The Somewhat Accidental Discovery of the Mobile Bay Gas Field: A Story of Perseverance and Good Fortune

Weldon G. Frost

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Abstract

In 1979, NASA's SkyLab was still in orbit; Jimmy Carter was President; the US was suffering from the Second OPEC Oil Crisis; the Sony Walkman was introduced; and Terry Bradshaw's Pittsburgh Steelers took Super Bowl XIII from the Dallas Cowboys. I was Exploration Manager for Mobil in New Orleans, and the Mobile Bay Field was discovered.

Today, Jimmy Carter has been a former President for over 30 years; the Walkman is an antique; and Terry Bradshaw is a 61-year old actor and sports commentator. However, Mobile Bay is still producing gas and will continue to do so for at least another thirty years.

An oil or gas discovery often comes from a combination of luck, sound technical and management decisions, overcoming legal, environmental, and operational difficulties - and perseverance at critical times. This story of the discovery of gas at 20,450 feet in the Mobile Bay #76-1 well in 1979 includes all of the above. Located in the very heart of a major Gulf Coast recreational and historical area - an offshore Civil War Battlefield no less - Mobile Bay #76-1 presented a unique set of technical and environmental challenges. This presentation describes the technical aspects of how this discovery came about, but unlike most such papers, the passage of time allows the author an opportunity to provide a new generation of geologists a glimpse of how the industry and the technical story has evolved. The real story here is one from a personal and human perspective and how the character and experience of some of the individuals involved had such a great impact on the successful and surprising outcome.
The Somewhat Accidental Discovery of the Mobile Bay Gas Field:

A Story of Perseverance and Good Fortune

Weldon G. Frost
STORY ELEMENTS

* Getting the LEASES and PERMITS to DRILL
* The PROSPECT
* DRILLING Operations
* TESTING the Well
* What was FOUND
* AFTERTHOUGHTS
Acquiring Leases and Permits
Challenges

• The Attorney General for the State of Alabama Opposed Mobil’s Application.
• The Oil and Gas Board had to delay action on the applications while rules for offshore drilling were formulated.
• Mobil successfully filed a suit in Federal Court to stop the clock on the lease expirations.
• A State appeal of that decision was unsuccessful so the clock remained stopped.
• Hearings were held with the Corps of Engineers, the Oil and Gas Board and the Alabama Water Improvement Commission.
• Certification was eventually denied by the Alabama Water Improvement Commission.
• Another suit was filed in Federal Court by Mobil, was deferred to a State Court then removed to the Circuit Court in Montgomery County – all without resolution.
<table>
<thead>
<tr>
<th>Principal Parties and Groups Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alabama Water Improvement Commission</strong></td>
</tr>
</tbody>
</table>
| Ken Keller  
General Manager, Mobil New Orleans |
| **U.S. Corps of Engineers** |
| Myrt Jones  
President, Mobile Bay Audubon Society |
| **Alabama Oil and Gas Division** |
| Tom Joiner,  
State Geologist Oil and Gas Division State of Alabama |
Pre-conditions for approval of the Mobile Bay Audubon Society

* Mobil was to provide a $55MM BOND against potential damages that might occur as a result of drilling
* A ―NO DUMP POLICY‖ — the first of its kind in industry
  
  Mobil would collect all mud, cuttings, sewage and even rainwater that fell on the rig
  
  All water / cuttings would be directed into a special barge and disposed of onshore in an approved landfill

* Special Containment EQUIPMENT around the rig
* Continuous MONITORING of water quality in the Bay: Pre-, During-, and Post-drill
History

August 5, 1864

US Navy Recruiting poster, WWI-era
The Prospect

Depth Structure, Top Norphlet
Crandall et. al
(MOEPSI, ca. 1987, Prior to 3D acquisition)

Mobil 76-1 =
State Lease 347 No. 1
Norphlet Sand
Mobil rig delivered for bay drilling

Permits sought for more wells

By J. E. ODOM
Register Staff Reporter

DAUPHIN ISLAND AL — A huge oil and gas drilling rig is expected to be locked into place one mile east of here in Mobile Bay Tuesday for start of Mobil Oil Corp.'s multi-million-dollar exploration of this area's proposed energy resources.

A Oral Williams, superintendent of the field, said Mobil Oil Co. has filed applications with the Mobile District office of the U.S. Army Corps of Engineers for permission to drill four additional wells in the area. The first drilling at the primary location proved successful. If approved by the Corps, there will be located west of the Mobile ship channel and one north of Fort Morgan.

The barge rig for Tuesday's drilling operation arrived at Dauphin Island Sunday from Galveston, Texas, after a delay of several weeks due to bad weather. The drilling platform on the barge has been raised and crews are beginning actual drilling operations today.

The Mobil Oil Corp. is preparing to drill with a new type of rig that will be more efficient and effective than previous rigs. The company's exploration work is expected to be completed in six months.

The project is expected to have a major impact on the local economy, creating jobs and increasing the region's energy supply.

Mobil to drill for oil and gas near Mobile Bay

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DRILLING PROBLEMS

• Stuck the surface casing and had to re-drill
• The pad of oyster shells placed under the barge rig washed away and had to be replaced and protected by sheet piling
• Lost a 13 ¾ inch bit at 5,950 feet and milled on it
• Twisted off twice
• Lost a turbo drill at 14,750 feet, fished and sidetracked, losing six weeks
• Numerous logging difficulties due to the high temperature and pressure, as well as vendor organizational problems
• Lost both coiled tubing and wire line while testing the well which required lengthy fishing operations
Hurricane Frederic

MB 76-1
Hurricane Frederic

Landward sand transport over Dauphin Island

Destroyed Dauphin Island Causeway

Images courtesy of the University of South Alabama
Mobil 76-1

Tight Zone Isochore: 74’
Porous HC Column: 412’
Net Gas: 362’
Gross Norph. Isochore: 542’

Porosity avg: 11.1%
Permeability avg: 7.7 md
SW avg: 14.6%
## Testing the Well

<table>
<thead>
<tr>
<th>Remarks / Depth</th>
<th>Time</th>
<th>Duration (Minutes)</th>
<th>Coil Tubing Depth (Feet)</th>
<th>Coil Tubing (PSI)</th>
<th>Annulus (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,000'. Pumping N2</td>
<td>12:30</td>
<td>88</td>
<td>7000</td>
<td>1400</td>
<td>0</td>
</tr>
<tr>
<td>7000' of 3-1/2&quot; blown dry. N2 returns to surface. Monitored for no feed-in. Begin GIH to 8000'</td>
<td>13:58</td>
<td>24</td>
<td>7000</td>
<td>1400</td>
<td>0</td>
</tr>
<tr>
<td>At 8000'. Pumping N2. Running low on N2 supply. Well showing no indication of feed-in. <strong>GIH to 10,000' while pumping N2.</strong></td>
<td>14:22</td>
<td>28</td>
<td>8000</td>
<td>1400</td>
<td>0</td>
</tr>
<tr>
<td>At 10,000'. Pumping N2. Increase in injection pressure equal to increase in hydrostatic head (1400 to 3000 psi).</td>
<td>14:50</td>
<td>40</td>
<td>10000</td>
<td>3000</td>
<td>0</td>
</tr>
<tr>
<td>At 10,000'. Injection Pressure had built from 3000 to 3600 psi. Began picking up coil tbg. to 9700'. Pressure stabilized at 3600.</td>
<td>15:30</td>
<td>37</td>
<td>10000</td>
<td>3600</td>
<td>0</td>
</tr>
<tr>
<td>Getting anticipated returns; however, returns seemed stronger than usual. Start POOH w/coil tbg. Annulus pressure starting to build. <strong>Well is coming-in.</strong></td>
<td>16:07</td>
<td>53</td>
<td>9200</td>
<td>3400</td>
<td>500</td>
</tr>
<tr>
<td>Gas hit at surface</td>
<td>17:00</td>
<td></td>
<td>6021</td>
<td>6100</td>
<td>4700</td>
</tr>
</tbody>
</table>
The Big Lesson:

Perseverance
Mobil 76-1

Final Test Results

12.6 MMCF/D, 28/64 ths Choke, 12 hrs
9% H2S, 5% CO2
Trace C3
Calculated AOF: 37.3 MMCF/D

At 20,729’:
BHT 414 Deg. F
BHP 11,240 psi (0.542 psi/ft)
Isochore, Porous Norphlet
INDUSTRY ACTIVITY

20+ Platforms Active

320 MMCFG/D Current Production

4.5 TCF Produced to Date
Mobile Bay Success Was Worth The Wait

By KATHY SHIRLEY
EXPLORER Staff Writer

It took Mobil Oil Corp. more than two decades to finally drill its prospect in Alabama’s Mobile Bay, but the results were certainly worth the wait.
The firm completed its first discovery east of Dauphin Island in Mobile Bay in December 1979 — more than 20 years after Mobil explorationists first suspected there was a structural trap in the region, said Roy Roadifer, chief geologist for Mobil.

But the discovery well, 76-1, made all the hard work and frustration worthwhile when it hit pay and was tested at 12.2 million cubic feet of gas per day at a total depth of 21,113 feet.

Today, their may be a bright future for an area that has only yielded one dry hole, that just 10 years ago had no offshore oil or gas discoveries, and that 20 years ago gave only the smallest hint of the potential that lay beneath the shallow waters of Mobile Bay.
The story started in the late 1950s, when Mobil explorationists studying the area concluded that there could be a structural trap beneath the bay in Cretaceous objectives. Those early conclusions were based primarily on a gravity survey and one well on the Fort Morgan Peninsula that indicated a structure in the bay, Roadifer said.

Mobil at that time had not thought in terms of production deeper than the Cretaceous, because at that time deeper seismic data could not be obtained. There was no way of mapping what lay deeper.

‘Mobile Bay’ Paper Slated For Atlanta

Roy Roadifer, chief geologist with Mobil will present a special paper “The Mobile Bay, Alabama, Exploration Play,” at the AAPG annual convention in Atlanta.
The special session will be held at 5 p.m. Tuesday, June 17.

Mobil spent the next 10 years in the frustrating process of attempting to obtain the leases in Alabama’s state waters in Mobile Bay. This leasing problem was complicated by the fact that the leases that now cover the Mary Ann Field are in the shipping channel between Fort Gaines and Fort Morgan.

Ultimately, Mobil was the successful bidder, and in 1969 leased four blocks of about 5,000 acres each for approximately $80,000, with a 1/6 royalty.

But Mobil’s troubles weren’t over. For the following nine years the company fought for the appropriate federal and state permits allowing it to drill in the bay.

A drilling permit finally was issued in 1978. Mobil wasted no time in spudding its first well.

Hitting The Norphlet

During the 20 years Mobil landmen and attorneys were battling for leases

See ‘Mobile Bay,’ page 12

Development of Mobile’s Mary Ann Field offshore Alabama is underway. The Rowan Rig 4, pictured here, drilled the discovery well in the field as well as one of the delineation wells.

AAPG Explorer, May 1986
A Win-Win Outcome: Benefits to the citizens of Alabama

1982: ALABAMA HERITAGE TRUST FUND
$449 Million - Lease Bonuses, Sale No. 1, Alabama State Waters

1985: ALABAMA TRUST FUND
Bonuses, Rents, and Royalties from offshore gas industry

2001: ALABAMA TRUST FUND
(Combined both Trusts: Permanent and Irrevocable)
$3.4 Billion (Year 2009) Total Assets
+/- $300 Million Annual Income
THANKS

The author wishes to thank his co-author, R. Scott Hubbard, and ExxonMobil, for preparation of the graphics.

Tom Joiner, Ellis Babcock, Joe Fryer, Bill Sinclair, Jack Wilson and Ted Lumley assured the authenticity of the story.
The End

(For now)