BS&W FOR DENSITY VARIATION IN TRUCK UNLOADING

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As the U.S. shale play grows, mid-stream operators increasingly face products with a wide range of densities unloading at a single site. Traditionally, capacitance probes have been used at custody transfer sites such as truck loading and unloading risers, LACT units, gathering stations, etc. Our customer experienced problems with their capacitance probe sticking at or near the top of its range when lower density product was offloaded. This caused the load to be rejected despite being on-spec.

Original OWD installation and spool design / actual unit during install.

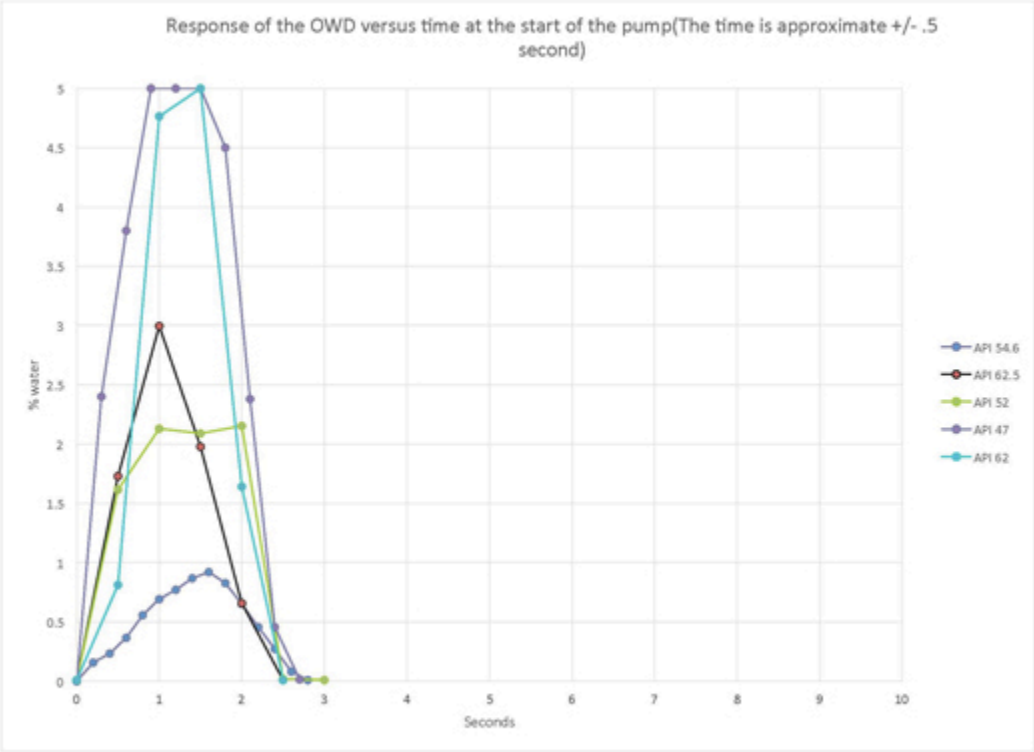
Consequently, the end user conducted a study to compare performance between the existing capacitance probe and a KAM OWD – a microwave based watercut meter. The OWD was installed horizontally on a T at the top of the "API loop" immediately in line after the capacitance probe. Flow was deemed to be sufficiently mixed based on the proximity to the pump and the vertical flow. The capacitance probe was calibrated for an API gravity of 52. A density input from an existing Coriolis was connected to the OWD to allow for density compensation from API 20-72.* Density data was then passed from the OWD to an existing PLC to save on wiring costs / requirements.

The test was conducted over two days with individual batches' API gravity ranging from approximately 32 to 60. OWD and capacitance results were compared with both Karl Fischer Moisture Analysis and centrifuge. All units performed within acceptable accuracies with the exception of two, higher density batches. In each of these cases, the capacitance probe registered high water content (3% and 4.7% respectively) while the Karl Fischer, Centrifuge and OWD all read between 0 and 0.1%.

	CENTRIFUGE % WATER	KF % WATER	CAPACITANCE % WATER	KAM OWD % WATER	Truck observed Gravity and corrected	Meter observed Gravity and corrected	Manual Observed and corrected
DAY 1	0.1	0.05	0.054	0.1	52.8@90.8=49.7	53.5@95=49.9	53.1@93=49.7
	0.1	0.01	0.04	0.008	54.6 @92=51.3	52.8@93.5=49.4	52.9@89=49.9
	0.1	0.026	0.04	0.44	62.6@86=59.5	61.8@86=58.7	61.6@82=59.0
	0.05	0.05	0.045	0.0066	60.8@88=57.6	60.6@92=56.9	61.2@92=57.5
	0.1	0.03	3	0.1	30.8@86=29.0	33@88=31.0	32.6@85=30.8
DAY 2	0.1	0.058	0.04	0.008	52.8@78=49.9	53.4@76=51.7	52.6@74=51.2
	0.1	0.069	0.04	0.009	53.5@80=51.4	52.5@83.5=50.4	52.3@83=50.0
	0.1	0.045	0.044	0.02	47.0@96=43.7	46.4@96=43.1	46.4@92=43.5
	0.1	0.065	4.7	0.013	33.0@78=31.7	33.5@85=31.7	33.5@87=31.5
2-DAY AVG.	0.094	0.045	0.889	0.078			

2-DAY AVERAGE OWD VS CENTRIFUGE: – 0.016%
2-DAY AVERAGE OWD VS KF: + 0.034%

Additionally, the OWD showed an extremely fast response to changes in water levels. Initial water slugs at the bottom of the tank were accurately reflected and readings dropped to normal levels almost immediately.



Conclusion: the OWD provides superior performance and accuracy to a capacitance probe in truck unloading scenarios where product density varies widely by batch.

* Density input for test was not corrected. KAM recommends a corrected density input for highest possible accuracy.