and annex for natural gas systems. Please note that the numbers in the report have not yet been updated.

I've highlighted in yellow all of the text that changed. It's not a lot.

In the main text, see pages 7-12.

In the annex, see pages 1-3, 14-16, and 24-25.

Changes specific to GHGRP can be found on pages 7, 8, 11, and 12 of the main text.

Sorry for getting this over to you later than expected.

If it'd be possible to get any edits by tomorrow COB, that'd be great.

Melissa

Weitz, Melissa

From: Weitz, Melissa
Sent: Friday, April 05, 2013 10:06 AM
To: Irving, Bill
Subject: RE: timing of your review of GHG Inventory text on natural gas
Attachments: Natural Gas Systems_4.5.[redacted]

Hi Bill,

The text on Natural gas is attached. The areas with updates are highlighted in yellow.

Melissa

From: Irving, Bill
Sent: Thursday, April 04, 2013 1:38 PM
To: Weitz, Melissa
Subject: RE: timing of your review of GHG Inventory text on natural gas

I can review tomorrow.

From: Weitz, Melissa
Sent: Thursday, April 04, 2013 1:33 PM
To: Irving, Bill
Subject: timing of your review of GHG Inventory text on natural gas

Hi Bill,

I've updated the inventory text on natural gas. Mark and Suzie are reviewing it and getting me comments by COB today.

If I send you the updated text tomorrow a.m., will you be able to review it tomorrow? If not, can I send you the version I have today for your review? I'm trying to have it finalized by tomorrow COB, though we can definitely sneak in some edits after we send it to ICF if we need to.

I will highlight the areas of the text with changes. It will not be a lot of text to review ~ 1 page total, likely.

Melissa

Weitz, Melissa

From: Weitz, Melissa
Sent: Friday, April 05, 2013 11:51 AM
To: Waltzer, Suzanne
Subject: review of GHG Inventory text on natural gas
Attachments: Natural Gas Systems_4.5[redacted]

HI Suzie,

Will you be able to review the natural gas systems text? The latest is attached. If you have comments on an earlier version, I can incorporate them.

Thanks!
Melissa

Weitz, Melissa

From: Irving, Bill
Sent: Friday, April 05, 2013 12:30 PM
To: Weitz, Melissa
Subject: RE: timing of your review of GHG Inventory text on natural gas
Attachments: Natural Gas Systems_4 5 (BI) (b)(5) delibera[redacted]

Here you go.

From: Weitz, Melissa
Sent: Friday, April 05, 2013 10:06 AM
To: Irving, Bill
Subject: RE: timing of your review of GHG Inventory text on natural gas

Hi Bill,

The text on Natural gas is attached. The areas with updates are highlighted in yellow.

Melissa

From: Irving, Bill
Sent: Thursday, April 04, 2013 1:38 PM
To: Weitz, Melissa
Subject: RE: timing of your review of GHG Inventory text on natural gas

I can review tomorrow.

From: Weitz, Melissa
Sent: Thursday, April 04, 2013 1:33 PM
To: Irving, Bill
Subject: timing of your review of GHG Inventory text on natural gas

Hi Bill,

I've updated the inventory text on natural gas. Mark and Suzie are reviewing it and getting me comments by COB today.

If I send you the updated text tomorrow a.m., will you be able to review it tomorrow? If not, can I send you the version I have today for your review? I'm trying to have it finalized by tomorrow COB, though we can definitely sneak in some edits after we send it to ICF if we need to.

I will highlight the areas of the text with changes. It will not be a lot of text to review ~ 1 page total, likely.

Melissa

Weitz, Melissa

From: Hockstad, Leif
Sent: Friday, April 05, 2013 1:33 PM
To: Weitz, Melissa
Subject: Recalculations chapter
Attachments: PR DRAFT US-GHG-Inventory-BY2011-Recalculations.docx

Do you have any specific text that you think needs to make it in to the Recalculations chapter?

Here is the version we published for public review. Does the natural gas systems text seem all right for the final report?

****
Leif Hockstad
Climate Change Division
OAR - Office of Atmospheric Programs
U.S. Environmental Protection Agency
Phone: 202 343 9432
Fax: 202 343 2359
hockstad.leif@epa.gov
****

1. Recalculations and Improvements

Each year, emission and sink estimates are recalculated and revised for all years in the Inventory of U.S. Greenhouse Gas Emissions and Sinks, as attempts are made to improve both the analyses themselves, through the use of better methods or data, and the overall usefulness of the report. In this effort, the United States follows the 2006 IPCC Guidelines (IPCC 2006), which states, "Both methodological changes and refinements over time are an essential part of improving inventory quality. It is *good practice* to change or refine methods" when: available data have changed; the previously used method is not consistent with the IPCC guidelines for that category; a category has become key; the previously used method is insufficient to reflect mitigation activities in a transparent manner; the capacity for inventory preparation has increased; new inventory methods become available; and for correction of errors."

The results of all methodological changes and historical data updates are presented in this section; detailed descriptions of each recalculation are contained within each source's description found in this report, if applicable. Table 10-1 summarizes the quantitative effect of these changes on U.S. greenhouse gas emissions and sinks and Table 10-2 summarizes the quantitative effect on annual net CO_2 fluxes, both relative to the previously published U.S. Inventory (i.e., the 1990 through 2010 report). These tables present the magnitude of these changes in units of teragrams of carbon dioxide equivalent (Tg CO_2 Eq.).

The Recalculations Discussion section of each source's chapter presents the details of each recalculation. In general, when methodological changes have been implemented, the entire time series (i.e., 1990 through 2010) has been recalculated to reflect the change, per IPCC (2006). Changes in historical data are generally the result of changes in statistical data supplied by other agencies.

The following ten emission sources and sinks, which are listed in descending order of annual change in emissions or sequestration between 1990 and 2010, underwent some of the most significant methodological and historical data changes. A brief summary of the recalculations and/or improvements undertaken is provided for each of the ten sources.

- *Agricultural Soil Management (N_2O)*. Methodological recalculations in the current Inventory were associated with the following improvements: 1) incorporation of MODIS Enhanced Vegetation Index as to reduce uncertainties in the estimation of crop production and subsequent carbon input to the soil; 2) using the National Resources Inventory (NRI) as the basis for crop histories and land use change (USDA-NRCS 2009); 3) addition of specific tillage practices with statistics from Conservation Technology and Information Center (CTIC 2004); 4) extension of the N fertilizer activity data with new USDA statistics on fertilizer use through 2010 (USDA-ERS 2011); and 5) N_2O emissions from rice cultivation were estimated with the recommended emission factor from the IPCC (2006). These changes resulted in an increase in emissions of approximately 24 percent on average relative to the previous Inventory. The differences are partly due to the broader scope of the current Inventory that includes the influence of land use change on mineral N availability in soils, which is a key driver of nitrification and denitrification. Synthetic fertilizer rates are also higher for crops based on the USDA statistics. Other differences are still under investigation and will be finalized after public review. These changes resulted in an average annual increase in N_2O emissions from Agricultural Soil Management of 51.0 Tg CO_2 Eq. (24.2 percent) relative to the previous report.
- *Natural Gas Systems (CH_4)*. EPA received information and data related to the emission estimates through the Inventory preparation process, and the formal public notice and comment process of the proposed oil and gas NSPS for VOCs, and through a stakeholder workshop on the natural gas sector emission estimates. EPA carefully evaluated all relevant information provided, and has made updates to two key sources in the expert review draft: liquids unloading, and completions with hydraulic fracturing and refracturing. Additional updates were made to well counts (activity data), which impact multiple sources. EPA will continue to refine emission estimates to reflect the most robust data and information available. In particular, EPA is reviewing and will potentially incorporate data from the EPA's Greenhouse Gas Reporting Program, which will publish the first year of emissions data from the oil and gas sector in 2013. The recalculations to the current Inventory primarily impacted CH_4 emission estimates in the production sector, which decreased from 126.0 $TgCO_2e$ (for 2010) in the previous Inventory report to 57.6 $TgCO_2e$ (for 2010) in the current Inventory. The key reason for this change is the recalculation for liquids unloading, which decreased CH_4 emissions from 85.6 $TgCO_2e$ (for 2010)

in the previous Inventory report to 5.4 $TgCO_2e$ (for 2010) in the current Inventory. These changes resulted in an annual average decrease for CH_4 emissions from Natural Gas Systems of 41.3 Tg CO_2 Eq. (20.0 percent).

- *Settlements Remaining Settlements (C Sink).* The 1990 to 2010 net C flux estimates were recalculated based on three changes in activity data; (1) 2010 U.S. Census data were released in March 2012, along with updated definitions of urban area and urban cluster, resulting in revisions to the annual urban area estimated for 1990 to 2010; (2) a revised average urban tree canopy cover (35.0 percent) was published by Nowak and Greenfield (2012); and (3) C sequestration data was available for 28 rather than 14 cities from Nowak et al. (2013, in review). The combination of the methodological and historical data changes resulted in an average annual net sequestration decrease of 19.5 Tg CO_2 Eq. (24.5 percent) in urban trees compared to previous Inventory across the time-series.

- *International Bunker Fuels (N_2O & CO_2).* Changes to N_2O and CO_2 emission estimates for International Bunker Fuels resulted from revisions made to historical activity data for marine residual and distillate fuel oil consumption and a methodology change for collecting U.S. and Foreign Carrier Aviation Jet Fuel Consumption. These historical data changes resulted in an average annual increase of 0.2 Tg CO_2 Eq. (15.9 percent) in N_2O emissions, and an annual average increase of emissions15.8 Tg CO_2 Eq. (15.1 percent) in CO_2 emissions across the time-series relative to the previous Inventory.

- *Cropland Remaining Cropland – Mineral and Organic Soil Carbon Stock Changes (C Sink).* Methodological recalculations in the current Inventory were associated with the following improvements: 1) use of the DAYCENT biogeochemical model to estimate soil organic C stock changes for the Tier 3 method; 2) incorporation of MODIS Enhanced Vegetation Index as to reduce uncertainties in the estimation of crop production and subsequent carbon input to the soil; 3) incorporation of new activity data from the National Resources Inventory (NRI), extending the time series through 2007 (USDA-NRCS 2009); 4) recalculation of the Tier 2 portion of the inventory with the new NRI activity data; 5) extension of the tillage activity dataset with statistics from Conservation Technology and Information Center (CTIC 2004); and 6) extension of the N fertilizer activity data with new USDA statistics on fertilizer use through 2009 (USDA-ERS 2011). These changes resulted in an average annual net sequestration decrease of 3.6 Tg CO_2 Eq. (19.1 percent).

- *Petrochemical Production (CH_4).* CH_4 from Petroleum Production ranked as the largest average percent change in emissions estimates over the timeseries relative to the previous inventory. Emissions for all years were updated using emission factors published in the 2006 IPCC guidelines (IPCC 2006). Previous estimates used the 1996 IPCC guidelines (IPCC/UNEP/OECD/IEA 1997). A significant decrease in CH_4 emissions from carbon black production occurred because the emission factor in the 2006 IPCC guidelines is based on actual data from three European carbon black facilities. These facilities use thermal treatment to control CH_4 emissions, and the assumption of thermal treatment is recommended for North American facilities as well. The feedstock C content for carbon black was revised from 89 to 90 percent based on the values for carbon black feedstock listed in IPCC (2006) rather than the value used in the previous Inventory, which was an average of ten petrochemical feedstocks.

  The emission factor for ethylene production was revised upward from 1.0 g CH_4/kg of product to 6.0 g CH_4/kg of product based on the 2006 IPCC guidelines. This emission factor is based on test data from 15 European facilities and reflects the most current knowledge of this process. The emission factor for ethylene dichloride was revised in IPCC (2006) downward from 0.4 to 0.0226 g CH_4/ kg product to reflect the information that CH_4 emissions arise only from combustion of natural gas, not from the production process itself. The adjustments to emission factors for the petrochemical source category resulted in an annual average increase in estimated CH_4 emissions of 2.0 Tg CO_2 Eq. (184.8 percent) across the time series. The ethylene process is the primary driver of the increase.

- *Land Converted to Cropland (C Sink).* Methodological recalculations in the current Inventory were associated with the following improvements: 1) use of the DAYCENT biogeochemical model to estimate soil organic C stock changes for the Tier 3 method; 2) incorporation of new activity data from the National Resources Inventory (NRI), extending the time series through 2007 (USDA-NRCS 2009); 3) recalculation of the Tier 2 portion of the inventory with the new NRI activity data; 4) extension of the tillage activity dataset with statistics from Conservation Technology and Information Center (CTIC 2004); and 5) extension of the N fertilizer activity data with new USDA statistics on fertilizer use through 2009 (USDA-ERS 2009). These changes resulted in an average annual net sequestration decrease of 1.5 Tg CO_2 Eq. (23.4 percent).

- *Soda Ash Production and Consumption (CO_2).* In previous Inventories, emissions from soda ash included CO_2 from glass production. Emissions from glass production are now included in the Glass Production source category, and historical production estimates have been adjusted to remove the amount of soda ash associated with glass uses. This resulted in an average annual decrease in emissions of 1.3 Tg CO_2 Eq. (30.5 percent) across the time-series.

Table 10-1: Revisions to U.S. Greenhouse Gas Emissions (Tg CO_2 Eq.)

Gas/Source	1990	2005	2007	2008	2009	2010
CO_2	**(20.6)**	**(17.9)**	**4.9**	**11.4**	**14.4**	**4.7**
Fossil Fuel Combustion	(18.8)	(17.5)	4.8	9.9	13.3	(4.9)
Electricity Generation	NC	NC	NC	NC	NC	0.8
Transportation	(20.9)	(24.6)	5.7	8.8	11.6	3.2
Industrial	2.2	7.1	+	NC	(0.5)	(10.8)
Residential	NC	NC	NC	NC	NC	(3.5)
Commercial	NC	NC	NC	NC	NC	(2.5)
U.S. Territories	+	+	(0.9)	1.1	2.2	8.0
Non-Energy Use of Fuels	(2.2)	(1.4)	+	0.9	0.3	7.7
Natural Gas Systems	0.1	+	(0.2)	(0.2)	+	+
Cement Production	NC	NC	NC	NC	NC	0.4
Lime Production	+	(0.1)	+	+	(0.1)	+
Limestone and Dolomite Use	(0.2)	(0.4)	(0.3)	(0.4)	(0.1)	(0.5)
Glass Production	NC	NC	NC	NC	NC	NC
Soda Ash Production and Consumption	(1.3)	(1.3)	(1.2)	(1.1)	(1.0)	(1.0)
Carbon Dioxide Consumption	NC	NC	NC	NC	NC	NC
Incineration of Waste	+	+	+	+	+	+
Titanium Dioxide Production	NC	NC	NC	NC	NC	(0.1)
Aluminum Production	NC	NC	NC	NC	NC	(0.3)
Iron and Steel Production & Metallurgical Coke Production	0.2	0.7	0.1	0.7	0.9	1.5
Ferroalloy Production	NC	NC	NC	NC	NC	NC
Ammonia Production	+	+	+	+	+	+
Urea Consumption for Non-Agricultural Purposes	+	+	+	+	+	+
Phosphoric Acid Production	NC	+	+	+	+	+
Petrochemical Production	0.1	0.1	0.1	0.1	0.1	0.1
Silicon Carbide Production and Consumption	NC	NC	NC	NC	NC	NC
Lead Production	NC	NC	NC	NC	NC	NC
Zinc Production	NC	NC	NC	NC	NC	+
Cropland Remaining Cropland	NC	NC	NC	NC	+	0.3
Wetlands Remaining Wetlands	NC	NC	NC	NC	NC	+
Petroleum Systems	NC	+	+	+	+	+
Land Use, Land-Use Change, and Forestry (Sink)[a]	*9.2*	*58.0*	*125.6*	*131.7*	*127.0*	*132.8*
Biomass - Wood[b]	*NC*	*+*	*(2.8)*	*(0.4)*	*1.0*	*0.2*
International Bunker Fuels[b]	*20.9*	*24.6*	*(5.7)*	*(8.8)*	*(11.6)*	*(1.0)*
Biomass - Ethanol[b]	*NC*	*NC*	*NC*	*NC*	*NC*	*(1.9)*
CH_4	**(28.3)**	**(31.6)**	**(37.1)**	**(48.6)**	**(67.9)**	**(73.4)**
Stationary Combustion	+	+	(0.1)	+	+	+
Mobile Combustion	+	(0.1)	+	+	+	+
Coal Mining	NC	0.1	+	0.2	0.2	(0.2)
Abandoned Underground Coal Mines	NC	NC	NC	NC	NC	NC
Natural Gas Systems	(28.4)	(31.1)	(36.5)	(48.9)	(69.8)	(71.5)
Petroleum Systems	NC	+	+	0.1	(0.1)	(0.2)
Petrochemical Production	1.4	2.1	2.2	2.0	2.1	2.2
Silicon Carbide Production and Consumption	NC	NC	NC	NC	NC	NC
Iron and Steel Production & Metallurgical Coke	NC	NC	NC	NC	NC	NC

Production						
Ferroalloy Production	NC	NC	NC	NC	NC	NC
Enteric Fermentation	(1.1)	(2.0)	(2.1)	(2.0)	(2.0)	(2.0)
Manure Management	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)
Rice Cultivation	NC	NC	NC	NC	NC	NC
Field Burning of Agricultural Residues	+	+	+	+	+	+
Forest Land Remaining Forest Land	+	(0.1)	(0.2)	(0.1)	(0.1)	(0.2)
Landfills	0.1	(0.2)	(0.1)	0.5	2.1	(1.1)
Wastewater Treatment	+	+	+	+	+	+
Composting	NC	NC	NC	NC	+	+
Incineration of Waste	NC	NC	NC	NC	NC	NC
International Bunker Fuels[b]	+	+	+	+	+	+
N_2O	**45.2**	**39.9**	**65.8**	**57.9**	**58.2**	**61.6**
Stationary Combustion	+	+	+	+	+	+
Mobile Combustion	(0.2)	(0.3)	+	+	0.1	(0.1)
Adipic Acid Production	+	NC	NC	NC	NC	1.6
Nitric Acid Production	0.5	0.5	0.6	0.5	(0.5)	+
Manure Management	(0.4)	(0.5)	(0.5)	(0.5)	(0.5)	(0.6)
Agricultural Soil Management	45.3	40.3	66.0	57.9	59.1	60.8
Field Burning of Agricultural Residues	+	+	+	+	+	+
Wastewater Treatment	NC	+	+	+	+	+
N_2O from Product Uses	NC	NC	NC	NC	NC	NC
Incineration of Waste	NC	NC	NC	NC	NC	NC
Settlements Remaining Settlements	NC	NC	NC	+	+	0.1
Forest Land Remaining Forest Land	+	(0.1)	(0.2)	(0.1)	(0.1)	(0.1)
Composting	NC	NC	NC	NC	+	+
Wetlands Remaining Wetlands	NC	NC	NC	NC	NC	+
International Bunker Fuels[b]	*0.2*	*0.2*	*(0.1)*	*(0.1)*	*(0.1)*	+
HFCs	**NC**	**NC**	**+**	**+**	**(0.1)**	**(1.7)**
Substitution of Ozone Depleting Substances	NC	NC	NC	+	+	+
HCFC-22 Production	NC	NC	NC	NC	NC	(1.7)
Semiconductor Manufacture	NC	NC	+	+	(0.1)	+
PFCs	**NC**	**NC**	**0.1**	**(0.1)**	**(1.2)**	**0.3**
Aluminum Production	NC	NC	NC	NC	NC	+
Semiconductor Manufacture	NC	NC	0.1	(0.1)	(1.2)	0.3
SF_6	**+**	**(2.8)**	**(3.3)**	**(3.6)**	**(4.0)**	**(4.0)**
Electrical Transmission and Distribution	+	(2.8)	(3.3)	(3.6)	(3.8)	(4.1)
Semiconductor Manufacture	NC	NC	+	+	(0.3)	0.1
Magnesium Production and Processing	NC	NC	NC	NC	+	+
Net Change in Total Emissions[b]	**(3.7)**	**(12.5)**	**30.5**	**17.0**	**(0.6)**	**(12.4)**
Percent Change	**-0.1%**	**-0.2%**	**0.4%**	**0.2%**	**0.0%**	**-0.2%**

+ Absolute value does not exceed 0.05 Tg CO_2 Eq. or 0.05 percent.
Parentheses indicate negative values
NC (No Change)
[a] Not included in emissions total.
[b] Excludes net CO_2 flux from Land Use, Land-Use Change, and Forestry, and emissions from International Bunker Fuels.
Note: Totals may not sum due to independent rounding.

Table 10-2: Revisions to Annual Net CO_2 Fluxes from Land Use, Land-Use Change, and Forestry (Tg CO_2 Eq.)

Component: Net CO_2 Flux From Land Use, Land-Use Change, and Forestry	**1990**	**2005**	**2007**	**2008**	**2009**	**2010**
Forest Land Remaining Forest Land	4.5	35.9	99.9	105.0	99.3	104.2
Cropland Remaining Cropland	(6.0)	(0.1)	1.3	1.1	1.1	0.9
Land Converted to Cropland	0.4	(4.1)	(4.1)	(4.1)	(4.1)	(4.1)
Grassland Remaining Grassland	(0.3)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)
Land Converted to Grassland	1.0	2.4	2.4	2.4	2.4	2.4
Settlements Remaining Settlements	9.6	24.6	26.8	27.9	29.0	30.1
Other	NC	NC	NC	NC	NC	NC
Net Change in Total Flux	**9.2**	**58.0**	**125.6**	**131.7**	**127.0**	**132.8**
Percent Change	**1.0%**	**5.3%**	**11.3%**	**12.1%**	**11.9%**	**12.4%**

NC (No Change)

Note: Numbers in parentheses indicate a decrease in estimated net flux of CO_2 to the atmosphere, or an increase in net sequestration.

Note: Totals may not sum due to independent rounding.

+ Absolute value does not exceed 0.05 Tg CO_2 Eq. or 0.05 percent

Weitz, Melissa

From: Weitz, Melissa
Sent: Friday, April 05, 2013 4:01 PM
To: Marty Wolf
Subject: RE: Revised Text and Annex
Attachments: Methodology for Estimating CH4 and CO2 Emissions from Natural Gas System_4.5.MW[redacted]

Hi Marty,

Just the tables for today.

Please use the version attached.

Thanks!

Melissa

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Friday, April 05, 2013 3:55 PM
To: Weitz, Melissa
Subject: RE: Revised Text and Annex

Melissa,

[redacted] (b)(5) deliberative [redacted]

Do you want this change just in the two tables (reductions and net emissions) or do I need to get this fixed in the spreadsheet as well?

Do you need this today? Or can we do the tables today and then the spreadsheet next week? The reason I am asking is that I am also responding to some last-minute issues with Mausami.

Thanks,
Marty

>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 4/5/2013 12:37 PM >>>

Marty, can you re-check the [redacted] (b)(5) deliberative [redacted]

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Thursday, April 04, 2013 4:38 PM
To: Weitz, Melissa
Subject: Revised Text and Annex

Melissa,

Here is the revised text and annex.

The version of the text that you sent me had the old references in it for some reason. I cut those and added what we had from the Public Review draft. There might still be a reference or two that you'll need to add - I think Petron was one that I spotted.

Let me know if you need any last minute help tomorrow (or Monday?).

I also am sending the latest version of the inventory spreadsheet. Nothing changed except the labeling of some of the table tabs. Also the file name matches the revised text and annex file names.

Thanks,
Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com

Weitz, Melissa

From: Weitz, Melissa
Sent: Friday, April 05, 2013 4:25 PM
To: Hockstad, Leif
Subject: RE: Recalculations chapter
Attachments: PR DRAFT US-GHG-Inventory-BY2011-Recalculations MW[redacted]

Okay, I cut and pasted the text directly from the Inventory.

From: Hockstad, Leif
Sent: Friday, April 05, 2013 1:33 PM
To: Weitz, Melissa
Subject: Recalculations chapter

Do you have any specific text that you think needs to make it in to the Recalculations chapter?

Here is the version we published for public review. Does the natural gas systems text seem all right for the final report?

****
Leif Hockstad
Climate Change Division
OAR - Office of Atmospheric Programs
U.S. Environmental Protection Agency
Phone: 202 343 9432
Fax: 202 343 2359
hockstad.leif@epa.gov
****

Weitz, Melissa

From: Marty Wolf [Marty.Wolf@erg.com]
Sent: Friday, April 05, 2013 5:20 PM
To: Weitz, Melissa
Subject: RE: Revised Text and Annex
Attachments: Methodology for Estimating CH4and CO2 Emissions from Natural Gas System_4.5_erg_040513[(b)(5) deliber[redacted]

Melissa,

Here it is.

The table numbering is going funky, so I highlighted a couple of spots for you to look at and make sure that things are OK. I wouldn't be worried, except that that was messed up in the Public Review document.

Marty

Martinus (Marty) E. Wolf
Eastern Research Group, Inc. (ERG)
10860 Gold Center Drive, Suite 275
Rancho Cordova, CA 95670
USA
916-635-6594 (phone)
916-859-0185 (fax)
marty.wolf@erg.com>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 4/5/2013 1:01 PM >>>

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Melissa

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To: Weitz, Melissa
Subject: RE: Revised Text and Annex

Melissa,

[redacted]
(b)(5) deliberative
[redacted]

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Thanks,
Marty

>>> "Weitz, Melissa" <Weitz.Melissa@epa.gov> 4/5/2013 12:37 PM >>>

Marty, can you re-check the [redacted] (b)(5) deliberative [redacted]

From: Marty Wolf [mailto:Marty.Wolf@erg.com]
Sent: Thursday, April 04, 2013 4:38 PM
To: Weitz, Melissa
Subject: Revised Text and Annex

Melissa,

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I also am sending the latest version of the inventory spreadsheet. Nothing changed except the labeling of some of the table tabs. Also the file name matches the revised text and annex file names.

Thanks,
Marty

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Weitz, Melissa

From: Weitz, Melissa
Sent: Friday, April 05, 2013 5:35 PM
To: Hockstad, Leif
Cc: leslie.chinery@icfi.com
Subject: final inventory text for natural gas and petroleum systems
Attachments: Methodology for Estimating CH4and CO2 Emissions from Natural Gas System_4 5 _FINAL[redacted]; NG Inventory text 4.5 FINAL[redacted]; Petroleum Systems_4Apr13[redacted] Methodology for Estimating CH4and CO2 Emissions from Petro_4Apr13 (2)[redacted]

Please see attached.

ICF- There were some issues with the table numbers in the natural gas systems annex to look out for. We have also added a few tables since the public review draft, which might add to the numbering issues.

Thanks!
Melissa

Weitz, Melissa

From: Weitz, Melissa
Sent: Monday, April 08, 2013 2:21 PM
To: Waltzer, Suzanne
Subject: FW: Minor Revisions to natural gas chapter text--RE: final inventory text for natural gas and petroleum systems
Attachments: NG Inventory text 4.5 FINAL-revised 4.8 b)(5) delibera[redacted]

Hi Suzie,

I made edits that I believe address your comments. Thanks very much for your review!

I think the QA/QC section is much more readable now.

Melissa

From: Weitz, Melissa
Sent: Monday, April 08, 2013 2:20 PM
To: Hockstad, Leif
Cc: 'leslie.chinery@icfi.com'
Subject: Minor Revisions to natural gas chapter text--RE: final inventory text for natural gas and petroleum systems
Importance: High

Hello,

I have some small revisions to the natural gas systems chapter text, please see the highlighted text on pages 5-9.

Let me know if you have any questions. Thank you!
Melissa

From: Weitz, Melissa
Sent: Friday, April 05, 2013 5:35 PM
To: Hockstad, Leif
Cc: 'leslie.chinery@icfi.com'
Subject: final inventory text for natural gas and petroleum systems

Please see attached.

ICF- There were some issues with the table numbers in the natural gas systems annex to look out for. We have also added a few tables since the public review draft, which might add to the numbering issues.

Thanks!
Melissa