Update on Implementation of Rule 1148.2
(June 2014)

Background

Rule 1148.2 – Notification and Reporting Requirements for Oil and Gas Wells and Chemical Suppliers was adopted on April 5, 2013. The purpose of Rule 1148.2 is to gather air quality-related information on oil and gas well drilling, well completion, and well reworks. This is a summary of data analysis SCAQMD staff performed during June 2014.

Summary of Well Activities (Notifications)

Rule 1148.2 requires facilities to notify the South Coast Air Quality Management District (SCAQMD) if they are conducting drilling, acidizing, gravel packing, or hydraulic fracturing operations. In June 2014, the SCAQMD has received 59 notifications representing 68 drilling, acidizing, gravel packing or hydraulic fracturing activities (there can be multiple activities on a notification, for example one notification may cover well drilling and acidizing activities). Figure 1 shows the distribution by the type of activity and Table 1 provides information on numbers and types of events reported for June 2014.

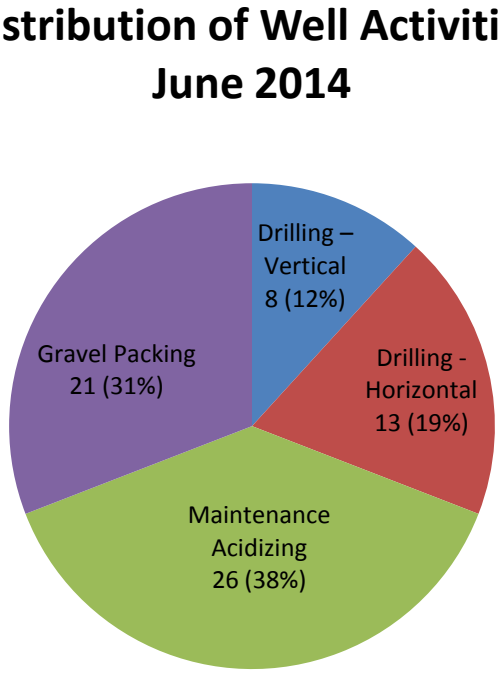

Figure 1. Distribution of Well Activities in June 2014 (Total of 68 activities).

Table 1: Monthly Summary of Notifications for Well Activity Events
June 2013 through June 2014

Well Activity	June 2013	July 2013	Aug 2013	Oct 2013	Nov 2013	Sep 2013	Dec 2013	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	June 2014	Total
WELL DRILLING														
Drilling – Vertical	2	14	13	6	9	11	11	7	5	10	11	11	8	118
Drilling - Horizontal	8	4	5	2	0	3	2	1	10	6	9	7	13	70
Drilling - Unspecified	0	1	0	0	1	0	0	0	0	0	0	0	0	2
WELL REWORK and WELL COMPLETION														
Acidizing[1]	15	24	41	37	34	26	33	24	20	16				270
Maintenance Acidizing[1]											23	17	26	66
Matrix Acidizing[1]											1	0	0	1
Gravel Packing	11	15	18	7	8	13	15	11	14	15	17	13	21	178
Hydraulic Fracturing	1	6	2	0	0	0	5	0	0	0	0	0	0	14
Other[2]	2	3	0	1	1	0	1	3	2	6	7	2	0	28
Grand Total for all Activities														**747**

[1] Distinction between Matrix and Maintenance Acidizing began April 2, 201

[2]Other category includes cement squeeze, perforation, redrill, replacement of lining and tubing, acid wash without stimulation

All but one notifications submitted during June 2014, were for oil wells. Only one gas horizontal well drilling activity was reported by the Southern California Gas Company. Reported Activities took place in the City of Los Angeles, Ladera Heights, Wilmington, Long Beach coastal areas near the port, Porter Ranch and Huntington Beach. Table 2 lists operators who submitted notifications in June 2014.

Table 2. Operators Submitting Notifications in June 2014

Operator Name	Number of Notifications
ABC	1
E&B Natural Resources	2
Freeport McMoran Oil and Gas	12
OXY	4
Southern California Gas Company	1
Thums Long Beach Company	18
Tidelands Oil Production Company	25
Warren E&P, Inc.	5

Equipment

Rule 1148.2 requires facilities to report the combustion equipment used during various operations for oil extraction. Reporting requirements include information on the type of engine, engine tier, and hours of operation for each engine used at the job site. During the month of June, SCAQMD staff performed analysis and calculated emissions based on the engine reporting information.

Based on engine tier and hours of operation, emissions can be estimated. Table 3 below presents estimates for NOx and particulate matter (PM) emissions for each type of well activity. Average emissions reported in Table 3 are based on reports submitted from June 2013 through June 2014.

Table 3. Estimates of Average Emissions per Type of Activity*

Well Activity	NOx (lbs/day)	PM (lbs/day)
Drilling	7.5	3.8
Acidizing	0.5	0.4
Gravel Packing	1.6	5.0
Hydraulic Fracturing	8.4	0.6

*Operators allowed up to 60 days after completion of the event to submit engine use information.

Fluids Usage

Under Rule 1148.2 operators are required to submit fluids usage information. In the month of June, SCAQMD staff analyzed data submitted for fluids usage for the entire reporting period (since June 2013). Hydraulic fracturing uses the most fluids by far. Figure 2 and table 4 below provide graphical representation of fluids usage pertaining to oil extracting activities in the South Coast Air Basin and amounts of fluids used.

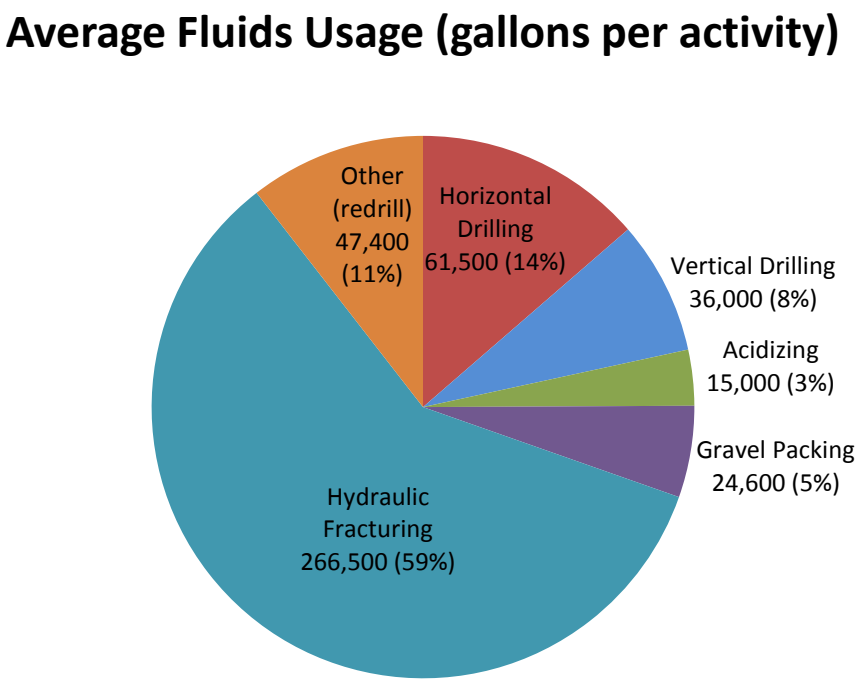

Figure 2. Distribution of fluids usage per type of activity.

Table 4. Total Fluids Usage
(June 2013 through June 2014)*

Well Activity	Number of Events reported fluids usage	Average Fluids Volume per Activity (gallons)
Well Drilling[1]		
Horizontal	27	61,468
Vertical	91	35,889
Well Rework and Well Completion		
Acidizing[2]	252	14,972
Maintenance Acidizing[2]	5	11,392
Gravel Packing	47	24,604
Hydraulic Fracturing	13	266,406
Other (redrill)	5	47,378

[1] One unspecified drilling event reported use of 345 gallons of fluids used
[2] Distinction between different types of acidizing began April 2, 2014.
*Operators allowed up to 60 days after completion of the event to submit fluids use information.

Treatment fluids are injected in the well bore during well stimulation and well rework techniques, such as hydraulic fracturing, acidizing, or gravel packing in order to enhance hydrocarbon recovery after well drilling operations. During the rulemaking for Rule 1148.2, it was the SCAQMD staff's understanding that in order to begin hydrocarbon recovery, these fluids are pumped-out and return to the surface. These returned fluids are referred to as flowback fluids [Schramm, 2011; Esswein et al., 2014]. Under the Rule 1148.2, operators have to report the volume of collected flowback fluids. Based on reports submitted to the SCAQMD for compliance with Rule 1148.2, SCAQMD staff noticed that in majority of operations no flowback fluids were reported. Local operators state that due to the nature of formation in the South Coast Air Basin, majority of acidizing treatment fluids remain in the well bore and are absorbed in the formation. In the coming months SCAQMD staff will observe well stimulation activities in the basin to verify that indeed no flowback fluids are being recovered.

Chemicals

Under Rule 1148.2 operators are required to submit chemical use data. Previous Rule 1148.2 reports have reported air toxics used in different well activities. Table 5 below outlines amounts of these key air toxics that were used in well operations in the South Coast Air Basin (June 2013 – June 2014), and Table 6 lists suppliers of chemicals used in well activities.

Table 5. Amounts of Key Air Toxics Used in Well Activities (From Non trade-secret Report Operator Reports)*

	Drilling	Acidizing	Gravel Packing	Hydraulic Fracturing
Number of Events[1]	177	254	155	14
Air Toxic	Average use per activity (lb)	Average use per activity (lb)	Average use per activity (lb)	Average use per activity (lb)
Crystalline Silica	1,943	7,240	42,883	86,947
Ethylbenzene	Not used[2]	209	Not used[2]	Not used[2]
Ethylene Glycol	0.2	2.2	19	74
Formaldehyde	0.2	<0.05	0.2	Not used[2]
Glutaral	212	Not used[2]	221	Not used[2]
Hydrochloric Acid	Not used[2]	3,461	Not used[2]	Not used[2]
Hydrofluoric Acid	Not used[2]	411	197	Not used[2]
Methanol	2	80	14	1,003
Naphthalene	0.2	1	0.1	Not used[2]
Phosphoric Acid	125	Not used[2]	Not used[2]	Not used[2]
Sodium Hydroxide	Not used[2]	0.05	21	58
Toluene	Not used[2]	27	Not used[2]	Not used[2]
Xylene	Not used[2]	109	Not used[2]	Not used[2]

[1] Number of events with chemical information reported. Under the provisions of the Rule 1148.2, operators have 60 days after the end of the activity to file the chemical report.

[2] "Not used" correspond to chemical not being reported for this type of activity.

*Operators allowed up to 60 days after completion of the event to submit fluids use information.

Table 6. Chemical Suppliers (June 2013 – June 2014)

Primary Suppliers	Secondary Suppliers
Aushburn Oil Well Cementing Company	Amber Chemical, Inc
Baker Hughes	Borregard Lignotech
Enterprise Drilling Fluids, Inc.	CESI Chemical, Inc.
GEO Drilling Fluids Inc.	Champion Technologies
Halliburton	CHEMEOR, INC.
Heartland Energy Group	Fritz Industries, Inc.
Lynn Operating, Inc.	GEO Specialty Chemicals, Inc.
M-I Swacco	Heartland Energy
MTS Stimulation Services, Inc.	Ibex Chemicals, Inc.
Nalco	Impact Fluid Solutions, LLC
Schulumberger	Lignotech USA, Inc.
Sinclair Well Products and Services	Mayco Wellchem, Inc.
Tetra Technologies, Inc.	NALCO
South Bay Salt Works	Nalco Champion
Warren E&P	Sekisui Specialty Chemicals

Next Steps

SCAQMD staff will continue to evaluate the data and provide monthly updates, and revise the data as necessary based on the review and audit of reported data. Staff will continue to evaluate the chemical reports looking at amounts of reported chemicals and chemicals used for each type of well activity. Staff will continue to conduct field inspections and sampling.

References

Esswein E.J., Snawder J., King B., Breitenstein M., Alexander-Scott M., Kiefer M., and Couch J. (2014), Case Study Evaluation of Some Potential Chemical Exposure Risks During Flowback Operations in Unconventional Oil and Gas Extraction: Preliminary Results, Journal of Occupational and Environmental Hygiene, 11-10, October 2014, D174-D184.

Schramm E. (2011), What is flowback, and how does it differ from produced water, The Institute for Energy and Environmental Research for Northeastern Pennsylvania, Marcellus Shale Information Clearinghouse, http://energy.wilkes.edu/pages/205.asp.