

**Investigation of Blowout and Fire
East Cameron Block 328
Gulf of Mexico
Off the Louisiana Coast
April 1, 1997**



U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Regional Office

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Charles Schoennagel
Joe Gordon
Jane Scholzen
Greg Gould

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**New Orleans
March 1999**

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Investigation and Report

Authority

A serious blowout and fire occurred on the morning of April 1, 1997, aboard the platform rig *Pride 1001E* while it was conducting drilling operations on Well A-6 for American Exploration Company on Lease OCS-G 10638, East Cameron Block 328, in the Gulf of Mexico, offshore the State of Louisiana. Pursuant to Section 208, Subsections 22 (d), (e), and (f), of the Outer Continental Shelf (OCS) Lands Act, as amended in 1978, the Minerals Management Service (MMS) is required to investigate and prepare a public report of this accident. By memorandum dated April 8, 1997, the following MMS personnel were named to the investigative panel:

Charles Schoennagel	New Orleans, Louisiana (Chairman)
Joe Gordon	Lafayette, Louisiana
Jane Scholzen	New Orleans, Louisiana
Greg Gould	Herndon, Virginia

Procedures

Personnel from the Lafayette District of the Minerals Management Service, Gulf of Mexico OCS Region, flew over the scene on April 1, 1997. The overflight of the area revealed that the platform and rig were totally engulfed in fire. The MMS personnel proceeded to board the motor vessel (M/V) *Subsea Mayo* and were able to monitor the blowout and fire. On April 4, 1997, the Derrick Barge (*DB*) 50 arrived on location and was able to extinguish the fire with spray cannons. The well finally bridged over on April 10, 1997.

Lafayette District personnel were able to board the platform on April 15, 1997, and inspect the scene of the accident.

The Investigative Panel conducted a hearing on July 29 and July 30, 1997, in Room 111 of the MMS offices in New Orleans, Louisiana, during which the following individuals were questioned:

July 29, 1997

James P. Wakefield Petroleum Professionals International

Patrick J. Simon Ocean Energy

Charles R. Taylor BJ Services

Melvin R. Thompson Petroleum Professionals International

July 30, 1997

Ghanshyam C. Patel Baker Oil Tools

Ted Martin Baker Oil Tools

Timothy Lirette Pride Offshore

Arthur Bolin Pride Offshore

Edward Corkern Pride Offshore

Timothy Parks Pride Offshore

Ronnie David Pride Offshore

Louis Trahan Pride Offshore

The panel members met at various times throughout the investigative effort and, after having considered all of the information available, produced this report.

Introduction

Background

Lease OCS-G 10638 covers approximately 5,000 acres and is located in East Cameron Block 328, Gulf of Mexico, off the Louisiana coast. (For lease location, see attachment 1.) The lease was issued to Union Pacific Resources Company on May 1, 1989, for a cash bonus of \$4,115,600 with a fixed 1/6 royalty rate and an annual rental of \$3 per acre. On September 30, 1996, Union Pacific Resources Company designated American Exploration Company as the operator of East Cameron Area Block 328.

A Supplemental Development Operations Coordination Document (SDOCD) for Well A-6 was submitted October 3, 1996, and approved November 1, 1996. On January 1, 1997, American Exploration Company submitted an Application for Permit to Drill (APD) for Well A-6 in East Cameron Block 328. The ADP was approved January 14, 1997, and American Exploration began drilling operations on March 25, 1997, using the platform rig *Pride 1001E*. Prior to the drilling of Well A-6, Wells A-4 and A-8 were drilled on February 19, 1997, and March 23, 1997, respectively. During the drilling of Well A-6, simultaneous operations involving the production of oil and gas from Wells A-1, A-2, and A-4 were ongoing.

Description of Accident

At approximately 12:15 a.m., on April 1, 1997, a serious blowout and subsequent fire occurred on Platform A in East Cameron Block 328. After cementing the 9⁵/₈-inch casing, annular flow was observed between the 9⁵/₈-inch casing and 13³/₈-inch casing while the blowout preventer (BOP) stack was being nipped down.

Attempts were made to stop the flow by using a casing swedge and reattaching the hydraulic control lines to the BOP. The crew was able to put the casing swedge in place; however, it did not mitigate the flow of mud/cement/gas. The crew was not able to reattach the hydraulic control lines because of the increase of well flow.

The production platform was shut in using an emergency shut down (ESD) station and the decision was made to evacuate. All 42 personnel were evacuated by a standby workboat. No injuries were sustained during the accident and all personnel were taken to the nearby jack-up rig, *Adriatic 7*. Within one and one-half hours of evacuation, the gas flowing out of the annulus ignited.

The fire was extinguished on April 4, 1997, and cleanup operations began; however, the well was still flowing mud, sand, water, and gas. On April 9, 1997, the well was accidentally ignited by a cutting torch. The well bridged over on April 10, 1997.

Findings

Preliminary

In the APD, American Exploration Company proposed drilling a horizontal well

Activities

to a measured depth (MD) of 5,422 feet and a true vertical depth (TVD) of 2,845 feet. The well would be located in 243 feet of water. American Exploration Company anticipated driving a 20-inch casing to a measured depth of 595 feet (595 feet TVD), drilling a 17½-inch conductor hole and setting 13⅜-inch conductor casing at a measured depth of 1,200 feet (1,200 feet TVD), drilling a 12¼-inch hole and setting 9⅝-inch casing at a measured depth of 4,623 feet (2,845 feet TVD), and drilling an 8½-inch horizontal hole to a total measured depth of 5,422 feet (2,845 feet TVD), as per the directional plan.

On March 24, 1997, *Pride 1001E* was skidded over Well A-6 and the 20-inch drive pipe was driven to a measured depth of 595 feet. On March 26, 1997, the 20-inch diverter system was installed, tested and Well A-6 was spudded. A 17½-inch hole was drilled to a measured depth of 1,200 feet (1,200 feet TVD). On March 27, 1997, 13⅜-inch casing was run and cemented. Slips were set on the 13⅜-inch casing and the 20-inch diverter system was rigged down. On March 28, 1997, a final cut was made on the 13⅜-inch casing and a 20x13⅝-inch, 3,000-psi wellhead was installed. The 13⅜-inch BOP stack was installed and tested to a low pressure of 250 psi and a high pressure of 3,000 psi. A 12¼-inch bit and steering assembly were run in the hole to 1,146 feet MD (1,146 feet TVD), and the casing was tested to 1,500 psi. After drilling out the casing float equipment and 10 feet of new formation, a leak-off test was performed on the casing shoe with a 180-psi surface pressure resulting in a 12.5-pounds-per-gallon equivalent mud weight shoe

test. Through March 31, 1997, drilling operations continued on Well A-6 to a measured depth of 4,910 feet (2,846 feet TVD). The 12¼-inch hole was circulated and conditioned in preparation of running the 9⅝-inch casing. The 9⅝-inch casing was run and cemented starting at approximately 5:00 p.m. on March 31, 1997.

The 9⅝-inch casing was cemented with 1,100 sacks of cement with the lead slurry weighing 11.6 ppg and the tail slurry weighing 16.2 ppg. Three plugs were used, with the first plug being pumped ahead of the lead cement. After the 1,100 sacks of cement had been pumped, the second plug was dropped behind the tail cement and an additional 10 barrels of cement were pumped behind the second plug. This cement was the inflation cement to be used to inflate the external casing packer (ECP) located above the float collar. The third plug was pumped behind the inflation cement to keep that portion of the cement together. Saltwater was then pumped to displace the casing and bump the second plug. During the pumping of the saltwater, the pressure was expected to reach about 1,000 pounds as the second plug bumped. However, at 800 pounds, there was a drop in pressure of about 250 pounds and it was assumed the second plug had been bumped and the ECP had inflated. It was then assumed that approximately 10 more barrels of salt water would be needed to bring the pressure up to 1,000 pounds. After a total of 12 barrels of saltwater were pumped, the pressure was only 640 pounds and not rising. The pumping was stopped and a discussion was held between the company man, the Baker Oil Tools man, and the drilling consultant. During this discussion, it was assumed that the ECP had ruptured and that there would be no consequences from this rupture if operations continued. The pressure was then bled off the casing, thereby

completing the cement job for the 9⁵/₈-inch casing. The cementing job took approximately four hours and was concluded at about 9:00 p.m. During the pumping of the 1,100 sacks of cement, returns were noted with one interruption of approximately one to two minutes. One witness account of the cementing procedure indicated that the first plug bumped approximately 40 barrels late. It is to be noted that the crew change occurred at 6:00 p.m. and included the tool pusher, driller, and floor hands.

Loss of Well Control

After the cement job was completed, the crew proceeded with readying the well for the removal of the 13⁵/₈-inch BOP stack. Prior to nipping down, the rig crew drained and washed the BOP stack and disconnected the two accumulator lines located on the annular preventer. A cradle, located around the annular preventer, was removed. Cables were then secured to the BOP stack. The BOP's could then be lifted, allowing for a rough cut on the 9⁵/₈-inch casing. Prior to the BOP's being lifted, a floor hand was hit with mud, and he noticed the BOP stack was full. The driller proceeded to the shale shaker pit and saw a small amount of mud in the ditch that had just been cleaned. The driller then looked into the BOP stack and noticed that the stack had filled back up and was bubbling.

Attempts to Stop Well Flow

A casing swedge was installed on the 9⁵/₈-inch casing, but that did nothing to alleviate the flow from the well. Meanwhile, attempts were made to reconnect the accumulator lines to the annular preventer. The well began blowing and attempts to reconnect the accumulator lines to the annular preventer failed. A decision was made to activate the ESD system for the production on Platform A. When the company man and day tool pusher were awakened at around midnight, they attempted to shut in the annular

preventer from the remote BOP panel, not knowing that the accumulator lines had been disconnected. This emptied the accumulator of all the fluid. They then tried unsuccessfully to shut the blind rams. The decision was then made to evacuate.

Evacuation and Rescue

The company man and day tool pusher called the nearby workboat M/V *Trinity*

Seal. The "abandon platform" alarm was hit. Many employees went to the escape capsule, but were told to go to the +10 deck and wait for the M/V *Trinity Seal*. Others were told directly to go to the +10 deck and wait for the M/V *Trinity Seal*. The M/V *Trinity Seal* backed up to the platform and employees either jumped or swung on the rope to board the boat. The boat's deckhands assisted the platform and rig employees. Everyone boarded the boat without incident. After the boat left the platform, a head count was made and it was discovered that the measurement while drilling (MWD) operator was missing. The boat went back to the platform and, using its search lights, discovered the missing person at the escape capsule.

Testimony revealed that the MWD operator had been in the mud logging unit at the time of the blowout and could not hear any alarms. He did hear loud noises, but attributed them to a helicopter landing. Testimony also revealed that there were no alarms inside the mud logging unit connected to the "abandon platform" alarms; the only means of communication was a phone. After awhile, he left the unit to find no one on the platform. He got his life vest and went to the escape capsule. He then noticed the boat turning around with its search lights on and he started waving. He climbed down the leg of the platform on a ladder and boarded the boat.

The M/V *Trinity Seal* went to the jack-up rig *Adriatic 7*, approximately five miles away. The blowout from Well A-6 ignited at approximately 2:30 a.m. on April 1, 1997.

**Subsequent
Activities**

By early Tuesday morning, the derrick had fallen over. There was a dive boat,

Subsea Mayo, in the area; it had come by and started to water down the platform. It was later joined by the *DB 50* and *DB 3*. The fire was extinguished by Thursday, April 4, 1997, but the well was still flowing mud, sand, water, and gas. There were bubbles around the Well A-6 caisson, and a remotely operated vehicle (ROV) inspection revealed two holes in the drive pipe approximately 40 feet below the water line. International Well Control (IWC) personnel boarded the platform and confirmed that only Well A-6 had flow; all other wells were holding. Well A-8's tree had burned off. The clearing of debris and remaining drilling packages from the deck began.

As of April 8, 1997, the flowing conditions of Well A-6 were the same. The top deck was nearly all cleared and the clearing of the well bay deck would start. Well A-6 was accidentally ignited by a cutting torch, and the decision was made to let the fire remain burning while cutting operations were in progress near the well bay. The *DB 50* and *Subsea Mayo* were still on location. The drilling rig *Marine 301* was standing by, waiting on weather, in preparation of preloading to drill a relief well.

By April 10, 1997, Well A-6 had bridged over and no flow was coming from the well. Clearing operations continued on the well bay area. The *Marine 301* was preloaded and the relief well was spudded on April 13, 1997. A

back-pressure valve (BPV) and dry hole-tree (DHT) were installed on Well A-8.

On April 16, 1997, a bullfrog crane was used to rig up a snubbing unit on Well A-6. Diagnostic testing was conducted and the well was temporarily abandoned on May 19, 1997, after the testing indicated no downhole flow. The relief well was plugged and abandoned on May 14, 1997.

Damages

The platform sustained major damage and the rig was totally destroyed. The entire topside of the platform was subsequently removed and rebuilt with what was salvageable.

The upper deck and trees on the producing wells have been replaced and the platform was returned to production.

Conclusions

Probable Cause of Incident

Formation gas migrated through the cement between the 9 $\frac{3}{8}$ -inch casing and the 13 $\frac{3}{8}$ -inch casing.

Contributing Causes

1. There was not enough wait-on-cement time prior to nipping down the blowout preventer.
2. The BOP accumulator pressure was drained immediately due to the hydraulic control lines being disconnected.

Possible Contributing Causes

1. Temporarily losing returns, as well as noting that the first rubber cement bumped 40 barrels late, may have indicated problems with the cement job.
2. Because of the well being drilled horizontally, the casing may not have been properly centralized, resulting in a nonuniform cement job.
3. The effect, if any, of the ECP not behaving as expected, and presumably rupturing, is unclear.

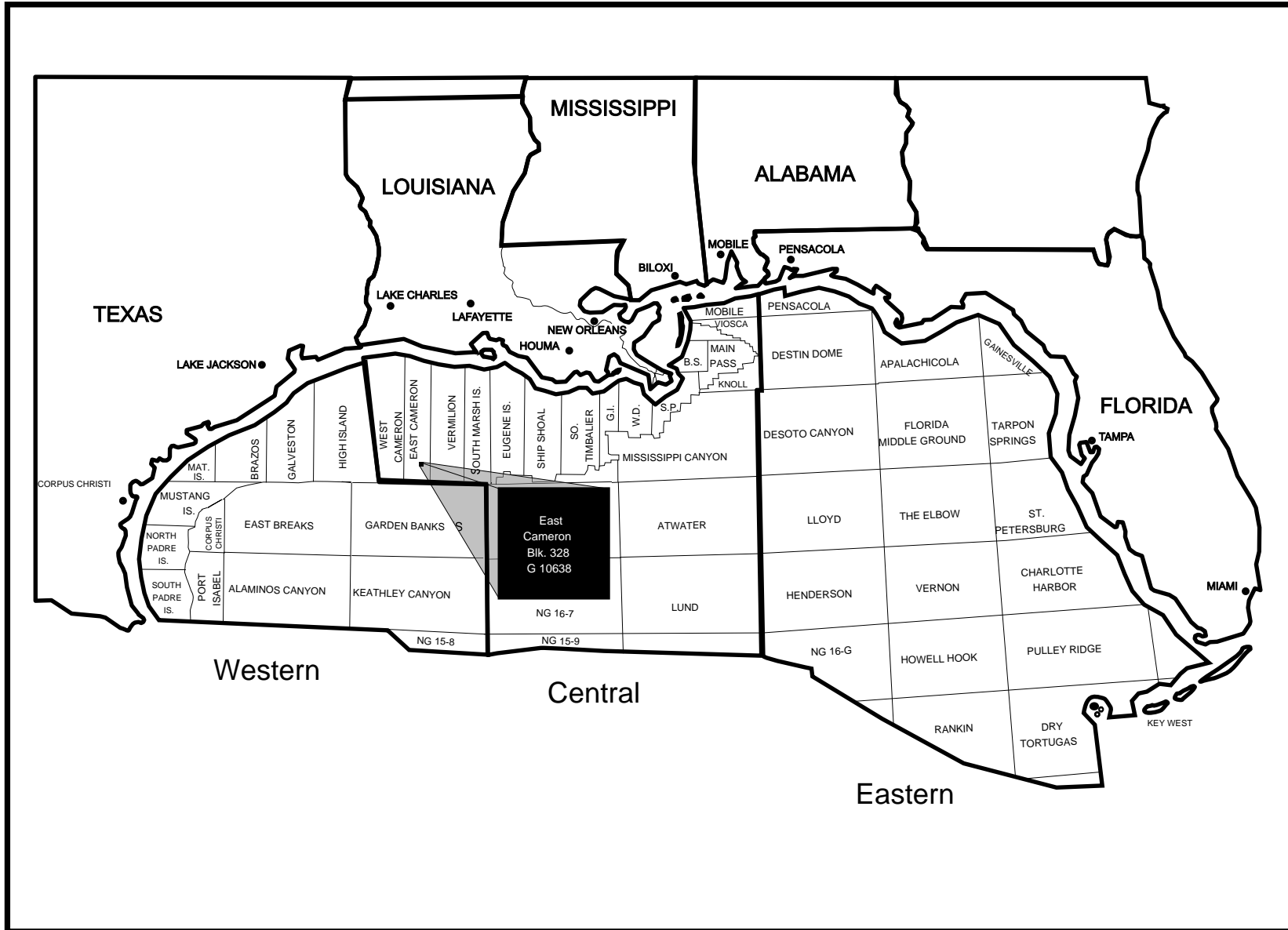
Recommendations

Safety Alert

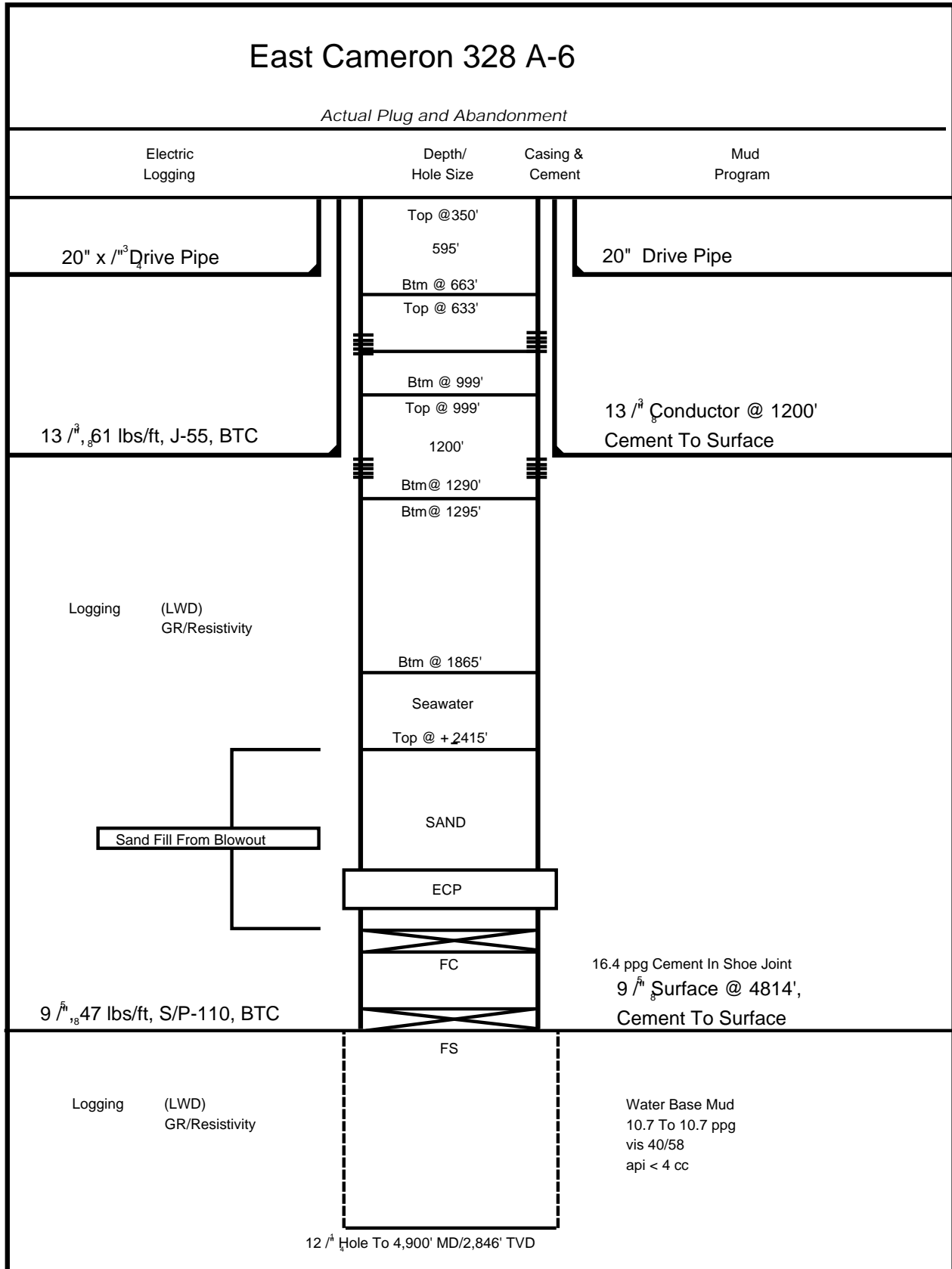
The Gulf of Mexico OCS Region should issue a Safety Alert to lessees and contractors concerning the latest accidents involving wait-on-cement time. Emphasis should be placed on minimizing the amount of time that the BOP control lines are disconnected. Special care should also be given when conducting the cementing job in horizontal wells. Further, personnel in the mud logging unit were unable to hear the "abandon platform/rig" alarm; considerations should be given to connecting the "abandon platform/rig" alarm to the mud logging unit via a light or alarm.

Study

A study should be conducted to determine what recommendations should be made regarding wait-on-cement time prior to nipping down the blowout preventer.



Location of Lease OCS G-10638, East Cameron Block 328.



Well Bore Schematic