U.S. Strategic Petroleum Reserve (SPR)

Crude Oil Quality & Cavern Overview

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Received 855,952,235 bbls since commencement of operations
The original requirements for volumes and types of oil to be stored at the Strategic Petroleum Reserve reflected the commercial and technical preferences of manufacturers in the mid-1970s. Oil collected through the 1990s was classified and segregated along the following templates:

- One generic, medium gravity sour crude
- Four distinct medium gravity sweet crude types
- One heavy, sour crude similar to Alaskan North Slope (ANS)
- One category similar to Mayan crude.
That level of segregation became very problematic very quickly, and four crude classifications were established:

- One medium gravity sweet crude similar to Ninian/Forties
- One medium gravity sour crude similar to Mexican Isthmus
- One blend of ANS with other medium gravity crude oils
- One segregation that was primarily Mexican Maya

Shutdown of our site at Weeks Island gave the SPR an opportunity to improve its ability to serve the American public by reducing crude segregation to just 2 primary classifications:

- One medium gravity sweet crude (0.50 mass% sulfur, max)
- One medium gravity sour crude (1.99 mass% sulfur, max)

Each SPR location now segregates only 2 grades of crude oil.
## SPR Domestic Oil Comparables

<table>
<thead>
<tr>
<th>SPR Crude</th>
<th>API</th>
<th>SULFUR %</th>
<th>U.S.G.C. Domestic Crude</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM SWEET</td>
<td>36.4</td>
<td>0.38</td>
<td>LIGHT LOUISIANA SWEET (LLS)</td>
</tr>
<tr>
<td>BM SOUR</td>
<td>33.3</td>
<td>1.41</td>
<td>BONITO SOUR (BS)</td>
</tr>
<tr>
<td>BH SWEET</td>
<td>35.4</td>
<td>0.40</td>
<td>LLS</td>
</tr>
<tr>
<td>BH SOUR</td>
<td>30.8</td>
<td>1.44</td>
<td>POSEIDON CRUDE (HOUMA)</td>
</tr>
<tr>
<td>WH SWEET</td>
<td>36.9</td>
<td>0.33</td>
<td>LLS</td>
</tr>
<tr>
<td>WH SOUR</td>
<td>33.5</td>
<td>1.38</td>
<td>BS</td>
</tr>
<tr>
<td>BC SWEET</td>
<td>35.4</td>
<td>0.43</td>
<td>LLS</td>
</tr>
<tr>
<td>BC SOUR</td>
<td>31.9</td>
<td>1.46</td>
<td>POSEIDON CRUDE (HOUMA)</td>
</tr>
</tbody>
</table>
Cavern Sampling

Requirements defined in the SPR Crude Oil Quality Program & Test Criteria

Cavern sampling frequency - Initially established for a 5 year cycle
- 1998 – Revised to 7 year cycle
- 2003 – Revised to its current 10 year cycle

10 year cycle provides for a +/- 2 year allowance
- Allows sampling activities to fit into other planned work (i.e. degas operations, workover rig schedule, cavern maintenance)
Cavern Sampling – Additional Requirements

Sampling for recently filled/re-filled caverns

- Filled caverns which have received 1 million barrels or greater than 25% of the beginning inventory of oil will be sampled
- Samples are obtained a minimum of 180 days after injection is complete
- If a cavern is only partially refilled, M&O contractor will provide sampling recommendation with final disposition pending DOE concurrence

Additional pressurized samples (TVP-95) are taken in support of the Vapor Pressure monitoring program; BPP monitoring

Cavern sample testing

- Comprehensive Assay Analysis
- Gas Chromatographic Analysis (Light ends, PIANO)
Laboratory Analysis Testing

Cavern samples obtained are shipped to the Contracted laboratory where a full slate assay is conducted.

Analysis results are provided to DOE-HQ, DOE-PMO, and the M&O Contractor

- M&O Contractor maintains of all assay reports in the Crude Oil Sample Management and Organization System (COSMOS)
- Current assays for all caverns also are keep in SharePoint for quick access by local SPR groups (COL/COMT)

Duplicate retain samples are held at the BH sample repository, and are retained until new cavern samples are obtained
Crude Oil Assay Program

The DOE Crude Oil Assay Manual is published and updated by HQ

• Current manual (3rd Edition) was last published August 2008
• Manual topics: Acquisition and Storage of Crude Oils, the Crude Oil Quality Assessment Program, Laboratory Procedures, and SPR Crude Oil Composition

Crude Oil Assay Stream Postings

• Official updated composite assays are posted on the HQ webpage [www.spr.doe.gov](http://www.spr.doe.gov) under SPR Crude Oil Comprehensive Analyses (most current assays dated 2016)
• SPR Oil Sales assays: [https://www.spr.doe.gov/reports/Crude_Oil_Assays.html](https://www.spr.doe.gov/reports/Crude_Oil_Assays.html)
Louisiana Storage Sites

SPR West Hackberry Storage Facility

Location: Hackberry, LA
Caverns: 21
Storage Capacity: 221,000,000 Barrels

Drawdown Rate: 1,300,000 Barrels/Day

SPR Bayou Choctaw Storage Facility

Location: Plaquemine, LA
Caverns: 6
Storage Capacity: 76,000,000 Barrels

Drawdown Rate: 515,000 Barrels/Day
Texas Storage Sites

**SPR Bryan Mound Storage Facility**

- **Location:** Freeport, TX
- **Caverns:** 19
- **Storage Capacity:** 247,000,000 Barrels
- **Drawdown Rate:** 1,500,000 Barrels/Day

**SPR Big Hill Storage Facility**

- **Location:** Winnie, TX
- **Caverns:** 14
- **Storage Capacity:** 170,000,000 Barrels
- **Drawdown Rate:** 1,100,000 Barrels/Day
Relational Comparison

Office of Fossil Energy

![Salt Dome Image]

- SALT DOME
- Typical SPR Cavern
- Willis Tower 1,451’
- Mercedes-Benz Superdome 273’
- Washington Monument 555’
- 2550’
- 2260’

[Image of Salt Dome with Various Landmarks]
Storage Cavern Leaching Development

Leaching Stage I

Leaching Stage II

Storage Cavern Complete

Storage Cavern Drawdown
Thank You!

Questions?

Further information: http://energy.gov/fe/services/petroleum-reserves/strategic-petroleum-reserve