



**Investigation of Fatal Accident
V-Door Guide Post Failure
Chandeleur Block 31, Well No. 1
OCS-G 27214
18 July 2006**

**Gulf of Mexico
Off the Louisiana Coast**



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Jack Williams – Chair
Tom Perry
David Emilien
Kevin Langlinais

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Executive Summary

On a drilling rig, a floor crew rigged a block and tackle assembly to the top of one of the V-door guide posts and used the air hoist to attempt to rotate a 48-inch drive pipe string. The string could not be rotated fully into position and when one of the floor roustabouts (Floorman) went to check the connection, the V-door guide post suddenly broke off from its weld. Propelled by the cable tension, the V-door guide post jumped across the floor fatally striking the Floorman.

The investigation by an MMS panel found that the V-door guide post was structurally unlikely to have withstood the load applied to it and was not supposed to have been used to support a load. The rig up method used to try to turn the drive pipe was inadequate to accomplish the task in a safe manner. The Panel investigation concluded that the Accident was caused by the following:

- 1. Insufficient on-site oversight - No oversight of the rig-up process was given by the Offshore Installation Manager (OIM), Tool Pusher, or Company Man. The Driller either failed to check the rig-up or did not recognize the insufficient nature of the method.*
- 2. Failure to visually mark the V-door guide post as “no-load bearing,” and a failure to communicate that status to the crew, contributed to allowing its use. The location of pad eyes welded to the guide post encouraged its use as a base for loads.*
- 3. The Job Safety Analysis meeting did not address the rotation of the drive pipe.*
- 4. Neither the Contractor nor Operator had a defined methodology for rotating the drive pipe. No training in how to accomplish that operation had been given to the crew.*
- 5. Rigging up the cable to the top of the V-door guide post rather than the bottom multiplied the forces on the base of the post several times over.*
- 6. The Driller’s communication of the details of the method to be used to the crew rigging up the drive pipe rotating assembly may have been ineffective or incomplete.*

Investigation and Report

Authority

A fatal accident (the Accident) occurred on *18 July 2006* at approximately *0055 hrs* aboard the jack-up drilling rig Nabors D-110 (the Rig) contracted to LLOG Exploration Company, LLC (Operator or LLOG) while operations were being conducted for the Operator on Lease OCS-G 27214, Chandeleur Area Block 31, Well No. 1 (the Well), in the Gulf of Mexico, offshore the State of Louisiana. The fatally injured person (the Floorhand) was an employee of the drilling contractor, Nabors Drilling (Nabors, or the Contractor), and was working as a roughneck on the rig floor on the night shift.

Pursuant to Section 208, Subsection 22 (d), (e), and (f), of the Outer Continental Shelf (OCS) Lands Act, as amended in 1978, and Department of the Interior (DOI) Regulations 30 CFR 250, Minerals Management Service (MMS) is required to investigate and prepare a public report of this Accident (the Investigation). By memorandum dated 2 August 2006 the following personnel were named to the investigative panel (the Panel):

Jack Williams, Chairman – Office of Safety Management, Field Operations, GOM OCS Region;
Tom Perry – Offshore Regulatory Program, Accident Enforcement Branch, OMM, Herndon;
David Emilian – Lead Inspector, New Orleans District, Field Operations, GOM OCS Region;
Kevin Langlinais, District Engineer, Lafayette District, Field Operations, GOM OCS Region;

Procedures

On the morning of *18 July 2006*, two representatives from the DOI, Minerals Management Service (MMS), Gulf of Mexico (GOM) Regional Office in New Orleans, Louisiana, visited the site of the Accident to assess the situation, take photos and statements, and gather information. On *19 July 2006*, four representatives from the MMS GOM Regional Office arrived on the Rig. They continued the preliminary investigation including taking measurements, additional photos, and reviewing the sequence of events.

On *27 July 2006*, two members of the Panel conducted phone interviews with regulatory contact personnel for Operator and Contractor and reviewed the incident with MMS personnel who visited the site.

On *30 October 2006*, the Panel visited the Rig, site of the Accident, gathered information and geographical data, and conducted interviews with witnesses. On *8 March 2007* the Panel reviewed the data received and organized further lines of inquiry of the Investigation. On *10 August 2007* the Panel reviewed the unwillingness of the Rig contractor to provide further documentation as requested. The Panel agreed on the outline of the conclusions absent that data.

The Panel also met, discussed the evidence, and reviewed progress of the Investigation on a number of occasions. After having considered all of the information available, the Panel produced this report.

Introduction

Background

Lease OCS-G 27214 covers approximately 5,000 acres and is located in Chandeleur Island Block 31 (CA-31, or the Lease), Gulf of Mexico (GOM), off the Louisiana Coast (*for lease location, see figure 1*). The Lease was originally purchased effective on 1 Jun 2005 by LLOG who owns 100 percent of the mineral rights and operates the Lease on its own behalf. In 2005, the subject Well was planned as the initial exploratory effort on the Lease.

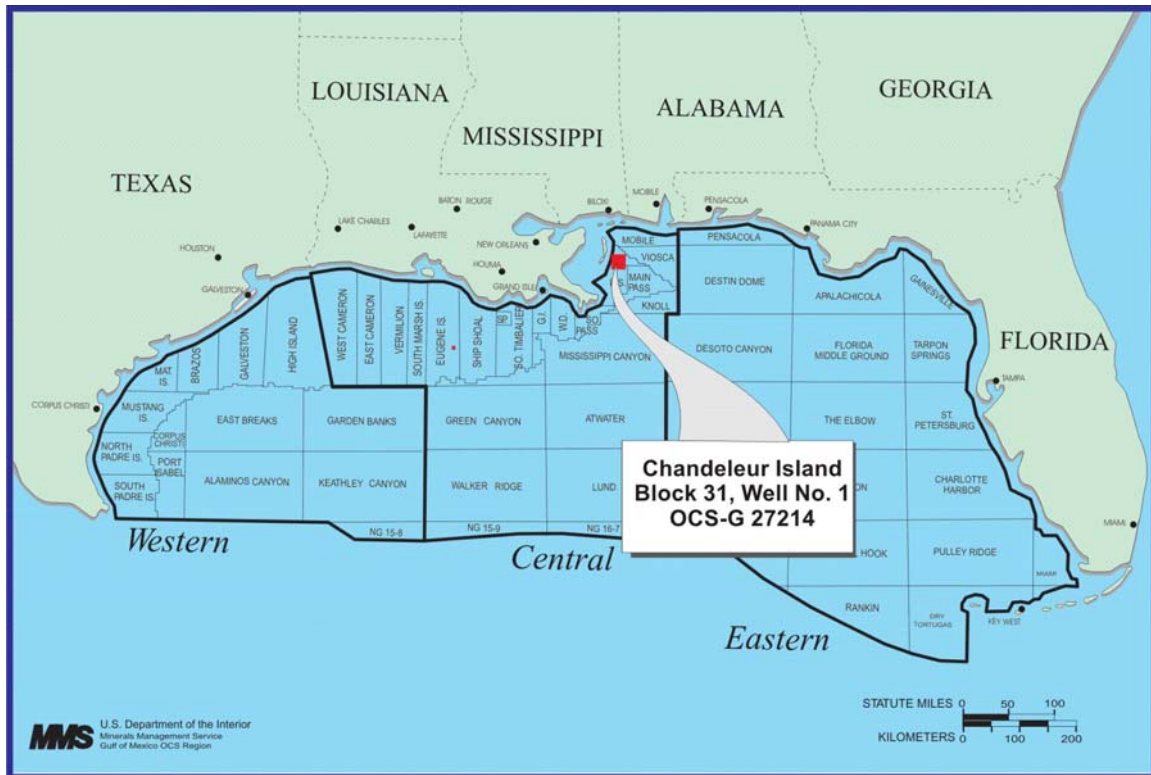


Figure 1: Location of Lease OCS-G 27214, Chandeleur Island Block 31, Well No. 1

Brief Description, Fatality on Drilling Rig

On 18 July 2005, operations preparing to spud the subject Well were continuing on the jack-up drilling Rig, Nabors D-110. Three joints of 48-in drive pipe with two pup joints had been welded together and the pipe was suspended extending below the false rotary but not to the mud line. During the night shift, an additional joint of 48-in had been welded up and the entire string had been lowered until the drive pipe pad eyes contacted the top of the rotary table (*see figure 2*).

An attempt was then made to rotate the drive pipe assembly to align the welded drive pipe pad eyes with the guides attached to the top of the rotary table. This operation was conducted by connecting an air hoist on the rig floor to a pad eye of the drive pipe, using a cable and pulley assembly and a shackle attached to the top of a V-door guide post (*see figures 3 and 4*).

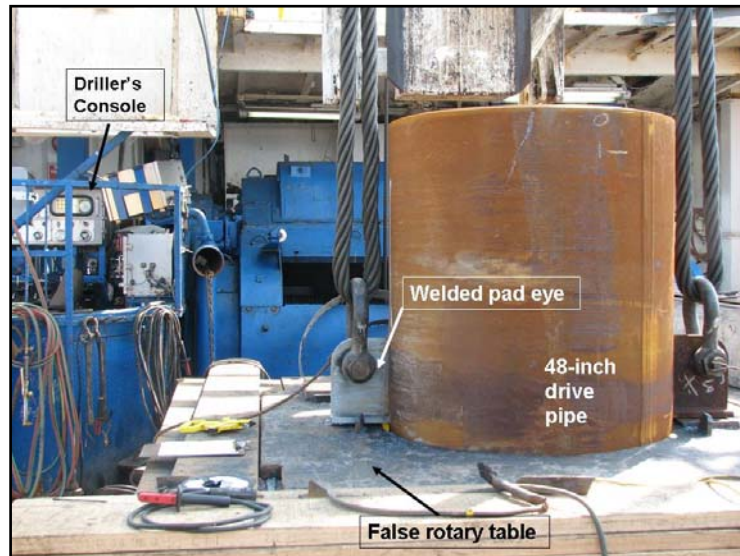


Figure 2: Drive pipe assembly and false rotary table.

When a bind was taken using the air-hoist, the drive pipe assembly rotated a short distance and stopped without reaching the final position required. A Floorhand approached the drive pipe and investigated the cable assembly. While the Floorhand was investigating the assembly, the V-door guide post suddenly broke free and was propelled across the floor by the tension of the cable assembly bind. The guide post struck the Floorhand in the forehead and chest.

Life support first aid was performed on the Floorhand but he did not respond. First aid was continued upon the arrival of the paramedics aboard a medivac flight. The roughneck was medivaced to West Jefferson Hospital, Harvey, LA, where he was not able to be revived.



Figure 3: Method of rigging up to rotate 48-in drive pipe

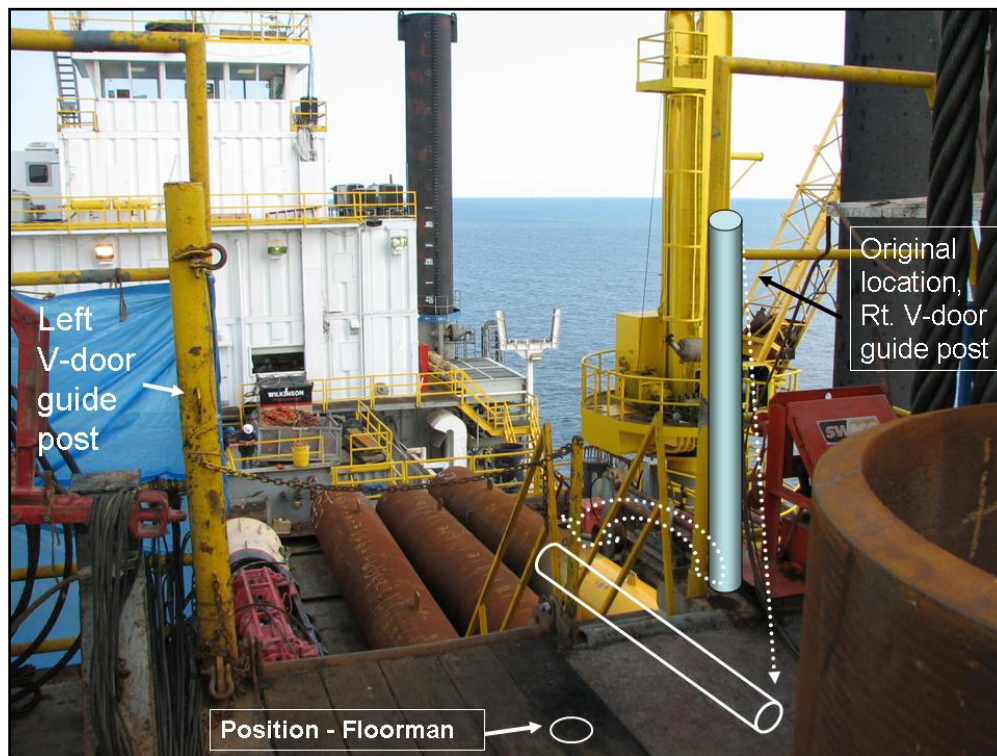


Figure 4: Path of V-door guide post after failure

Findings

Preliminary Activities – Well Plan

The exploratory Well plan was filed with the Minerals Management Service (MMS) by the Operator and the Application for Permit to Drill (APD) was approved on *July 14, 2006*. The Well plan called for drilling a 9,000-ft True Vertical Depth (TVD), 11,037-ft Measured Depth (MD) well using 48-in drive pipe, 16-in conductor casing, and 10 ¾-in surface casing. It was proposed that 7-in production casing be set if the well encountered commercial hydrocarbons. No unusual hazards were expected.

Operations

Operations Through the Accident

15-16 Jul 2007, 1100 hrs - The Rig moved onto location, jacked-up to approximately a 55-ft air gap, skidded out, and commenced operations preparatory to drilling the Well. The 48-in drive pipe and welding equipment were taken onboard the Rig (*see figure 5*).

The Rig crew and other personnel including the drive pipe handling contractors, (Wilkinson) were taken onboard the Rig. The Nabors' Rig Safety Coordinator conducted a pre-job safety meeting attended by the day shift. From testimony, attendance included all involved in the upcoming operation. A signed Job Safety Analysis (JSA) form was not created.

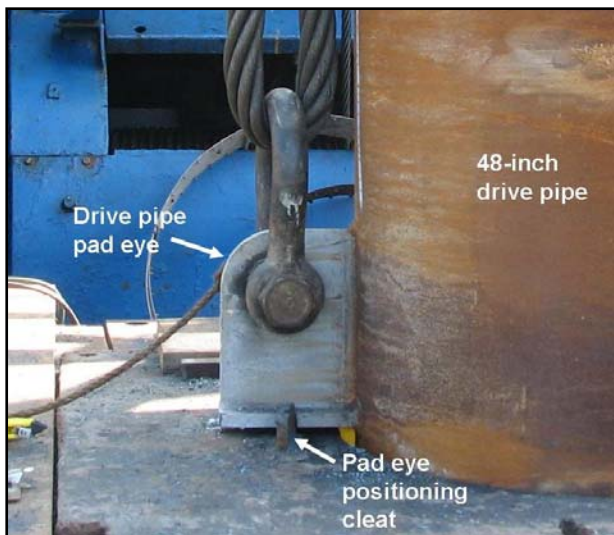


Figure 5: Example, 48-in drive pipe

17 Jul 2006, 0100-0600 hrs - The night shift picked up the first joint of 48-in drive pipe and located it into the false rotary table. They picked up two 48-in pup joints, leveled and welded them onto the drive pipe assembly. The day shift came on duty (tower) at 0600 hrs. A safety meeting of the day shift was conducted prior to coming on tower, though no signed JSA form was generated.

0600-1800 hrs - The day shift picked up drive pipe joints #2 and #3 and welded them to the drive pipe assembly. The welds of the joints were ultra-sonic tested (UT) and the drive pipe assembly was then run. The seams of the drive pipe assembly were aligned by rotating the pipe after each joint was added to the assembly. The day shift prepared to pick up drive pipe joint #4. The night shift reported on tower at 1800 hrs. The Rig Safety Coordinator held a JSA meeting prior to 1800 hrs attended by all night shift personnel including the Wilkinson Welding and Casing Service Company (Wilkinson) crews. No signed JSA form was generated.

1800-2400 hrs - The night shift continued operations to pick up joint #4 of 48-in drive pipe. The joint was added to the assembly, leveled, welded and ultrasonic tested (UT'd). An assembly using pulleys, pad eyes, shackles, and tackle (the drive pipe rotating assembly) was rigged up on the Rig floor (*see figure 3, p. 6, above*). The cable was run from an air hoist through a shackle on a V-door guide post to a drive pipe pad eye. A bind was taken using the air hoist in an attempt to rotate and align the seams, before picking up drive pipe joint #5.



18 Jul 2006, 0055 hrs - The drive pipe was rotated, but failed to fully align with the guides (cleats or stops) attached to the top of the rotary table (*see figure 6*). While the air hoist maintained tension on the rotating assembly, the Floorman approached the drive pipe pad eye connection to the rotating assembly, checked it and then backed off a few steps while continuing to examine the connection.

Figure 6: Pad eye and positioning cleat

As he checked the tension of the cable, a sound was heard as if the Driller slacked off the brake slightly. Suddenly the V-door post which formed the anchor of the drive pipe rotating assembly broke from the Rig floor. The post (*see figure 7*) was propelled across the floor by the tension held on the rotating assembly, and struck the Floorman in the head and chest.



Figure 7: Broken right side V-door guide post

Post-Accident Medical Procedures

First aid and life support was initiated, supervised by the Company Man and Offshore Installation Manager. The Coast Guard and Medivac were called and mobilized. The Medivac arrived approximately two hours after the incident at approximately *0235 hrs.* Medical personnel on the Medivac evacuated the Floorman to West Jefferson Hospital in Harvey, Louisiana where he was pronounced deceased. An autopsy was performed by the coroner of Jefferson Parish.

Personnel and Companies

From testimony, it was determined that at least eight personnel were working on the rig floor at the time of the Accident. These included four Nabors crew members as follows: the “Driller,” who was working the brake and who was the supervisor of the night shift; two Nabors

“roughnecks” including the Floorman, who were assisting operations as required, primarily hoisting and positioning the joints of drive pipe on the rig floor; and the “Derrickman.”

Additionally, other Nabors personnel were engaged in activities immediately below the Rig floor supporting lift operations for the 48-in drive pipe. According to testimony, at least one roughneck was positioned below the V-door near the pipe rack in such a manner that he had a clear view of the rig floor.

A service company, Wilkinson, had been contracted to weld, emplace, and hammer the drive pipe into position in accordance with the Well APD. The Wilkinson crew consisted of 9 men, four per shift with one supervisor. Each shift included two welders and two tool men. According to testimony, they worked with the Rig shift on tower and were responsible for welding the drive pipe and seeing that the drive pipe assembly was properly UT'd and installed. They were also responsible for overseeing hammer operations once the drive pipe penetrated the mud line.

The “Offshore Installation Manager” and the “Tool Pusher” were Nabors’ employees charged with the management of all operations of the Rig. Either the OIM or the Tool Pusher was on duty at all times. The Rig activities on the Lease were also observed and managed as specified in the Operator’s Well APD by two contracted “Company Men” who worked for the Operator. None of the managerial personnel were on the Rig floor at the time of the Accident. Testimony was received that all of the managerial personnel had extensive oil field experience.

Testimony was received and documentation indicated that all Rig personnel on the Rig floor or witnessing the Accident were trained and experienced. Testimony was received that conditions which are normally associated with unusual and excessive physical fatigue, such as an unusual and erratic schedule lasting for several days, longer than normal hours, or particularly intense, long lasting stress, were not present on the Rig crew at this time.

No testimony indicated any lack of competence, training, or experience for any Rig or Wilkinson personnel on tower at the time of the Accident. No testimony indicated unusual or erratic performance that could be associated with fatigue or stress on the Wilkinson employees. Drug and alcohol test were performed after the Accident but no testimony or other evidence indicated either was a factor.

Safety Manuals and Safety Meetings

Rig Management System (RMS) Safety Manual

Nabors has an extensive, multi-volume safety manual that includes the company standard operating procedure for most operations undertaken on a rig. This Nabors' manual is known as the Rig Management System (RMS) Safety Manual. The Panel reviewed the RMS volumes that were available on the Rig. The Panel requested Nabors forward a copy of all portions of the RMS Safety Manual that referred to handling large diameter pipe including casing and drive pipe.

Nabors initially agreed to provide this information but later failed to honor that request concurrently with their blanket declaration of privileged information regarding testimony. Testimony was received that nothing in the RMS Safety Manual covered rigging up and rotating drive pipe. During the review of the RMS Safety Manual on the Rig, the Panel members found no references to running, rotating, or setting drive pipe.

Testimony was received that there was not an "industry standard" or "Nabors'" method of rigging up for rotating a drive pipe string being run through a false rotary table, as in this incident. No testimony was received indicating the existence of a Nabors' training program that dealt with the specifics of running a string of drive pipe.

JSA Meetings

Testimony was received that Contractor and Operator policy calls for a fully attended JSA safety meeting to be conducted prior to a shift coming on duty. This meeting was supposed to be conducted by a Rig manager, or supervisor of the shift. The Contractor requires a JSA form outlining the operation to be conducted and the hazards likely to be encountered, be signed by all who attended. The Operator has no such requirement.

Testimony was received that a safety meeting was held prior to the night shift beginning work. Testimony indicated that all or most of the shift attended the meeting which was conducted by the Tool Pusher and Wilkinson supervisor with input by the Driller. Testimony of the Company Man and the OIM indicated that no complete specific JSA form was generated prior to this operation and that no such form was signed by those attending the meeting.

The night shift crew members testified that the hazards associated with handling large diameter drive pipe were discussed at the JSA meeting. There was no discussion of how to rotate the drive pipe string. Testimony indicated that the supervisors of the two shifts did not discuss rotating the drive pipe string. From the IADC reports, no references were made that the night shift had previously been required to rotate the drive pipe string at any previous time on this particular Well. Such operations had all apparently been performed by the day shift.

Operation Details

Rig-Up to Handle Drive Pipe, Conditions and Factors

Testimony was received that when handling large casing strings, or drive pipe, a specialty contract company is usually hired to conduct the operation. These contract companies provide the specialized expertise, experienced personnel, and the special tools needed to safely run the large diameter pipe. On this Well, a Wilkinson crew was employed to make up, weld, UT the



Figure 8: “UT”ing the welds, 48-in drive pipe

draw works. The Nabors floor men and roustabouts assisted moving the joints of drive pipe into position as needed. The Wilkinson crew assured the proper alignment, welding, and UT scanning all the welds to check the acceptability of the welded connections (*see figure 8*).

welds, and install the 48-in drive pipe string.

The Wilkinson crew assigned to this Well consisted of 9 men, four per shift with one supervisor. Each 12 hour shift included two welders and two tool men. According to testimony, they worked with the regular Rig crew on tower. The Rig driller supervised operations on the rig floor and operated the

The Company Man, Tool Pusher, and Driller of the Rig night shift that were on duty when the accident occurred testified that they had been involved in running drive pipe many times in the course of their oil field experience. They also testified that the floor crew of the Rig were all experienced and had run drive pipe and casing on several occasions.

The methodology for making up the drive pipe string involved a series of steps. These steps are as follows:

- Weld the pad eyes to opposite sides of the drive pipe joint while it is on the pipe rack insuring they aligned the seam of the pipe as required.
- Using the rig prime mover, pick up the first joint (usually approximately 30-ft long) of 48-in diameter drive pipe and position it through the false rotary.
- Rotate the joint until the pad eyes position into the pad eye stop on the false rotary, so that the seam of the pipe is properly aligned.
- Pick up a second joint of 48-in drive pipe; position it above the joint resting in the false rotary.
- Weld joint #2 to joint #1, UT the weld to determine that the weld meets standards of acceptability.
- Pick up the entire drive pipe assembly using the Rig block connected to the pad eyes on joint #2.
- Cut the pad eyes off of joint #1.
- Lower the drive pipe assembly until the pad eyes on joint #2 contacts the false rotary.
- Rotate the drive pipe assembly until the pad eyes on joint #2 engage the pad eye stop to ensure alignment (*see figure 9*).
- Detach the drive pipe assembly from the Rig block and pick up joint #3, repeat process.

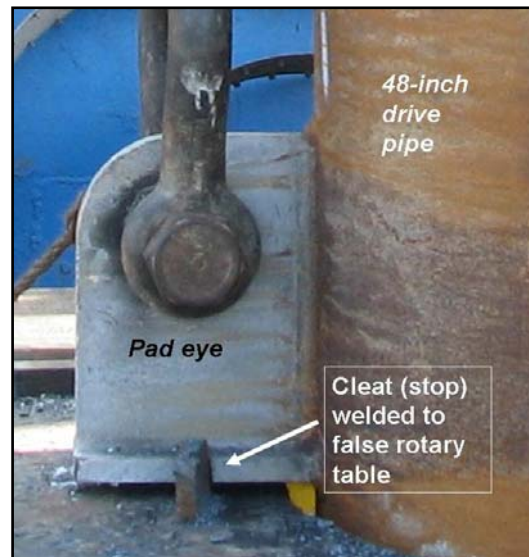


Figure 9: Positioning cleat (stop) for pad eye, 48-in drive pipe

Specifics, Rig up to Rotate Drive Pipe, Communication

According to testimony, making up the drive pipe string on the Well was proceeding normally prior to the Accident. From the International Association of Drilling Contractors (IADC) reports, when the drive pipe assembly operation began on *16 July 2006*, the night shift picked up, positioned, and leveled the first joint of drive pipe in the false rotary. They had then picked up joint #2, leveled and positioned it above joint #1 and were welding the two joints together when they were relieved by the day shift.

The day shift completed welding joint #2 to joint #1, performed a UT inspection and lowered the drive pipe string into place resting on the false rotary. They rotated the string to insure proper alignment, then picked up and welded joint #3, performed the inspections, set and rotated into position, and prepared to pick up joint #4. At this time they were relieved by the night shift.

During the night of *17 July*, the night shift completed picking up, leveling, positioning and welding joint #4. They UT'd the weld, lowered the drive pipe string, and prepared to rotate the string to line up the pad eyes on the top of joint #4 into the pad eye cleats (stops). The Floorman rigged up a cable assembly to rotate the 48-in drive pipe using the air hoist. The Derrickman was positioned to operate the air hoist. The Driller manned the draw works brake. The four Wilkinson employees on the rig floor were positioned around the 48-in drive pipe having completed the welding of joint #4 to joint #3, and the UT of the welds.

Testimony indicated that there were several ways to rotate the drive pipe string. In this case, a decision was made to use the air hoist to power the rotation of the string. A cable was run beginning at the air hoist on the left side of the V-door, up to a pulley and tackle assembly installed above the V-door.

The cable then was routed over the pulley and down through a shackle attached to the pad eye on the top of the right V-door guide post. After passing through the shackle, the cable made approximately a 90-degree turn, and then was routed across the rig floor and attached to the nearest pad eye welded onto the V-door side of the drive pipe (*see figure 10, p. 15, below*).



Figure 10: Rig-up method to attempt to rotate 48-in drive pipe

Testimony was received that rotating the string should have required a relatively minor amount of torque (turning force), because the string of drive pipe had not penetrated the mud line. Various methods of rotating the drive pipe string had been used by this crew in the last 9 months. Rigging up to rotate the drive pipe string in this particular manner had been used in the past by the night shift according to testimony.

According to testimony, the cable from the air hoist to the drive pipe pad eye was not looped around the drive pipe to assist in applying rotation force (torque). With the rig up method employed in this case, once the drive pipe had been rotated near its intended final position, the angle of the cable applying the force to the drive post was so reduced that the perpendicular distance from the center of the drive pipe to the plane of the rotating force, the “lever,” became nearly non-existent.

Without a “lever” element, no torque (turning force) can be applied to turn an object. Instead, additional applied force will simply act to pull that object in the direction of the applied force rather than turn it. From examination of the diagram (*see figure 11, p.16, below*) it is evident when the pad eye of the drive pipe was oriented into the position at the time of the Accident, little or no effective torque was being applied to the drive pipe despite any increase in applied force.

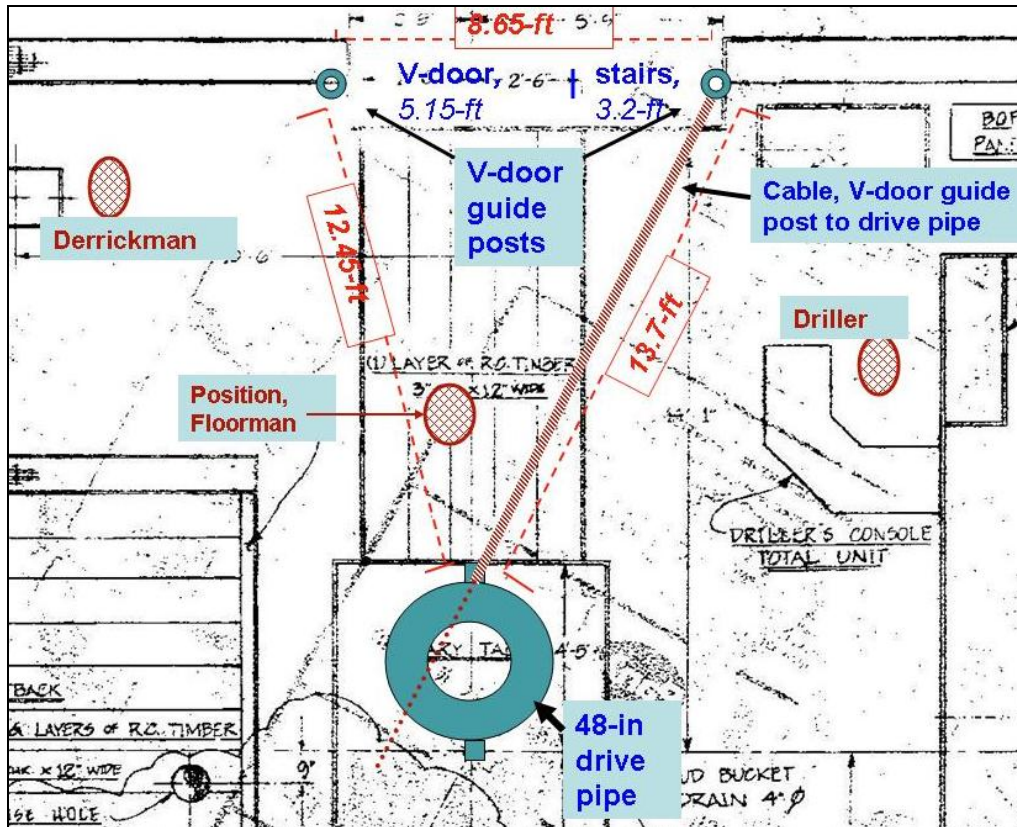


Figure 11: Schematic, drill floor layout

However, increasing “torque” was being applied elsewhere. An equal but opposite force to that being applied to the drive pipe was being applied to the top of the right V-door guide post. This force was being applied there because the cable had been routed through a shackle attached to a pad eye at that location. The force at the top of the V-door guide post was converted to a rotational “moment” on the bottom of the post, magnified by the approximate 7-ft distance from the shackle to the weld at the base of the post. This rotational force on the base of the post can be approximated by multiplying the force on the cable by the length of the post (lever distance). The torque on the base of the post was many times greater than that which would have been applied if the rotational assembly had been directly attached to the bottom of the V-door guide post.

Testimony was received that the Floorman set up the assembly used to rotate the drive pipe. However, testimony also indicated the Driller would normally be responsible for overseeing such a set up and checking it to insure it was rigged up as he directed. The Derrickman who operated the air hoist, would also usually be charged with insuring that the assembly was rigged up safely and in a manner that would accomplish the task.

Both the Driller and the Derrickman testified that they had successfully rigged up to turn drive pipe in this manner in the past. It was noted that if the cable had been routed anti-clockwise around the drive pipe before attaching to the pad eye, the applied force would have produced consistent rotational torque throughout the range of movement needed to land the drive pipe pad eye against the false rotary cleats. Testimony from crew members of the day shift indicated that would have been a better way to rig up to rotate the drive pipe, if the air hoist was to be used.



Figure 12: Cat head chain location

During testimony, it was noted that several other ways of rotating the drive pipe could have been employed. One such method would have been to “use the draw works.” Another would have been to use the cat head chain which has a much heavier chain and more powerful motor. The cat head was also located at a favorable angle to turn the drive pipe assembly (*see figure 12*). No supervisors or Rig

managers testified to having checked the block and tackle system as it was rigged up and used to rotate the drive pipe.

V-door Guide Posts

The rig floor has two V-door guide posts welded to the floor, one on either side of the V-door. The purpose of these posts is to protect the rig superstructure from being hit by pipe being raised or lowered from the drill floor. The V-door posts also help funnel or guide equipment onto the center of the rig floor and prevent inadvertent pinch points from being created against the Rig floor superstructure for the Rig crew.

The two V-door posts on the Rig were relatively thin walled 6.5-inch diameter, schedule 80 class B (or C). The posts were 7.2-ft long and were welded directly to the rig floor. Both posts had two relatively large pad eyes attached; one at the top of the post, and another large one on the

base of the posts where it was also welded to the Rig floor (*see figure 13*). The left hand V-door guide post also had additional smaller pad eyes welded in the middle of the post.

Both of the guide posts had shackles attached to the pad eyes. The left post also had a large chain wrapped around the base of the post. The chain seemed to be stored in that manner to be available for future use. Both posts were originally painted yellow. However, both were heavily scarred from use with many dents, scrapes, and dings that revealed raw and-or heavily rusted unpainted metal. The posts also showed evidence of having been frequently cut off and re-welded into place. This was indicated by the multiple re-weld seams at the base of both posts (*see figure 14*).



Figure 13: Left V-door guide post

Testimony from the night shift Rig floor personnel indicated that they were not aware of any restrictions on the use of the V-door guide posts as a load bearing member. Testimony was received that the V-door guide posts had been used as an anchor point for rotating drive pipe in the past. No testimony indicated how the turning mechanism was set up previously.

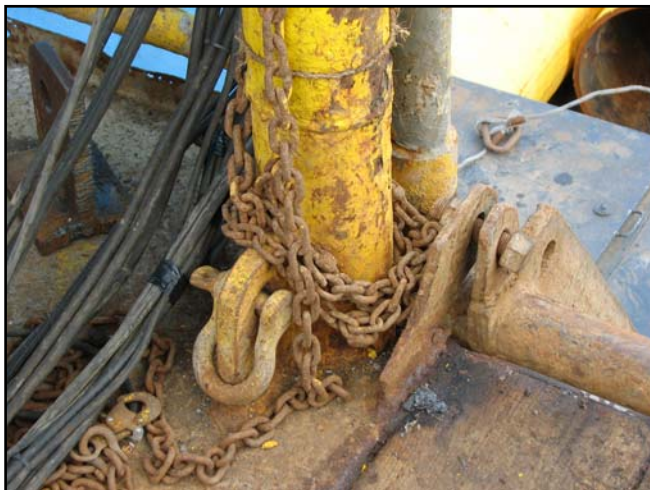


Figure 14: Base, left V-door guide post

Both V-door guide posts were attached to the rig floor in what appeared to be a temporary manner. They appeared to be simply “tack-welded” to the floor, and neither appeared to be welded using a bead that went completely around the circumference of the pipe and pad eye. Neither post seemed to be welded in a manner that attached the full pipe wall thickness to the Rig floor.

From examination of the post, it appeared as if the welds failed completely around the pipe circumference (where tack-welded) and around the lip of the lower pad eye. A portion of the pipe itself also seems to have failed. It appeared as if portions of the post were not welded to the Rig floor. Much of the exposed pipe wall thickness was rusted, rough-cut in appearance, and showed no sign of a recent failure. The pipe appeared to have been tack-welded so that only portions of the outside wall were connected to the deck (*see figures 15 and 16*).



Figure 15: Base, broken right side V-door guide post



Figure 16: Location, welded base of V-door guide post to rig floor

Testimony was received from the OIM that the V-door guide posts were not intended to be a base point for heavy loads. Neither the pipe dimensions and specifications, or the tack-welded temporary connection to the rig floor appeared to have enabled the post to be safely used as a base for supporting heavy loads or operations. Neither of the original guide posts had any markings indicating that they were not to be used for bearing loads, other than being painted yellow.

No testimony was received whether the color yellow indicated a no-load bearing member on this Rig. Testimony was received that there did not seem to be a standard Contractor method of identifying no-load portions of the Rig. The presence of multiple pad eyes, chains, shackles attached to both of the V-door guide posts indicated both could readily be used as a support base for moving or securing loads. Testimony also indicated that both posts had been used in such a manner many times despite their apparent unsuitability.

Despite repeated requests, Nabors failed to provide engineering drawings containing specifications of the Rig's V-door guide posts. Testimony was received that the Rig was bought by Nabors some considerable length of time after its construction. However, the Rig managers on site confirmed that it is generally the rule that the V-door guide posts are usually not designed to support loads because they are frequently required to be removed, moved or replaced. Rig managers testified that had they been aware of the situation, they would not have used the V-door post as an anchor point, nor rigged up to turn the drive pipe in the manner employed.

Conclusions

The Accident

After a review of the information obtained during the investigation, it is concluded that, at approximately 0055 hours on 18 July 2006, operations were being conducted to rotate a string of 48-in drive pipe. The method of applying torque to rotate the string included rigging a block and tackle to a V-door guide post (6.5-in schedule 80 class “B” or “C” pipe), and using it as an anchor while applying torque with the Rig air hoist system.

The torque applied to the casing ceased to turn the drive pipe when it was still not rotated far enough to be aligned properly. When the Floorman checked the tension on the line rigged up to turn the casing, the guide post anchoring the assembly broke free of its attachment to the Rig floor. The weld attaching the V-door post to the floor, and a portion of the pipe wall, failed under the load applied and subsequently the V-door post was propelled across the floor striking and fatally injuring the Floorman.

Cause of Fatality

- 1. Insufficient onsite oversight - No oversight of the rig-up process was given by the OIM, Tool Pusher, or by the Company Man. Therefore, no discussions of alternative methods of rigging up to rotate the drive pipe were made available to the personnel on duty when rig-up was initiated.*
- 2. The V-door guide post was not designed to carry any significant load. Use of the V-door guide post as an anchor point directly lead to the failure of the post and the subsequent fatal injury.*
- 3. Failure to rig up in such a manner that would allow the drive pipe to freely rotate through the full arc required for the operation, caused the force applied to the anchoring V-door guide post to exceed the critical failure point of the pipe and/or the weld .*

4. Failure to mark the guide post as a “no-load bearing” structural component, and the installation of pad eye connections on both guide posts, allowed and even encouraged the use of the guide post as a load bearing member.

5. Insufficient onsite pre-job review and communication – It is concluded that the onsite job preview was not sufficient to prepare adequately for rotating the drive pipe.

- No JSA meeting discussed rig-up procedure for rotating the drive pipe.*
- There was no communication between towers (shifts) about the methods previously used to successfully rotate the drive pipe.*

Probable Contributing Causes of the Fatality

1. A lack of a Contractor (Nabors) defined and approved methodology for rotating the drive pipe in the Rig’s RMS Safety Manual, and training in that method given to the supervisors on the floor, probably contributed to the use of an inadequate and unsafe method to rig up the air hoist to the drive pipe.

2. Rigging up the rotating mechanism to the top of the V-door guide post rather than the bottom multiplied the force applied to the welds at the base of the post several times over. This probably contributed to the failure of the welds and/or pipe.

3. It is probable that the Rig floor supervisor (Driller) failed to check the method used to rig up for the operation or did not recognize the insufficient nature of the rig up. This probably contributed to the accident. The errors in rig up included the following:

- connecting the line to the V-door guide post rather than some load bearing member;*
- connecting the line to the pad eye located on the top of the V-door guide post rather than the bottom;*
- routing the line directly from the drive pipe pad eye to the shackle on the V-door post, rather than looping it around the casing.*

Possible Contributing Causes of the Fatality

Possible failure of communication: it is possible that the supervisor (Driller) intended to rig-up in a way that differed in some aspects from that actually used. If so, it is possible that the communication of the method to be used to those actually rigging up this project was not complete or definitive.

Recommendations

It is recommended that MMS issue a Safety Alert that briefly describes the fatal accident and that alerts the operators to the following:

- 1. Supervisors and rig managers should be vigilant and explicitly review the methods employed to accomplish common tasks that are not routine, especially those that move loads using power and block and tackle rig ups.*
- 2. Mark non-load bearing structural components of the rig that might be used for anchoring heavy loads and insure that all crew members understand what “non-load bearing” means. Do not use V-door guide posts as a base of support for significant loads unless they are specifically designed for it.*
- 3. The Operators should review their planning processes to ensure a detailed review of every element by fully experienced personnel is covered in the Job Safety Analysis meeting.*
- 4. The Contractors should have a fully vetted and approved method for accomplishing common but not routine tasks that involve using power and block and tackle rig ups. The employees should be fully trained in this method, and the dangers of unauthorized hook ups should be taught.*