OCS Report
MMS 92-0067

Investigation of October 13, 1991 Elf Exploration, Inc., Oil Spill Lease OCS-G 9637 South Timbalier Block 38

Gulf of Mexico
Off the Louisiana Coast

MMS U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region

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Steve Ledet
Paul Marsh
Burt Mullin

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

New Orleans
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Investigation and Report

Authority

The following investigative panel of Mineral Management Service (MMS) personnel was assigned to investigate and to prepare a public report on the oil spill that occurred on October 13, 1991, at South Timbalier Area, Block 38, from Platform A, Lease OCS-G 9637, where Elf Exploration, Inc., was conducting producing operations:

Steve Ledet

Paul Marsh

Burt Mullin

The panel members were named by memorandum dated October 18, 1991, pursuant to the MMS Manual, Part 640, Chapter 3, Accident Investigations, and to Section 208 (subsections 22 d, e, and f) of the Outer Continental Shelf (OCS) Lands Act, as amended in 1978.

Procedures

Panel members Steve Ledet and Paul Marsh visited Platform A, South Timbalier Area, Block 38, on October 16. Preliminary interrogation of personnel familiar with the accident was conducted, and photographs of pertinent equipment were taken.

The investigative panel convened on November 12, 1991, at the MMS Gulf of Mexico OCS Regional Office in New Orleans, Louisiana. The following

individuals were questioned about the oil spill. They all work for Elf Exploration, Inc.

Robert Aucoin

Elliot Bellaire

Casey Jones

John Alleman

Glen McCoy

Introduction

Background

Elf Aquitaine, Inc., along with Bechtel Associates Limited, each with 50 percent working interest, acquired Oil and Gas Lease OCS-G 9637 at Central Gulf Lease Sale 113 with an effective date of May 1, 1988. All of South Timbalier Area Block 38 comprises Lease OCS-G 9637, as shown on OCS Louisiana Leasing Map LA.6. Elf Exploration, Inc., formerly Elf Aquitaine, Inc. (herein referred to as Elf), was designated as operator, and an exploratory well (Well No. 1, API No. 1787154073100) was spudded on October 31, 1989, and subsequently sidetracked on November 16, 1989, and December 3, 1989. Hydrocarbons in paying quantities were discovered, and the well was temporarily abandoned on December 18, 1989.

A four-pile, three-deck, unmanned production platform designated as Platform A was approved by Minerals Management Service and was installed on July 29, 1991. Well No. 1 was completed as Well A-1 and was placed on production August 8, 1991. (For a map of the area, as well as a vicinity map, please refer to attachment 1.)

Description of Incident

On October 14, 1991, at approximately 7:30 a.m., a Petroleum Helicopters Inc. pilot flying the South Timbalier Area spotted a large oil slick originating from an unmanned Elf platform in South Timbalier Block 38 (see attachment 2). The pilot had the information relayed to Elf operating personnel at Eugene Island Area, Block 184, Platform A.

The production supervisor for Elf's offshore operations located at Eugene Island Block 184 then contacted his supervisors in Elf's Houston office, as well as operating personnel at West Delta Block 138, Platform A. Elf personnel at West Delta Block 138 also operate the South Timbalier Block 38 Platform A remotely with limited telemetry capabilities. The order was then given to shut down South Timbalier Block 38 Platform A (henceforth referred to as Platform A). By means of telemetry, Platform A was shut-in, and a shut-down confirmation signal was received at approximately 8:00 a.m. A helicopter was dispatched with personnel from the West Delta Area to investigate the sighting.

Immediately upon notification, Elf personnel in Houston began to implement Elf's Oil Spill Contingency Plan (OSCP). The National Response Center (NRC) was contacted at 8:52 a.m. The NRC assigned Control No. 92171 to the report. Elf also contacted the U.S. Coast Guard, the MMS, the Louisiana Department of Environmental Quality, as well as Local and State Officials whose jurisdiction would be affected if the slick were to make landfall. Weather and spill trajectory analysis were also performed as described in Elf's OSCP. Clean Gulf Associates was put on alert and spill cleanup preparations were begun.

At approximately 9:00 a.m., personnel from West Delta arrived at Platform A and found the platform completely shut-in and oil still surfacing from the produced water disposal line ("water-leg"). Electrical power was restored and it was noticed that the meter failure circuit from the lease automatic custody

transfer (LACT) panel had annunciated. No other alarms were indicated. Further investigation indicated that the heater treater burner had an apparent flameout, evidenced by the burner safety low signal on the master panel. Likewise, the level safety high sensor on the dry oil tank had also tripped on the master panel. Closer investigation of the dry oil tank found it to be completely full of oil, as was the dry oil tank containment pan. The containment pan had been spilling into the drain system to the sump tank. Upon investigation of the sump tank, it was discovered that the block valve on the level safety high sensor switch was closed, making the sensor inoperative. The oil had displaced all the water in the sump tank and the water leg and was still surfacing from the underwater discharge point.

Once the platform was secure and the preliminary investigation completed, oil was pumped from the sump tank into the wet oil tank and from the dry oil tank into the pipeline. Water then was pumped through the dry oil drip pan into the sump tank to clean and flush the drain system of oil. Once this was completed, the water level was restored in the sump tank. A small amount of oil that had spilled on and around the dry oil tank and was also cleaned. Thereafter, production was restored to test the safety system to determine why the system failed to prevent such an occurrence.

Equipment Malfunction

On October 14, 1991, when Elf personnel investigated the cause of the spill, it was learned that the accident resulted from a series of unlikely events. Both human error and mechanical failure contributed to the spill.

The series of events began with the flameout of the burner on the heater treater, evidenced by the burner safety low signal on the master panel. The flameout in turn raised the basic sediment and water to a point where it was rejected by the metering system. The LACT panel showed the meter failure alarm had annunciated prior to the platform's shut-in. A meter failure signal shuts down the pipeline pumps and alarms and does *not* shut down platform production.

Consequently, it was recognized by Elf personnel that an alarm by the metering system on an unmanned platform was inappropriate and an oversight in the design of the system. Both the burner safety low sensor and the meter failure signal only shut-in the pumps and the fuel gas to the burner, respectively. Current MMS regulations and American Petroleum Institute Recommended Practices call for alarms and local component shut-in and not platform shut-in when these safety devices are tripped. These documents do not give consideration to whether the platform is manned or not.

With the pipeline pumps not functioning and the well still flowing, oil production continued to fill the dry oil tank (see flow diagram, attachment 3). The dry oil tank filled until the level safety high sensor was activated, as indicated on the master panel. Although the safety system was designed to shut-in production in the event of a level safety high sensor signal in the dry oil tank, the device tripped at the pneumatic panel, but the panel failed to shut-in production.

The dry oil tank level safety high was the primary safety device to detect such an upset and shut-in the platform. The shut-in circuit, which receives the level safety high signal, had been successfully tested on several occasions before and after the oil spill. However, after continued testing of the circuit following the spill, the circuit's reset pilot (spool valve) failed in the partially cleared position and did not initiate platform shut-in. The spool valve has a pin used to hold the spool valve in the "cleared" position during start-up and pressurization of the panel. The pin is designed to release the spool valve automatically when the panel is pressurized and the circuit clears. If the pin fails to release the spool valve, the circuit fails in a partially cleared mode and does not shut-in the platform. This is commonly referred to as "cross-spooling." The spool valve was removed and disassembled, at which time small amounts of debris (sand, rust, etc.) were found within the spool valve. Apparently on the day of the incident, the level safety high was activated and a signal was received by the panel, but either low operating pressure on the panel and/or debris in the spool valve allowed the valve to cross-spool, which did not result in shut-in of the well. Therefore, the dry oil tank continued to fill and eventually oil entered the overflow line and spilled into the skid containment pans (drip pans), through the skid drain system and subsequently into the sump tank.

Oil continued to fill the sump tank, displacing water out of the tank. The level control signaled the sump pump to start and pump the sump tank oil bucket to the wet oil tank. The sump pump, a double-acting diaphragm pump, appeared to be air-locked and did not function. A properly working sump

pump could have prevented or lessened the severity of the spill by pumping the oil into the wet oil tank. The wet oil tank level safety high should then trip and shut-in the platform. Nonetheless, oil continued to fill the sump. As the oil rose in the sump tank, the level safety high sensor was not activated, as the upper level safety high sensor isolation valve was closed. The isolation valve is used to bypass the vessel during testing. This valve probably had mistakenly been left closed. This human error eliminated the secondary protection against such an upset. The oil completely displaced the water in the sump and forced the water out of the water-leg and the spilled oil into the Gulf.

On October 14, 1991, a Petroleum Helicopters Inc. pilot passing over South Timbalier Block 38 noticed a sheen. The original slick reported by the helicopter pilot was 7 miles long by 3 miles wide, consisting of a light sheen containing numerous heavy patches. Seas were reported at 1 to 5 feet, with a northeasterly current carrying the slick. The original sighting was approximately 7 to 8 miles from shore.

Elf's people observed the spill from the air at 8:45 a.m. and confirmed that the sheen was caused by their South Timbalier 38 platform (see attachment 4). The platform at South Timbalier 38 had been shut in by telemetry at 8:00 a.m. The dimensions reported by Elf, as of 9:15 a.m., were 6 to 7 miles long by 50 to 150 feet wide. The appearance was rainbow-like with heavy brown patches; the approximate volume was 300 barrels. The weather reported was winds of 10 mph out of the south-southwest, with seas of 2 to 3 feet. The slick was heading north-northeast at approximately ½ mph. Elf continually called Wilkins Weather Service for hourly weather updates and for a trajectory analysis. At 11:20 a.m., the slick was 7 miles long by ½ mile wide, still rainbow colored with brown patches, centered in South Timbalier Block 21, and located approximately 5 miles from shore.

By nightfall on October 14, the slick was heading east-northeast, tracking the shoreline, and still approximately 5 miles from shore. During the night the weather changed to winds of 20 to 25 knots from the north.

By morning on October 15, the sheen, now 7 miles by 2 miles, was 12 to 15 miles from shore, heading south, and centered in Grand Isle Block 47. At 10:20 a.m. on October 15, the sheen was reported as silvery, no longer rainbow or brown, dispersing at the edges, and no longer recoverable. At 3:00 p.m., on October 15, with approval from the Coast Guard and the Minerals Management Service, all cleanup operations were discontinued.

Oil-Spill Recovery

Elf contacted Clean Gulf Associates (CGA) and requested they deploy equipment at 9:40 a.m. on October 14, 1991. The equipment deployed included three Fast Response Units with skimmers and 1,500 feet of expandi-boom each. The Shell ID boat *Cecilia C*, located in South Timbalier Block 26 with skimmer and 500 feet of expandi-boom, was also deployed. Including 2 additional boats with expandi-boom and 4 boats used for deployment, a total of 10 boats was involved in the clean-up. Elf also hired Jim O'Brien of O'Brien Oil Pollution Services, a consultant specializing in beach cleanup, to study the possible scenario of beach impact.

By 1:30 p.m. on October 14, the *Cecilia C*, with crew and equipment, arrived and commenced skimming operations. The three CGA boats arrived on the scene and were picking up oil by 3:30 p.m.. By 3:00 p.m. the following day, October 15, the cleanup was discontinued.

The final recovery was 8 to 10 barrels of crude oil, plus 100 barrels of oily water. Elf's final estimate of the total amount spilled was 280 barrels.

Oil-Spill Volume

The estimated normal daily production from the South Timbalier 38 platform, based on production history, was 550 barrels per day, which equates to 22.9 barrels per hour. The platform flowed from 10:00 a.m. on October 12 until it was shut in at 8:00 a.m. on October 14 by telemetry. Upon inspection, 658 barrels of oil had passed through the LACT meters during that 46-hour period. Using a rate of 22.9 barrels per hour for 46 hours, total production should have been 1,053 barrels. The difference yields 395 barrels unaccounted for. However, the dry oil tank was full and its capacity is 90 barrels. The working volume of the tank is approximately 80 barrels. Subtracting this 80-barrel amount leaves 315 barrels unaccounted for. The sump tank was also full, and its capacity is 34 barrels. Subtracting this amount leaves 281 barrels. Finally, the deck drain system holds about 1 barrel. Subtracting this amount leaves a total volume of 280 barrels unaccounted for.

An estimate of the volume spilled made from visual observance was never calculated by any of the parties involved because the high crude gravity (39.5°) caused the sheen to break up and dissipate rapidly. However, the consensus of all observers, based on the visual observations of the slick, was that it did not look like a 280-barrel spill.

Conclusions

From the production rate of the well at the time of the spill, the meter readings prior to and after the spill, as well as the volume of oil in the dry oil tank, the drain system and the sump tank, it can be determined that 280 barrels of oil were released.

The upset in the system occurred in the late afternoon of Sunday, October 13, 1991.

Although the platform was installed 2-½ months prior to the spill and its design incorporates the latest technology, the accident occurred as a result of a design oversight, human error, and mechanical failure.

Inspection of the platform's operating records indicated that Elf was not satisfactorily meeting the requirements for daily pollution inspections as outlined in 30 CFR 250.41.

If the overflow line from the dry oil tank had been piped to the wet oil tank, this incident may have been avoided.

Cross-spooling of similar spool valves is a common occurrence.

Unmanned oil facilities need special consideration during the design phase as well as the operational phase.

Recommendations

The MMS should investigate records to determine if similar unmanned platforms provide well shut in function for all upsets in the safety system.

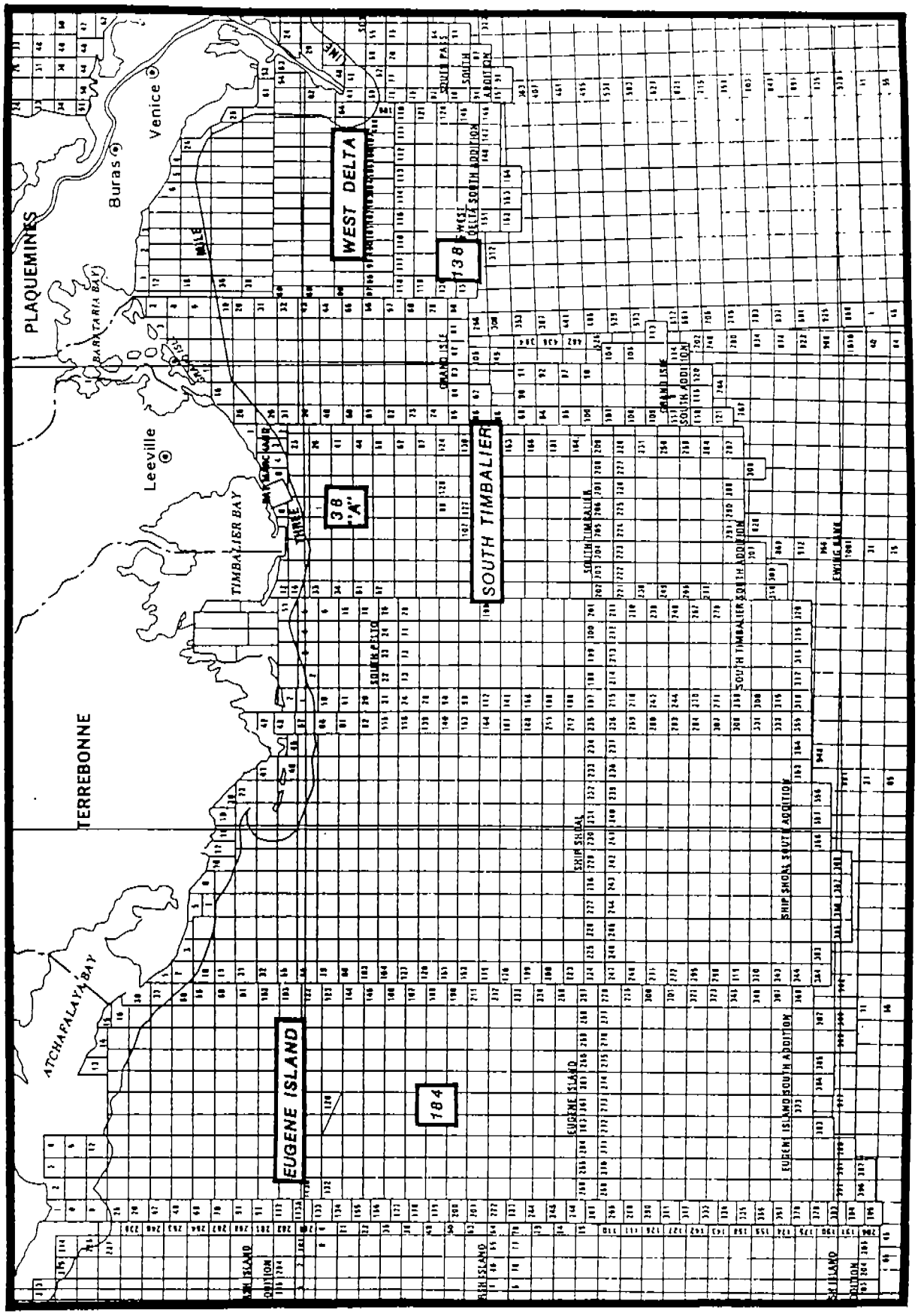
The MMS should modify current policy to require well shut in function for all upsets within the safety system on unmanned platforms.

The MMS should immediately issue a safety alert to notify all lessees with similar circuit reset pilots (spool valves) of the possibility of cross-spooling.

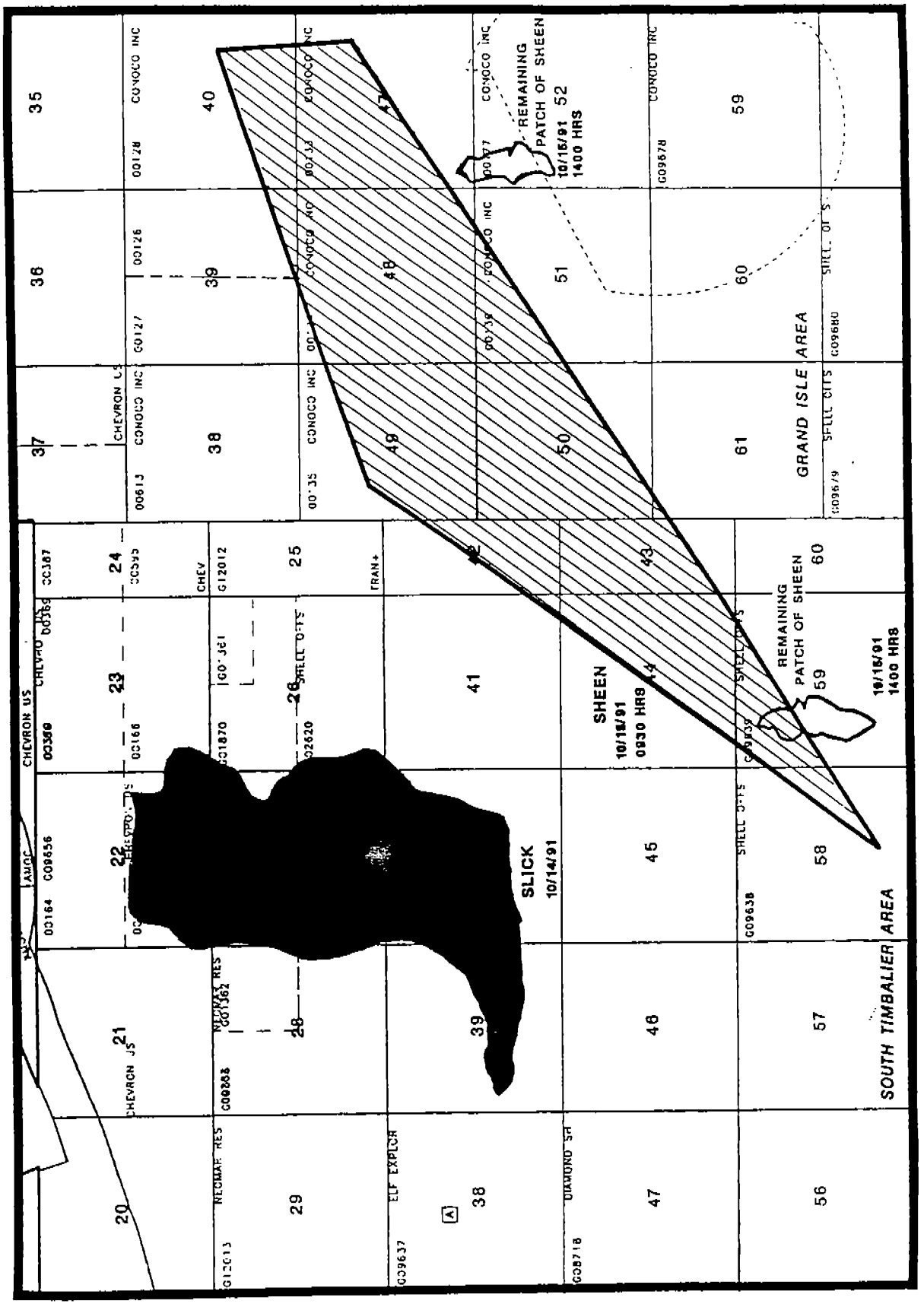
The API RP 14C committee should consider modifying the current document to take into consideration whether or not platforms are unmanned.

The MMS should advise operators to conduct thorough inspection of the safety system during the required daily pollution inspections. These investigations should include a check of safety devices to ensure they were not inadvertently left out of service, checking fluid levels in tanks, and manually pumping the sump oil bucket.

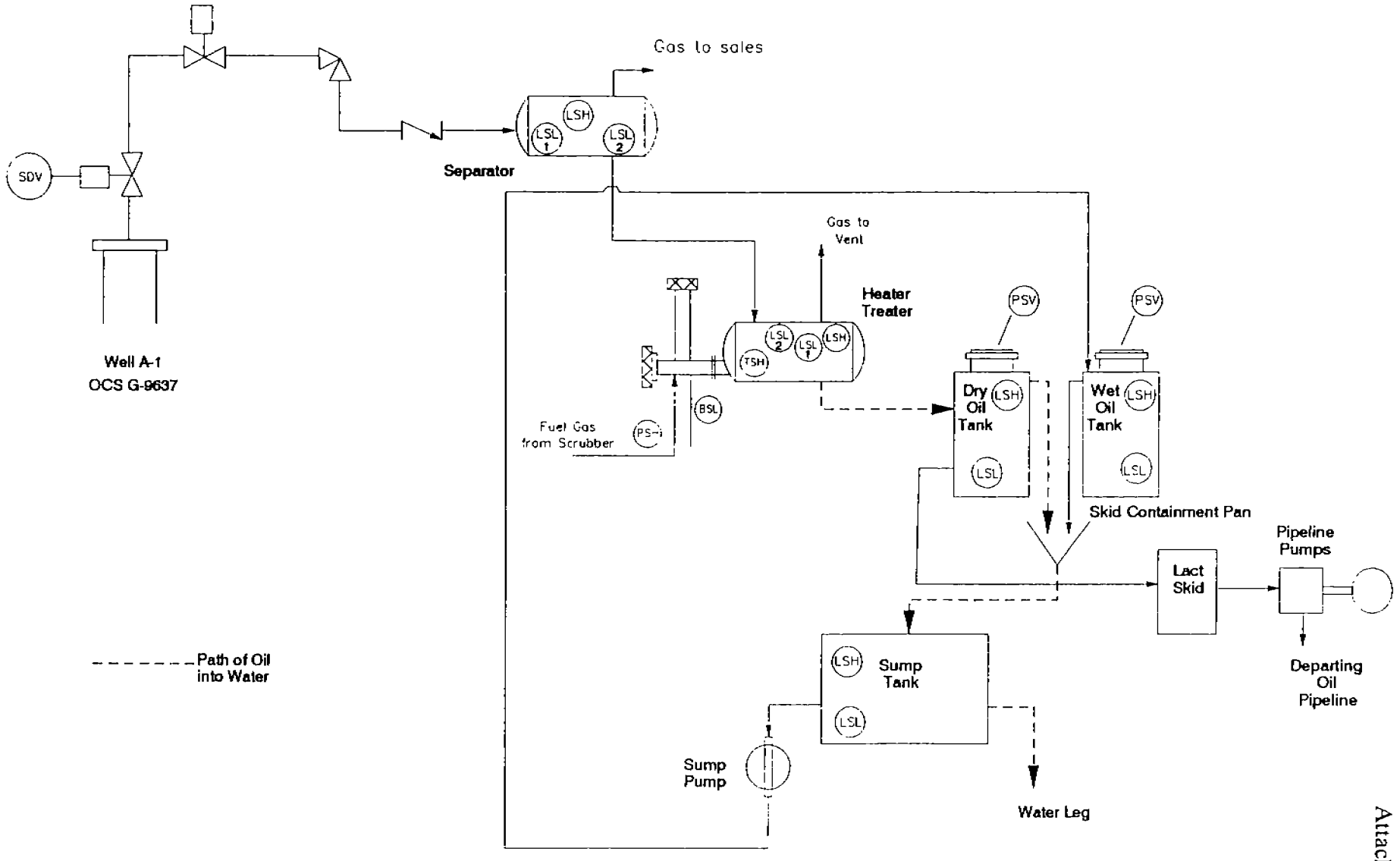
The MMS should investigate the applicability of more advanced remote monitoring and control systems for operationally complex unmanned platforms.



Vicinity Map

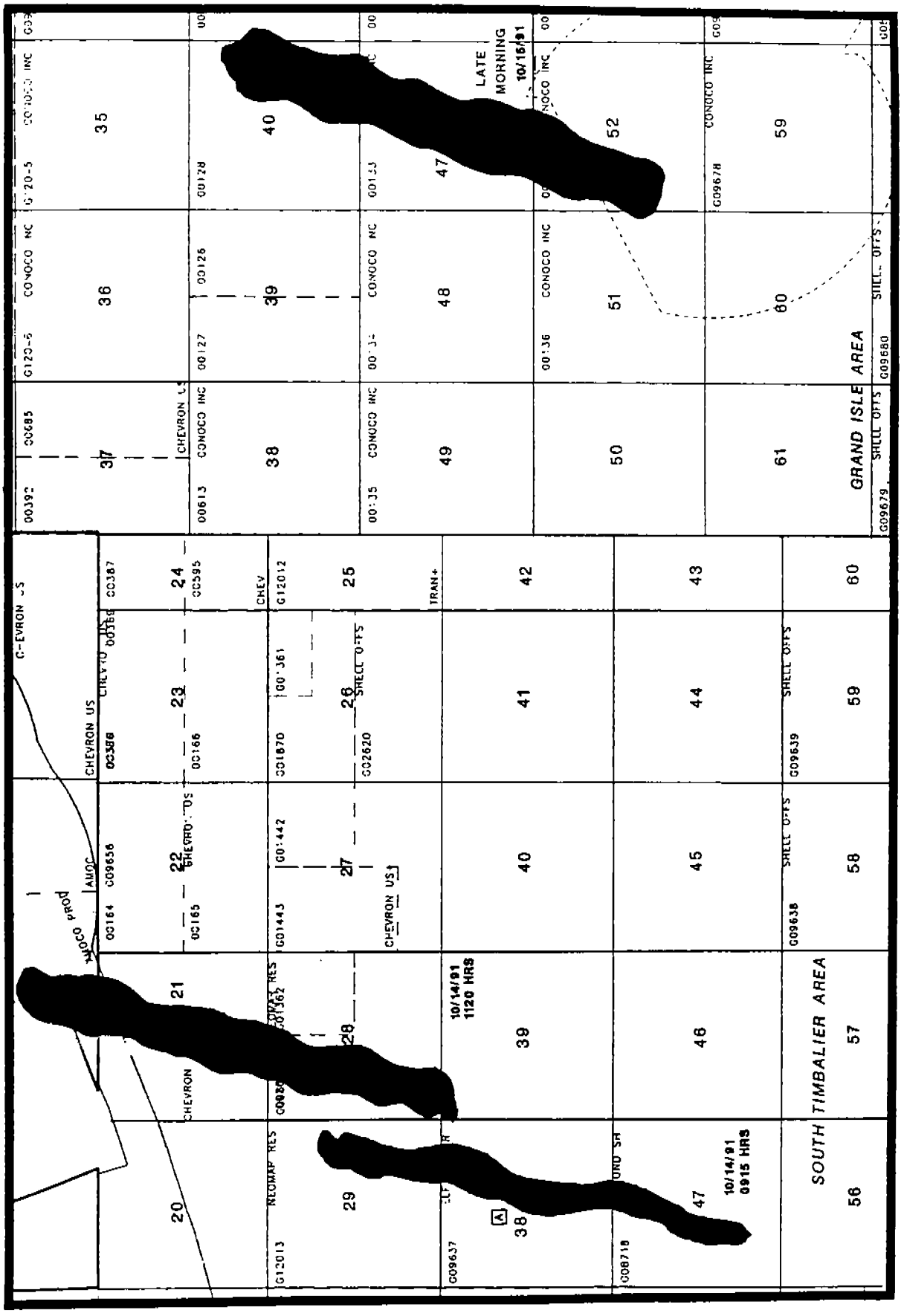


Helicopter Reported Spill Sighting



Flow Diagram

Attachment 3



Elf Exploration, Inc.'s, Reported Spill Sighting