



US Condensate

Lease condensate: Lease condensate, called so because it is produced at the lease level from oil or gas wells, is the most commonly discussed type of gas condensate. This condensate is generally recovered at atmospheric temperatures and pressures from wellhead gas production and can be produced along with large volumes of natural gas. The API gravity of lease condensate ranges between 45 and 75 degrees, and lease condensates with higher APIs contain more NGLs, which include ethane, propane and butane, but not many heavy hydrocarbons. Higher API lease condensate is also clear or translucent (clean). On the other hand, lease condensates with a lower API gravity are a black or near black color, like crude oil, have higher concentrations of heavier compounds (dirty).

Condensate versus distillate: The terms "condensate" and "distillate" are used interchangeably to describe the liquid produced in tanks, but each term stands for a different material. Along with large volumes of gas, some wells produce a water-white or light straw-colored liquid that resembles gasoline or kerosene. The liquid has been called "distillate" because it looks like products obtained in refineries by distilling the volatile components from crude oil. But it has also been called "condensate" because it is condensed out of the gas produced by the well.

(Lease) Condensate: Light liquid hydrocarbons recovered from lease separators or field facilities at associated and non-associated natural gas wells. Mostly pentanes and heavier hydrocarbons. Normally enters the crude oil stream after production.

Lease condensate consists of very light hydrocarbons which condense from gaseous into liquid form when they leave the high pressure of oil reservoirs and exit through the top of an oil well. This condensate is less dense than oil and can interfere with optimal refining if too much is mixed with actual crude oil.

The oil industry's own engineers classify oil as hydrocarbons having an API gravity of less than 45--the higher the number, the lower the density and the "lighter" the substance. Lease condensate is defined as hydrocarbons having an API gravity between 45 and 70.

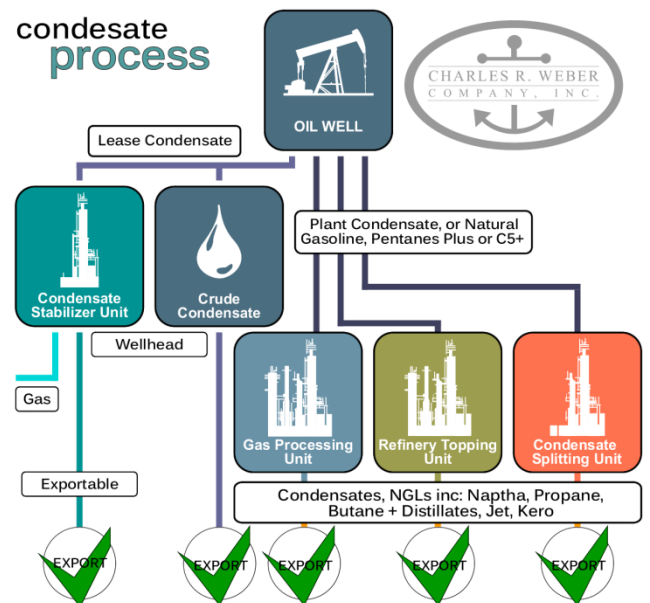
What the EIA calls crude oil is actually crude plus lease condensate. With huge new amounts of lease condensate coming from America's condensate-rich tight oil fields--the ones tapped by hydraulic fracturing or fracking--the United States isn't producing quite as much actual crude oil as the raw numbers would lead us to believe.

Exactly how much of America's and the world's presumed crude oil production is actually condensate remains a mystery. The data just aren't sufficient to separate condensate production from crude oil in most instances.

Much condensate has been moved into blended crudes, that is heavier crude oil that is blended with condensates to make it lighter and therefore something that fits the definition of light crude. Light crude is generally easier to refine and thus more valuable.

Trouble is, the blends lack the characteristics of nonblended crudes of comparable density (that is, the same API gravity), and refiners are discovering to their chagrin that the mix of products they can get out of blended crudes isn't what they expect.

Here it is worth mentioning that when oil companies talk about the price of oil, they are referring to the price quoted on popular



Stabilization Units
Lease Condensate stabilization units are common at Eagle Ford wellhead production facilities or at crude gathering points such as the Plains terminal at Gardendale, TX. Liquids rich hydrocarbons coming out of the wellhead are first separated at atmospheric pressure into liquids and gas. Then a stabilizer is used to treat the stream of gas, which still has liquids suspended in it. The stabilizer separates out lighter, more volatile components in the stream from heavier liquids. There is usually some heat involved in the process - to flash the lighter ends into a vapor that is collected from the top of the stabilizer. These lighter components continue into the wet gas gathering system that is sent to a natural gas processing plant. Condensates drop to the bottom of the stabilizer and go into pipelines or tanks to be picked up by trucks or shipped out via pipeline.



futures exchanges--prices which reflect only the price of crude oil itself. The exchanges do not allow other products such as condensates to be mixed with the oil that is delivered to holders of exchange contracts. But when oil companies (and governments) talk about oil supply, they include all sorts of things that cannot be sold as oil on the world market including biofuels, refinery gains and natural gas plant liquids as well as lease condensate. Which leads to a simple rule of thumb when considering oil: *If what you're selling cannot be sold on the world market as crude oil, then it's not crude oil.*

Neither Fish nor Fowl

Crude oil production in the Eagle Ford has ramped volumes hugely over the last few years. In most reports and statistics, all of this volume shows up as crude oil. But it's not. Between 60%-70% of this production is condensate – a hydrocarbon classification that is somewhere between crude oil and natural gas liquids. It is valued differently from crude, can require handling differently than crude, and can go into different markets than crude. But neither is it a natural gas liquid. Condensates are produced in the field, not extracted from a wet gas stream by a cryogenic processing unit.

The growth in condensate volume is not unique to the Eagle Ford. From the Granite Wash to the Bakken, they are becoming a much more important factor in the liquid hydrocarbons market. Condensates make up about 11% of what is generally referenced as “crude oil” in the global petroleum market.

You can get a lot of definitions for condensates. Schlumberger has the following description: “A low-density, high-API gravity liquid hydrocarbon phase that generally occurs in association with natural gas. Its presence as a liquid phase depends on temperature and pressure conditions in the reservoir allowing condensation of liquid from vapor.” Let's translate that. Condensates generally come along with natural gas. They can be either a liquid or a gas depending on temperature and pressure. Generally field production moves through separators and stabilizers that allow condensates to ‘fall out’ of the gas at something around ambient temperatures and pressures (plant). In addition, condensates are produced out of the well in liquid phase (lease).

The liquid condensate is a very light hydrocarbon, somewhere between 45 and 75 API gravity. (WTI is about 39 API, Brent 35 API, motor gasoline mid-50's API.) The official delineation between a condensate and a crude oil is 45 API. So this stuff is a highly volatile mixture of natural gas liquids (very high API numbers), naphtha range materials (like gasoline) and a variety of other cats and dogs. You can run your tractor on a very clean condensate.

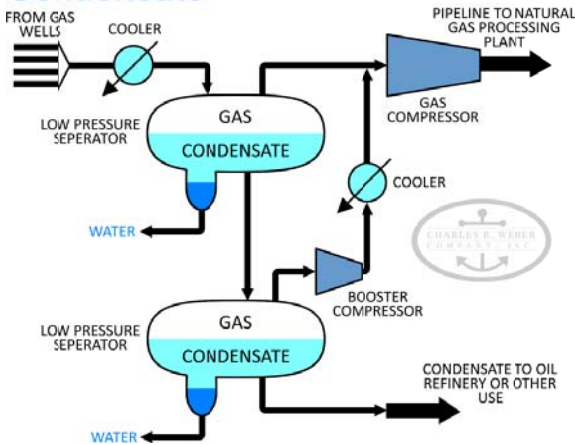
Because condensates have such a high percentage composition of light-ends (like NGLs and light naphthas) they require special storage and logistical equipment. The NGL components can easily transition back to a vapor state, which means condensates must be handled carefully.

There are three primary markets for condensates:

- (a) Sale as crude oil.
- (b) Sale as diluent for heavy crude blending.
- (c) Processing in a splitter and sold as component products.

In many situations, the preferred market for the producer is a crude oil sale. It requires the least special handling. Condensate is blended with a heavier crude oil (say something in the 30-35 degree API range), which raises the average API gravity of the blend. Higher gravity (lighter) crude oil usually commands a higher price. But when condensates are involved, it can work the other way. Refiners learned long ago that a crude oil blend that has been spiked with a light condensate has a large portion of lower value NGLs (relative to gasoline), and lots of light naphthas in the gasoline range. ...Little or no yield of distillates – which make diesel and jet fuel – and are what refiners are making most of their money on these days. So refiners create pricing formulas (called gravity banks or bend-over pricing provisions) that compute a lower price for crudes containing a high portion of light condensates. In other words, refiners discount the price they will pay for a crude-condensate blend.

Condensate



A second market for condensates is the diluent market. Diluent is used to 'thin down' Canadian oil sands crude so it will flow in pipelines without heating it, or processing through a syncrude plant. New infrastructure has been developed to move more condensates into this market sector.

The third condensate market is into a splitter for sale as component products. Think of a splitter as a very simple refinery. It is basically a distillation column that separates the condensates into raw mix NGLs, naphthas and other products. The NGL ends can then be handled as a mixed NGL stream in a fractionator. Naphthas can go into gasoline blending or the petrochemical market. Some splitters are inside refineries while others are stand-alone units. Several new splitters are being developed.

Getting Crude From the Source

In a pressing quest to secure the best possible crude, U.S. refiners are increasingly going straight to the source to avoid condensate blends.

Many US oil firms are buying up tanker trucks and extending local pipeline networks in order to get more oil directly from the wellhead, seeking to cut back on blended crude cocktails and taking control of their supply chains to secure a more predictable, consistent stream of crude.

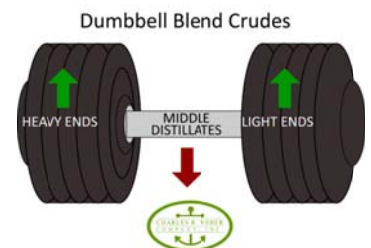
They are attempting to reduce their reliance on oil coming from Cushing, Oklahoma, the nation's biggest crude oil crossroads and storage hub. Here, a growing volume of Canadian oil sands is often mixed with lighter domestic shale crude, resulting in blends that can be less profitable than similar oil fresh from the field. For refiners, the investment is less about profitable logistics than quality control.

Many executives say that the crude oil blends being created in Cushing are often substandard approximations of West Texas Intermediate (WTI), the longstanding U.S. benchmark familiar to, and favored by, many refiners in the region. Typical light-sweet WTI crude has an API gravity of about 38 to 40. Condensate, or super-light crude that is abundant in most U.S. shale patches, ranges from 45 to 60 or higher. Western Canadian Select, itself a blend, is about 20. While the blends of these crudes may technically meet the API gravity ceiling of 42 at Cushing, industry players say the mixes can be inconsistent in makeup and generate less income because the most desirable stuff is often missing.

The blends tend to produce a higher proportion of fuel at two ends of the spectrum: light ends like gasoline, demand for which has dimmed in recent years, and lower-value heavy products like fuel oil and asphalt. What's missing are middle distillates like diesel, where growing demand and profitability lies.

"You end up with a dumbbell-like material rich in front and back ends, neither of which refineries find most profitable," said Dennis Sutton, a former chemist and retired crude quality expert with Marathon Petroleum Corp who now heads the Crude Oil Quality Association.

Oil pipeline operators, who risk losing customers as more refiners source their own supply, are also responding. They are shipping crudes in separate batches, rather than throwing them together in a single stream, as has been common for major crude pipelines to Cushing or Houston. Traditional "common stream" lines, where super-light crudes mingle with WTI-like oil, also are adapting.



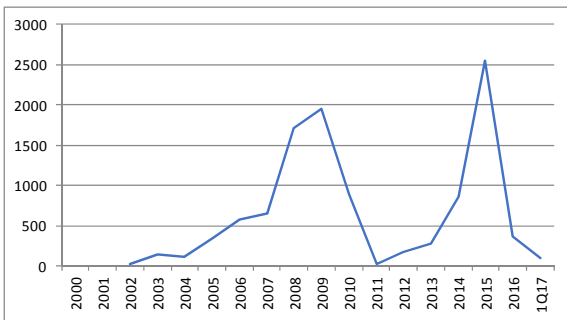


Condensate Exports & Imports - Unraveling the US codes

In terms of exports, the condensate trade began to build a little in 2014/15, but quickly fell back when the regulations were changed to allow the unfettered exports of all crudes.

A	Petroleum Oils And Oils Obtained From Bituminous Minerals, Testing Under 25 Degrees Api, Crude
B	Petroleum Oils And Oils Obtained From Bituminous Minerals, Testing 25 Degrees Api Or More, Condensate Derived Wholly From Natural Gas, Crude
C	Petroleum Oils And Oils Obtained From Bituminous Minerals, Testing 25 Degrees Api Or More, Crude, NESOI*

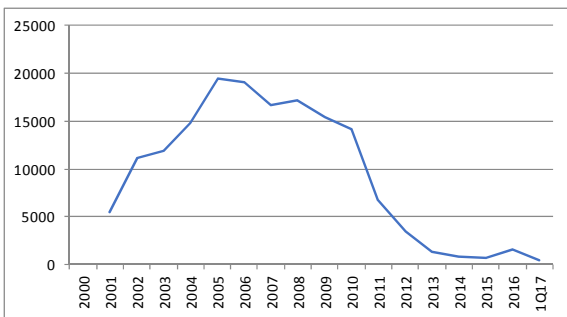
*NESOI: Not Elsewhere Specified Or Included or Not Elsewhere Specified Or Indicated



Reported US Crude Exports 2000 – Q1 2017

'000 tonnes

ID	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 Q1
A	1	3	6	0	0	118	0	74	0	0	0	0	0	0	223	634	351	334
B	0	0	21	148	117	341	570	656	1707	1949	889	29	181	271	854	2544	367	99
C	0	0	443	633	1409	2059	1228	1391	1487	2256	2213	2862	3581	6462	16364	19975	25233	10509



Reported US Crude Imports 2000 – Q1 2017

'000 tonnes

ID	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 Q1
A	130433	150591	157996	166761	185649	184740	190391	184484	185410	183309	188664	199228	195576	194966	203293	211826	220526	59198
B	0	5504	11094	11908	14800	19492	19053	16654	17118	15458	14204	6774	3457	1390	816	672	1585	468
C	0	160973	308222	334647	335533	327396	318958	318909	304352	268828	271969	253882	226910	188832	165115	151266	162264	43657

Source: US Customs