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March 2, 2011

Peter Tsirigotis
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Attention: Docket ID Number EPA–HQ–OAR–2010–0505

Ref.: Proposed Rulemaking – Oil and Gas Sector Regulations
Standards of Performance for New Stationary Sources: Oil and Natural Gas Production and Natural Gas Transmission and Distribution;
(Docket ID No. EPA-HQ-OAR-2010-0505)

Mr. Peter Tsirigotis:

The American Petroleum Institute (API) is submitting this supplemental comment letter on the proposed rulemaking to create a new Subpart OOOO as a result of EPA's sector-based rulemaking for the oil and natural gas (O&G) industry. API represents more than 490 oil and natural gas companies and most of our members will be directly impacted by these proposed regulations.

The attachment to this letter is intended to:

1. Address EPA's concerns regarding industry's ability to reliably anticipate the volatile organic compound (VOC) content of a gas well prior to drilling in order to comply with a VOC percent by weight applicability cutoff for the reduced emissions completion (REC) requirements in the well. Suggested rule text has been provided that would implement this process.

2. Expand our cost-effectiveness arguments further supporting inclusion of an appropriate percent by weight VOC cutoff for RECs in the final rule.

3. Correct the record regarding API's November 30, 2011 comments that underestimated the VOC content of common shale plays by only showing the average for an entire shale play.

We believe this additional information further supports an appropriate VOC percent by weight threshold for REC requirements in the final rule. As this data indicates, an operator will have sufficient knowledge of the VOC content of given gas well, because of its location and gas characteristics, and can determine in advance whether a well is likely to be above the 10% VOC by weight threshold. We are aware, however

of the importance to EPA of an easily implemented and enforceable mechanism to ensure that all gas wells above the VOC threshold are subject to the requirements of NSPS OOOO. Whether a gas wellhead facility is subject to NSPS OOOO can be readily determined by direct measurement of the VOC content of any gas well that did not conduct a REC within 30 days of the date that production commences and report any wells that were, indeed, above the threshold as deviations. This will provide strong incentive for operators to get it right in the first instance and will provide information that will assist EPA in improving implementation of the rule.

We appreciate your consideration of our concerns and request the Agency include this supplemental letter in the docket. Please feel free to contact me with any questions (202-682-8319; toddm@api.org).

Sincerely,

/s/

Matthew Todd

CC: Bruce Moore, EPA
David Cozzie, EPA

VOC Content Threshold for Reduced Emissions Completions

API has recommended a 10% VOC content by weight threshold for requiring reduced emissions completions. This supplemental comment is intended to address issues that EPA has raised. First, we believe it is possible to know the concentration of VOC from a well before the well is completed. As discussed below, the gas composition data collected from nearby producing wells provides good evidence of what the VOC content will be prior to drilling new wells. Second, EPA has requested information on what percentage of wells would be exempted at various VOC thresholds. Additional information on the VOC content of Shale Gas Reservoirs has been supplied to correct some information in our comments. Finally, API would like to emphasize a couple of concerns on the cost-effectiveness of reduced emissions completions.

Method for Determining VOC Content Prior to Completions

EPA has mentioned some concern with how to determine the VOC content prior to flowback immediately following hydraulic fracturing since a sample of the gas cannot be taken until the well is producing. VOC content does vary from reservoir to reservoir and even from one geographic area to another within the reservoir. However, the approximate VOC content of a well can be predicted before the well is drilled based on gas analyses of other nearby wells producing from the same reservoir. Typically, wells in close proximity within the same reservoir have similar VOC content. Exploration and production companies spend substantial resources understanding the reservoirs they produce to optimize their drilling and production programs. Properties such as the homogeneity of the formation and fractures within the reservoir have significant impact on how predictable the VOC content is within a reservoir. Reservoir data is collected from the first exploration well to subsequent new delineation and development wells. This continual collection of reservoir information gives operators the needed data to anticipate the VOC content of the gas. Operators will use engineering judgement and available data to estimate the VOC concentration. Therefore, we recommend the agency determines compliance with the VOC threshold based on the measured VOC content of the gas sampled within 30 days after the well begins production for gas wells that do not employ a REC procedure for flowback following hydraulic fracture.

Hydraulically fractured gas wells that are expected to be under the VOC threshold would not be an affected facility. For these wells, API recommends that the operator be required to estimate the expected VOC content of the well based on the gas samples from nearby other wells in the same reservoir and the operator's knowledge of the reservoir and record the result. The operator will provide the agency a notification that lists the gas wells that will be hydraulically fractured within the next month as well as gas wells that are expected to have a VOC content of less than 10% by weight, thus are not affected facilities. For wells not employing a REC procedure for flowback following hydrofracture, the operator must keep records of the measured VOC content (utilizing Method 18) of the gas sampled within 30 days after the well begins production. If the measured VOC content exceeds 10% VOC by weight, the operator must notify EPA of a deviation by listing it on the next annual report. The low VOC source exclusion can be implemented using the following regulatory text.

§60.5365 (a) An onshore natural gas wellhead affected facility, is a single natural gas well that has flowback following hydraulic fracturing stimulation and is anticipated to produce natural gas with greater than 10% VOC by weight as determined by (a)(2). Flowback immediately following hydraulic fracturing stimulation that occurs at an onshore natural gas wellhead affected facility is the only regulated activity. For the purposes of this subpart, an existing onshore natural gas wellhead facility is considered modified if it meets the criteria of modification in §60.14. The modification of an existing natural gas wellhead affected facility does not affect the status of other equipment, process units, storage vessels, or pneumatic devices located at the well site.

(1) An onshore natural gas wellhead facility that has flowback immediately following hydraulic fracturing stimulation that is not an affected facility need only comply with §60.5365 (a)(2)-(3), and §60.5410 (a)(2).

(2) You must estimate the expected VOC content of the well prior to flowback and record the result. You must measure VOC content of the gas in accordance with Method 18 of 40 CFR part 60, Appendix A within 30 days after the well begins production and record the result.

(3) If the estimated VOC content prior to completion does not exceed 10% by weight but the measured VOC content exceeds 10% VOC by weight, the operator must notify EPA of the deviation by listing it on the next annual report.

§ 60.5410 (a)(1) For gas wellhead affected facilities, you have notified the Administrator monthly of all the well flowbacks following hydraulic fracturing stimulation that are anticipated to occur at any onshore gas wellhead facility during the upcoming month. Information in this notification must include the tentative scheduled start date of the well flowback, the name of the well, the latitude and longitude coordinates of the well in decimal degrees to an accuracy and precision of five (5) decimals of a degree using the North American Datum (NAD) of 1983,; affirmation of whether flowback will comply with REC procedures, and if applicable, the reason for not performing a REC for each well.

(2) For non-affected gas wellhead facilities, you have notified the Administrator monthly of all the well flowbacks following hydraulic fracturing stimulation that are anticipated to occur at any onshore gas wellhead facility during the upcoming month. Information in this notification must include the name of the well, the latitude and longitude coordinates of the well in decimal degrees to an accuracy and precision of five (5) decimals of a degree using the North American Datum (NAD) of 1983, an indication that the VOC content of the well will be less than or equal to 10% VOC by weight.

VOC Composition of Shale Gas Reservoirs

The VOC concentrations for shale gas reservoirs from API's comments, Table 15-1 should be corrected for several reasons. First, only the average composition of each reservoir was shown in the table. As can be seen from the attached maps of the Barnett and Eagle Ford reservoirs, shale plays will typically have large (partial/whole counties or even small regions) of well defined "types of production windows" (i.e. dry gas, wet gas/condensate, and oil windows). Some shale gas plays may have only one or two "type of production windows". The VOC content for gas produced from the same formations in these "windows" can be fairly homogeneous such that operators can have a good idea of the typical gas composition. As wells get closer to the window transition zones, there can be much more variability in gas composition from the same formation. An API member company supplied gas analyses samples from three different sites in the Eagle Ford Shale wet gas/condensate window in Table 1 (also see Eagle Ford map attached).

Table 1
Eagle Ford Samples Gas Compositions in Mol%

Compound	#1 Sample	# 2 Sample	#3 Sample
Nitrogen	0.1	0.09	0.49
Carbon Dioxide	0.98	0.71	1.48
Methane	82.57	77.61	73.46
Ethane	9.15	13.2	15.88
Propane	3.08	5.01	6.22
Isobutane	1.07	1.07	0.43
n-Butane	0.99	1.31	1.25
Pentanes	0.95	0.7	0.5
Hexanes +	1.11	0.3	0.29
Total Mol%	100	100	100
VOC mol%	7.2	8.4	8.7
VOC wt%	19	21	20
HHV, Btu/cf	1236	1265	1267

Table 2 below summarizes information supplied to the Western Regional Air Partnership Phase III inventories that provide addition support for the predictability of VOC content. This information shows that most of the basins in the west have less than 2% standard deviation from the average mole%.

Table 2
2006 Basin Wide Produced Gas Composition

Basin Name	VOC Content (mol %)			Sample Size	Std. Dev.
	Basin Wide Average	Min	Max		
Conventional Wells					
DJ	8.6%	5.5%	12.0%	13	1.4%
Piceance	2.7%	0.5%	7.0%	20	1.5%
South San Juan	6.7%	0.0%	11.6%	15	3.6%
Uinta	3.2%	0.5%	6.7%	28	1.8%
Powder River Basin	3.6%	3.6%	3.6%	1	n/a
Southwest Wyoming	2.7%	0.0%	14.9%	23	3.4%
Wind River	7.1%	0.1%	26.0%	7	8.7%
CBM Wells					
South San Juan	0.1%	0.0%	0.3%	4	0.2%
Uinta	0.5%	0.0%	1.4%	3	0.8%
Powder River Basin	0.1%	0.0%	0.2%	8	0.1%

Note: North San Juan Basin VOC content is unavailable because gas compositions were not gathered for this basin as part of the Phase III work.

Secondly the source article[1] for these concentrations truncated the compositions at propane and normalized them to 100%. API mistakenly understood the propane composition to be the

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[1] "Compositional variety complicates processing plans for US shale gas"; Oil & Gas Journal, March 9, 2009

composition for propane and heavier compounds (a common practice in the O&G industry). By tracing the compositions back to the original referenced article[2], the concentrations in the attached represent the full analysis for the Barnett Shale. By using the full analysis for the Barnett Shale, the average composition of VOC increased from 2.0% by volume as reported in Table 15.1 to 3.51% as shown in the attached table below. Finally, the compositions were reported in percent by volume instead of weight percent as proposed for the threshold. Weight percent VOC for natural gas is typically close to three times the volume percent VOC. Table 3shows the Barnett Shale has an average VOC content of 9.08% by weight with a range of 1.95% to 19.94% VOC by weight. To aid in referencing the analyses below to the attached coded maps, the BTU content has been calculated for each well. Dry gas is typically less than 1050 BTU/SCF. Condensate/gas mixtures are typically between 1050 and 1250 BTU/SCF. Associated gas from oil production typically exceeds 1250 BTU/SCF.

Table 3
Barnett Shale Gas Well Composition

Well Name	Caswell 1	Cole Trust C 1	Jerry North 1	Peterson 1	
Field Name	Newark East	Newark East	Newark East	Newark East	
n2	1.39	0.98	7.56	1.05	
o2	0.2	0.15	1.97	0.21	
co2	0.31	2.68	1.35	2.25	
h2	0.73				
c1	77.82	93.05	77.02	90.9	84.70
c2	11.34	2.56	7.77	4.4	6.52
c3	4.96	0.02	2.2	0.42	1.90
n-c4	1.56	0.25	0.86	0.32	0.75
i-c4	0.92	0.26	0.7	0.34	0.56
n-c5	0.29	0.02	0.2	0.04	0.14
i-c5	0.37	0.03	0.23	0.05	0.17
		BTU			
	1218.529	1004.2002	1038.6989	1031.5828	
		Weight %			
n2	1.90	1.57	10.56	1.65	
o2	0.25	0.22	2.55	0.31	
co2	0.66	6.74	2.96	5.55	
h2	0.07	0.00	0.00	0.00	
c1	60.61	85.12	61.43	81.55	
c2	16.56	4.39	11.62	7.40	
c3	10.62	0.05	4.83	1.04	
n-c4	4.40	0.83	2.49	1.04	
i-c4	2.60	0.86	2.02	1.11	
n-c5	1.02	0.08	0.72	0.16	
i-c5	1.30	0.12	0.83	0.20	
	100.00	100.00	100.00	100.00	
		Averages			
wt%VOC	19.94	1.95	10.88	3.55	9.08
vol%VOC	8.1	0.58	4.19	1.17	3.51
Volume Concentrations From AAPG Bulletin, v. 91, no. 4 (April 2007), pp. 445-473					

[2] Volume Concentrations From AAPG Bulletin, v. 91, no. 4 (April 2007), pp. 445–473

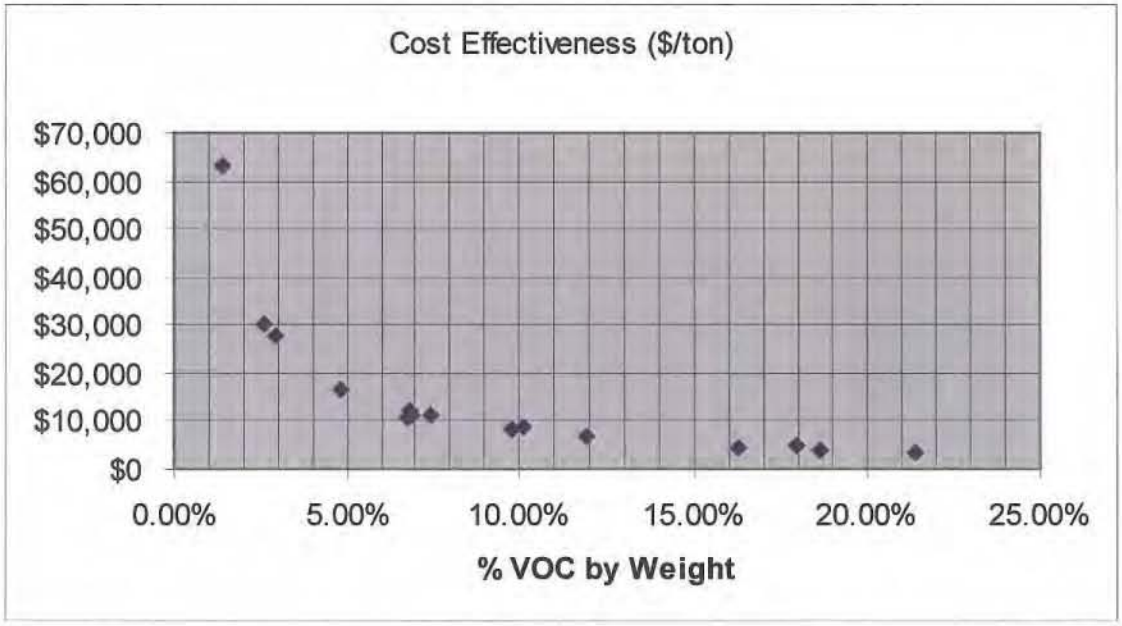
When viewed as a whole, this information shows that mainly "dry gas" will be excluded from being affected facilities with a 10% by weight VOC threshold. This fact has been masked by the fact that VOC content in mole % (which is identical to volume % for gas streams) is almost tripled when converted to weight % VOC in natural gas streams. Further, when you consider that low natural gas prices and high oil prices are encouraging the O&G industry to drill in areas that are rich in condensate, far fewer "dry gas" wells will be drilled in the future, than have in the past.

Cost-Effectiveness of Reduced Emission Completions

Summary of API Economic Analysis

As discussed in both comment 15.10 (page106) and Attachment G, REC is not cost effective at a VOC content by weight less than 10%. API comments (Table G-6 of Attachment G) demonstrate that emission control requirements to flowback immediately following hydraulic fracture stimulation (i.e., REC) are not cost effective when the VOC content by weight is less than 10% (see Graph 1). API estimates that **at 10.09% VOC by weight**, the cost of reduced completions is **$8,564/ton of VOC controlled**. A reduction to **4.81% VOC by weight** further increases the cost per ton estimate to **$16,552/ton of VOC.** With no VOC threshold for RECs, wells with almost no VOC content in the gas, such as coal bed methane wells, would be required to do REC and the cost per ton of VOC would approach infinity. Yet, EPA has proposed to control emissions from flowback operations regardless of the VOC content. The main differences between EPA's and API's analysis is that API increased EPA's assumption of 7 days of equipment rental to 30 days to account for mobilization, demobilization and time between completions, added mobilization cost (transportation, etc.), and increased cost of equipment installation. Graph 1 below shows the cost effectiveness per VOC % by weight.

Graph 1: Cost Effectiveness of Reduced Emissions Completions



Other Cost-Effectiveness Analysis Factors

As stated above, API based its economic analysis in the comments on the reduction of emissions between venting of hydraulic fracture flowback emissions and the recovery of saleable natural gas from hydraulic fracture flowback operations. However, API believes that this approach is incorrect. Under certain conditions, hydraulic fracture flowback emissions are combusted as part of standard operations for safety reasons. In some cases, hydraulic fracture flowback emissions can't be routed to a combustion completion device and are safely vented to the atmosphere. Such conditions include, but are not limited to; conditions may result in a fire hazard, gas is not combustible, or not allowed by state, tribal, or local requirement. The correct emission reduction basis should have been from combustion to the recovery of saleable natural gas from hydraulic fracture flowback operations. Assuming a combustion efficiency of 95% for this operation, the cost of VOC reductions should be increased by a **factor of 20.**

EPA calculated the value of gas recovered from REC operations at $4/MSCF of natural gas recovered based on natural gas price at nationwide market hubs (i.e. Henry Hub). However, API believes that EPA should have utilized the net income to the operator at the wellhead. The operator must pay royalties and a "basin differential" (cost of collecting, treating and transporting the gas to the market hubs) out of the standard market price. Both the royalty and basin differential vary significantly from basin to basin. Table 4 below contains estimated net income at the well head based on a market price of $4/MSCF for several basin. The net wellhead income to the operator averages about $3.00/MSCF. This significantly reduces the offset of REC cost of $35,410 calculated by EPA to $26,557.

Table 4: Estimated Net Income to Operators Based on an Average $3.00/MSCF

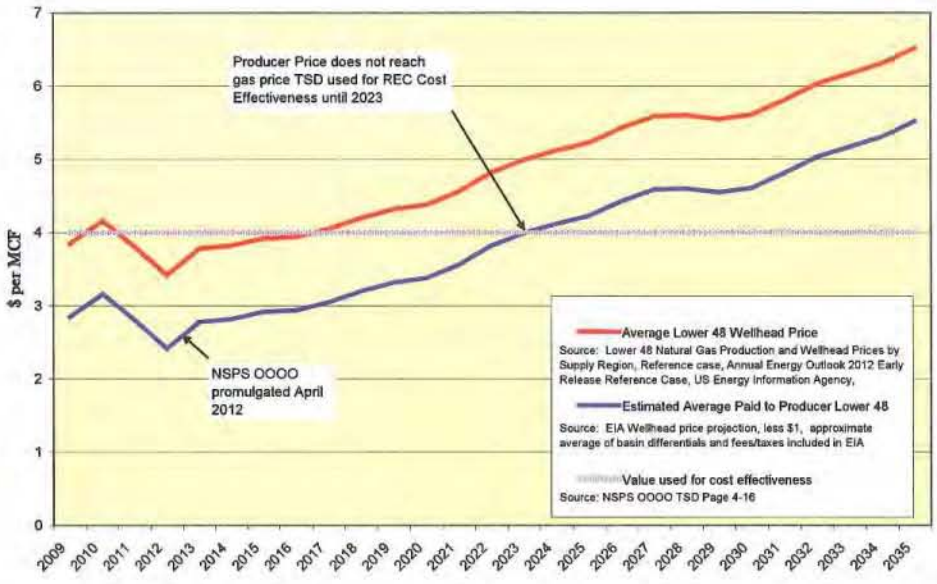
	Basin Differential $/MSCF)	Average Royalty (%)	Average Royalty ($4.00/MSCF)	Net Gas Income ($4.00/MSCF)
Hanynesville (East Texas)	$0.25	25.00%	$1.00	$2.75
Cotton Valley (East Texas)	$0.25	20.00%	$0.80	$2.95
Woodford Shale (Oklahoma)	$0.20	18.75%	$0.75	$3.05
Eagle Ford (South Texas)	$0.15	22.50%	$0.90	$2.95
Red Oak Conventional (Oklahoma)	$0.20	18.75%	$0.75	$3.05
Greater Green River (Wyoming)	$0.35	15.00%	$0.60	$3.05
San Juan North (Colorado)	$0.35	12.50%	$0.50	$3.15
San Juan South (New Mexico)	$0.30	12.50%	$0.50	$3.20

In the TSD for NSPS OOOO, it was stated that the cost effectiveness calculations were based on $4 MCF gas and that this was perceived to be "conservative" because gas prices had been higher than that in the recent past. However, as a result of increasing supply of natural gas primarily from shale gas production, long term projections for natural gas prices indicate that wellhead prices will be low for the foreseeable future. And, as noted above, the wellhead price does not represent the economic value of recovered gas to the gas producer, and that this price is about $1 less than the EIA reported wellhead price. Graph 2 shows the United States Energy

Information Agency projections for natural gas well prices (Lower 48 Average) from the 2012 Advance projection and compares it to the projected price to the producer.

Graph 2

Natural Gas Wellhead Price vs. Producer Price



What this graph shows is that the producer price, based on EIA data, is expected to be ~$3 MCF for the first five years after NSPS OOOO is finalized, and does not reach $4 until over 10 years after rule finalization.

NSPS OOOO's requirements for gas wellhead facilities are stated in the preamble to be for the control of VOCs. Sections 5 and 15 of API's comments on NSPS OOOO discussed the need for a VOC threshold before a REC requirement would apply to a gas wellhead facility. The Clean Air Act unquestionably requires an emissions reduction system to be cost effective, which has typically been determined to be approximately **$5,000/ton** of criteria pollutants emissions avoided EPA's general practice in NSPS rulemakings is to limit rule applicability to instances in which the control is cost effective:

- NSPS K/Ka/Kb Size of tank and volatility of material stored
- NSPS VV/VVa 10% VOC threshold for LDAR applicability
- NSPS XX --Limited to gasoline loading above a certain throughput
- NSPS KKK/VV—10% VOC threshold
- NSPS WWW Non methane organic compound emissions threshold

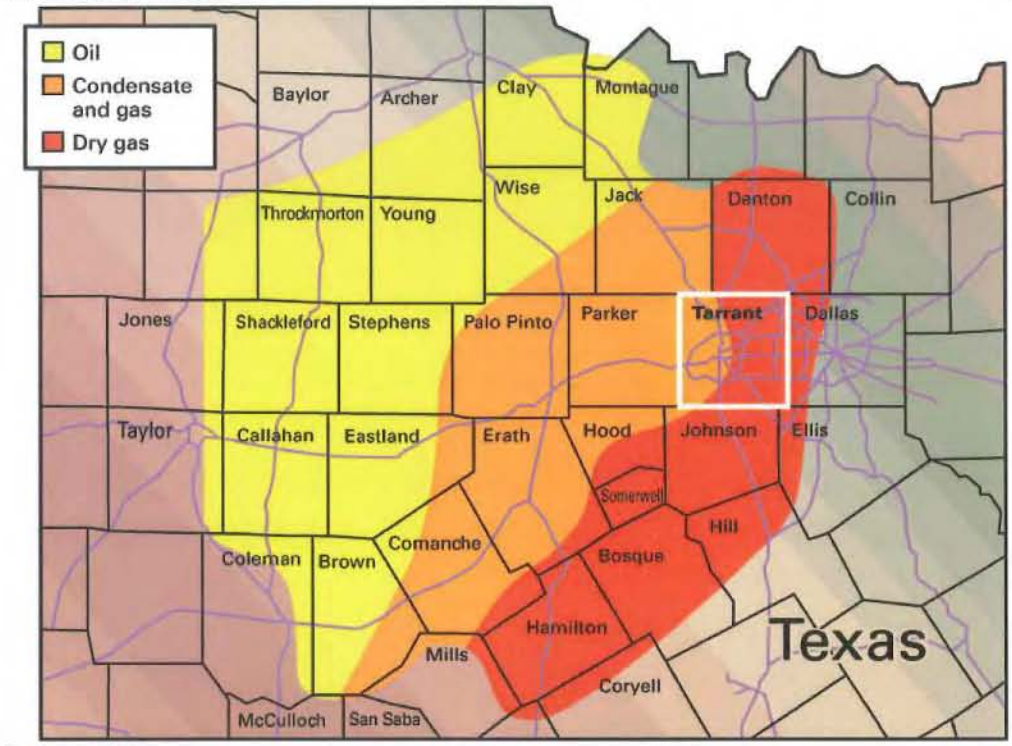
For example, EPA clearly concluded in the 1983 NSPS VV/GGG rulemaking that a 10% cut-off for VOC content was necessary for the rule to be cost effective and not cover "those sources that have only small amounts of photochemically reactive substances in the line." Page 5-22, VOC Fugitive Emissions in Synthetic Organic Chemicals Manufacturing Industry, Background Information for Promulgated Standards, June 1982. See also pages 3-9 and 10 to Petroleum Fugitive Emissions, Background Information for Promulgated Standards, October 1983. Even in

NSPS OOOO, EPA has included provisions that are clearly designed to avoid regulating certain types or sizes of facilities that have emissions of VOC that would not be cost effective to control, such as tanks. For this reason, **API believes it is imperative for the rule to include a threshold for VOC content in the gas wellhead affected facility.**

In conclusion, API continues to recommend a 10% VOC by weight applicability threshold for REC. If this threshold is adopted, exclusion of wells subject to REC will not be as prevalent as originally suggested in our comments due to errors in presenting VOC information in various shale reservoirs. Companies should be allowed to evaluate their own wells for applicability to the REC requirements, and for wells that did not use REC procedures, they must follow up with a post completion VOC lab analysis to include in their records.

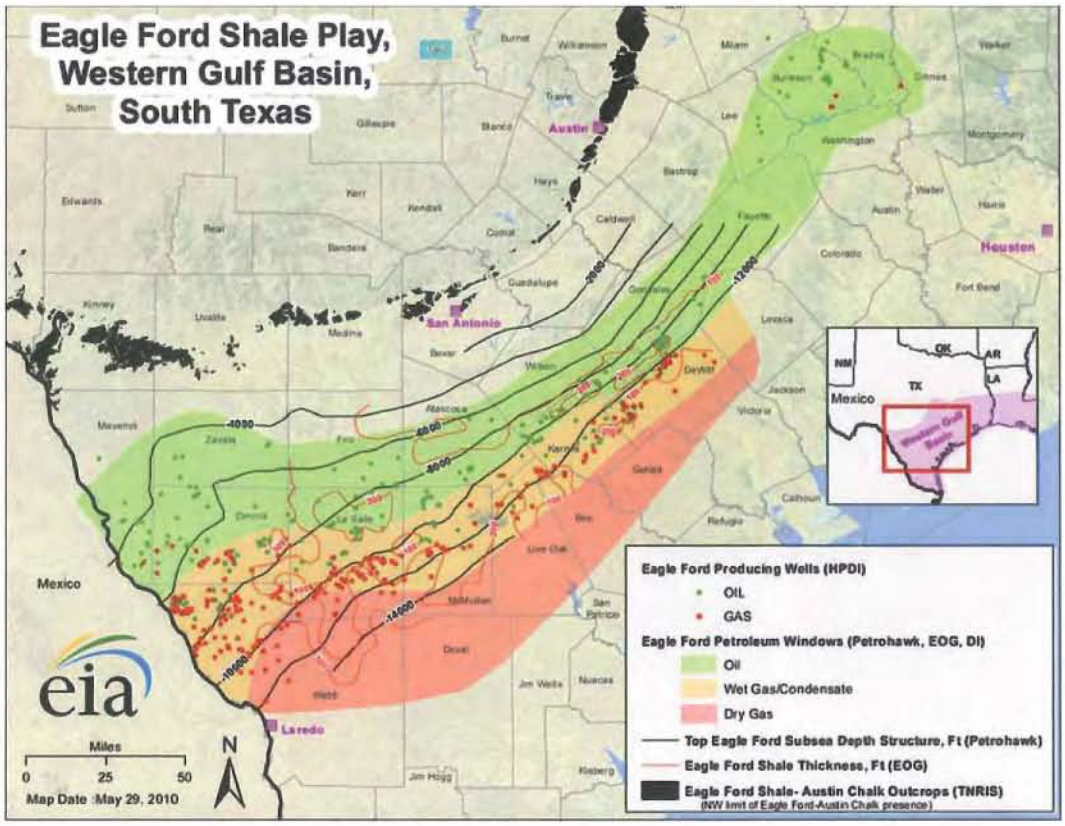
TEXAS BARNETT SHALE

Fig. 2



Source: www.oilshalegas.com

From - *"Compositional variety complicates processing plans for US shale gas"*; Oil & Gas Journal, March 9, 2009



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