



Effective Well Control - Prevention & Response

Agenda



- **Gulf of Mexico Activity**
- **Historical Well Control Events**
- **Components of Effective Well Control**
- **Source Control Response**
- **Questions?**

Drilling Rigs Working in U.S. Gulf of Mexico



Platform Rig = 19



Semi-submersible = 19



Drillship = 20



Jack-up rig = 29

**Total Rigs Working: 87
as of May 19, 2014**

U.S. Gulf of Mexico New Deepwater Rigs



Deepwater Rig & Type	Operator	Quarter Expected
Sadrill West Auriga drillship	BP	3rd Qtr. 2013
Noble Don Taylor drillship	Shell	
Sadrill West Vela – drillship	BP	4th Qtr. 2013
Stena IceMAX – drillship	Shell	1st Qtr. 2014
Diamond Offshore Ocean Onyx – rebuilt semi	Apache	
Atwood Advantage - drillship	Noble Energy	
Maersk Viking – drillship	ExxonMobil	
Sevan Louisiana – cylinder hull	LLOG Exploration	
Diamond Offshore Ocean Blackhawk - drillship	Anadarko	2nd Qtr 2014
Noble Bob Douglas - drillship	Anadarko	
Maersk Valiant - drillship	ConocoPhillips	
Transocean Deepwater Invictus – drillship	BHP Billiton	
Pacific Sharav – drillship	Chevron	3rd Qtr. 2014
Diamond Offshore Ocean BlackHornet – drillship	Anadarko	
Noble Sam Croft – drill ship	Freeport McMoran	
Rowan Resolute – drillship	Anadarko	
Sadrill West Neptune – drillship	LLOG Exploration	4th Qtr 2014
Rowan Reliance - drillship	Cobalt Intl. Energy	1st Qtr 2015
Noble Tom Madden - drillship	Freeport McMoran	
ENSCO DS-9 – drillship	Conoco Phillips	3rd Qtr 2015



A Look At Historical/Recent Well Control Events

BSEE Definition of Loss of Well Control (LWC)



The current definition for LWC:

- Uncontrolled flow of formation or other fluids. The flow may be:
 - to an exposed formation (an underground blowout) or
 - at the surface (a surface blowout).
- Flow through a diverter
- Uncontrolled flow resulting from a failure of surface equipment or procedures

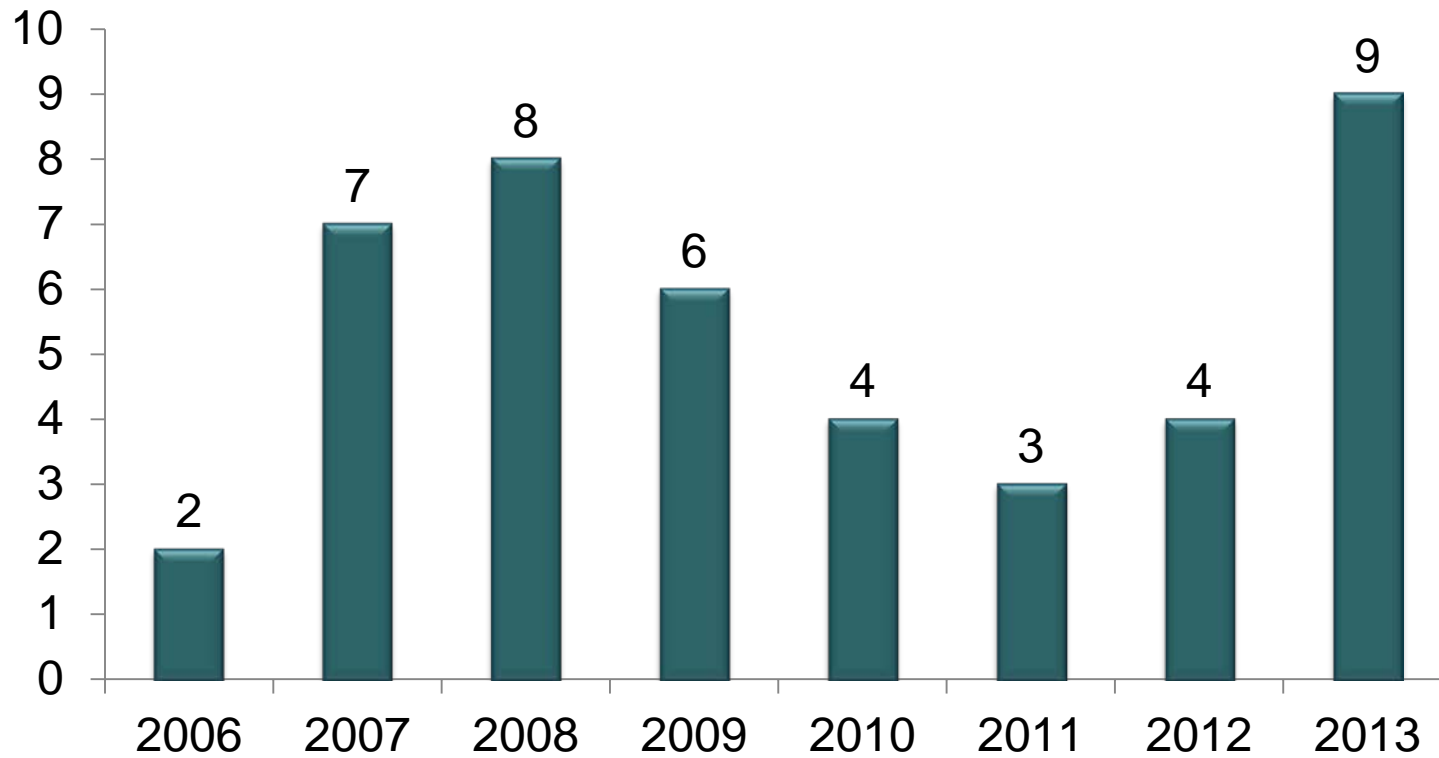
BSEE requires that all Losses of Well Control be reported. Effective July 17, 2006, BSEE revised the regulations for incident reporting.

All loss of well control, besides shallow water flows, must be reported by immediate oral report, per 30 CFR 250.188(a)(3). For shallow water flows, BSEE requires that they be reported within 12 hours of occurrence.

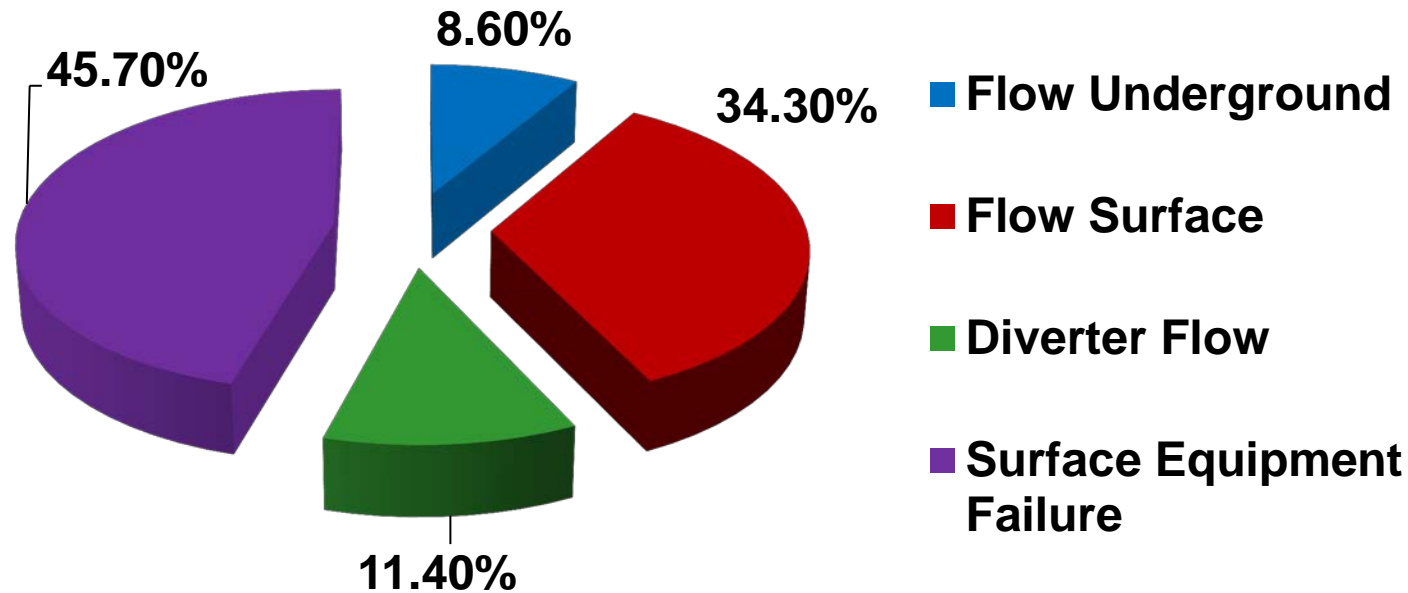
Loss of Well Control



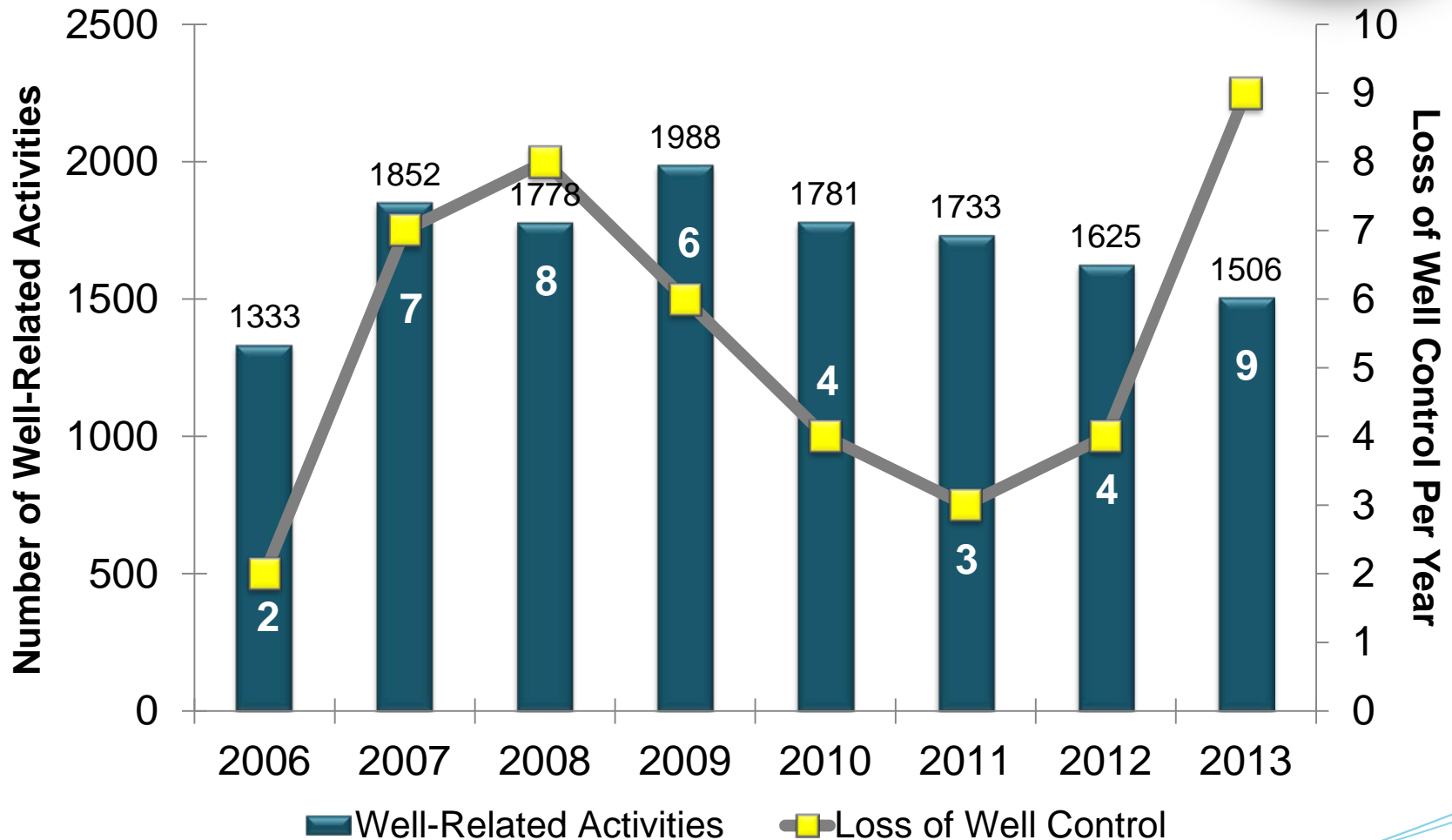
OCS LWC Incidents (2006-2013)



Loss of Well Control Incidents by Type (2006 -2013)

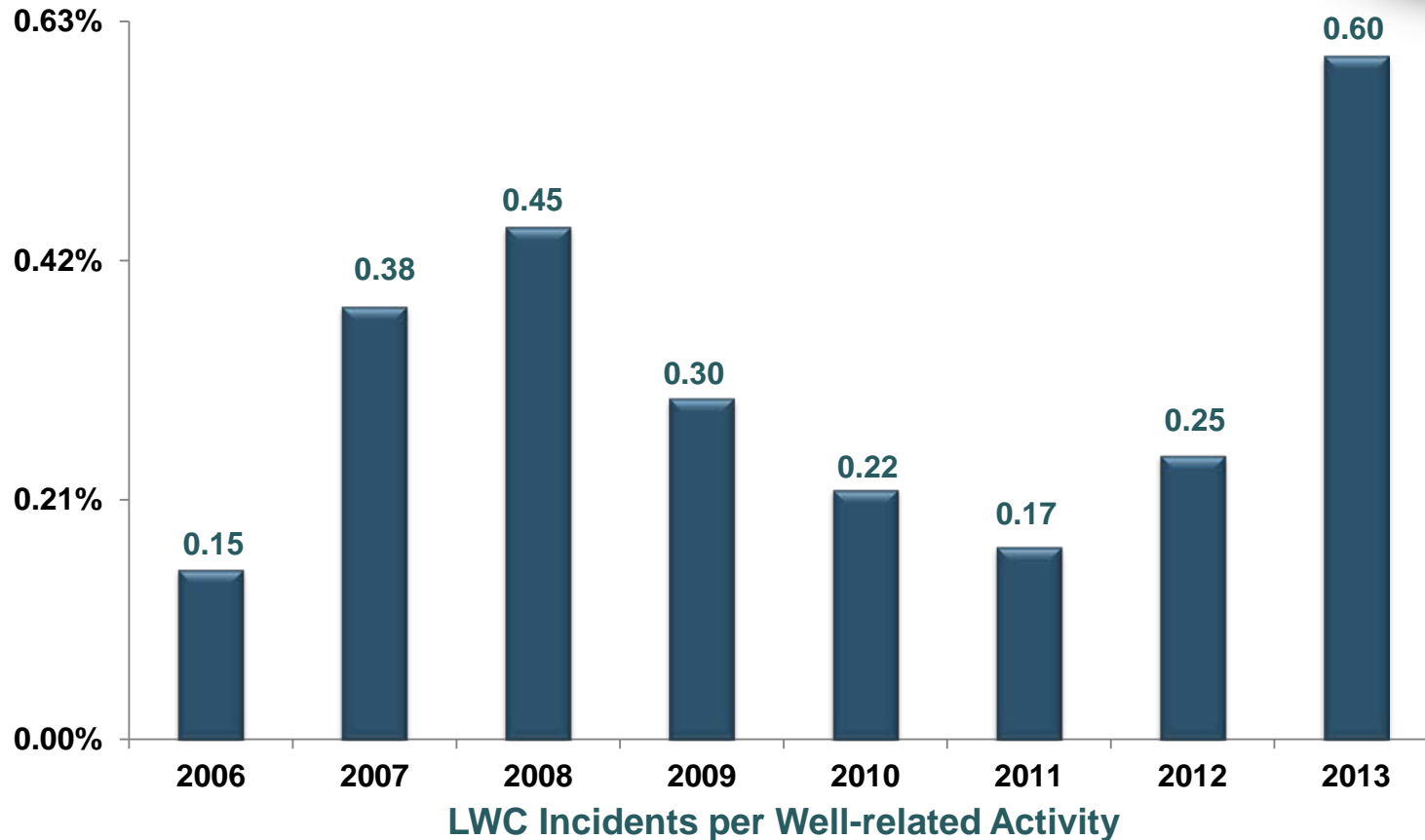


Loss of Well Control in GOM 2006-2013



Well-Related Activity: Total of (1) the number of new wells spud plus (2) the number of wells reentered for the purpose of reworking or abandonment during a calendar year

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Well Control Incidents in 2013 (by type)



- **Flow Underground**
 - **2-05-13 Apache @ Main Pass 295**
- **Flow Surface**
 - 2-11-13 BP @ Mississippi Canyon 777
 - 4-25-13 Petrobras America @ Walker Ridge 206
 - **7-23-13 Walter Oil and Gas @ South Timbalier 220**
- **Diverter Flow**
 - 4-10-13 Pisces Energy @ Vermilion 356
 - 12-20-13 Walter Oil & Gas @ South Timbalier 285
- **Surface Equipment Failure**
 - 2-28-13 Cobalt @ Green Canyon 896
 - **7-07-13 ERT/Talos @ Ship Shoal 225**
 - 9-17-13 Shell Offshore @ Viosca Knoll 956

MP 295 #1 / ENSCO 87



- Water Depth – 218 feet
- Distance to Shore – 20 miles
- Product - Gas
- Exploratory Well

2013 LWC Incidents of Interest



5 February 2013, LWC, Underground

Date: 5 February 2013

Facility: MP 295 #1 / ENSCO 87

Incident: On 5 February 2013 at approximately 0700 hours, a well control event occurred on the jack-up rig Ensco 87 that resulted in an underground blowout. The Ensco 87 was drilling an exploratory well for Apache Corporation, Lease OCS-G32263, Main Pass (MP) Block 295, Gulf of Mexico (GOM), offshore the State of Louisiana.

On 2/14-2013 at 10:40 A.M. Apache informed the New Orleans District that they have underground flow from the kick that was taken on 2-5-2013 and that kill operations are ongoing.

District Investigation concluded the causes of the incident were:

- 1) The 18" liner top seal assembly failed.
- 2) The cement barrier between the conductor casing and the surface liner failed.

MP 295 #1 / ENSCO 87

Surface Well Control Event Response



- **Response for uncontrolled underground kick at Apache's MP 295 location**
 - **2/10/13**
 - Kick occurred
 - Non-essential employees were evacuated from drilling rig
 - Well control consultant is on location
 - BSEE mobilized to command center
 - Divers have performed a survey near the well
 - **2/11/13 – 2/14/13**
 - Pumping operations began to isolate the flow
 - **2/15/13**
 - Relief well rig is under contract and has suspended operations and is preparing to move to location for relief well purposes
 - Personnel is on location for pumping specialty plug and begin pumping the plug
 - **2/15/13**
 - Pumping operation ongoing and the final squeeze
 - Rigged up noise/temp log to run after the plugs are set
 - **2/16/13**
 - Operator has started working with BSEE to get relief well permit approved if needed
 - Noise/temp log indicated noise is still present indicating underground flow to shallow formation
 - Well is stabilized but cross flow continues
 - **2/17/13 – 3/5/13**
 - Lubricate and bleed well control is under way to stop cross flow
 - Site survey is conducted and no additional source is detected

Ship Shoal (SS) 225 B



- Water Depth – 146 feet
- Distance to Shore – 65 miles
- Product – Gas and condensate
- Abandonment procedure

2013 LWC Incidents of Interest



7 July 2013, LWC, Surface

Date: 7 July 2013

Facility: SS 225 B

Incident: During a temporary abandonment procedure on July 7, 2013, while attempting to pull a tubing plug hold down stop in the short string of the B002 well, unexpected pressure was encountered. Well control was lost due to leaks in the tubing, production casing, and surface casing to an unsealed annulus. Well control was regained and the well has since been plugged. There were no injuries but there was a loss of hydrocarbons to the waters of the Gulf of Mexico (GOM).

District Investigation concluded the probable cause of the loss of well control was pulling the short string plug at 2550 feet without confirming the existence of pressure below the plug.

SS 225 B

Surface Well Control Event Response



- Response for uncontrolled gas release at surface at ERT's SS 225 well B002 location
 - 7/7/13
 - Plug was being pulled in tubing when kick was taken
 - 7/8/13
 - Operator evacuates all personnel to nearby supply boats
 - Operator contacted various other operators for rig availability in case a relief well was needed
 - 7/9/13
 - Operator acquired a supply boat loaded with kill weight mud
 - Operator acquired 2 crew boats for logistics
 - Southern Marine Vessel
 - Wild Well Control (WWC) firefighting equipment will be placed on this vessel
 - 3 men boarded to collect LEL readings
 - A flyover was performed overseeing a sheen of approximately 3 barrels
 - Another vessel will be utilized for pumping operations
 - 7/10/13
 - 6 personnel from Operator on board to access the damage
 - 2 support kill vessels are at location
 - WWC personnel to install equipment
 - 7/11/13 – 7/12/13
 - Kill operations begin with BSEE personnel on board of Kill weight mud supply board
 - Kill successful
 - 7/13/13
 - Cement plug was installed to seal well
 - 7/14/13
 - Well is under control and isolated

ST 220 A / Hercules 265



- Water Depth – 154 feet
- Distance to Shore – 55 miles
- Days to complete relief well – 74
- Product – Gas
- LWC Occurred – POOH with TCP gun

2013 LWC Incidents of Interest



23 July 2013, LWC, Surface

Date: 23 July 2013

Facility: ST 220 A / Hercules 265

Incident: On 23 July 2013, the rig was performing approved completion operations, and the formation had been perforated the previous day. After perforation the well was taking 30bbl/hr of fluid. The fluid was circulated from a 15.7ppg filtered brine to a 15.3ppg, after which the well was taking 7bbl/hr, a pill was also spotted. The rig then snapped in and out of the sump packer (to confirm no fill) at which time the well was still taking fluid. At 0300hrs this morning the rig began to trip out of the hole. At 0813 it was reported that the well was still taking 3bbl/hr of fluid. It is estimated that the blowout occurred at 0845.

Relief well operations were not completed until 15 October 2013 – 74 days after the initial LWC

Panel Investigation is underway.

ST 220 A / Hercules 265

Surface Well Control Event Response



Response for uncontrolled gas blowout resulting in loss of rig at Walter's ST 220 location

7/23/13

- Kick occurred while tripping out of hole
- BSEE mobilized inspectors to fly over location and BSEE personnel also at Source
- Well is flowing gas only
- All personnel were recovered by a marine vessel in the area
- WWC personnel have been mobilized to location
- Potential relief well rigs are being sought if needed.
- A vessel is on location to provide a water shower over the rig to prevent potential ig

7/24/13

- Fire ignited at the wellhead.
 - Additional firefighting equipment is mobilized to location
 - Water curtain is continued to protect the rig
- Relief well is the primary plan to kill this well
 - No top side capabilities due to fire
- Kill weight mud is on location if a well kill pumping is to be pursued

7/25/13

- Well started to reduce in flow
 - Well bridged over; fire was reduced to small flame

7/26/13

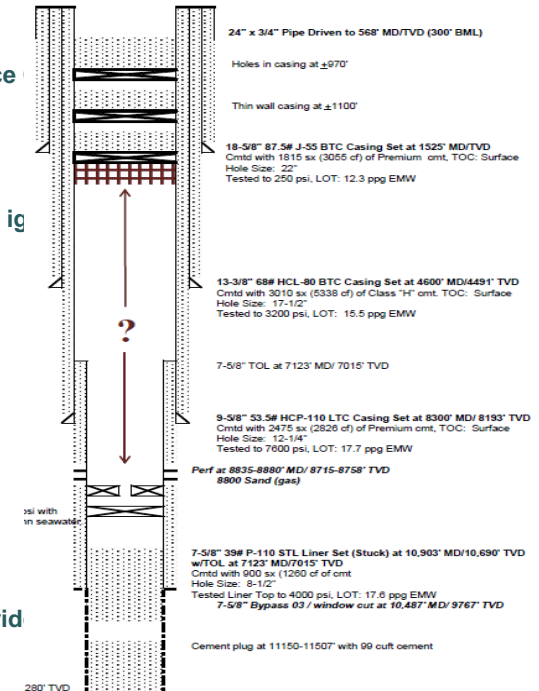
- Sonar started to survey the debris field for placement of relief well rig
- WWC on rig to assess damage and install gas detectors around wellhead
- A visual inspection using a downhole camera will be used to determine the top brid
- A plug is set on

Well bridge continued to hold and fire was extinguished

- Debris removal has started to gain vertical access to wellhead to run downhole camera(7/26/13 - 8/8/13)
- Relief well has started to kill the source zone
- A bridge plug has been set with cement on top to isolate the source

Decision was made to turn the relief well into a pressure depletion well

- New facility and flow line was installed to deplete reservoir to seawater sub-hydrostatic conditions



Synopsis of Data



BSEE has 288 unique loss of well control incidents captured in our database from 1956 – 2010. Additionally, BSEE has 18 additional cases in TIMS from 2010-2013 which are not accounted for in this synopsis:

- 69 of 288 Incidents had a duration of ≥ 5 days (24%)
 - 55 of 69 occurred in water depth < 300 feet (80%)
 - 42 of 69 occurred within 50 miles of shore (61%)
 - 31 fatalities in 5 of the 69 incidents
 - 84 injuries in 7 of the 69 incident
 - 8 incidents were oil blowouts (12%)
 - Max duration of the oil blowout – 141 days, 10 relief wells drilled

Effective Well Control



- **Detection of kick (well bore monitoring)**
- **Competent on-site crew and operator (Knowledge of risks and preparedness to react)**
- **Equipment/Well Control (reliable Blowout Preventer(BOP) systems/ barrier integrity)**
 - **Drilling Safety Rule**
 - **Proposed Rulemaking for Well Control**

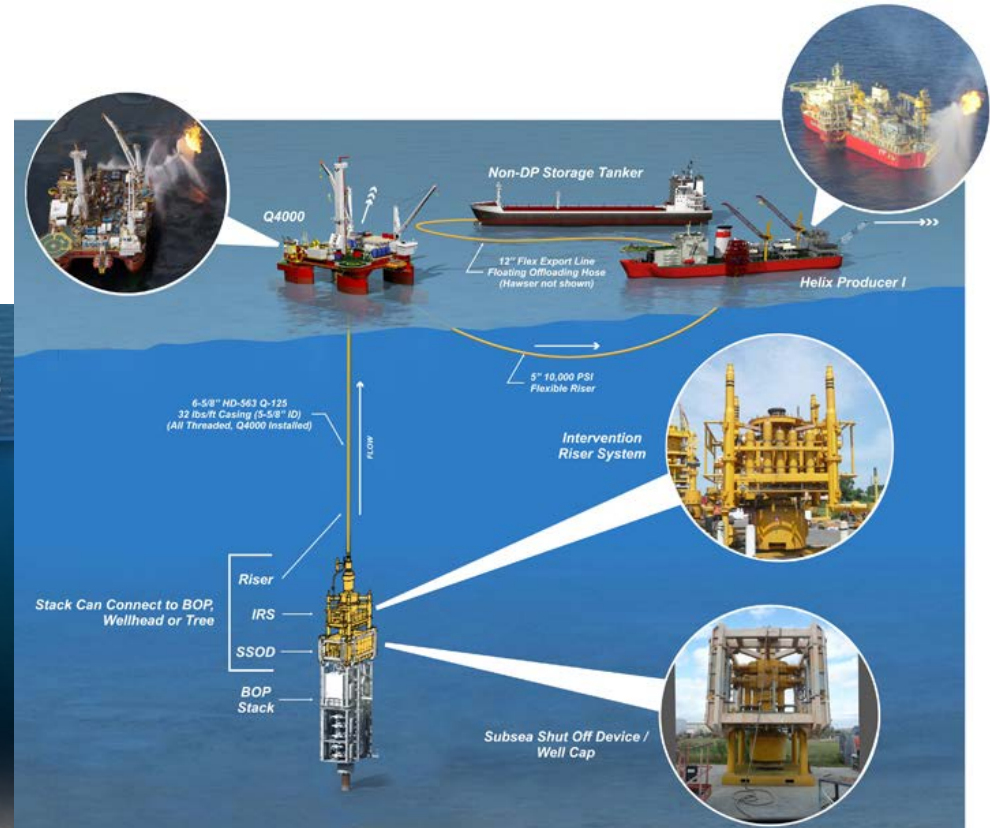
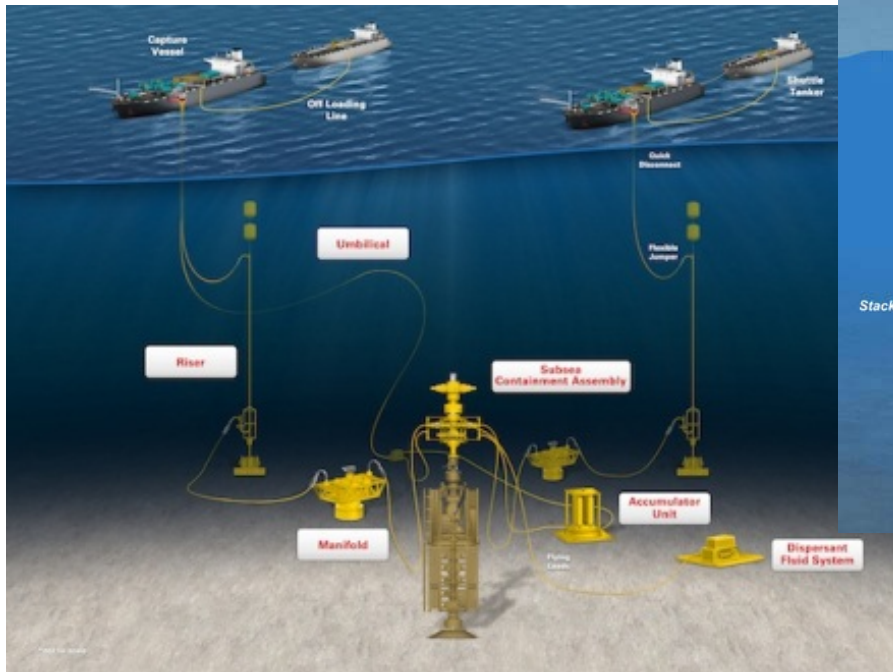


Response to Loss of Well Control

Source Control Response



Systems available in the Gulf of Mexico

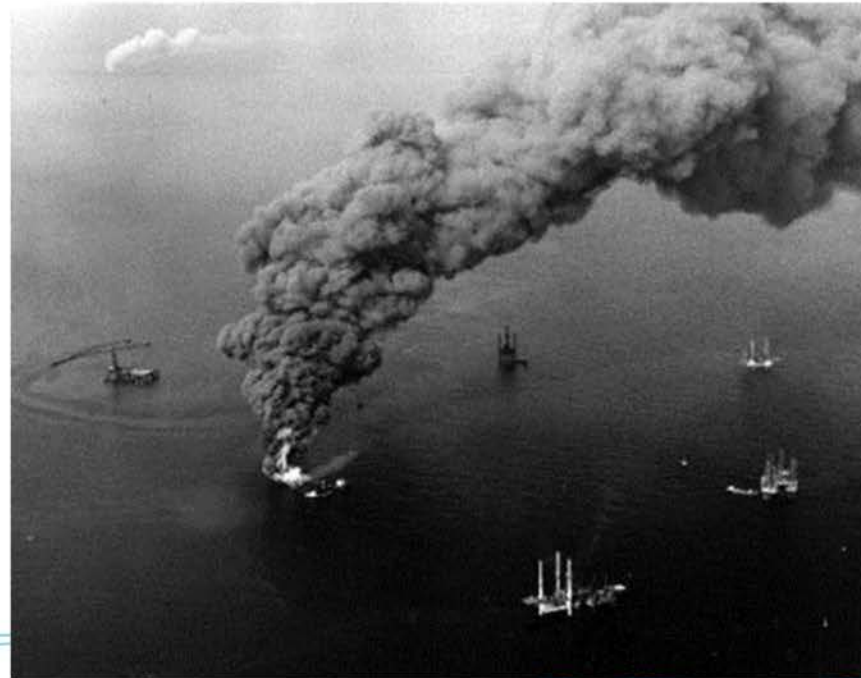


12/01/1970 South Timbalier(ST) 26 B – Bay Marchand



Approximately 8 miles from shore
Four fatalities, thirty six injuries, lost platform and
2 drilling rigs, minor amounts of oil on beaches.
53,000 bbls estimated to be spilled.

10th and final relief well killed blowout on April 7th, 1971.





**Thank you for your
attention.**

Website: www.bsee.gov