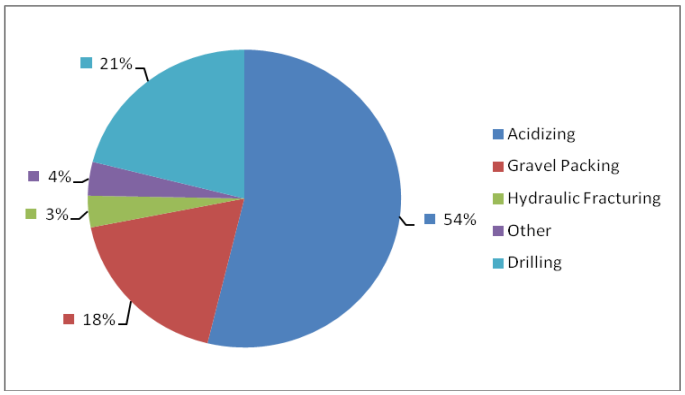
Summary of Initial Results of Implementation of Rule 1148.2

Summary of Well Activities (Notifications)

Rule 1148.2 requires facilities to notify the SCAQMD if they are conducting drilling, acidizing, gravel packing, or hydraulic fracturing operations. Between June 2013 and December 2013, the SCAQMD has received 369 notifications representing 409 drilling, acidizing, gravel packing or hydraulic fracturing events. 90 percent of the notifications are for wells located in LA County and the remaining activity is in Orange County. The following summarizes events between June and December 2013. Note: There can be multiple activities on a notification. For example one notification may cover well drilling and acidizing.

Well Activity	Well Type	Well Completion Activity	June 2013	July 2013	Aug 2013	Oct 2013	Nov 2013	Sept 2013	Dec 2013	Grand Total
WELL COMPLETION			10	12	21	8	11	8	16	86
	GAS						1			1
		Other					1			1
	OIL		10	12	21	8	10	8	16	85
		Acidizing	3	1	3	2	6		2	17
		Gravel Packing	1	2	16	6	3	7	9	44
		Hydraulic Fracturing	2	6	1		1		4	14
		Other	4	3	1			1	1	10
WELL DRILLING			7	15	18	9	8	13	15	85
	GAS			1	1					2
		Drilling – Vertical		1	1					2
	OIL		7	14	17	9	8	13	15	83
		Drilling – Vertical	4	13	11	7	7	10	14	66
		Drilling - Horizontal	3		6	2		3	1	15
		Drilling - Unspecified		1			1			2
WELL REWORK			22	27	53	36	34	30	36	238
	OIL		22	27	53	36	34	30	36	238
		Acidizing	20	21	41	34	30	26	31	203
		Gravel Packing	2	4	12	1	3	3	5	30
		Other		2		1	1	1		5
Grand Total			**39**	**54**	**92**	**53**	**53**	**51**	**67**	**409**

Distribution of Events



Some key points about well activity data:

- Most wells in the South Coast Air Basin are oil
- Between June and December 2013 – 14 wells were hydraulically fractured (6 in LA and 8 in Orange County)
- 54% of the events were acidizing
- 18% of the events were gravel packing
    - Gravel packing is akin to a mini hydraulic fracturing job
- Eight operators submitted the 369 notifications
    - Breitburn Operating
    - Freeport McMoran Oil and Gas (Formerly Plains Exploration and Production)
    - Linn Operating, Inc
    - Matrix Oil Corporation
    - Oxy USA
    - Thums Long Beach Company
    - Tidelands Oil Production Company
    - Warren E&P, Inc. Drilling

Equipment

Rule 1148.2 requires facilities to report the combustion equipment used during drilling, acidizing, gravel packing and hydraulic fracturing. Initial evaluation of data is summarized below. Table below shows average hours of use of combustion equipment, average number of engines reported, and average engine size. More than 50% of engines used in hydraulic fracturing are over 2000 HP.

Well Activity	Average Hours of Operation	Average Number of Engines	Average Engine Size (HP)
Horizontal Drilling	250	10	400
Vertical Drilling	86	7	700
Acidizing	84	2	471
Gravel Packing	70	9	555
Hydraulic Fracturing	37	6	1165

Chemical Usage

Under Rule 1148.2 operators and suppliers are required to submit chemical use data. Based on an initial evaluation of the data submitted, there were approximately 40 of air toxics reported by the operators and approximately 5 additional air toxics reported by the suppliers as trade secret. The SCAQMD staff took a closer look at the following thirteen air toxics:

Initial Results of Well Activities that Key Air Toxics are Found
(Based on Non-Trade Secret Chemical Reporting Only)

Air Toxics	Drilling	Acidizing	Gravel Packing	Hydraulic Fracturing
Crystalline Silica	X		X	X
Ethylbenzene		X		
Ethylene Glycol	X	X	X	X
Formaldehyde	X	X	X	
Glutural	X	X	X	
Hydrochloric Acid		X		
Hydroflouric Acid		X		
Methanol	X	X	X	X
Naphthalene	X	X	X	
Phosphoric Acid	X			
Sodium Hydroxide			X	X
Toluene		X		
Xylene		X		

Well Inspections

Following implementation of Rule 1148.2 in June 2013, SCAQMD staff conducted 74 inspections of various oil and gas well sites conducting drilling, well completion, and well rework operations. Site visits were prioritized by the well activity taking place and the presence of sensitive receptors located in close proximity to the well. Distances from the well to the sensitive receptor locations ranged from 50 feet to 1300 feet. During the inspections, SCAQMD staff observed various well operations, including:

- 13 well drilling events;
- 14 hydraulic fracturing events
- 36 acidizing events, and
- 3 gravel packing events.

During the inspections, SCAQMD staff observed well operations, taking particular note of any visible dust emissions, smoke, or odors. Following is a summary of findings from SCAQMD staff's observations:

- 11 events (15%) where visible smoke was observed, primarily from internal combustion engines at the well site;

- 12 events (16%) where visible dust was observed, primarily from vehicle traffic and sand mixing operations;
- 7 events (9%) where noticeable odors were observed by SCAQMD staff.

Monitoring and Sampling

AQMD air monitoring staff conducted sampling and monitoring at four events from October through December 2013. Handheld devices were used to measure PM and H2S. Canister samples were also taken at all events except one hydraulic fracturing job due to rain.

Event	Handheld Results for PM and H2S	Canister Results for Organics
Acidizing Event	No elevated levels of PM or H_2S	Canister samples elevated levels of hydrocarbons (10x ambient) with slightly elevated levels (3x ambient) of certain air toxics such as benzene and xylenes
Hydraulic Fracturing Event 1	Slightly elevated levels of PM10. H_2S not measured due to weather.	No canister sample due to weather.
Hydraulic Fracturing Event 2	No elevated levels of PM10, except for one short-term period of elevated levels. No elevated levels of H_2S.	Canister sampling showed slightly elevated levels of benzene and xylenes.
Drilling Event	Elevated levels of PM10 and PM2.5. Slightly elevated levels of H_2S.	Canister sampling results pending

Caveats and Next Steps

The above is staff's initial evaluation of data reported under Rule 1148.2. Staff will continue to evaluate the data. Staff will continue to evaluate the chemical reports looking at volumes of reported chemicals. Staff is continuing to conduct field inspections and sampling.