OCS Report
MMS 98-0041

Investigation of Rig Accident and Fatality
Grand Isle Block 19
Gulf of Mexico
Off the Louisiana Coast
September 24, 1996

MMS

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

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Frank Pausina
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U.S. Department of the Interior
Minerals Management Service
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New Orleans
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Investigation and Report

Authority

An accident that resulted in one fatality occurred on the ENSCO 86 jack-up rig located on Platform A, Grand Isle Block 18, Louisiana State Lease 15083, while completing Well A-16, Grand Isle Block 19, Lease OCS 0033, in the Gulf of Mexico on September 24, 1996, at approximately 1100 hours. Pursuant to Section 208, Subsections 22 (d),(e), and (f), of the Outer Continental Shelf Lands Act, as amended in 1978, and the Department of the Interior Regulations 30 CFR Part 250, the Minerals Management Service (MMS) is required to investigate and prepare a public report of this accident. By memorandum dated October, 10, 1996, the following MMS personnel were named to the investigative panel:

Frank Pausina, New Orleans, Louisiana (Chairman)

Mike Conner, New Orleans, Louisiana

Thomas Machado, New Orleans, Louisiana

Procedures

On the afternoon of September 24, 1996, representatives of the United States Coast Guard (USCG) investigated the scene of the accident. All of the information gathered by the USCG in their investigation was expeditiously forwarded upon request to the MMS investigative panel.

On the morning of September 25, 1996, Frank Pausina and Thomas Machado visited the scene of the accident, thereby initiating MMS's investigation of the accident.

On October 3, 1996, Frank Pausina and Thomas Machado interviewed witnesses at ENSCO's facility in Broussard, Louisiana. While there, Pausina and Machado also physically examined certain equipment that was involved in the accident and that had been removed from the accident scene and secured under lock at ENSCO's facility.

The panel also communicated requests for information through written correspondence to representatives of the owners of various equipment involved in the accident. Not all of the requests were answered.

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

Introduction

Background

Lease OCS 0033 at present covers approximately 3,766 acres and is located in Grand Isle Area Block 19, Gulf of Mexico, off the Louisiana Coast. For lease location, see Attachment 1. The lease was originally issued on September 9, 1946, at which time it covered approximately 5,000 acres. In July 1981 the lease was redefined within Grand Isle Block 19, resulting in a coverage of approximately 3,766 acres. In January 1973 Exxon Corporation obtained 100 percent ownership of the lease and thereby became designated operator of the lease.

Brief Description of Accident

At approximately 1100 hours on September 24, 1996, ENSCO floor hands were in the process of performing a drill-pipe-to-drill-pipe makeup in preparation for a reverse circulation procedure following a casing perforation. During or at the immediate conclusion of the makeup, a chicksan swivel joint, the armored hose to which it was connected at one end, and the pump-in sub connection to which the chicksan swivel joint was connected at the other end disconnected from the pump-in sub and fell to the rig floor. The chicksan swivel joint fatally struck an ENSCO floor hand.

Findings

Scheduled Activities

The scheduled activities on the morning of the accident involved the cleaning of the cased hole, which had been perforated at approximately 13,000 feet on the previous day. The cleaning operation was to be accomplished by reverse circulating fluid down the annular region between the perforated casing and the drill string and up through the drill string and surface equipment. The pertinent surface equipment consisted of a pump-in sub assembly, chicksan swivel joint, armored hose, and safety chain.

Description of Surface Equipment

The pertinent surface equipment consisted of five basic components:

1. Drill pipe,
2. Pump-in sub assembly,
3. Chicksan swivel joint,
4. Armored hose, and
5. Safety chain.

The pump-in sub assembly consisted of three subcomponents:

1. Safety valve,
2. Pump-in sub, and
3. Pump-in sub connection.

For a simplified schematic of the five basic components of the surface equipment, see Attachment 2. For photographs of the pump-in sub connection, chicksan swivel joint, valve, armored hose, and safety chain as the unit lay on the rig floor following the

accident, see Attachments 3 and 4. For photographs of the pump-in sub and safety valve, see Attachments 5 and 6.

The owners of the equipment are as follows:

1. Pump-in sub assembly — Quail Tool, Inc.
2. Chicksan swivel joint — B. J. Services
3. Armored hose — ENSCO

The chicksan consists of three swivels, the purpose of which is to permit various twisting movements of the pump-in sub assembly and armored hose without compromising the integrity of connections and structural soundness of the integrated unit. The purpose of the swivel that is nearest to the pump-in sub connection is primarily to allow for the makeup of pipe without resulting in the breakout of any pipe, pump-in sub assembly, or chicksan swivel joint connections.

Accident

The morning shift on the day of the accident began at 0600 hours. The pump-in sub assembly had already been made up to the chicksan swivel joint by the previous crew. This fact is supported by the driller's report. Because of problems encountered in attempting to reverse circulate, the 0600 hour crew, henceforth referred to as the morning crew, decided to pull eight joints of pipe and reenter the well with two joints. Eight joints of drill pipe were pulled and laid down. The first joint of pipe was then returned to the well. The attempt at reentering the well with a second joint of pipe was similar procedurally to the first — namely, a joint of pipe hanging from the pump-in

sub assembly was stabbed into a joint in the mousehole. The two hanging joints were then stabbed into the pipe in the slips. As the joints were made up, the pump-in sub broke out of the pump-in sub connection. The chicksan swivel joint, with the pump-in sub connection attached to its hammer union, fell together with the armored hose and struck an ENSCO floor hand. The employee was immediately tended to by a medic and was evacuated to a hospital approximately 45 minutes after the accident. Shortly after arriving at the hospital, the employee was pronounced dead by the attending physician.

Safety Procedures

Interviews with the morning crew, specifically the tool pusher, driller, and two floor hands, revealed that the only meeting on the morning of the accident occurred on the rig floor prior to their shift's activity. When asked if the meeting constituted a safety meeting, one of the crew responded that the details of the reverse circulation operation were discussed. Another of the crew interviewed stated that there were no special safety procedures for this operation, since the operation was viewed as being "normal" and "routine." The driller's report did not indicate that a safety meeting was held by the morning crew.

In response to a question asked on the rig by one of the two panel members on the day following the accident, an ENSCO employee stated that a Job Safety Analysis did exist for the reverse circulation procedure. However, in reviewing the collection of Job Safety Analyses on the rig, the panel members could find no such Job Safety Analysis for the reverse circulation operation.

The safety chain as seen in Attachment 3 usually connected the armored hose to the elevators for the purpose of preventing the chicksan swivel joint from falling should it break out of the pump-in sub assembly. However, on the morning of the accident the safety chain connected the chicksan swivel joint to the armored hose. The chain was in that configuration when the morning crew began their shift at 0600 hours. One of the crew members stated that the chain was attached in that configuration by a previous drilling crew and was simply overlooked.

Another interviewed crew member stated that it was assumed that the pump-in sub connection was properly made up to the pump-in sub when the unit arrived on location and that the makeup was aided through "wrench torquing" if the pump-in sub connection was observed to be moving with respect to the pump-in sub when connecting the pump-in sub connection to the chicksan swivel joint's hammer union.

One of the crew members stated that it was his opinion that the safety chain configuration interfered with the performance of the chicksan swivel joint's swivel nearest the pump-in sub connection and that, in turn, resulted in the breaking out of the pump-in sub from the pump-in sub connection.

Exxon states, in part, in their response to the investigation panel's request for information that:

1. Exxon requires all contractors have a safety program at least equal to its own. Exxon lists as part of its program the use of a safety manual as a guide for mitigating hazards. While Exxon's manual doesn't specifically reference the

operation being performed at the time of the accident, it does reference the use of safety chains for a class of operations within which the operation at the time of the accident could reasonably be expected to fall.

2. Exxon requires all contractors to use the Job Safety Analysis thinking process prior to beginning any work activity and that all persons involved in the work to be done should participate in preparing the Job Safety Analysis.

3. ENSCO developed a Job Safety Analysis for the work that was performed when the accident occurred.

Equipment Observations

An examination of the threads of the male end of the pump-in sub revealed that it had been made up to a depth of approximately five threads to the female end of the pump-in sub connection with approximately that many threads left unused. This was determined by an inspection of the thread's Teflon coating. For a photograph of the male end of the pump-in sub, see Attachment 7. A visual inspection of the male and female threads of the connection did not reveal any significant damage to the threads. One interviewed crew member stated that more threads should have been used.

An examination of the chicksan by MMS panel members at ENSCO's facility revealed that the swivel nearest to the pump-in sub connection did turn. The MMS panel members also determined at the scene of the accident that the other swivels functioned.

An observation was made by MMS panel members at the scene of the accident that the safety chain was pressing firmly against the chicksan swivel joint's swivel nearest the pump-in sub connection. For a photograph of the safety chain and swivel, see Attachment 8.

There was no indication that any torque wrenching of the connection occurred on the morning of the accident. Any such torquing would have probably resulted in the use of at least more threads in the connection.

Conclusions

Cause

The death of the ENSCO employee was the result of his being struck by a falling chicksan swivel joint during operations in preparation for a reverse circulating procedure. The chicksan fell as the result of a breakout of the pump-in sub from the pump-in sub connection during a pipe-to-pipe makeup at the rig floor.

Contributing Causes

The contributing causes of the accident are as follows:

1. There existed a departure from the normal procedure of using a safety chain to connect the armored hose to the elevators to one in which the safety chain was used to connect the armored hose to the chicksan swivel joint. The result was that there was no safeguard existing against the hazard of the falling chicksan swivel joint resulting from the breakout of the pump-in sub from the pump-in sub connection.

2. The failure of the ENSCO employees on the 0600 hour crew to notice the abnormal safety chain configuration resulted in the commencement of the reverse circulation operations without the necessary change to the normal safety chain configuration.

Possible Contributing Causes

Possible contributing causes of the accident are as follows:

1. There is no indication that there was any discussion on the morning of the accident by the ENSCO crew at the beginning of their shift concerning safety issues with respect to the operation to be performed. Such discussions would probably have resulted in the attention of the crew being directed to the existence of the abnormal

safety chain configuration. Therefore, the apparent omission of such a meeting can certainly be considered a possible contributing cause of the accident.

2. There is no indication that there existed on the rig at the time of the accident an official ENSCO Job Safety Analysis of the operation to be performed. Therefore, any safety meeting conducted by the morning crew would not have had the benefit of a formalized listing of pre-analyzed safety issues to be addressed. Furthermore, the lack of a field-located formal Job Safety Analysis of the operation did nothing to increase the probability of a safety meeting occurring.

3. Although the swivel nearest the pump-in sub connection was manually turned by panel members, it is possible that the pressing of the safety chain against the swivel interfered with its proper functioning. Given the forces of the weight of the hose, to which one end of the chain was attached, and the weight of the drill pipe hanging from the pump-in sub assembly, it is possible that the chain prevented the swivel from turning sufficiently enough to compensate for the multiple make-up rotations, thereby resulting in the eventual breaking-out of the pump-in sub from the pump-in sub connection.

4. The unused threads of the male end of the pump-in sub at the very least did not add to the integrity of the connection and at worst compromised that integrity. The degree to which the connection would have held had all threads been used is not known. However, when considered in conjunction with the possible interference of the swivel by the safety chain, not using all the threads available can be considered a possible cause of the accident.

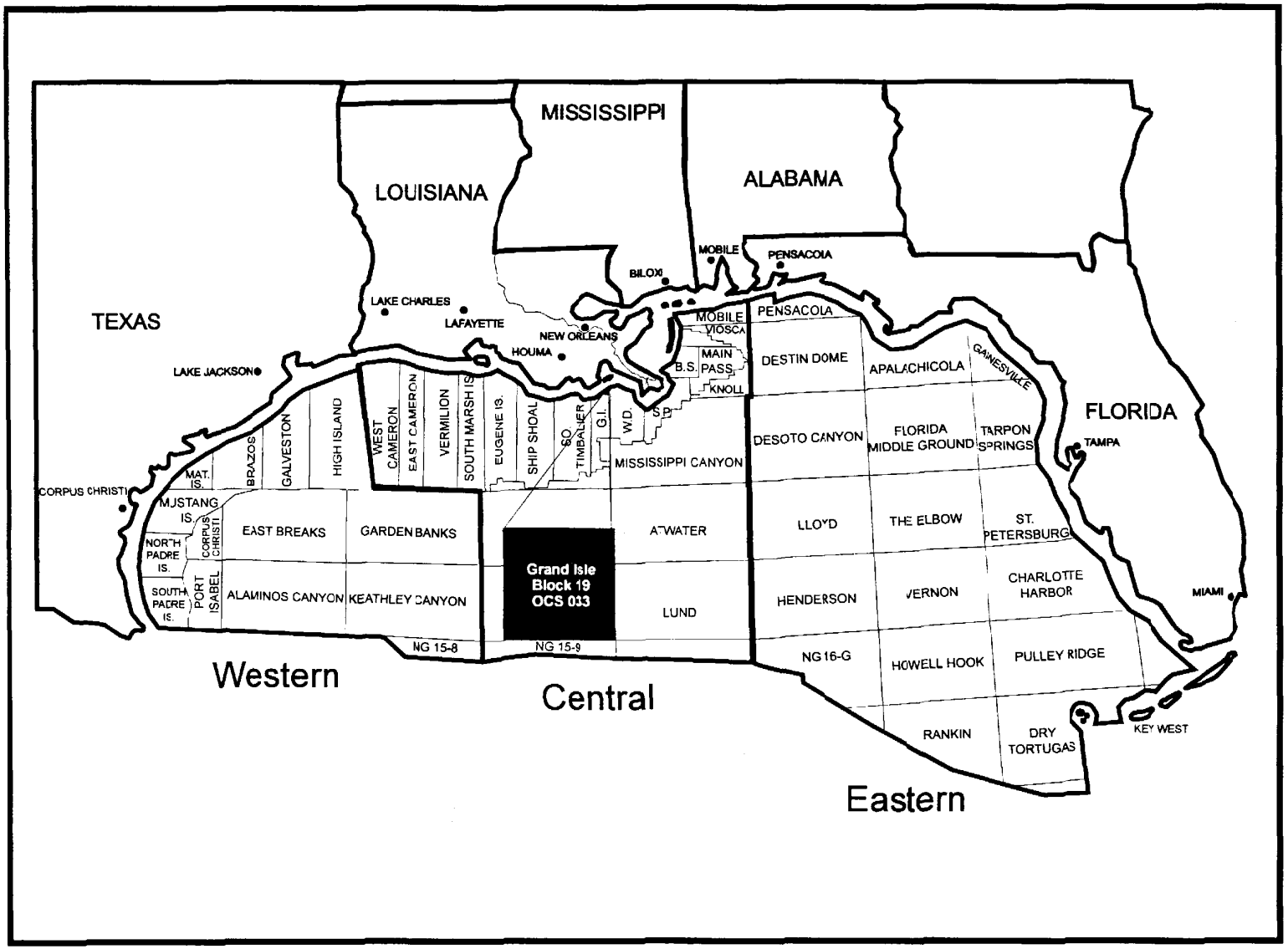
5. Also considered possible contributing causes of the accident are (a) the failure of the crew to realize at the beginning of their shift that not all the threads were used in the makeup and (b) an apparent absence of a procedure that would have required an inspection of all connections of the aforementioned surface equipment prior to the commencement of operations.

6. A possible contributing cause of the accident was Exxon's apparent failure to enforce fully their stated requirement that contractors use the Job Safety Analysis thinking process prior to the beginning of any work activity. While ENSCO might have generally used a Job Safety Analysis approach in its operations, the absence of a safety meeting on the morning of the accident certainly implies (a) an absence of a Job Safety Analysis approach to the morning crew's scheduled reverse circulation activities and (b) a failure on the part of Exxon to identify the absence of such a meeting as not constituting a Job Safety Analysis approach to the crew's scheduled activities.

Recommendations

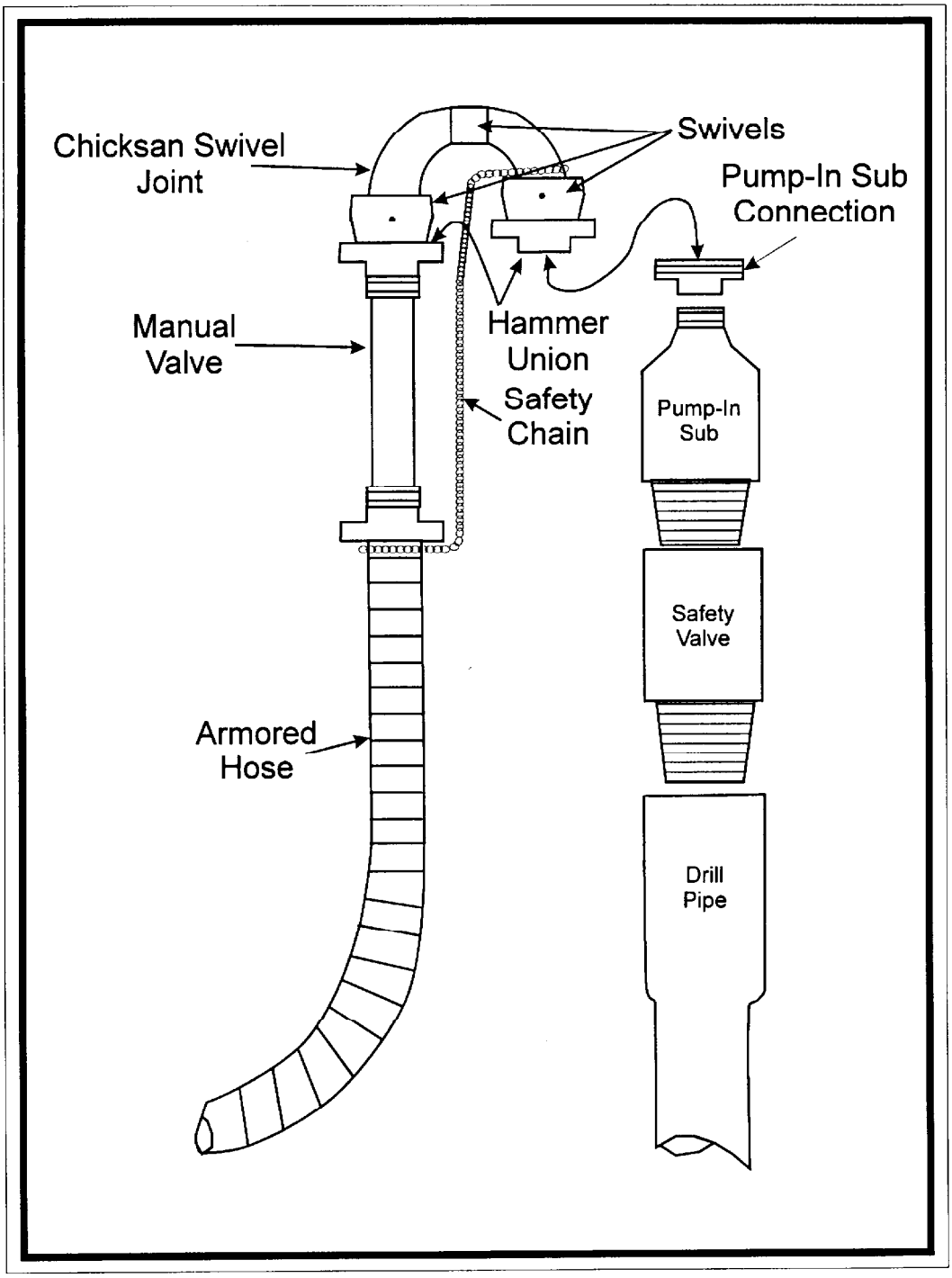
The MMS should issue a Safety Alert recommending that operators review contractors' Job Safety Analysis programs for existence and sufficiency, and periodically assess contractors' performance with respect to adherence to the programs.

Appendix

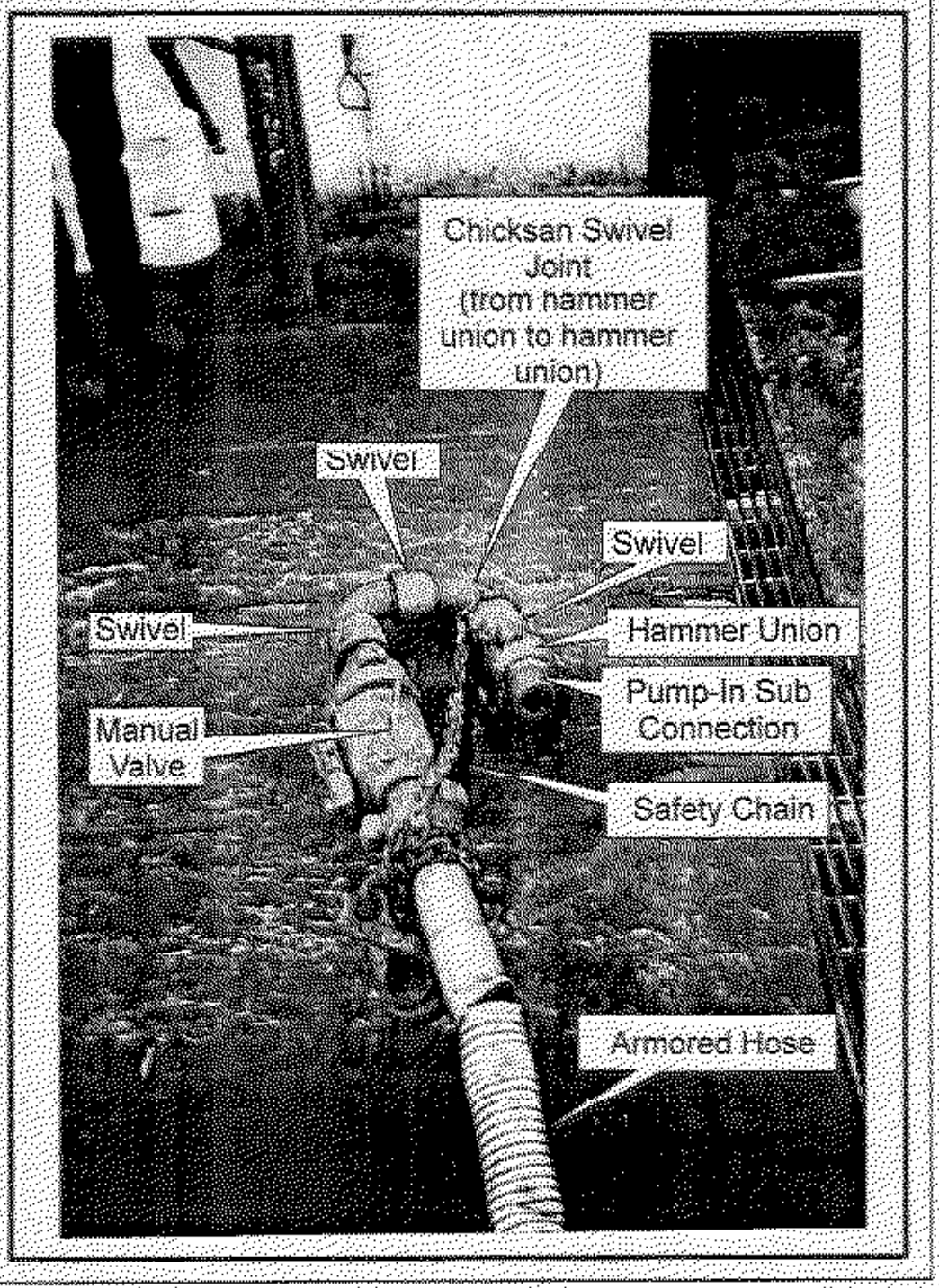


Location of Lease OCS 033, Grand Isle Block 19.

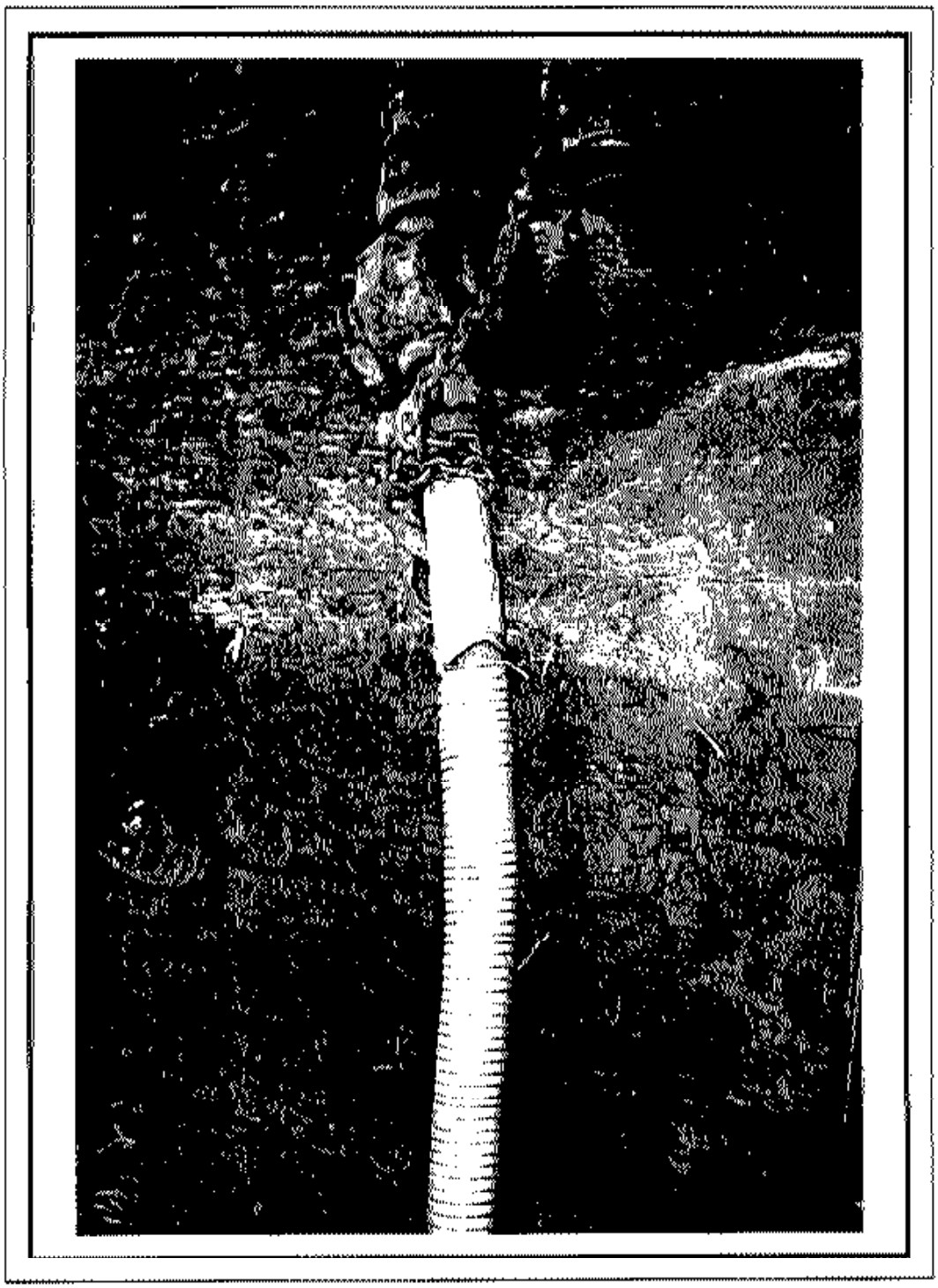
Attachment 1



Simplified Schematic of basic components of surface equipment (not to scale)

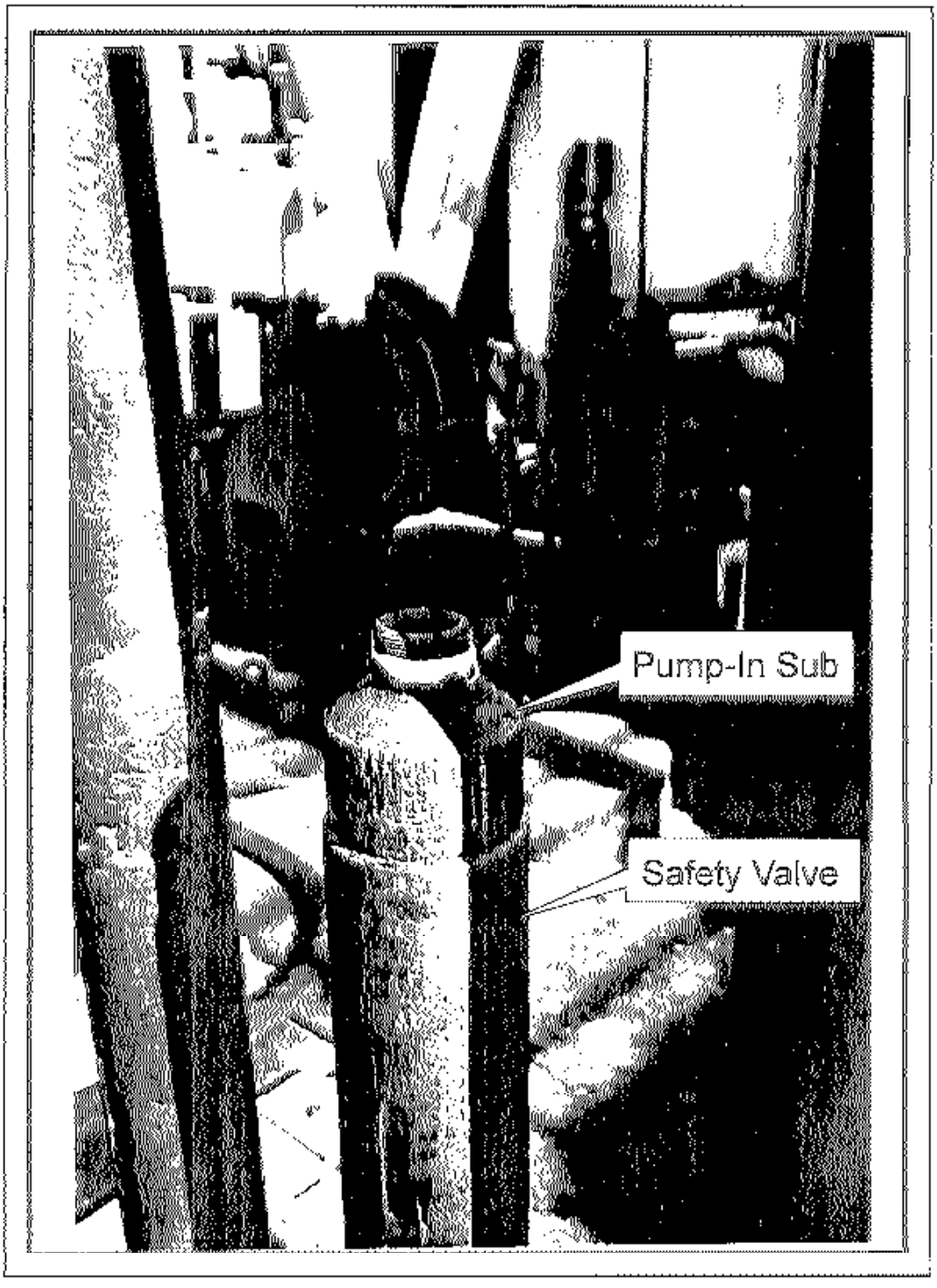


Photograph of the pump-in sub connection, chicksan swivel joint, manual valve, armored hose, and safety chain as the unit lay on the rig floor following the accident.

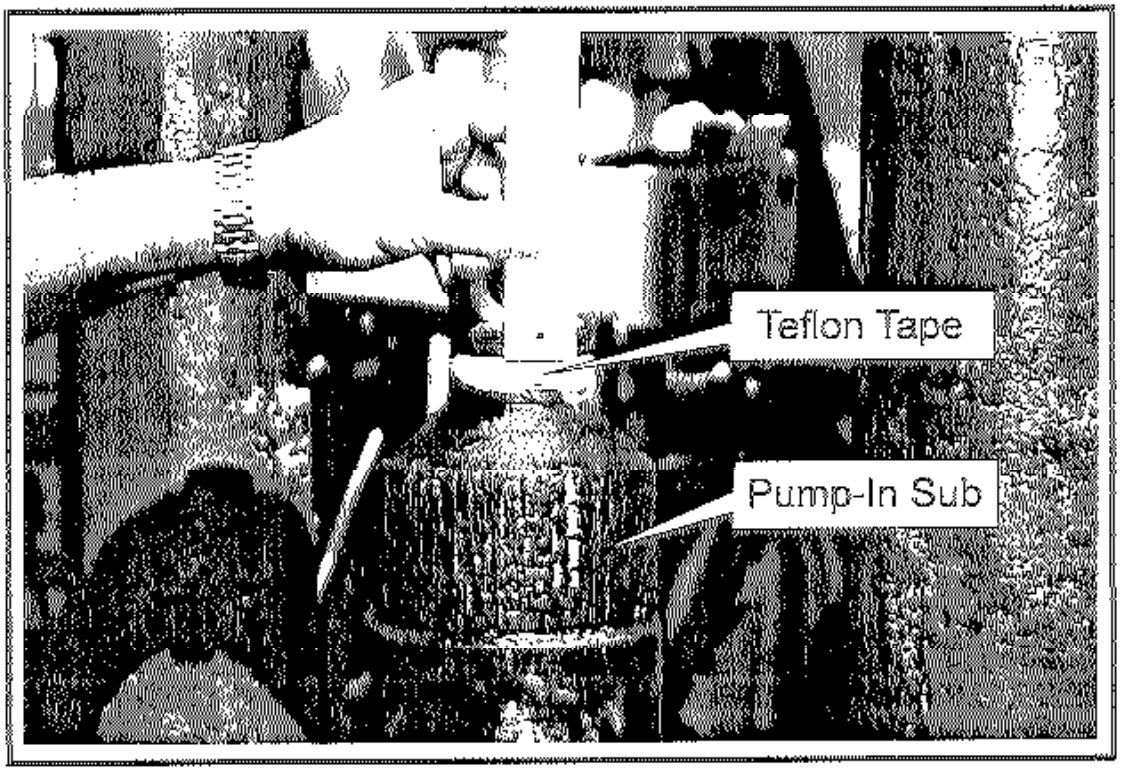


Photograph of the pump-in sub connection, chicksan swivel joint, manual valve, armored hose, and safety chain as the unit lay on the rig floor following the accident.

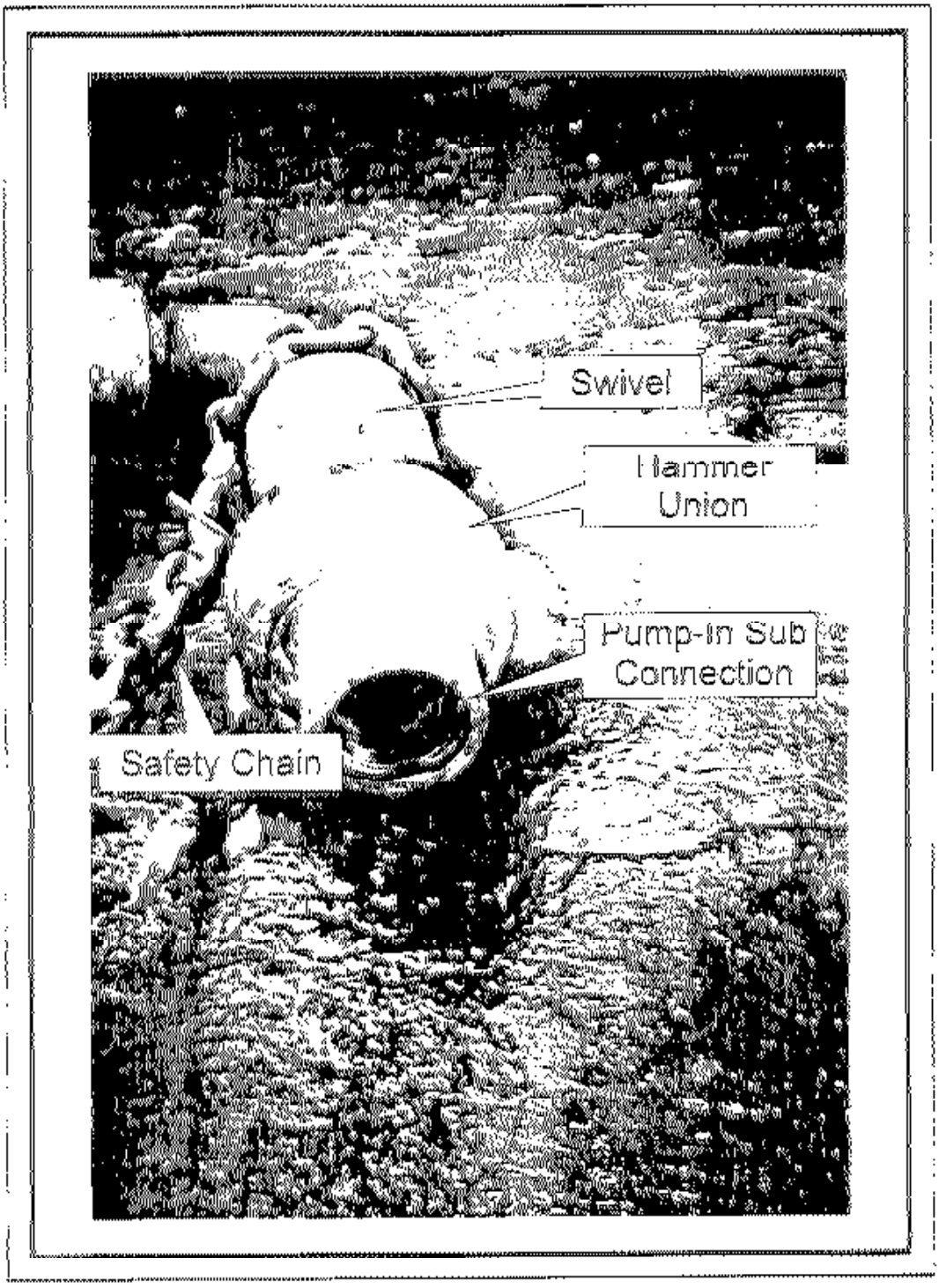
Photograph of pump-in sub and safety valve



Photograph of pump-in sub and safety valve



Photograph of male end of pump-in sub



Photograph of safety chain and swivel

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 **Royalty Management Program** 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.