

Oil Sales The Road So Far



FLUOR
FEDERAL PETROLEUM
OPERATIONS



U.S. DEPARTMENT OF
ENERGY

History

The mission of the office of the Strategic Petroleum Reserve is to protect the United States from severe petroleum supply interruptions through the acquisition, storage, distribution, and management of emergency petroleum stocks and to carry out U. S. obligations under the International Energy Program.



Crude Oil Sales

Projected Sales Volumes By Year & Requirements

Drawdown Legislation	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Bipartisan Budget Act of 2015 (H.R. 1315, Section 403) <i>(Annual Sales Volumes Mandated by Budget Bill)</i>	-	5	5	5	5	8	10	10	10	58
Bipartisan Budget Act of 2015 (H.R. 1315, Section 404) <i>(Annual Sales Volumes based on \$2 billion revenue)</i>	6.4*	TBD	TBD	TBD	-	-	-	-	-	36.4
Surface Transportation Reauthorization and Reform Act of 2015 (H.R. 22, Section 32203) <i>(Annual Sales Volumes Mandated by Highway Bill)</i>	-	-	-	-	-	-	16	25	25	66
21st Century Cures Act of 2015 (H.R. 6, Section 5010) <i>(Annual Sales Volumes Mandated by Bill)</i>	10	9	6	-	-	-	-	-	-	25
Total Annual Drawdown Volume	16.4									185.4

All volumes in millions of barrels

Assumes SPR crude oil sold for \$50 per barrel in FY2018; \$55 per barrel in Fys 2019-20; changes to sales prices would require volumetric adjustments

*Completed in May 2017 and does not reflect the President's 2018 Proposed Budget

Mission Evolution from Emergency Reserve to include Crude Oil sales

Infrastructure challenges due to age or other delivery impediments. Planned site upgrades (LE2) have seen additions to the list of deliverables and some adjustments in task priorities.

Customer expectations regarding service, pricing, and product quality have evolved as the SPR expands its role to include commodities supply.

Adjustments in resource allocation, delivery strategies, and product quality considerations have been made and continue to be evaluated and addressed.

Enhanced Customer Focus on Feedstock Quality

During emergencies the primary goal is to maintain the supply of feedstock.

In non-emergency sales events customers have flexibility to be more discriminating in their feedstock selections.

Some customers have asked for additional information regarding cavern product quality, availability of samples for additional testing, and scheduling/delivery revisions not normally available during emergency operations.

A Word About Assays

Caverns are sampled at nominal 10-year intervals for determination of yield, whole crude properties, and selected properties on the distillation fractions.

Completed assays on mingled streams can be viewed online at:

https://www.spr.doe.gov/reports/Assays/2017/1701_Assays.html

Testing technology evolves, new industry standards emerge, and additional legislative mandates will drive many aspects of refining process control.

Fundamental Quality Precepts in Cavern Storage

Cavern temperature and pressure conditions are not severe enough to induce chemical and physical changes that characterize a specific oil production area. Typically 640 psi at about 110F.

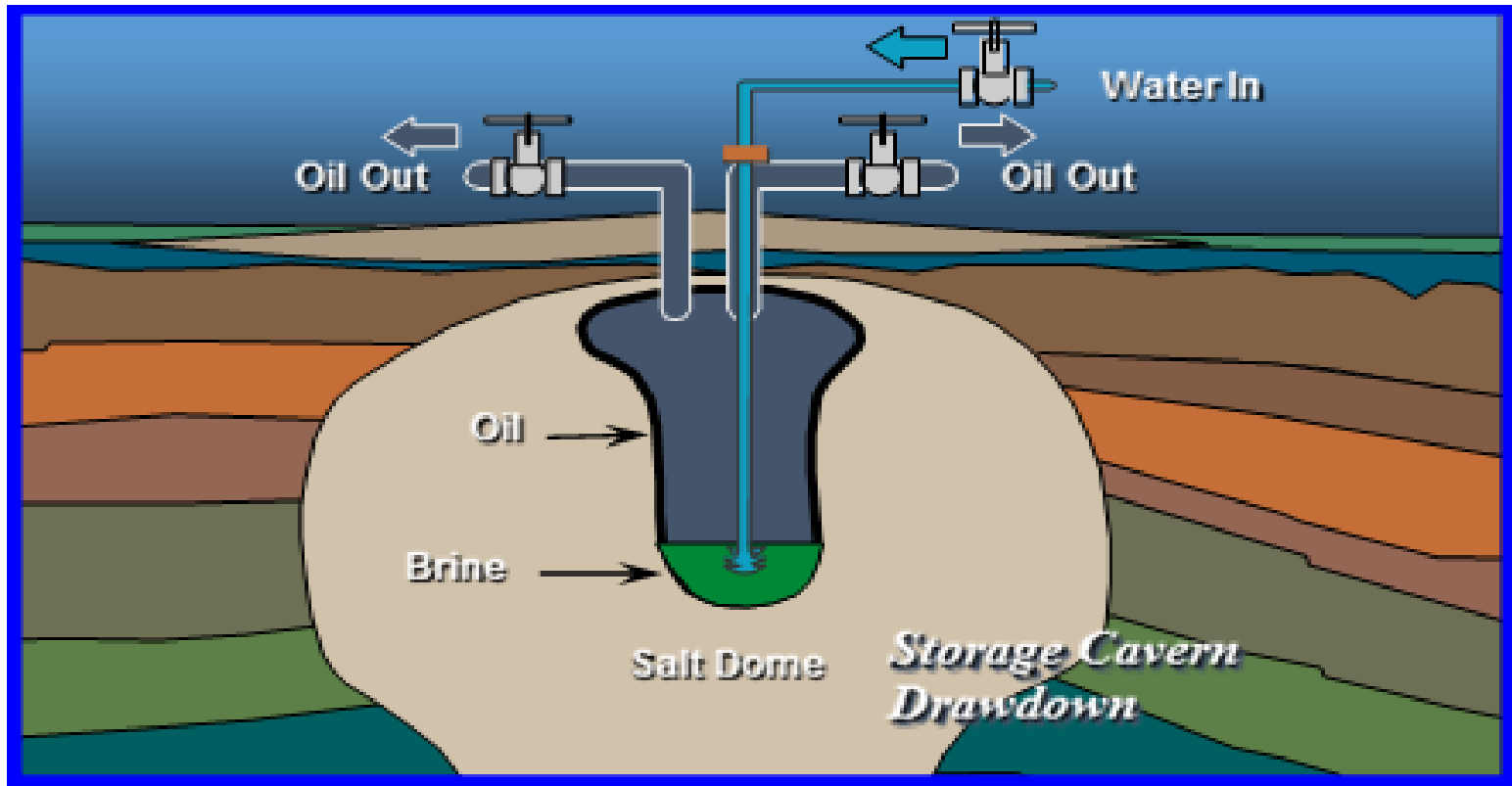
Generally, the oil quality in a filled cavern does not change noticeably over a period of a decade in storage. Quality may be *improved* through dropout of asphaltenes, heavy emulsions, water, and sediment over time.

Comparisons of 10-year Assay Data

Property	Cavern A 2005	Cavern A 2016	Cavern B 2005	Cavern B 2016*	Cavern C 2006	Cavern C 2016	Cavern D 2004	Cavern D 2016
Sulfur, mass%	0.429	0.431	1.34	1.39	1.53	1.49	1.60	1.51
Nitrogen, Mass%	0.123	0.14	0.13	0.13	0.132	0.15	0.104	0.13
Acidity/Tan mg KOH/g	0.19	0.16	0.22	0.22	0.16	0.09	0.16	0.14
UOP K factor	12	12	11.9	11.9	11.8	11.9	11.9	11.9
Ni, mg/kg	6.3	7.2	9.7	9.5	12.4	13.7	10.0	11.1
V, mg/kg	8.6	9.0	42.2	43.1	45.0	39.2	47.2	51.0
Fe, mg/kg	8.8	3.3	1.0	1.6	1.2	1.1	0.6	0.6
Vol% through 650F	62.2	62.2	57.3	56.7	54.9	53.8	57.6	56.9
API gravity	36.8	36.4	33.4	33.4	31.5	31.4	32.8	32.9
Water, mass%	0.08	0.02	0.03	0.03	0.02	0.03	0.03	0.04

* Sample of Opportunity

Cavern Structure Schematic



Not to Scale

Quality Considerations Have Evolved

Vapor Pressure

H₂S Levels in Oil and Vessel Headspace

Compatibility/Asphaltene Precipitation

Formation of Stable Emulsions

New or Revised Test Procedures

Policies, Procedures, and Review

Any questions regarding the assays or the analytical methods used in obtaining these should be addressed to:

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Questions