OCS Report
MMS 2006-002

Investigation of Fatal Accident South Pelto Block 15, Well No. 4 OCS-G 09652 26 January 2005

Gulf of Mexico
Off the Louisiana Coast

MMS

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

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Jack Williams – Chair
Tom Perry
Jay Cheramie
Mark Malbrue

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

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Investigation and Report

Authority

A fatal accident (the Accident) occurred on 26 January 2005 at approximately 0800 hours aboard the Pride Offshore, Inc. (Pride) jack-up rig *New Mexico* (*New Mexico* or the Rig) while it was conducting operations for Bois d'Arc Offshore, Ltd. (Operator or Bois d'Arc) on Lease OCS-G 09652, South Pelto Block 15, Well No. 4 (the Well), in the Gulf of Mexico, offshore the State of Louisiana.

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 Regulations 30 CFR 250, Minerals Management Service (MMS) is required to investigate and prepare a public report of this accident. By memorandum dated 27 January 2005, the following personnel were named to the investigative panel:

Jack Williams, Chairman – Office of Safety Management, Field Operations, GOM OCS Region
Jay Cheramie – Houma District, Field Operations, GOM OCS Region
Mark Malbrue - Lafayette District, Field Operations, GOM OCS Region
Tom Perry – Accident Investigation Board, Office of Offshore Regulatory Programs, Offshore Minerals Management

Procedures

On the morning of 26 January 2005, two inspectors from the Department of the Interior, Minerals Management Service (MMS) District office in Houma, Louisiana, visited the site of the fatal accident to assess the situation, take photos and statements, and gather information. On 2 February 2005, members of the investigative panel (the Panel) met and reviewed documents, pictures, written accounts of the accident, and planned the investigation. On 4 February 2005, Panel members discussed the progress of investigations by other organizations. On 17 February, data were requested from various companies. On 17 March, after a discussion with Pride personnel, a formal letter requesting additional data was forwarded. On 17 May, additional design, installation, operation and maintenance data were requested from Veristic Technology, Inc. (Veristic) and certain personnel information was acquired from Offshore Energy Services, Inc. (OES). Additionally, interviews, telephone conferences, and reviews were conducted on the dates as follows:

19 June - A phone conference with Pride arranged interviews and requested maintenance data; interviews were also arranged with OES personnel.

1 July - Panel members interviewed six crew members of the *New Mexico* and the accident investigation consultant representing Bois d'Arc and Eagle Consulting, L.L.C. (Eagle) at the MMS office, Houma.

4 July - A panel member interviewed the Rig Offshore Installation Manager (OIM) at his home in Bogue Chitto, Mississippi.

5 July - Panel members interviewed three OES casing crew members and an OES manager at the MMS office, Lafayette.

7 July - Panel members interviewed personnel from the designer and manufacturer of the hydraulic stabbing board (HSB), Veristic, in Houston.

8 July - Panel members interviewed the consultant (company-man) from Eagle, representing Bois d'Arc, and the safety officer for Pride at the MMS office, Houma.

8-15 July - Additional documentation, e-mail records, and correspondence were requested and received from Pride, Veristic, and OES.

15 July - Panel members met in New Orleans, reviewed the data, and agreed on the scope of the conclusions and outline of the report.

20 July - A Panel member interviewed a hydraulic expert from Oil States Applied Hydraulics by telephone.

21 July – A Panel member interviewed the driller, who had been on tower at the time of the accident, by telephone.

22 July - Additional interviews were conducted by telephone with Veristic personnel.

25 July - Follow-up telephone questions were asked; these were answered by personnel with Kanair, Inc. (Kanair) and Veristics; the Rig Maintenance Supervisor (RMS) for the *New Mexico* was interviewed by telephone.

26 July - The hydraulic technician who installed the HSB was located and interviewed by telephone and follow-up questions were answered by the OIM.

In addition to the interviews, other information was gathered at various times from a variety of sources. This information included the following reports and statements:

- From Bois d'Arc: Daily Morning Reports, 21 Jan 2005 – 26 Jan 2005;
- From Pride: International Association of Drilling Contractors (IADC) Daily Drilling Reports, 21 Jan 2005 – 26 Jan 2005;
- From Bois d'Arc: Application for Permit to Modify; Well Plan to plug back and sidetrack the Well;
- From Pride: Stabbing Board Inspection Report, 25 Jan 05; other stabbing board Inspection Reports dated from 2 Feb 2000 to 16 Jan 2005; the JSA form dated 2 Jan 2005 used in JSA meeting; layout and orientation of the Rig; diagram showing final position of the HSB bucket;
- From Pride: New Mexico Crew "B" information, including investigatory team, on tower crew, on tower casing crew; pictures of equipment, Rig, HSB, bucket;
- From Pride: Purchase order (PO) for the HSB; various invoices and PO's for purchase of replacement parts;
- From Pride: Written statement from the driller on duty;
- From Pride: Safety Meeting Attendance signature sheet dated 26 Jan 2005;
- From Pride and Veristic: Copies of e-mail correspondence, Nov 2004 – Feb 2005; copy of Veristic proposal to rework the system dated Dec 2004; Pride *Personnel Safety Manual (SG-14),* issued April 2002;
- From Pride: Job description for the Rig Safety and Training Representative;
- From Veristic: *Casing Stabbing Board (CSB)* [HSB] *Operation and Maintenance Manual (*hereinafter referred to as *Operation and Maintenance Manual* or *Manual)*; Review of HSB presentation;
- From Oil States Applied Hydraulics: A hydraulic expert's opinion on hydraulic trouble shooting;
- From IADC: Safety Alerts # 2005-22, 2005-04, 2004-40, 2004-41, 2004-50;
- Federal Aviation Administration sponsored studies on fatigue.

The panel members 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 09652 covers approximately 5,000 acres and is located in South Pelto Block 15 (PL-15), Gulf of Mexico, off the Louisiana Coast *(for lease location, see Attachment 1).* The lease was originally purchased by Kerr McGee in 1988 and was transferred effective in 1998 to a group that included the Operator (67%). Effective 1 May 2004**,** Bois d'Arc held approximately 73-percent interest ownership in the lease, with several minority companies and individuals holding the remainder. Bois d'Arc is the designated operator**.**

Bois D'Arc contracted Eagle Consulting, L.L.C. (Eagle) to prepare and plan the well work and provide supervisors (company-men) to oversee operations on the Well. The plan called for the Well to be plugged-back and sidetracked. Operations were to be conducted from the Well's surface location by using the jack-up drilling rig *New Mexico*. The Rig was moved, jacked-up on location, and Well operations were begun at 1600 hours on 21 January 2005.

Brief Description, Fatality on Rig

On 26 January, operations to plug back and prepare to sidetrack the Well were ongoing. A team of third-party casing handling specialists (the Casing Crew) had been contracted from OES and was engaged in pulling and laying down casing. The Casing Crew included one man (the Stabber), who was in the derrick-mounted hydraulic stabbing board (HSB) personnel bucket.

At approximately 0800 hours, as the casing was being pulled up preparatory to breaking out another joint, an anomalous sound was heard in the derrick. The driller immediately halted the ascension of the block and top drive unit. It was discovered that the personnel bucket of the HSB was caught on the top drive unit and was suspended horizontally. The Stabber was observed partially suspended from his safety harness, unresponsive to communication attempts. Rescue operations were initiated and the Stabber was lifted out of the bucket and lowered to the drill floor, where first aid was initiated. The Stabber did not respond and was pronounced deceased by paramedics at approximately 0900 hrs.

Findings

Rig Operations

Preliminary Activities – Well plan

As filed with the MMS by the Operator, the Application for Permit to Modify (APM) proposed plans to plug and abandon (P&A) the Well back below the setting depth of the 10¾-inch surface casing (set at approximately 2,900 ft) and then sidetrack the Well to a new bottomhole location.

As the well had 7⅝-inch production casing run to the surface, to prepare for sidetracking out of the surface casing and to provide enough open hole to allow a successful sidetrack, it was planned to plug the well back to approximately 3,800 ft, cut and pull the 7⅝-inch casing from a depth deep enough to allow the bottom of a sidetrack plug to be set at approximately 3,300 ft.

Operations, Through the Accident

On 21-24 January 2005, the *New Mexico* moved on location. The Rig was jacked up and operations commenced as per the APM on 21 January 2005. The pressure on the well was killed, the tree was nippled down, and the blowout preventers (BOP's) were nippled up. The tubing was cut at >11,700 ft, pulled, and racked back. An EZSV (drillable only, cement squeeze and bridge plug) was run in the hole on tubing, set, and cemented at approximately 11,700 ft.

On 24-25 January 2005, the 2⅞-inch tubing was laid down and the well was plugged back to approximately 3,700 ft with an EZSV plug run on drill pipe, set, and cemented. The 7⅝-inch casing was then cut at approximately 3,390 ft, and preparations to pull and lay down the 7⅝-inch casing were completed.

On 26 January, preparations for pulling the casing were completed. At 0430 hrs, the Casing Crew began pulling and laying down approximately 82 joints or 3,400 ft of 7⅝-inch casing. By 0800 hrs, 58 joints, or approximately 2,400 ft, of the casing had been laid down, and operations were continuing to pull the remainder. The four-man Casing Crew performing the primary work included one man operating in the derrick-mounted hydraulic stabbing board (HSB) personnel bucket, the Stabber. On the Rig floor also were Rig personnel (employees of Pride), including the driller, who was operating the draw works, and two floor men, who were guiding the individual joints of casing into the V-door.

At approximately 0800 hours, 26 January 2005, as the casing was being pulled out of hole preparatory to breaking out and laying down another joint, an anomalous sound was heard from the derrick. Upon hearing the warning of the men operating on the floor, the driller immediately halted the ascension of the block and top drive unit.

It was then discovered that the personnel bucket of the HSB was caught on the top drive unit and was suspended horizontally *(see Attachment 2).* The Stabber, who had been in the bucket, was observed to be partially suspended from his safety harness, not responding to communication from the drill floor.

Post-Accident Medical Procedures, Initial Investigation

Rescue operations were initiated, supervised by the company-man and OIM. Acadian Ambulance Medivac was called and mobilized almost immediately. Within 15 minutes, the Stabber was lifted out of the basket and lowered to the drill floor and placed onto a gurney. He was moved into the TV room and first aid procedures were continued, including chest compression and defibrillation. The Medivac service arrived within 45 minutes. Life support first aid was halted approximately one hour after the incident, after the trained medical technician on board the Medivac notified the company-man that the situation was beyond help.

After notification of the Coast Guard and MMS, the Stabber was evacuated by helicopter to Terrebonne General Hospital approximately 2½ hours after the Accident.

Later that day, personnel from the Coast Guard, MMS, Pride, representatives of OES and an accident investigation consultant representing the Operator and Eagle arrived on the Rig to conduct the initial inquiry into the Accident. A number of other personnel eventually inspected the site of the Accident, including a representative of the company that designed and installed the hydraulic system of the HSB, Konair, Inc. (Konair), who also represented the manufacturer, Veristics.

A schematic diagram of the HSB was among other documents initially requested by the MMS inspectors. Testimony indicates that a schematic was eventually faxed to the MMS, as the manual for the HSB was not immediately available or could not be located on the Rig.

The initial investigation by the MMS inspectors and others acquired pictures of the scene, written statements from key personnel, and other training, inspection, and operational information.

Personnel and Companies

The *New Mexico* was equipped with a top drive unit and was also equipped with one unusual mechanical device, a prototype hydraulic stabbing board (HSB) designed and manufactured by a specialty engineering firm, Veristic, and installed in August 2003. This piece of equipment is discussed in greater detail below.

The Operator was represented on the Rig by two company-men contracted from Eagle. The company-men monitored and oversaw operations on the Well, ensuring that the well APM and well plan were followed. The Rig operations offshore were managed by two Pride personnel, the OIM, who was the senior manager in charge of the Rig, and a tool pusher. The Rig was manned by two shifts of Pride employees, a day shift and night shift, with shift change occurring at 0600 hrs and 1800 hrs. Each shift included a driller, who operated the drill floor, an assistant driller (AD), a derrick man, and floor men. Each shift also included roustabouts, crane operators, and other specialty personnel who usually operated off the drill floor. The Rig crew also included nonshift personnel such as electricians, a rig maintenance supervisor (RMS), and others.

The Casing Crew consisted of four members, including a supervisor, who also operated the power tongs as needed; two floor men; and the Stabber. The Stabber usually worked from the stabbing board in the derrick while the Casing Crew were laying down or running casing.

Testimony and documents indicate the company men, OIM, and tool pusher, who were supervising on the Rig at the time of the Accident, were all experienced and properly trained in their respective roles. The Pride Driller on tower was likewise qualified, had held the position for a number of years, and had witnessed the installation of the hydraulic stabbing board. The Pride day shift AD had been recently promoted after several years filling the position of derrick man, and another shift member had been promoted into the derrick man position. Both were well qualified and were able to give knowledgeable testimony about the operation and about the hydraulic stabbing board with which the Rig was equipped. All of the Pride day shift on the Rig floor were similarly experienced and properly trained.

Testimony indicates that the Casing Crew was experienced and skilled. From testimony, the Stabber had previous experience with different types of stabbing boards, including other types of hydraulically operated stabbing boards, though not ones that operated exactly in the manner of this particular board. Excluding the HSB, testimony and maintenance documentation indicate the Rig and equipment were in acceptable mechanical operating condition.

Personnel Locations and Description of Accident

According to testimony, at the time of the accident six men occupied positions on or near the Rig floor, and the Stabber was in the derrick in the personnel bucket of the HSB *(see Attachment 3).* The Driller was operating the draw works while two Casing Crew floor men were operating the tongs and slips and conducting drill floor activities associated with pulling casing, assisted and directed by the Casing Crew supervisor. Two Pride floor-men were stationed in the V-door, guiding the casing joints onto the ramp. Other Pride personnel were at the base of the ramp, assisting in bundling casing and moving it by crane onto a workboat.

All facets of the job were proceeding rapidly and smoothly. The company-man and OIM had regularly toured the area and observed the performance of each ongoing activity. According to testimony, none of the supervisory personnel observed hazardous actions or abnormal methodologies being employed by any personnel. Individuals working on the rig floor confirmed the job was proceeding according to plan. The weather was calm and clear with little or no wind and no observable environmental complications were apparent.

The Casing Crew was pulling and laying down casing in a standard manner. The only unusual feature of this particular operation involved the use of the prototype HSB, which allowed the Stabber to move a personnel bucket in four directions, up, down, in towards the top of the casing, and away from the casing to avoid the path of the block and top drive unit. This HSB (discussed in detail below) had one unusual operating feature not common to most hydraulically operated equipment. Testimony indicates the HSB exhibited a delayed reaction to the controls (the Delay). This delayed reaction existed regardless of the direction moved.

Description of Stabbing Activities and the Accident

Use of the Stabbing Board

The stabbing board used on rigs during running or pulling casing is similar to a "monkey board" *(see Attachment 4),* but instead of being 90 ft off the floor, it is commonly located approximately 30-50 ft above the rig floor because the average length of a joint of casing is 43 ft. The role of the stabber is to stabilize the top of a joint of casing, and to attach or detach whatever lifting device is being used to hold the joint of casing. The stabber then ensures the joint is positioned properly for being "made up" to the string so it can be run in the hole, or balanced and securely attached to a sling in preparation for laying it down *(see Attachment 5).* This board is commonly only used for handling single joints of casing, drill pipe, or tubing.

If drill pipe or tubing is being run or pulled, the rig crew usually handles the pipe, and the rig derrick man mans the stabbing board. Because of the weight and large size of casing, most casing operations employ a third-party company, as these have the specialty tools and specially trained crews for handling the large-sized pipes.

Because of the proximity to heavy loads in motion, height, and a somewhat precarious position for conducting operations, and because the stabber must operate within the path of the block, the stabbing board is regarded as hazardous duty. If a conventional fixed stabbing board (usually just a platform attached to the derrick) is used, the stabber must lean out a considerable distance to reach the top of the casing. While doing this, he is commonly held by an elastic safety band and a fall protection harness as he spans the distance from the conventional board to the casing *(see Attachment 6).* To lessen the distance he must reach, most conventional boards are positioned close to the path of the block. The conventional stabbing board is often equipped with the ability to move up or down to allow handling casing of differing lengths. Most such boards employ an air hoist for this function, though a few hydraulic or electric powered stabbing boards have been deployed.

Accidents involving stabbing boards (or monkey boards) are not unusual in the industry. For example, within the last two years the following links describe accidents listed in the International Association of Drilling Contractors (IADC) reports alone.

3. http://www.iadc.org/alerts/2005_Alerts/sa%2005-22.pdf
4. http://www.iadc.org/alerts/2005_Alerts/sa05-04.pdf
5. http://www.iadc.org/alerts/2004_Alerts/sa04-40.pdf
6. http://www.iadc.org/alerts/2004_Alerts/sa04-41.pdf
7. http://www.iadc.org/alerts/2004_Alerts/sa04-50.pdf

The HSB and Steps for Pulling Casing

The prototype HSB on the *New Mexico* was designed to eliminate the need for the stabber to lean out from the board. This was accomplished by use of a hydraulic arm, which allowed a personnel bucket to move forward to the casing elevators and back out of the way of the block when the stabber's activities were completed *(see Attachment 7).*

Using the hydraulic stabbing board, the steps involved in pulling and laying down a joint of casing on the *New Mexico* are listed below, as are the responsibilities of each man *(see Attachment 8* for pictorial representation*)*. This description begins with a joint broken out from the string, ready to be laid down:

3. The Driller (Pride) is signaled by the Stabber (Casing Crew) that he is out of the way of the block. The block and top drive with the single joint sling holding a detached joint of casing is lowered by the Driller to the Rig floor. That joint of casing is guided to the V-door by floor men (Pride) using an air hoist and the single joint sling is detached by the Casing Crew floor men. The Casing Crew floor men then connect the elevators to the casing and the Driller raises the casing string until the next collar is exposed.

4. The block is stopped and the Casing Crew floor men set the slips, and attach the power tongs.

5. The Casing Crew Stabber maneuvers the HSB close to the top of the casing, and opens the elevators. Using the power tongs, the Casing Crew tong operator partially unscrews the top (exposed) joint of casing.

6. The Casing Crew Stabber then has the Driller raise the elevator over the joint of casing and attaches the single joint elevator to the casing.

7. The Casing Crew tong operator then unscrews the joint of casing with the power tongs until it comes free of the string. The Stabber then moves the HSB back out of the way of the block.

1. The Driller (Pride) then raises the joint slightly, the Casing Crew floor men install a thread protector, and the air hoist is connected to the bottom of the joint of casing, pulling a bind toward the V-door.

9. The Driller (Pride) checks the Stabber, who signals that he is clear, and the Driller lowers the joint of casing while the air hoist guides the end of the joint into the V-door. Two floor-men (Pride) see that the joint takes the ramp to the pipe deck.

Preparation for the Casing Operation

The Casing Crew and their equipment arrived on the *New Mexico* at approximately 1800 hrs on 25 January. From testimony, after checking over their equipment, they ate dinner and discussed the upcoming operation with several members of the Pride day shift, which came off tower at 1800 hrs. That evening, on two occasions, operation of the HSB was a topic of conversation between Pride day shift and the Casing Crew, including the Delay in response to the controls. The second discussion was in the smoking room, where the off-tower driller for Pride described the Delay to most of the Casing Crew, including the supervisor. The Stabber was not present at this conversation because he was reported to have gone to bed.

On 26 January, at approximately 0230 hrs, the Casing Crew was awakened and began preparations, including checking and installing their equipment. Then, according to testimony by all members of the Casing Crew and supervisors on the Rig, a detailed and fully attended Job Safety Analysis (JSA) meeting was held. At this meeting, the upcoming operations on the Rig were discussed and the procedures for handling the casing were agreed upon. Discussed also was the operation of the HSB and, according to testimony, the actual controls were demonstrated to the Stabber and the Delay was discussed. The Stabber stated he had dealt with hydraulic controls for stabbing boards before and understood the operation of them.

Though personnel did sign a separate general safety meeting attendance form, no signed, specific, JSA form indicating the attendance and agenda for this meeting was created. However, according to testimony, a generic casing operation JSA created a few weeks prior was used as a guide for the agenda and all personnel from the Pride night shift and the Casing Crew attended the meeting. This JSA form included the following language:

Sequence of Basic Job Steps	**Potential Accidents or Hazards**	**Recommendation to Eliminate or Reduce Potential Hazard**
…	…	…
Driller latches onto a joint and pulls out of hole, set slips, unlatch main elvtr., and pick up and latch single joint elevators. **emphasis added*	**Hanging top drive on stab board*. Not putting Keeper pin in elevators, slips not set right, Struck by small elevators.	Make sure keeper pin is in elvtr. Make sure slips are set right. **Watch hand on stab board, make sure he is out of way.* Watch back while pickup small elevators.

The Casing Operation Accident

The Accident occurred as the casing was being pulled and the block and assembly were rising past the Stabber in "step 1" above. As the assembly was being raised, the HSB personnel bucket contacted and hung on the top drive *(see Attachment 9* for pictorial representation*).* According to testimony, the top drive unit has a smaller diameter than the block and, therefore, usually tracks inside the path of the block. In this case, certain hydraulic fittings attached to the top drive may actually have extended slightly outside of the path of the block. While the top drive is ascending or descending, the path is positively fixed because it rides on rail fittings attached to the derrick, and thus cannot swing or vary its trajectory.

The HSB was attached to the derrick on the side opposite the V-door and on the opposite side from the location of the driller. Therefore, when the block and top drive were passing the stabbing board, the Driller momentarily had no sight of the Stabber. At the time of the Accident, the Rig was equipped with a closed circuit TV camera focused on the stabbing board. However, this camera was deployed in the wind walls of the pipe rack monkey board and fingers, 90 ft above the rig floor on the same side of the derrick as the V-door (*refer to Attachment 3*). Therefore, the camera was some 45 ft above the stabbing board, looking down on the stabbing board at approximately a 30-degree angle. This camera was also momentarily blocked from a view of the stabbing board when the block and top drive were passing opposite the Stabber.

At 0800 hrs, the HSB personnel bucket was struck and hung up on the top drive unit as the block was ascending. The driller immediately halted the ascension of the block after hearing verbal warnings from the Casing Crew floor men, who had been preparing to set the slips. The ascent of the block, estimated at about 4 ft per second (from testimony), was completely halted within approximately 2-3 seconds (calculated) of the impact of bucket and top drive. Afterwards, the personnel bucket was found hung at 90 degrees from vertical on the top drive fixed union, some 10 ft below the top of the top drive unit (*see Attachments 10 & 11*).

Marks on the bottom of the HSB personnel bucket matched the profile of a hydraulic fitting on the top of the top drive (*see Attachments 12 & 13*) and some residual scratch marks and personnel basket paint was on the top drive. A drawing was constructed approximating the path that the personnel basket would follow if it were initially lifted by the hydraulic fitting and then broke loose, ending in the observed position *(see Attachment 14)*. The drawing shows that the personnel bucket could have been lifted to an angle of approximately 135 degrees before breaking loose from the hydraulic fitting, sliding along the top drive, falling, and lodging on the fixed union.

The bucket was constructed using OSHA handrail specifications with the top rail 3½ ft above the floor of the bucket. The drawing also illustrates the approximate position of the top front rail of the bucket in relation to the arm of the HSB, as it skidded along the side of the top drive. The drawing indicates that, if the personnel basket were upended to 135 degrees, the top rail of the basket would severely constrict the space between the front rail of the personnel basket and the HSB arm, where the Stabber would have been standing.

Reports from the Rig concerning the injuries sustained by the Stabber indicated that severe bruising and contusions were apparent in the upper portion of his chest.

Description of Hydraulic Stabbing Board

Design

When the conventional stabbing board on the *New Mexico* was damaged during a well incident in early 2003, Pride approached Veristic and asked that company to design a new board. Veristic is a drill-floor-up engineering and manufacturing firm specializing in drilling and servicing structures, offshore derricks, crown and traveling block modifications, repairs, design, pipe racking systems, etc. According to testimony and documentation, Veristic is certified by DNV, ABS, and Lloyds and works to the standards of API, AISC, ASTM, ASME, and AWS. The firm has been in business for over 20 years and has a long business relationship with Pride.

Veristic examined conventional stabbing boards and concluded that they were increasingly dangerous and undesirable, as top drive units and rig blocks continued to grow in size. According to testimony, several attempts had previously been made in the industry to produce a workable hydraulic stabbing board that would allow the stabber to move in, do his work, and move out of the way. Drawbacks usually related to size or control mechanisms have limited the deployment of these type boards, though design refinement continues. Pride approved the Veristic design in early 2003 and contracted with Veristic for the production and installation of the system.

By June 2003, Veristic produced its hydraulic-on-hydraulic controlled stabbing board. As designed and built, the Veristic HSB had the ability to move in four directions, reach across the derrick to service the block or top drive, and extend to the rig floor, eliminating the need for the stabber to climb the derrick *(refer to Attachment 7)*. The device was relatively small and compact and thus could maneuver between racked tubing.

The HSB design included two sets of joy stick controls: one on the personnel bucket and one on the rig floor *(see Attachment 15)*. The rig floor control allowed the HSB to be moved out of the way or maneuvered as desired without physically accessing the personnel bucket. Both controls were equipped with an emergency stop button. The two controls were configured so that only one could operate at a given time.

The HSB was set up and successfully tested in Veristic's yard in Houston and, according to testimony, the test was video taped. The prototype unit was completed, tested, and shipped in June 2003.

Installation

Veristic was contracted by Pride for the design, manufacture, and installation of the HSB, and Veristic used Kanair for the design and installation of the hydraulics for the system. Along with the HSB device, Veristic also supplied a booklet that included installation drawings and operation, maintenance, and trouble-shooting instructions. The portion of the booklet pertaining to the hydraulics was written by personnel from Kanair.

Veristic contracted Polar Rig Specialties, Inc. (Polar) to turn-key the installation of the HSB on the *New Mexico*. Polar used its personnel to assemble and attach the iron, but Polar, or Veristic, or Kanair, arranged for American Aero Crane Co. (now Energy Crane Co.) to provide a hydraulic technician (the Technician) actually to install and adjust the hydraulics of the HSB. This Technician had previously worked for/with Kanair during the design and testing of the hydraulic portion of the HSB and was present at the field test in Veristic's yard.

Neither Veristic nor Kanair sent engineers to the installation. According to testimony, the Polar employees installed the device in the derrick according to the specifications provided by a set of engineering drawings, and the Technician installed and adjusted the hydraulics. The installation had to be repeated when it was decided to raise the HSB 8-12 ft higher in the derrick.

The Technician gave a brief, on-site orientation for the operation of the HSB to one or two Pride personnel, but no formal training was provided or required. Testimony indicates the orientation was limited and the Technician was not specifically charged with that responsibility. During the installation, it is unknown to what extent Polar personnel were in consultation with the manufacturer, Veristic. But consultation between the Technician and Kanair personnel did occur frequently concerning the installation and adjustment of the hydraulics.

From testimony, there was no special documentation or formal test of the system before acceptance by Pride. The judgment of the Technician that the system was operational to specifications was accepted by signing the work ticket.

Operation and Maintenance, Hydraulic Stabbing Board

Operation and Maintenance Manual Recommendations

In addition to the engineering drawings showing the specifications and installation instructions, Veristic supplied an *Operation and Maintenance Manual* for the control system. The introduction of this *Manual* recommends "the operating personnel should read and understand [the] *Manual* before servicing, operation, and maintenance of the equipment."

The *Manual* discussed the specifications of the hydraulic power unit and system, joy stick controls, hydraulic pressures at various points in the system, hydraulic system oil level, filtering, etc., and operating instructions. The *Manual* also detailed a number of cautionary inspections to be accomplished before starting to operate the system. These included examining the system for any oil leakage, ensuring the oil level was proper, ensuring the pump rotation was in the correct direction, ensuring the pressure isolation valve was open. The *Manual* also recommended testing the emergency stop button on the bucket and on the surface control.

Several operational recommendations were included in the *Manual*. Of note are the following recommendations:

3.8.1 "If any filter dirty-indicator is turned on replace the element as early as possible."

3.8.2 "If the joystick operation is sluggish, air may be trapped in the system. Bleed the air off the system to fix the problem."

The Maintenance and Troubleshooting section contained recommendations for keeping the HSB system operating as designed. Among the recommendations were the following:

3.8.1 "Leakage and Weepage: When a new hydraulic system is installed, it is possible that some components or fittings may show slow leakage. Fix the leakages promptly when observed…"

3.8.2 "Contamination Control: The [HSB] System is provided with a very high efficiency contamination control program…[list of 4 particulate filters and a bladder barrier to dirt and moisture]….Whenever indicated, replace the filter element promptly…"

Included also was a section on general maintenance and a subsection detailing evaluation and trouble-shooting of specific problems.

Rig Maintenance, Pre-operation Check List

No written documents were provided that show how the HSB was maintained during the approximately 1½ years the system was on the *New Mexico*. When using the conventional stabbing board, prior to the installation of the HSB, Rig personnel filled out and signed a pre-use checklist entitled "Stabbing Board Inspection Report." This report was intended for the inspection of a conventional stabbing board. The form was not changed after the installation of the HSB. Nowhere on the Rig Stabbing Board Inspection Report were any checks for hydraulics, controls, or any features associated with the HSB, nor were the recommendations contained in the *Manual* included.

Pride maintains a centralized maintenance computer system that tracks the scheduled requirements for their rigs. This system generates an automatic reminder of maintenance that is due for a rig's equipment. This reminder is continuously fed to the maintenance computer on the rig until an entry is made indicating the maintenance has been completed. According to testimony, there were no "required maintenance" entries for the HSB in this central system and there were no records made available that confirmed what maintenance was done.

During interviews, attempts were made to establish the maintenance and trouble-shooting schedule used for the HSB. Though the existence of the *Manual* was acknowledged, no personnel discussed any use of the maintenance or trouble-shooting procedures specified in the *Manual*. Specific questions about what maintenance was done and how often were not answered in detail. No record of trouble-shooting the system, bleeding the air, etc., was available from Pride. The *Manual* was not available when the MMS inspectors conducted their on-site initial investigation.

No written procedures for the operation of the HSB, developed by Pride Rig personnel, or included in Pride's general operating policies, were provided to the Panel. No discussion of written procedures for operating the HSB were included as part of the JSA meeting.

Delayed Response to Controls

One feature of the HSB that was discussed by everyone associated with the Rig, OES, Pride, and the Operator was the existence of a significant delayed reaction to the hydraulic controls of the HSB (the Delay). This Delay was present regardless of the direction of movement.

Different personnel estimated the length of the Delay to range from 13 to 45 seconds, but, the most common estimate was 20 to 30 seconds if the system was warm, and up to 45 seconds if the system was cold. Therefore, the HSB operator had to hold the joy stick controls fully activated from 20 to 45 seconds before motion started. To return the HSB to its original position or to move to another position required another activation of from 20 to 45 seconds.

Testimony indicates that, when the system was tested in the Veristic yard, the Delay was between 1 and 3 seconds, or about the time it took for the hydraulics to energize the system. Testimony from the Technician indicated that, when the system was installed on the Rig, he estimated the Delay to be from 3 to 5 seconds, and he believed the system was operating as designed.

Most of the testimony from Rig personnel stated the Delay was approximately 20 seconds when the system was first used. However, the OIM found that the Delay could be mitigated. The OIM testified that he was familiarized with the system a week or so after installation, when he came on duty. He estimated that the Delay was about 20 seconds at that time. But when the OIM bled the system using normal methodology, the Delay was reduced to about 10 seconds.

The OIM stated that, after bleeding the system, he called Veristic for help in reducing the Delay further. It is not known whom he talked with at Veristic. The Technician was dispatched back to the Rig by Kanair, approximately two or three weeks after the installation. He testified he found the Delay was approximately 10 to 15 seconds when he arrived on the Rig. According to his testimony, he bled the system and reduced the Delay back to 3 to 5 seconds.

When interviewed, he was asked what could cause a system to have a hydraulic control Delay that increased with time. He mentioned several possibilities, including a pinhole leak that would allow seepage of air into the system. He stated that to identify such a problem would take some time and would require pressuring the system to look for weepage. He departed the Rig without discovering why the system Delay should increase from 3-5 to 20 seconds in two weeks. In response to this event and at the request of the OIM, personnel from Kanair wrote "*Appendix I, Suggested Procedure for Bleeding Air from the System*," and added it to the *Operation and Maintenance Manual*.

Testimony confirms that the Delay ramped back up to an estimated 20 seconds within three to six weeks. The Driller testified that he thought the technician told him that the delay was a designed feature, but the Technician contradicted that impression when questioned. The OIM stated he "called Veristic one or two times" after the Delay increased and he thought he was told the Delay was a designed safety feature of the system. It could not be established whom the OIM spoke with, and Veristic personnel testified that they were reasonably confident that they did not talk to Pride field personnel until later in 2004. The RMS for the *New Mexico* testified that he "called Veristic once or twice" during the following months, and was told a Delay was a design feature of the system, though he could not recall whom he talked with.

Testimony established that the Delay worsened in cold weather, and two Rig personnel estimated the Delay in the winter would often be as high as 45 seconds. Several Rig personnel noted they would start the hydraulic unit an hour or more before it was to be used, in order to warm the oil.

Interviews established that the reaction to the Delay by the Rig personnel, supervisors, and those that regularly used the HSB was not favorable. Testimony indicates that there were complaints about the forced pauses in the work cycle. It was reported that ways to circumvent those pauses were used by at least one derrick man, the AD. He reported that he would position the HSB close to the path of the block and leave it in place, leaning out from the bucket to conduct his tasks, treating it as a conventional stabbing board. According to testimony, when the Casing Crew was informally briefed on the HSB the evening before the Accident, some hard language was used to describe the Delay.

While being interviewed, several personnel speculated that, in order to maintain a smooth work cycle, the Stabber might have deliberately activated the controls of the HSB before the passage of the block, timing the HSB Delay to reduce the wait time in the work cycle. No personnel claimed to have done this themselves when they used the HSB, but the idea that it could be done was frequently raised. In interviews, personnel who had used this stabbing board in the past did not offer any other credible alternative reason the controls may have been activated early.

Belief about the Cause of the Delayed Response to the Controls

Though the existence of the Delay and the dissatisfaction with the interruption in the work cycle caused by the Delay were widely discussed, no actions were initiated to alter the Delay during the first year of operations.

The main reason that nothing was done to mitigate the length of the Delay was alluded to several times during interviews. Every person associated with the Rig and the Well program, without exception, including all managers, supervisors, drillers, and company-men, reported that they thought a 20-to 30-second Delay was designed into of the system, deliberately included as a safety feature.

Even the persons who conducted the initial on-site accident investigation for the Operator, and investigators for other companies and organizations, all reported that the Delay in the system was a designed element. Testimony also indicated that it was the general opinion of the Rig personnel that the system was operating as designed and modification of the Delay would require redesign of the system.

Recognition of the Need for Faster Control Response

There is no indication that the *Operation and Maintenance Manual* was used systematically to trouble-shoot the system and mitigate the Delay. However, after the HSB had been in service for about a year, Rig supervisory personnel led by the OIM began to focus on ways to redesign the system to eliminate the "designed" Delay. After a review by an independent hydraulics specialist, the Rig supervisory personnel met to discuss the issue and charged the RMS with looking into modification of the system.

In fall 2004, the RMS stated that he "talked to Veristic" and at that time the manufacturer agreed that the Delay appeared to be excessive. But one or two attempts to trouble-shoot the system over the phone were described by the RMS as being too complicated, with some communication problems, and the attempts to deal with the issue via phone consultation were aborted.

Eventually, after Veristic and Rig personnel concurred that the Delay was excessive, e-mails between the companies show that Veristic suggested installing some maintenance items, such as new filters, to deal with the problem. The Rig personnel did order some spare parts from the manufacturer in December 2004, including filters. But from interviews, the Rig personnel indicated they thought they were getting a design modification of the system.

From e-mails, Veristic personnel acknowledged the order of the items and scheduled delivery. Later, on 25 January 2005, Veristic sent a notice that delivery would be in 6-8 weeks because of a shortage of a certain component. At this time, Veristic asked if "this is going to be a problem, if so, we (Veristic) will try and find an alternative solution." Pride had previously agreed to pay for the services of the hydraulic system design engineer from Kanair to rework or trouble-shoot the system when the parts were installed. However, the supply shortage delayed the visit of the Kanair engineer to the Rig until after the accident.

In November and December 2004, at the behest of Pride personnel, Veristic also analyzed potential changes to the hydraulic system. Though Veristic personnel testified that the Delay issue could probably have been resolved using maintenance methods, including a simple change in filters, Veristic eventually forwarded a proposal to modify the system by eliminating some unneeded hydraulic circuits used to allow setting limits to the movement of the HSB. In an e-mail proposal, Veristic suggested that if the activation switch for one of these circuits was inadvertently left partially open, the result could possibly cause "sluggishness" in the controls, or a Delay. The Veristic proposal noted that those limit circuits were probably redundant.

Source, Belief in a Designed Delay

A number of Pride personnel stated they thought they were told the Delay was designed into the hydraulic system as a safety factor. In the interviews, no persons definitely identified a source for the belief that the Delay was designed into the system. When the source of this widespread belief was indicated at all, the Technician who installed the system and unidentified "manufacturer personnel" were mentioned. This attribution was always qualified with a degree of uncertainty as to time and actual source.

However, the personnel from the manufacturer, Veristic, testified that no Delay was designed into the system and any Delay beyond the 1 to 3 seconds needed for the hydraulics to energize the system was likely the result of maintenance issues such as dirty filters, air in the system, etc.

The schematic drawings of the hydraulic system that were included in the *Operation and Maintenance Manual* gave no indication of any features that could be interpreted as intended to create a designed Delay.

A recognized hydraulic systems expert who specializes in construction, maintenance, and repair of hydraulics used offshore stated that the system had the common symptoms of excessive air in the lines, dirty filters, contaminated fluid, or a combination. He also noted that a contaminated hydraulic system might exhibit a variable time of Delay, or possibly could continue in motion for a short time after being control halted.

During the course of the investigation, a Panel member interviewed the engineer for Kanair, the company that designed and installed the hydraulics of the HSB system. While discussing the Delay with the Kanair engineer, the Panel member was told that a 20-to 30-second delay was desirable as a safety feature and was designed into the control mechanism of the system. This contradicted both the engineering drawings and the previous testimony from engineers with Veristic.

Personnel from Veristic then joined a three-way telephone conversation with the Panel member and the engineer from Kanair. After further discussions, all participants in the conversation agreed the information given the Panel member by the Kanair engineer was erroneous and that there was no designed Delay. The erroneous information initially given the Panel member was attributed to communication confusion relating to theoretical vs. actual designs, and uncertainty about terminology and the language used by the Kanair designer.

That three-way conversation also confirmed testimony that the HSB, as tested in the yard prior to delivery to Pride, exhibited a 1-to 3-second delay before responding to the controls. ■

Conclusions

The Accident

After a review of the information obtained during the investigation, it is concluded that, at approximately 0800 hours on 26 January 2005, while operations were being conducted to pull and lay down casing, the hydraulic stabbing board was impacted by the top drive as the unit was pulling casing, causing the death of the Stabber.

Cause of Fatality

1. *The HSB personnel bucket was caught on the top drive unit as it was ascending, and upended. This upending caused the front top rail of the HSB personnel bucket to crush the stabber against the boom arm of the HSB. The injuries from this contact caused the death of the stabber.*

2. *It is concluded that the stabber activated the controls for the HSB before the passage of the top drive unit and that, as a result, the HSB bucket was accidentally maneuvered by the Stabber into the path of the rising top drive unit.*

3. *It is concluded that the HSB controls had a prolonged response hesitation or Delay. The Delay of the response to the controls played a contributory role in the fatality.*

Probable Contributing Causes of the Fatality

1. *The HSB controls* [installed on the Rig] *had a prolonged response hesitation or Delay.* It is probable that this delayed reaction contributed to the accident by causing the stabber to attempt to reduce the cycle time of his activities, timing the forward activation of the HSB with the motion of the rising block and top drive unit. To do this, the Stabber probably activated the controls early and either mistimed the passage of the top drive, and moved the HSB prematurely, or the HSB reacted to the forward command of the controls earlier than he anticipated.

2. *The delay in the response of the HSB to the controls* was probably caused by an operational problem with the hydraulics of the HSB. Improper maintenance and trouble-shooting probably contributed to the existence of the hydraulic system problem at the time of the Accident.

The maintenance program for the HSB probably did not follow the recommendations of the manufacturer, as no formal program of inspection was documented. The inspection form was not changed from the one used for a conventional board to one appropriate to a hydraulic system. Because the *Operation and Maintenance Manual* could not be provided to inspectors during the initial investigation, it is probable that the *Manual* was not on the Rig or was stored and not consulted regularly.

3. It is probable that the erroneous belief in the existence of a designed Delay, held by all Rig and supervisory personnel, was a reason the need for maintenance or repair of the HSB was not recognized earlier. This belief probably led the personnel responsible for the maintenance of the HSB to ignore what would normally have been considered warning signs of hydraulic system problems.

It is probable that expedient temporary measures could have limited the operational problem until the parts could be acquired and installed, had the hydraulic issues been recognized as having a maintenance solution, rather than requiring a design change. Among the causes of "sluggish control response" that could probably have been identified and/or repaired by using the trouble-shooting steps in the *Operation and Maintenance Manual* were air in the system, low or contaminated hydraulic fluid, gummed up valves or filter, defective o-rings, orifice clogging, and/or a faulty hydraulic pump.

In fact, there was no delayed control reaction designed into the HSB unit as manufactured and tested. The strength of the belief in the existence of a designed Delay persisted even after the HSB operation was questioned and parts ordered from the manufacturer.

Possible Contributing Causes of the Fatality

1. It is possible that faulty or incomplete installation contributed to the existence of the hydraulic problems that caused the control Delay. The installation and after-installation adjustments to the hydraulics did not produce a system that operated as designed for more than a short time. Instead, problems with the hydraulics that were created at some point between testing in the yard and operations on the rig continued, producing a progressive lengthening in the response delay, up to a point. It was clear that the control response delay increased within two weeks of installation. Though many possible hydraulic problems that can create this situation, such as a pinhole leak, were understood, no systematic attempt to identify and repair the system was conducted by the installers. The problem was apparently addressed only temporarily by repeating the initial installation steps.

2. It is possible that, during the installation, the lack of presence and supervision of a direct representative from the company(s) that designed and/or manufactured the HSB contributed to the possible failure to complete the installation to design specifications. It is possible that the lack of direct involvement by personnel from the company (s) that designed or manufactured the HSB contributed to the possible follow-up failure later to trouble-shoot and repair the system thoroughly.

It is possible that the failure to plan and deliver a formal orientation briefing to the Rig personnel who were to use the equipment contributed to the failure to understand the system. Such a briefing would have allowed the presentation of trouble-shooting techniques, enabled questions to be answered, and established direct communication between the Rig personnel and the design and manufacturing companies. Such a briefing was probably not required by the Rig or Pride personnel.

3. It is possible that the belief that the system was designed with a Delay was continued or started as a result of a failure in communication between Rig, manufacturer, and/or hydraulic designer.

c. It is possible that the Rig personnel misunderstood explanations how the system operated that were offered by the hydraulic system designer.

a. It is also possible that the hydraulic system designer misunderstood the scope and length of the Delay and its effect on operations, as described by the Rig personnel.

4. Even after an intra-company consultation on ways to reduce the delayed control response and after the manufacturer had been contacted, the personnel on the Rig were still operating under the assumption that the Delay was a design feature. Therefore, it is possible that the communication from the Rig failed to convey the extent and nature of the operational problem to the support departments of Pride and/or enlist their help solving the problem or communicating with the manufacturer.

5. It is possible that design of the hydraulic system contained an element, the limit control circuits, that could have contributed to the control response delay under certain conditions.

6. It is possible Pride failed to establish and disseminate written procedures for operating this prototype equipment. Had Pride established such procedures, the need to wait until the motion of the block was completely halted before activating the HSP could have been reinforced to the Stabber during the JSA meeting. The establishment of such written procedures may have also prompted establishment of a formal maintenance program.

Recommendations

It is recommended that MMS issue a Safety Alert that briefly describes the fatal accident and that alerts the operators to four subjects as follows:

1. Operators should conduct a hazard analysis prior to deploying new equipment. Operators should ensure their front line and support personnel have a full understanding of what constitutes normal operations for a new or prototype hydraulic system. Operators should ensure that all field people have a known way to report and receive feedback if they encounter anomalous or user unfriendly characteristics when using new or prototype equipment.

2. The Operators should have a comprehensive monitoring and maintenance plan in place before deploying prototype equipment.

3. Operators should ensure that there are formal briefings and/or training of field personnel about the operation, maintenance, and trouble-shooting of any new or prototype operating equipment. Operators should ensure a written operating procedure is available and followed.

4. Operators should ensure that any new or prototype equipment is initially installed and operating to design specifications before such equipment is used for operations.

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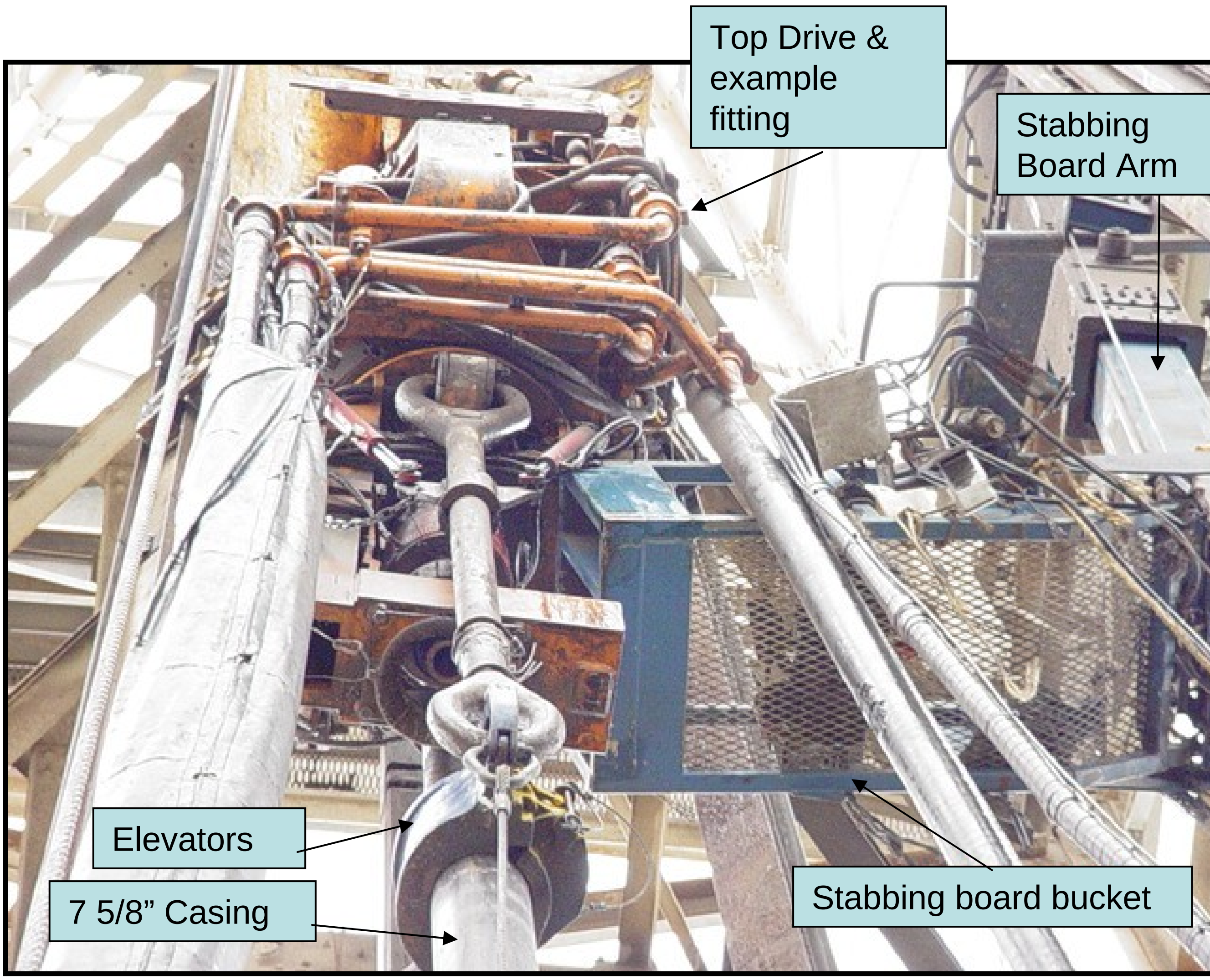
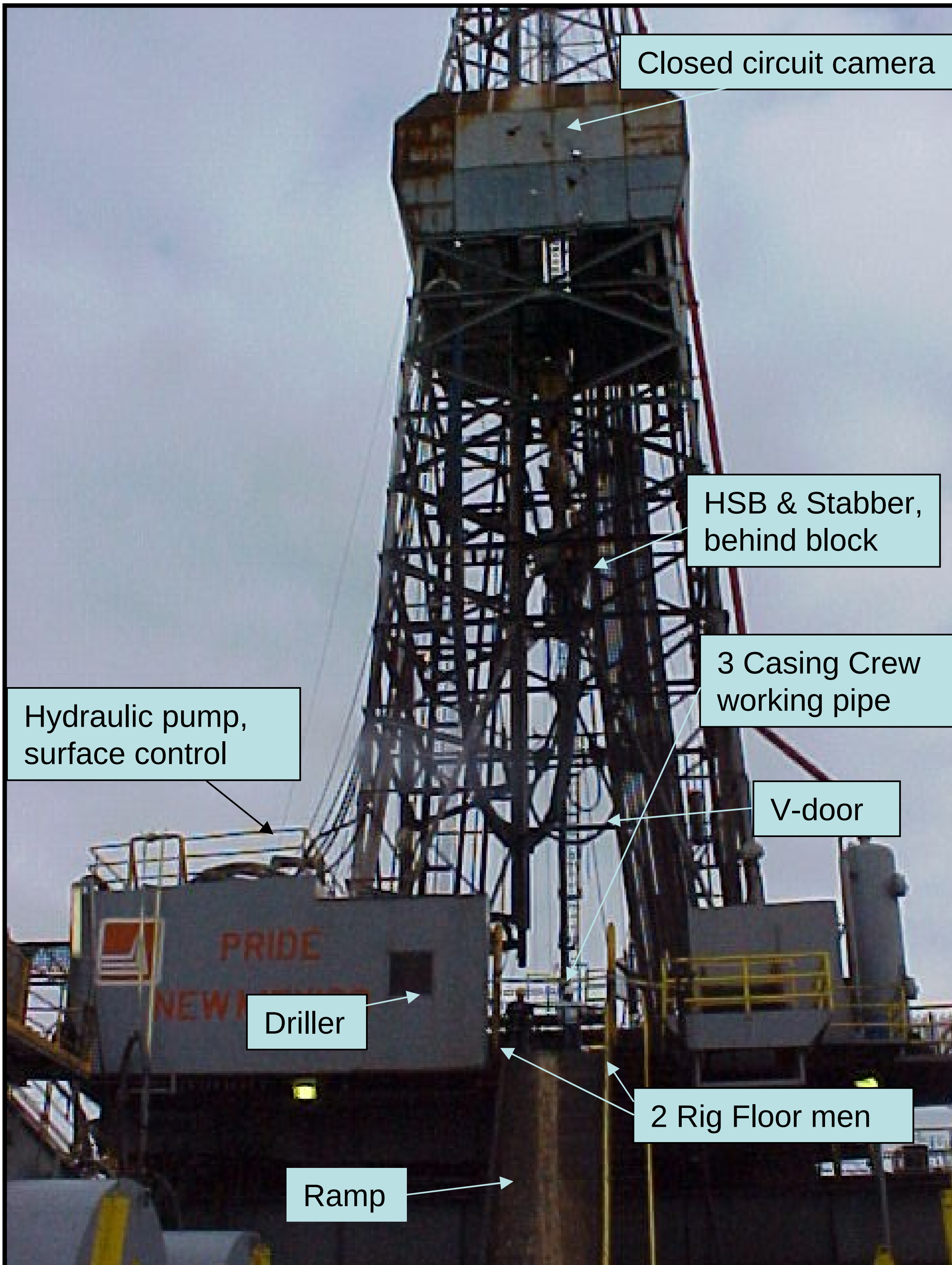
Location of Lease OCS-G 09652, South Pelto Block 15, Well No. 4

Attachment 2



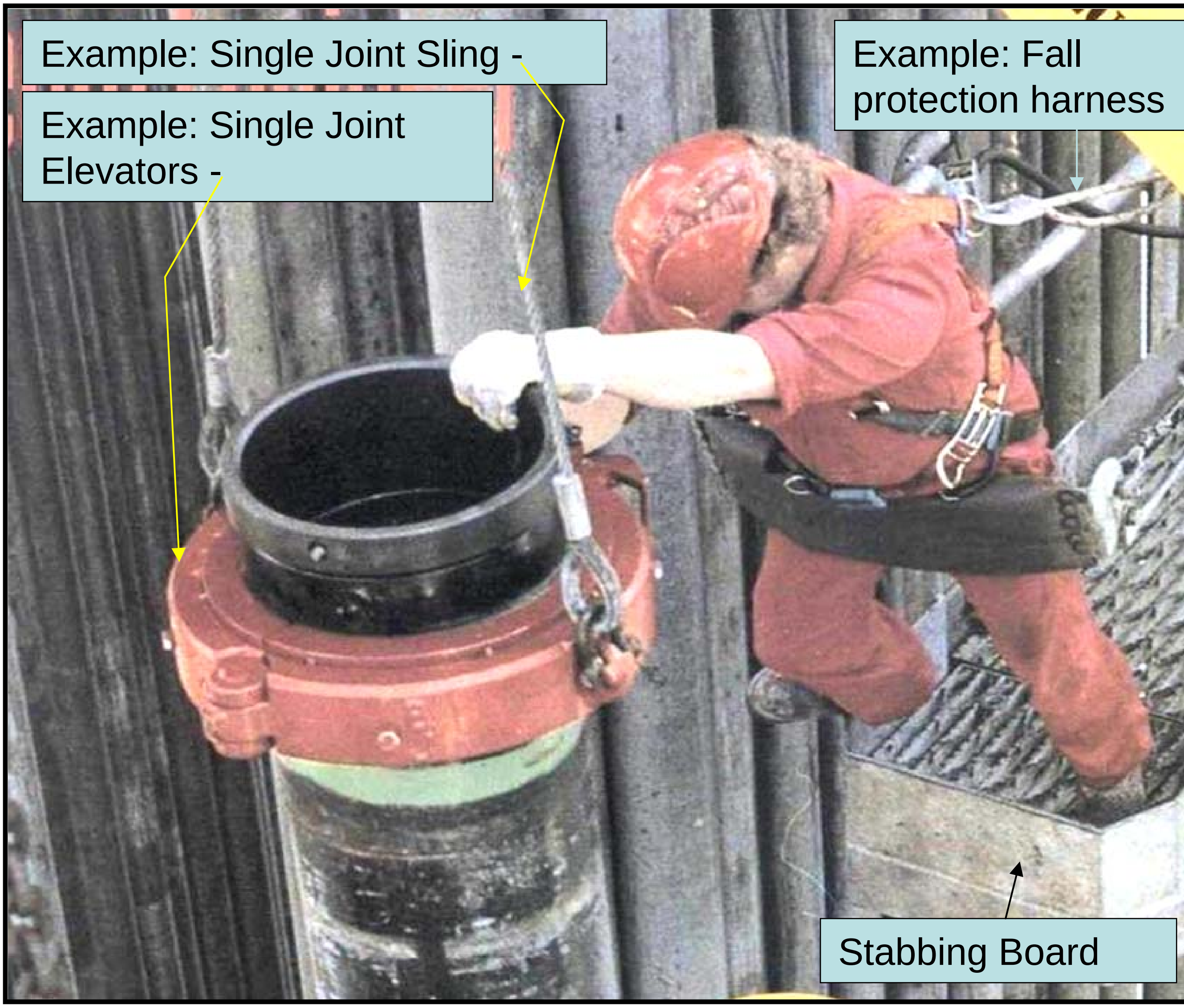
Hydraulic Stabbing Board Bucket Hung on Top Drive

Attachment 3



Pride *New Mexico*, Location of Personnel and Equipment

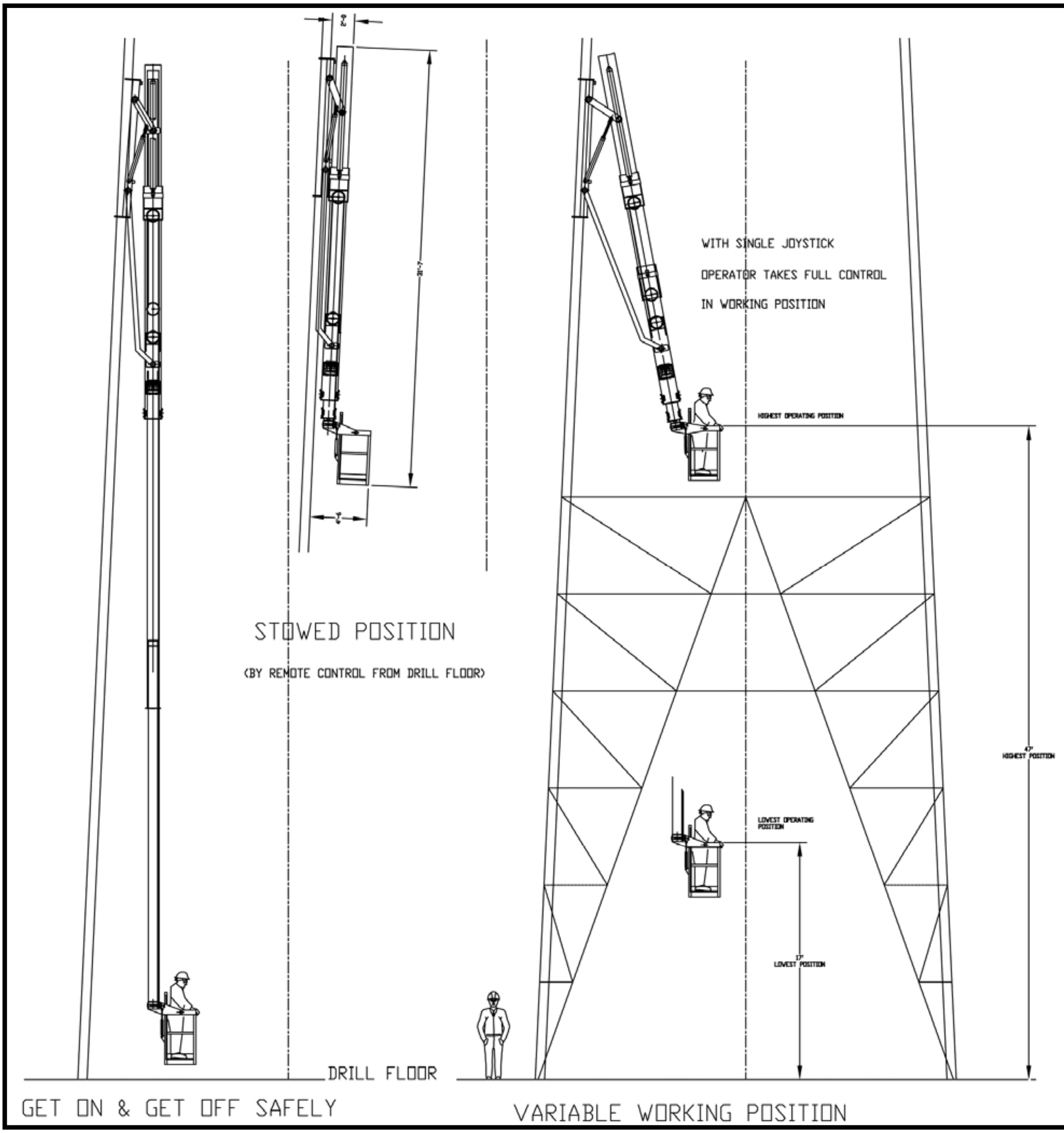
Example of Conventional Stabbing Board



Conventional Stabbing Board and Casing Operation

(Picture originally published in *Petroleum Engineer International.* Reprinted with permission of Hart Energy Publishing)

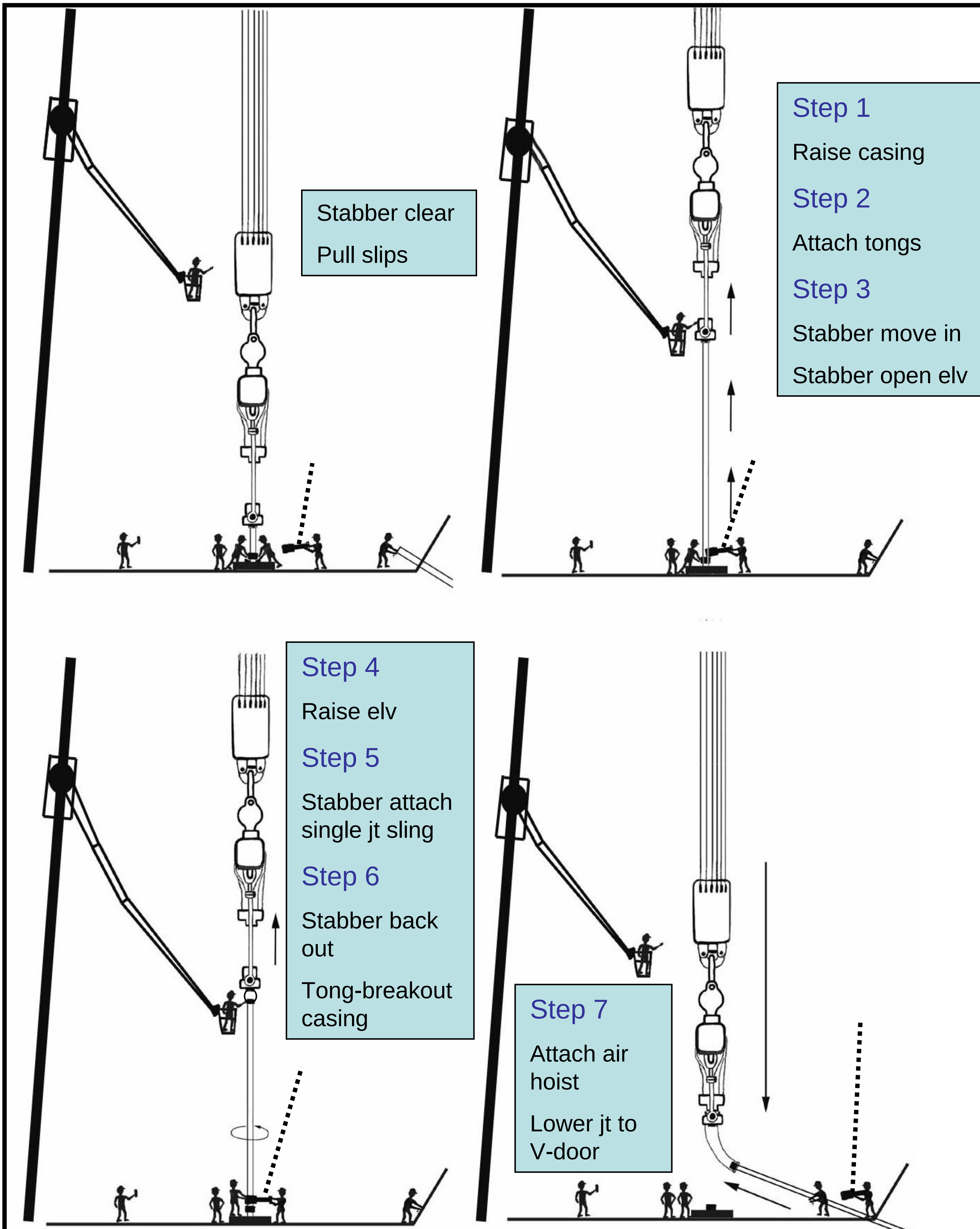
A Typical Stabbing Work Position



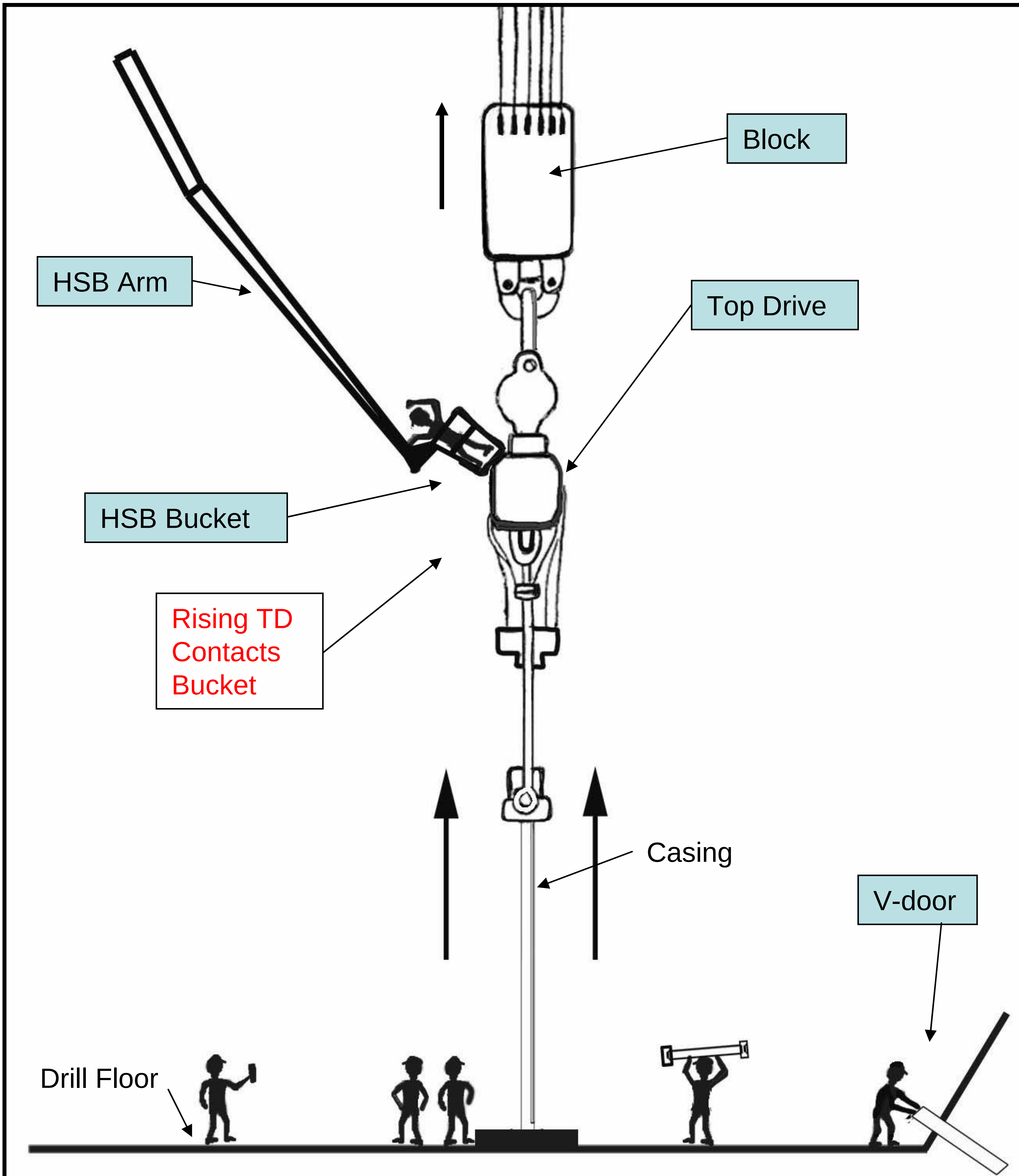
Design Diagram, Veristic Hydraulic Stabbing Board

(From Schematic, Veristic Technology, Inc.)

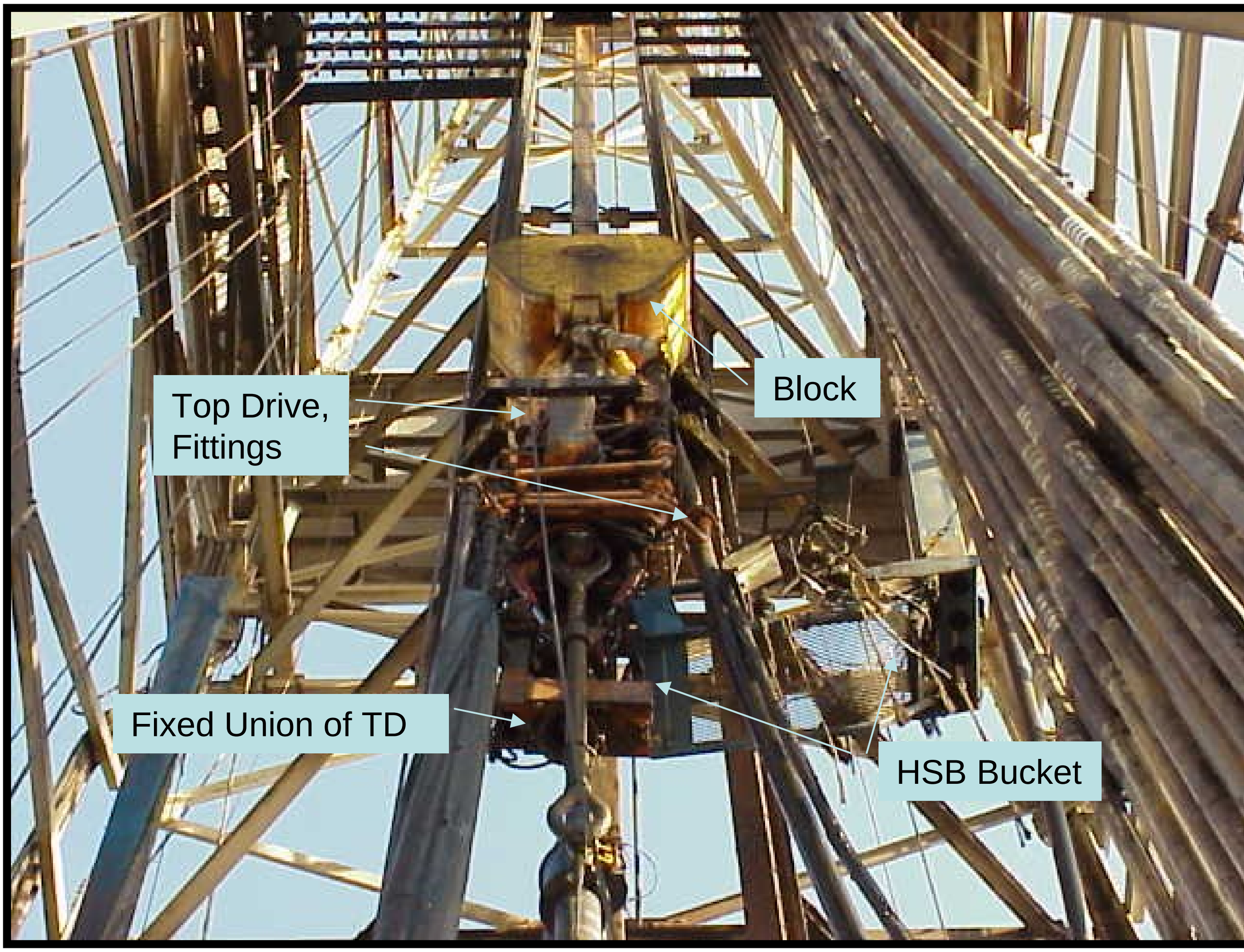
Attachment 8



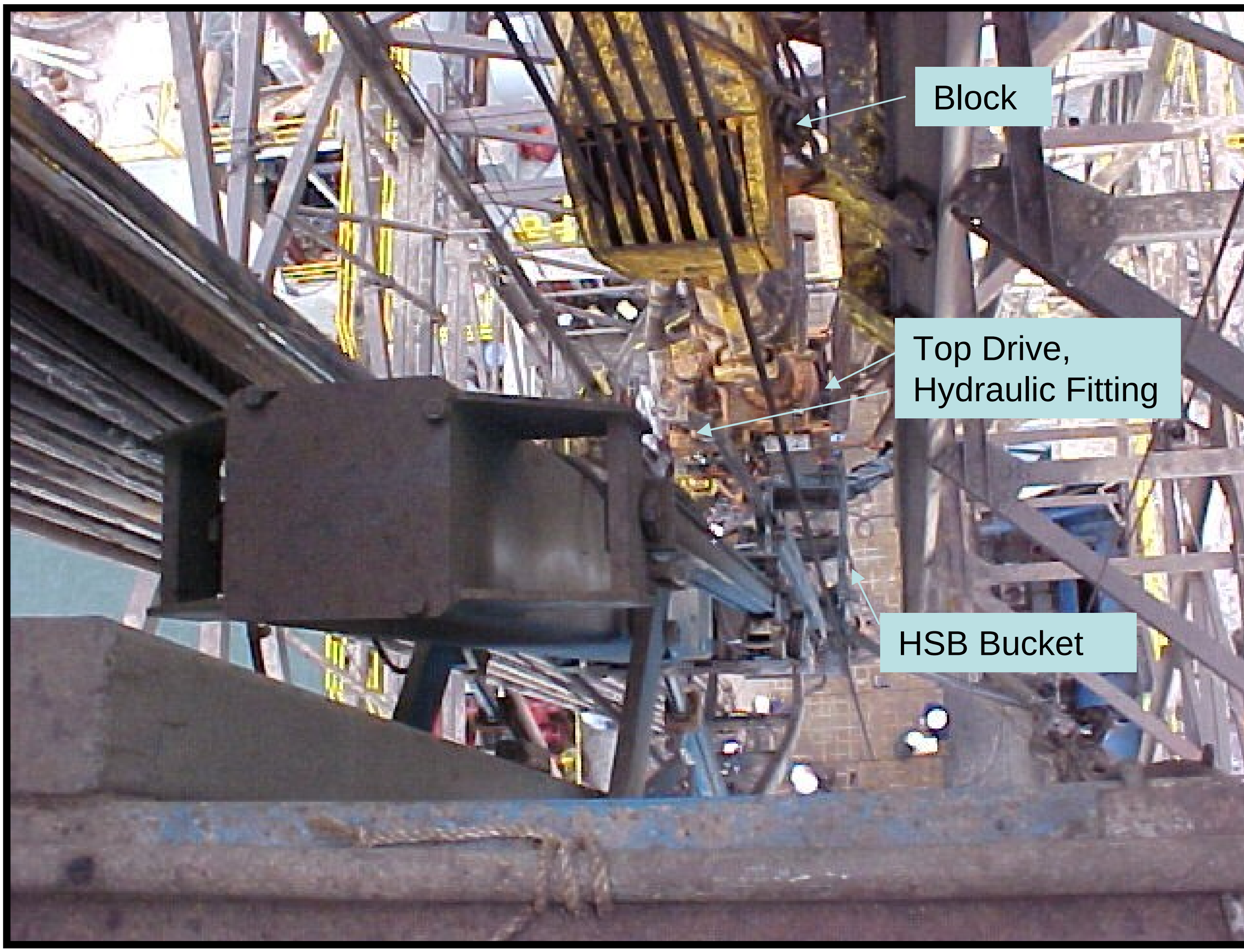
Pictorial Representation, Laying Down Casing



Pictorial Representation of Casing Operation Accident

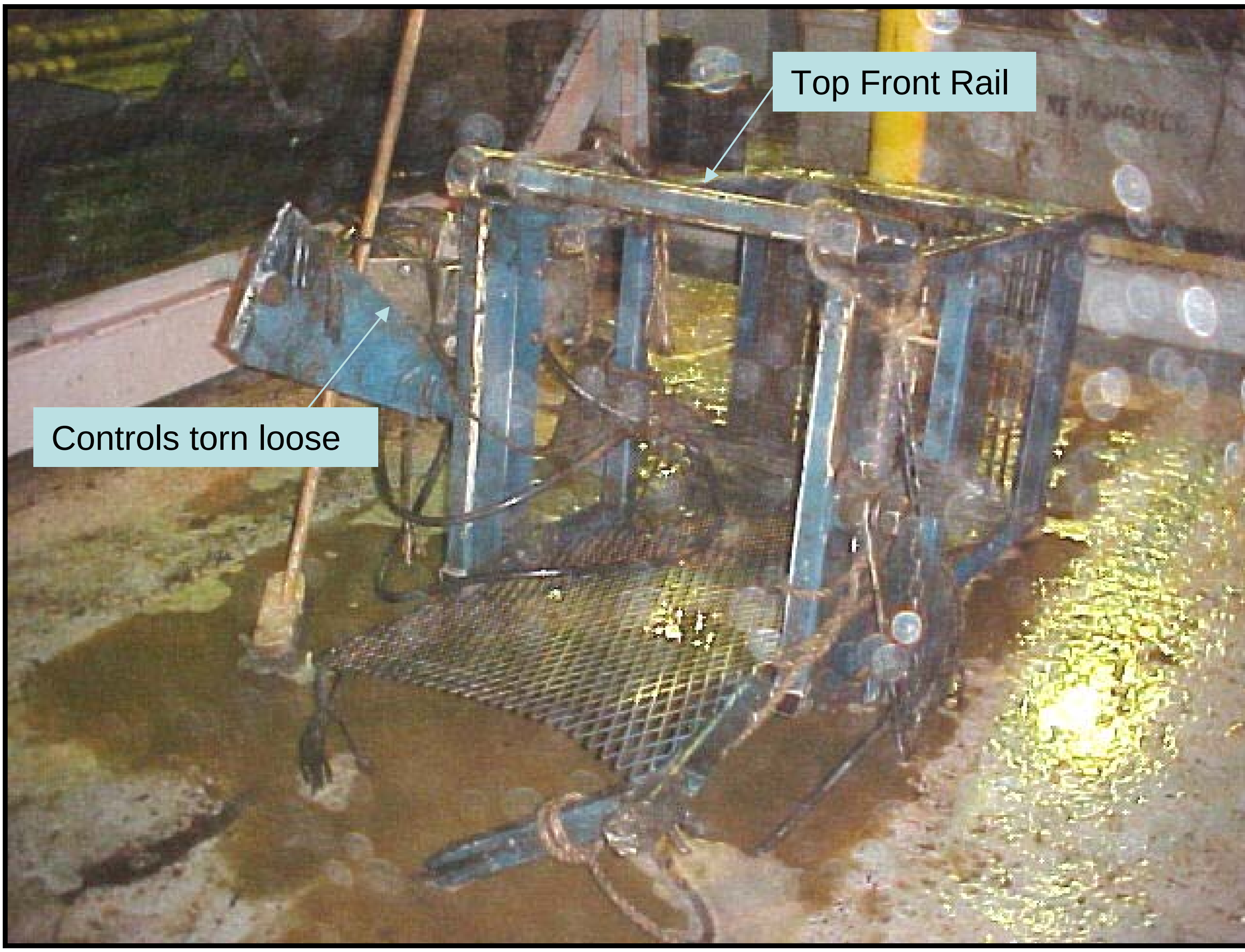


Block, Top Drive, Hung Stabbing Board



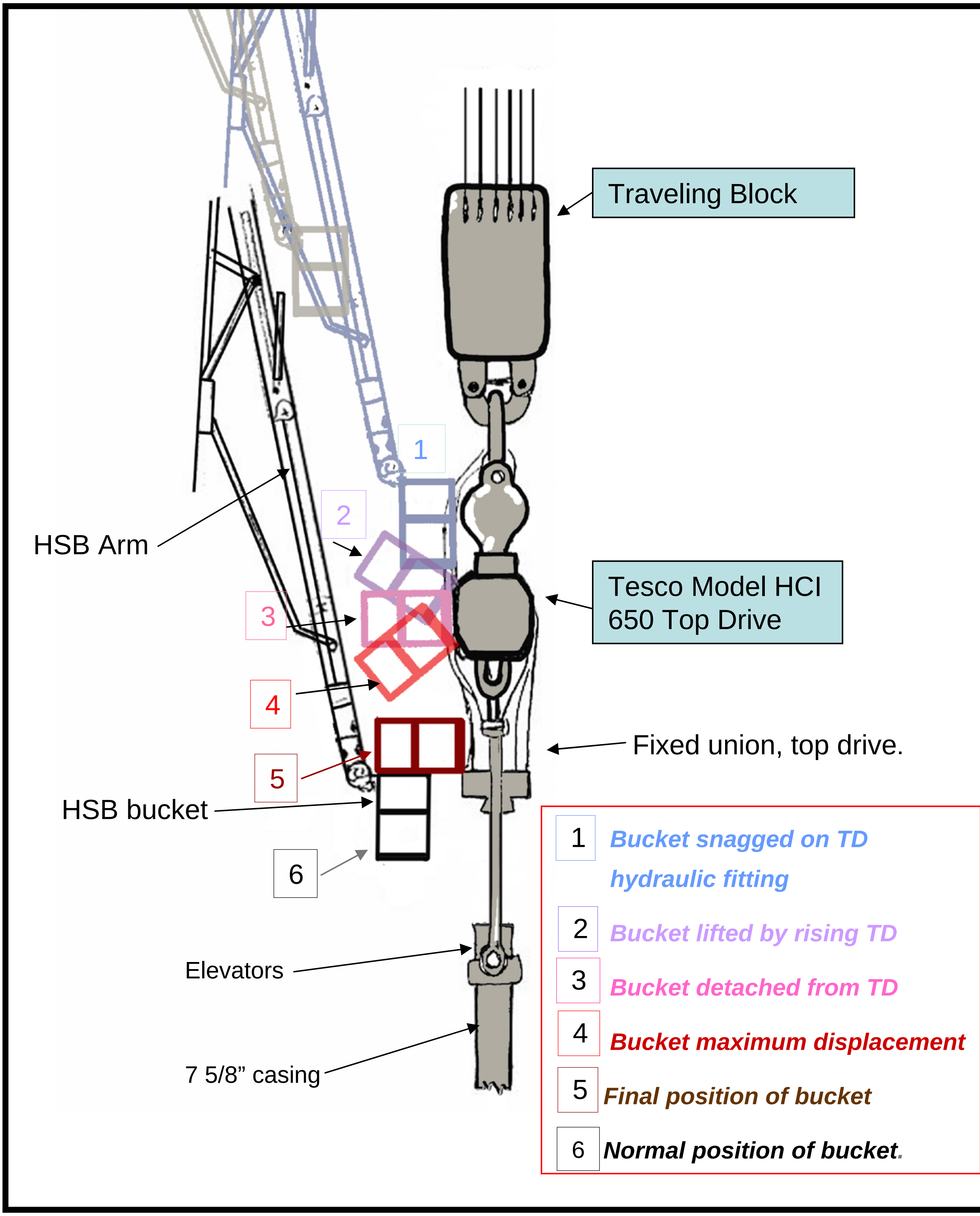
View From Above:

Block, TD, Hydraulic Fitting, Hung HSB Bucket



HSB Personnel Bucket, After Accident

Fitting Union Mark on Bottom of Personnel Bucket



Drawing of Movement of HSB Bucket When Hit by Top Drive

HSB Bucket Surface Control Joy Stick and Emergency Stop

MMS Securing Ocean Energy & Economic Value for America

The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.