OCS Report
MMS 97-0031

Investigation of Shell Offshore Inc, Hobbit Pipeline Leak, Ship Shoal Block 281, November 16, 1994, 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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Alex Alvarado
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U.S. Department of the Interior
Minerals Management Service
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Contents

Investigation and Report

Authority

A liquid hydrocarbon spill occurred during the latter part of November 1994 from a leak in Shell Offshore Inc.'s (SOI) 4-inch Hobbit pipeline. The leak occurred in Ship Shoal Block 281 where the Hobbit Pipeline is connected by a subsea tie in with Shell Pipe Line Corporation's (SPLC) 12-inch Cougar pipeline. 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 incident. By memoranda dated January 12, 1995, and February 7, 1995, the following MMS personnel were named to the investigative panel:

Alex Alvarado, New Orleans, Louisiana (Chairman)

Frank Pausina, New Orleans, Louisiana

George M. Conner, New Orleans, Louisiana

Pasquale Roscigno, New Orleans, Louisiana

Also participating on the panel was William Bertges of the Department of Transportation's Office of Pipeline Safety.

Procedures

Shortly after the formation of the panel, the panel chairman assigned to each panel member various preliminary investigative tasks in preparation for the first panel meeting. In performing their tasks, panel members had access to SOI's interim and final reports dated December 15, 1994, and January 31, 1995, respectively, in which details of the spill, including spill volume estimates, are addressed. During the first panel meeting, which occurred on April 26, 1996, it was determined that additional information was required to evaluate the spill properly. The information was requested of and submitted by SOI by letters dated March 6 and 13, 1996. Another panel meeting was held on June 30, 1996, during which the findings, conclusions, and recommendations of the panel's investigation were finalized.

Introduction

Background

Shell Pipe Line Corporation (SPLC) is the pipeline right-of-way (ROW) holder and operator of the Cougar pipeline system, which gathers liquid hydrocarbon production from Federal oil and gas leases in the South Timbalier (ST), Ship Shoal (SS), and Ewing Bank (EW) areas for delivery into the Central Gulf Gathering System (MMS Royalty Measurement Operations System No. 26.0). This production is transported to Union Operating Partners Limited's (UNOCAL) oil gathering station in SS Block 208 via SPLC's 12-inch Cougar pipeline and is then metered and transported shoreward via UNOCAL Pipeline Company's 18-inch White Cap pipeline.

The Cougar Pipeline System originates at SOI's ST Block 300 Platform A and, at the time of the spill, transported to UNOCAL's SS Block 208 Platform F production from the following sources through SS Block 241 Platform A pump station:

- SOI leases in ST Blocks 295 and 300.

  Production from ST Block 295 Platform A is measured for royalty and then transported to ST Block 301 Platform A via a 6-inch SOI pipeline (ROW OCS-G 8385). Production from ST Block 300 is measured for royalty at ST Block 300 Platform A.

- British Petroleum Company's (BP) lease in EW Block 826.

  Production from EB Block 826 Platform A is measured for royalty and then transported to ST Block 300 Platform A via a 12-inch BP pipeline (ROW OCS-G 10110).

- ARCO Oil and Gas Company's (ARCO) lease in SS Block 332.

  Production from SS Block 332 Platform A is measured for royalty and then transported via a 6-inch ARCO pipeline (ROW OCS-G 8058) to a subsea tie-in (SSTI) with the 12-inch Cougar pipeline in ST Block 299.

- SOI's lease in SS Block 259.

  Production from SS Block 259 Platform JA is measured for royalty and then transported via SOI's 4-inch Hobbit pipeline (ROW OCS-G 10065) to an SSTI with the 12-inch Cougar pipeline in SS Block 281.

All liquid hydrocarbon production measured into the Cougar pipeline system by royalty meters at the above-referenced platforms is measured again by meter as a combined stream at the SS Block 208 F Platform. The volume of the combined stream is compared daily at 0700 hours with the sum of the individual volumes that are measured into the Cougar pipeline. The result of the comparison is referred to as the "Loss/Gain Daily Report" (LGDR). A loss on the LGDR means that the combined volume is less than the sum of the individual volumes for the preceding 24-hour period and is listed as a loss for the preceding calendar day. Therefore, a loss listed on the LGDR for a particular day represents the aforementioned volume difference for the 24-hour period beginning at 0700 hours on that day and ending at 0700 hours on the next day.

The leak occurred on the 4-inch Hobbit pipeline in close proximity to the SSTI with the 12-inch Cougar pipeline in SS Block 281. The ROW for the Hobbit pipeline was granted, under 30 CFR 250, to SOI on June 3, 1988, shortly after which the pipeline was constructed. The Hobbit pipeline and the Cougar pipeline system are operated under the regulatory jurisdiction of the United States Department of Transportation (DOT), pursuant to 49 CFR 195 regulations, Transportation of Hazardous Liquids by Pipeline. (For a map of the pipeline system, see Attachment 1.)

Description of Incident

On the morning of November 16, 1994, SPLC began observing losses on the LGDR, i.e., the metered volume of the combined Cougar stream on SS Block 208 Platform F was less than the sum of the metered volumes on the individual platforms producing into the Cougar system. On the morning of November 18, 1994, a loss outside the range of what SPLC considered normal deviations initiated an investigation. The investigation attributed the loss to metering problems on SS Block 208. Losses continued and were also attributed to the same metering problem.

On November 21, 1994, the loss continued and an SPLC fly-over revealed a small sheen resembling diesel, which was attributed to fishing vessels observed in the area. Hourly metering checks were made to verify pipeline integrity. On the morning of November 22, 1994, the largest of the losses was experienced. A fly-over revealed a 1-mile by 2-mile sheen in SS Block 281. The pipeline system was shut-in with subsequent pressure testing of the Cougar pipeline confirming that SS Block 259 Platform JA was the source of the spill and the resultant losses. (After investigation and considerable analysis, MMS would determine these losses to be 4,533 barrels.)

On November 23, 1994, a diving survey further established the Hobbit pipeline as the direct spill source. Repairs to the pipeline were completed on December 25, 1994. The pipeline was pressure tested and placed back in service on December 26, 1994.

Findings

Chronology of Events

Wednesday, November 16

0700 SPLC morning gauge-off shows 84-bbl loss.

Thursday, November 17

0700 SPLC morning gauge-off shows 343-bbl loss.

Friday, November 18

0700 SPLC morning gauge-off shows 594-bbl loss. SPLC commences an investigation on the discrepancy. All meter readings at all receipt points are re-checked. A check with UNOCAL reveals that its SS 208 is having metering problems (pig caught in a turbine meter strainer). SPLC and UNOCAL agree this is causing the discrepancy.

Saturday, November 19

0700 SPLC morning gauge-off shows 568-bbl loss. SPLC rechecks with UNOCAL SS Block 208.

UNOCAL reports they are still having metering problems.

Sunday, November 20

0700 SPLC morning gauge-off shows 586-bbl loss. SPLC rechecks with UNOCAL SS Block 208.

UNOCAL reports they are still having metering problems.

Monday, November 21

0700 SPLC notices a 707-bbl loss on morning gauge-off. SPLC flies Cougar pipeline. No sheens over the pipeline are found, but a small rainbow sheen is observed north of the pipeline, about midway between SS Block 241 and ST Block 300. The sheen is light and resembles diesel. Several fishing boats are observed in the area. Since winds are from the north and fishing boats are in the area, the sheen is attributed to the boats.

1000 SPLC flies to UNOCAL's SS Block 208 platform. A visual check indicated that SOI's meter was operating properly.

1300 SPLC initiates hourly checks of pipeline system loss/gain to verify system integrity.

2000 SPLC completes hourly checks. The result is an overall net system gain, which indicates the pipeline has integrity.

Tuesday, November 22

0700 SPLC notices a 909-bbl loss on morning gauge-off.

0930 SPLC flies the Cougar pipeline. A rainbow sheen is observed in SS Block 281, in the vicinity of the SOI SS Block 259 SSTI.

1200 SPLC flies to UNOCAL SS Block 208 to double-check that UNOCAL's meter is working. The meter serving the Cougar system proves to be operating correctly.

1300 SPLC again flies the SS Block 281 spill area. The sheen size is determined to be about 1 mile by 2 miles, of a light rainbow color.

1400 SPLC begins notifying producers to shut in, and calls the SOI Spill Response Emergency Coordinator. A stand-up pressure test is initiated on the Cougar pipeline.

1400 SS Block 259 JA platform is shut in.

1430 SPLC makes initial call to the National Response Center (NRC) (Report # 270654) and the MMS Houma District. A 1-mile by 2-mile rainbow sheen, about 10 bbl of crude, of unknown cause/origin is reported.

1700 Results of the Cougar pressure test confirm the SS Block 259 JA pipeline as the spill source.

2030 The dive boat arrives on the scene. Diver investigations commence.

Wednesday, November 23

0100 Divers find the leak in the SS Block 259 JA pipeline near the subsea tie-in to the Cougar pipeline. Divers close the 4-inch isolation valve at tie-in. Shrimping debris (trolling nets) is observed at the leak site. Videos of the damage are made.

0200 Cougar pipeline is brought back on line.

0700 SPLC notices a 348-bbl loss on the morning gauge-off. SPLC flies over the site, and no sheen is observed.

0930 SOI and SPLC begin coordination of repair and installation work. Over the next several days, materials and equipment are ordered and shipped.

0930 The SOI Emergency Response Coordinator provides a follow-up verbal report to NRC (Report # 270732), MMS, and the MMS Pipeline Section. It is clarified that condensate was spilled, not crude oil.

1000 Upon approval from Transcontinental Pipeline Company (Transco), SOI diverts SS Block 259 JA platform gas and condensate production to Transco's adjacent 24-inch pipeline.

Thursday, November 24

0700 SPLC morning gauge shows a 6-bbl loss, which is within normal loss/gain deviation.

Tuesday, November 29

1500 Began replacement spool fabrication.

Wednesday, November 30

1930 Spool fabrication hydro-test completed onshore.

Thursday, December 1

1200 Work vessel GD-210 arrives on-site, sets anchors, and starts repair work.

Monday, December 5

2130 Repairs completed, and the repaired pipeline segment is leak-tested.

Tuesday, December 6

1100 SS Block 259 Platform JA pipeline is placed back into service.

1400 Spillnet trajectory analysis/modeling completed. A 1,300-gal/hr continuous release is modeled. Results indicate that a light condensate quickly dissipates, in less than 2 hours, with a maximum radial extent of 2 miles from the spill origin.

1400 The SOI Manager of Regulatory Affairs briefs MMS-New Orleans representatives (Oynes, Torres, Conner) about the spill.

Divers' Report

On November 22, 1994, divers located the damaged 4-inch condensate pipeline emanating from SS Block 259, Platform JA. According to the report filed by Global Divers and Contractors, Inc. at 2247 hours of that date, diving personnel <u>found</u> the following (see Attachments 2, 3, and 4, for insight):

2244 Divers out of bell.

2247 Divers located pipeline.

2248 Divers located shrimp net damage to pipeline and spool.

SSTI is flattened and bent upwards at a 40° angle. There is a piece of shrimp net over the flange bolts bending the same upwards. This flange is in the apex and is 7 feet off bottom, and is shown in Attachments 2, 3, and 4. The pipeline behind the flange is severely bent downwards. There are stress signs behind all flanges on the coating. After the pipeline is pressured up to 50 psi, the diver discovered a split in the subsea tie-in assembly.

2300 Divers depart.

Water depth in the area of the SSTI and leak is 201-203 feet.

Damaged Pipe Analysis

A review of the divers' report and an analysis of the pipe failure submitted by the Shell Offshore Inc. indicate the following:

On or about November 22, 1994, SPLC detected an abnormally high "gauge loss" on their Cougar pipeline (ROW OCS-G 5134). A preliminary investigation revealed a sheen in SS Block 281. SPLC immediately shut-in all production to the Cougar pipeline system. A pressure test of the Cougar pipeline verified the 12-inch pipeline's integrity and identified ROW pipeline OCS-G 10065, the Hobbit pipeline, as the origin of the spill. A cursory diver investigation found the SSTI in the following condition (see Attachment 4):

1. The 90° elbow in view A was flattened.

2. The spool piece preceding (in terms of the flow) the 90° elbow was straightened and located 7 feet off bottom.

3. The bolts on the connecting flanges of this spool piece were bent and pieces of a trawl net were found on some of the bolts.

4. A section of 4½-inch pipe was split (see Attachment 4).

5. The diver shut in the block valve, and production was allowed to proceed *on the Cougar 12-inch pipeline.*

On December 5, 1994, the SSTI was repaired, covered with sand/cement bags and concrete mats, hydro-tested, and placed back into service (see Attachment 5).

By letter dated January 18, 1995, Shell Development Company submitted to SOI a failure analysis of the damaged pipe. The failure appears to have initiated from a 2- to 3 in.-long crack that formed within a dent in the pipe, and propagated circumferentially in a shear mode. The failure was described as a common ductile shear fracture, with no indication of fatigue or other time-dependent crack growth. The fracture initiated as a result of a high transverse impact load that dented and ovalized the pipe. The crack initiated during subsequent straightening and reverse bending of the pipe.

Shell Offshore Inc.'s Volume Determination

The series of daily losses on the Loss/Gain Daily Report (LGDR) beginning on November 16, 1994, led SOI to assume that the spill began on that date and ended on November 22, 1994, when SS Block 259 Platform JA, was shut in. To determine the volume of production that was produced into the Hobbit pipeline during that period, SOI used the nonreset totalizer readings (NRTR) from both of the meters on Platform JA, which measure production into the Hobbit pipeline and whose readings are used in the preparation of the LGDR. The NRTR for both meters from 0700 hours on November 16 to 0700 hours on November 23 totaled 4,535 bbl.

In an attempt to determine the amount of production from Platform JA that was measured on November 16 after 0700 hours but was not spilled, SOI subtracted the LGDR loss for November 16 from the Platform JA production for the same day. The difference is 314 bbl and is subtracted from the above-referenced 4,535 bbl for the purpose of determining the total uncompensated volume spilled, which SOI calculated to be 4,221 bbl.

The uncompensated volume is then compensated for meter factors, basic sediment and water (BS&W), and temperature. SOI's final compensated spill volume is calculated to be 4,207 bbl.

As part of its evaluation of SOI's spill volume determination, the panel reviewed the proving reports and run tickets of all of the aforementioned meters for the purpose of determining the accuracy of the meters' registered volumes during the time of the spill.

Oil-Spill Reports Trajectory Analysis

A sheen was reported by SPLC at 1300 on November 22, 1995, near latitude 28° 22.48' North and longitude 90° 46.27' West. This sighting occurred during the last day of the spill event and was shaped like a triangle. It was estimated to be 1 mile wide at its base and 2 miles long. This "rainbow" sheen was calculated to contain ~5 barrels of product. Prior to this sighting, weather conditions with variable winds (10 - 28 knots) and seas (3 - 8 feet) may not have been favorable for sighting the sheen. The condensate, with its rusty color and mild odor, quickly dispersed as a thin layer at the sea surface.

The analysis, using the Applied Science Associates "Oil Map" trajectory model, characterizes physical and chemical parameters of the product and its interaction in seawater. As such, the assumptions and calculations are a reasonable approximation of the processes that influenced the dispersion of the condensate. At any given time, it was estimated that no more than 45 barrels of condensate were on the water and, given the weather conditions, the product probably dissipated in less than two hours following the pipeline shut-in. The trajectory modeling was confirmed by the sighting observations.

Condensate Fate and Effects

Waste-associated metals and hydrocarbons associated with the condensate are probably rapidly removed by scavenging, evaporation, and additional weathering processes (wind and wave action). Outside the initial mixing at first contact with the sea, significant concentrations of condensate on the water away from the platforms are not expected. Since this is a short-term impact on the sea-surface microlayer, the acute effects were probably transitory and the chronic effects nonexistent.

Previous Pollution Incident

Prior to the incident being addressed by this report, a similar incident at the same location occurred January 24, 1990 (See OCS Report MMS 91-0025*). At about 12 noon on that day, a helicopter pilot flying in the Ship Shoal Area reported a heavy oil slick 25 miles by 15 miles in size at latitude 28° 17.7' North and longitude 90° 51.8' West. The pilot immediately reported the slick to the National Response Center (NRC). Personnel at SOI's ST Block 300 Platform A overheard the report to the NRC and dispatched a helicopter to investigate. The SOI confirmed the slick sighting and surmised that the source of the leak was the Cougar pipeline system. The entire Cougar pipeline system was shut down. Field Operations at MMS was notified at 1:40 p.m. by SPLC.

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*Alavarado, Alex, Gerald Daniels, Stephen Leder, Carl Walker. 1991. *Investigation of Shell Offshore Inc. Hobbit Pipeline Leak, Ship Shoal Block 281, January 24, 1990, Gulf of Mexico Offshore Louisiana.* OCS Report MMS 91-0025. Minerals Management Service, Gulf of Mexico OCS Regional Office, New Orleans. 28 p.

At 3 p.m., MMS personnel from the MMS Houma District Office were on location and reported the slick to be 2 miles by 7 miles in size with the sheen scattered and broken.

Following preliminary tests of the systems, SOI had determined that the probable leak location was on the 4-inch Hobbit pipeline between the SS Block 259 Platform JA and the SSTI point with the 12-inch Cougar pipeline.

Cal-Dive International in Morgan City, Louisiana, was contracted to locate and repair the leak. In the early afternoon of January 25, 1990, an inspection of the SSTI by Cal-Dive International revealed that a 2-inch valve on the 4-inch SSTI assembly had been separated from a 4-inch by 4-inch by 2-inch reducing weld-tee. The valve and the parted flange were found on the seafloor approximately 18 inches from the SSTI assembly.

The 4-inch tie-in valve on the Hobbit pipeline was then closed, and the 12-inch Cougar pipeline was tested for leakage. No leakage was observed, and the unaffected portions of the 12-inch Cougar pipeline system were returned to service. The total shut-in time of the 12-inch Cougar pipeline was 29 hours.

The damaged portion of the SSTI assembly was disconnected at the corresponding flanges and brought to the surface for repairs. When the section was brought to the surface, a pink Poly Pig was found tightly wedged in the spool piece. After the Poly Pig was removed, the 2-inch girth weld where the break had occurred was found to be cut out. A two-inch Schedule 80 weld cap was welded to the newly installed outlet on the tee. The new weld was radiographically inspected and found acceptable. The spool piece was reinstalled and leak tested to 400 pounds per square inch (psi) for 40 minutes. The 4-inch Hobbit pipeline was returned to service at 6 p.m. on January 26, 1990.

The leak occurred on the 4-inch Hobbit pipeline where it connects subsea with the 12-inch Cougar pipeline in SS Block 281. (The ROW for the Hobbit pipeline had been granted to SOI on June 3, 1988, under 30 CFR 250 regulations; the pipeline was constructed shortly thereafter.) The flange referenced in the divers' report section was not provided with cover after this accident of January 1990 (see Attachment 3).

Leak Detection System Analysis

The Ship Shoal 259 JA platform leak detection system for the departing condensate pipeline, which ties into the 12-inch Cougar system, consists of an Axelson Type ESP pressure sensor. The pilot consists of a pressure sensing port, a process pneumatic instrument pressure port, and bleed port. A spring in the sensor is adjusted to the low-pressure set point (33 psig in this case) by compressing or releasing tension on the spring until the desired set point is reached. During operation, when the set point is reached, the pneumatic instrument pressure on the process side of the switch is bled off through the bleed port, the pipeline pumps shut down, and a warning light is activated in the control room. To shut off the light, the alarm must be acknowledged by a reset button in the control room. If the pipeline pressure remains below the set point the sensor cannot be reset. Once the pipeline sensor has been reset, the pipeline pumps can be reset and pumping resumed. There are no time delays attached to this sensor circuit.

Once the damage to the pipeline occurred, the pressure in the pipeline would have been approximately 36 psig at SS 259 JA when the pumps were pumping, indicating the sensor would not have tripped at this time. When the pumps were not running, the pressure in the pipeline would have equalized to approximately 6 psig in a matter of minutes from condensate leaking from the damaged section, during which the sensor would have tripped. Since the pumps cycle on for 30 minutes, then off for 60 minutes, the sensor should have tripped. After the incident and subsequent pipeline repair occurred, the sensor was tested for activation by simulating a low-pressure situation in the pipeline by blocking in the pipeline and bleeding off pressure. The sensor did trip in this case and the alarm and shutdown sequence occurred as outlined above.

The following is a list of possible causes of system failure:

1. Debris in the pressure sensing line from the pipeline sensing point to the location of the sensor in the local control panel. Debris could have become lodged in the sensing line, trapping a "false signal" in the sensor line and preventing the sensor line from bleeding down. The sensing line was checked and found to be clean after the incident but the debris could have been dislodged during the check.

2. Debris in the bleed port of the Axelson ESP pressure sensor, which would prevent the instrument supply from bleeding down and activating the shut-down sequence. No debris was found in the port of the device upon inspection.

3. Binding of the Axelson sensor stem, which would prevent the alignment of the bleed port with the instrument supply port. The device had been tested on a monthly basis as regulations require and functioned correctly. The device was also tested subsequent to the incident and operated correctly.

In summary, no clear explanation for the failure of the sensing device to actuate has been found at this time. The set point of the system has not been changed from its original setting, since the investigation has not provided justification to do so. The system was tested after the failure and no debris was found in the piping at the sensing point, the sensing line, or the sensor itself. It should be noted that the condensate that was pumped through this pipeline is very volatile and would not tend to leave much in the way of paraffins or sludge in the piping.

Trawl Net Hang Site Claims

In an attempt to determine whether any commercial fisherman had made a claim for damages, the Fishermen's Contingency Fund was contacted. The coordinator for the program, which is administered by the National Marine Fisheries Service, queried the database and found no claims were made for the location and time-frame in question.

Conclusions

Probable Cause of Damage

The most probable scenario for the cause of the damage to the pipe is that a shrimp boat was trawling north in the vicinity of this SSTI and snagged the bolts on the previously referenced unprotected flange. While attempting to free the net from the hangup, the vessel bent the pipeline several times and partially severed the 4½-inch pipe. Any product that was pumped into this pipeline probably never entered the 12-inch pipeline and was subsequently lost.

Contributing Cause of Damage and Spill

The trawl net getting caught was the result of an exposed spool piece flange that was left uncovered after repairs of the previous incident were completed in January 1990. As for the spill from the pipeline not being detected immediately, this was primarily the result of (low) pressure sensor pilots not being reliable for this type of operation and, secondarily, because of the meter problem confusion at SS Block 208 Platform F.

Probable Volume Spilled

The methodology of using pipeline system loss/gains to determine a probable starting date for the spill is logical and, in this case in conjunction with spill sightings, the most reliable. The use of the NRTR's of SS Block 259 Platform JA is also the best method of determining the amount of the spill since the location of the pipeline break, which is upstream of the tie-in spool check valve, indicates that only production from Platform JA is involved in the spill.

The probable starting date of the spill is November 16, 1994. The choice of an earlier date would be difficult to justify given the substantially lower system loss for

November 15, which is considered to be within the normal deviations for the system. The ending date of the spill is November 22, which is the date Platform JA was shut in.

Using the NRTR's at 0700 hours on November 16 and the closing reading of the run tickets that were pulled at 1330 hours on December 1 for both Platform JA meters, a volume of 4,533 bbls is determined to have passed through those meters during the spill period. Furthermore, since it is not known whether the spill began prior to or after the 0700 hour NRTR's were taken, it is assumed that the spill volume is 4,533 bbl.

SOI, in its spill volume determination, adjusts the above volume by subtracting from it the difference between the Platform JA metered volume for November 16 and the system loss for the same day. This adjustment implies that the spill occurred after 0700 hours on November 16 and that the entire system loss for that day is entirely attributable to the spill. A further implication is that without the spill the loss/gain for the system would have been zero. This is an invalid assumption, given the wide range of values for the daily loss/gains and is, therefore, not adopted. In addition, SOI's volume adjustment through the application of meter factors, BS&W, and temperature correction factors results in the reduction of the spill volume by less than 30 bbl (<1.0%). This adjustment is also not adopted since such a relatively sophisticated and small refinement of the spill volume is negligible when compared to the uncertainties of the assumptions made with respect to the starting time of the spill.

Recommendations

Regulatory Clarification

The MMS should issue regulatory clarification, in the form of an NTL or a Safety Alert, of the requirements of 30 CFR 250.153(a)(2), which specify that valves, taps, tie-ins, and repaired sections of pipe that could be an obstruction should be provided with cover.

More Reliable Leak Detection

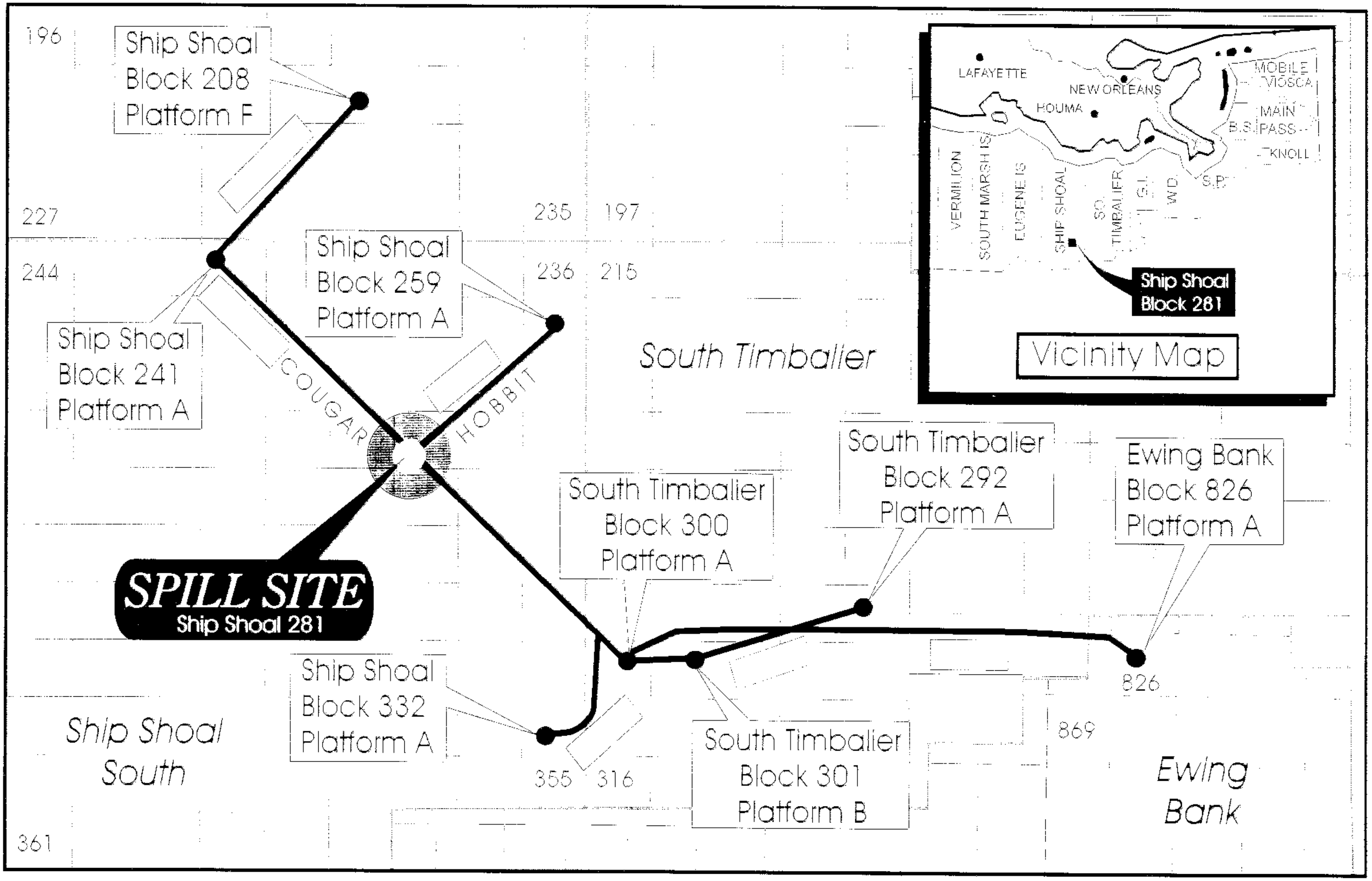
The MMS should form a team to study the necessity of augmenting current pipeline systems that rely on low-pressure pilots and manual volumetric comparison methods for leak detection. These methods should be augmented with alternate, more reliable leak detection systems.

Hang Site Information Reports

The MMS should develop procedures for using hang site report information to identify potential problems that could be associated with pipelines.

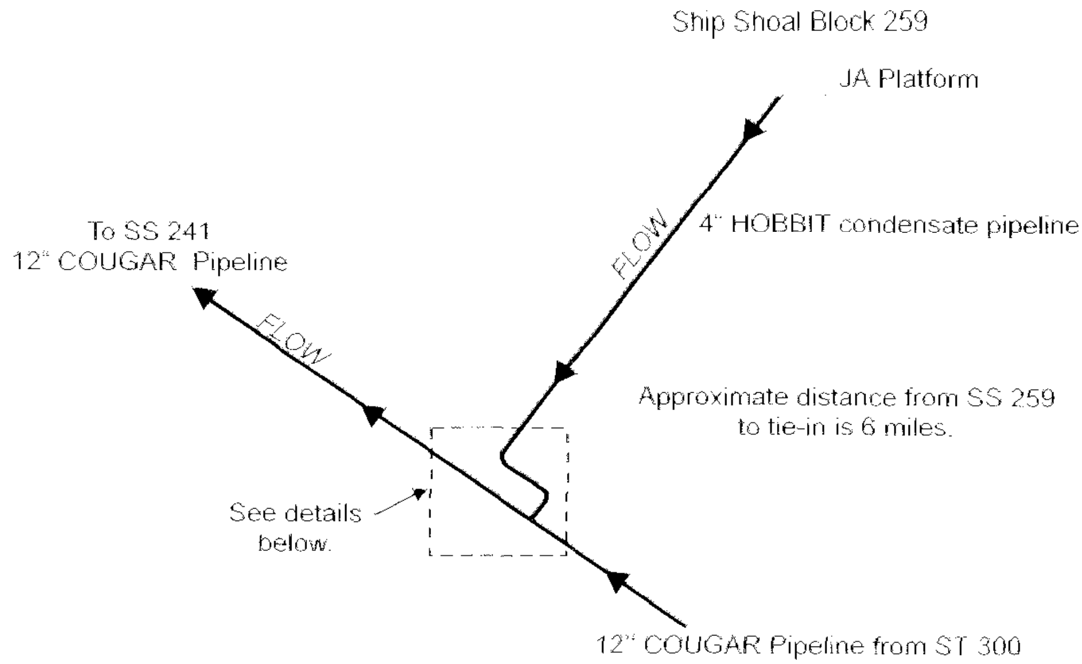
One-Call System

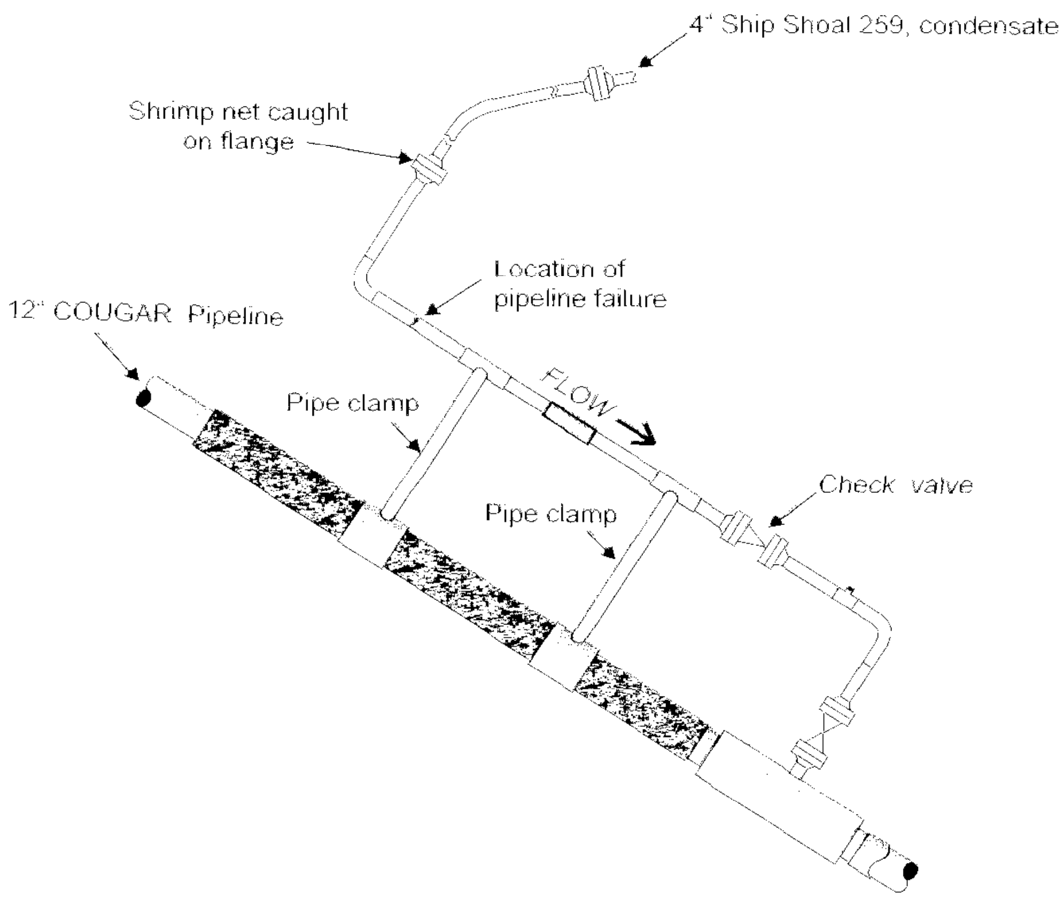
The MMS and DOT should look into forming an industry/Government team to study the feasibility of a one-call system for the marine interest to report hangs or any other problems.



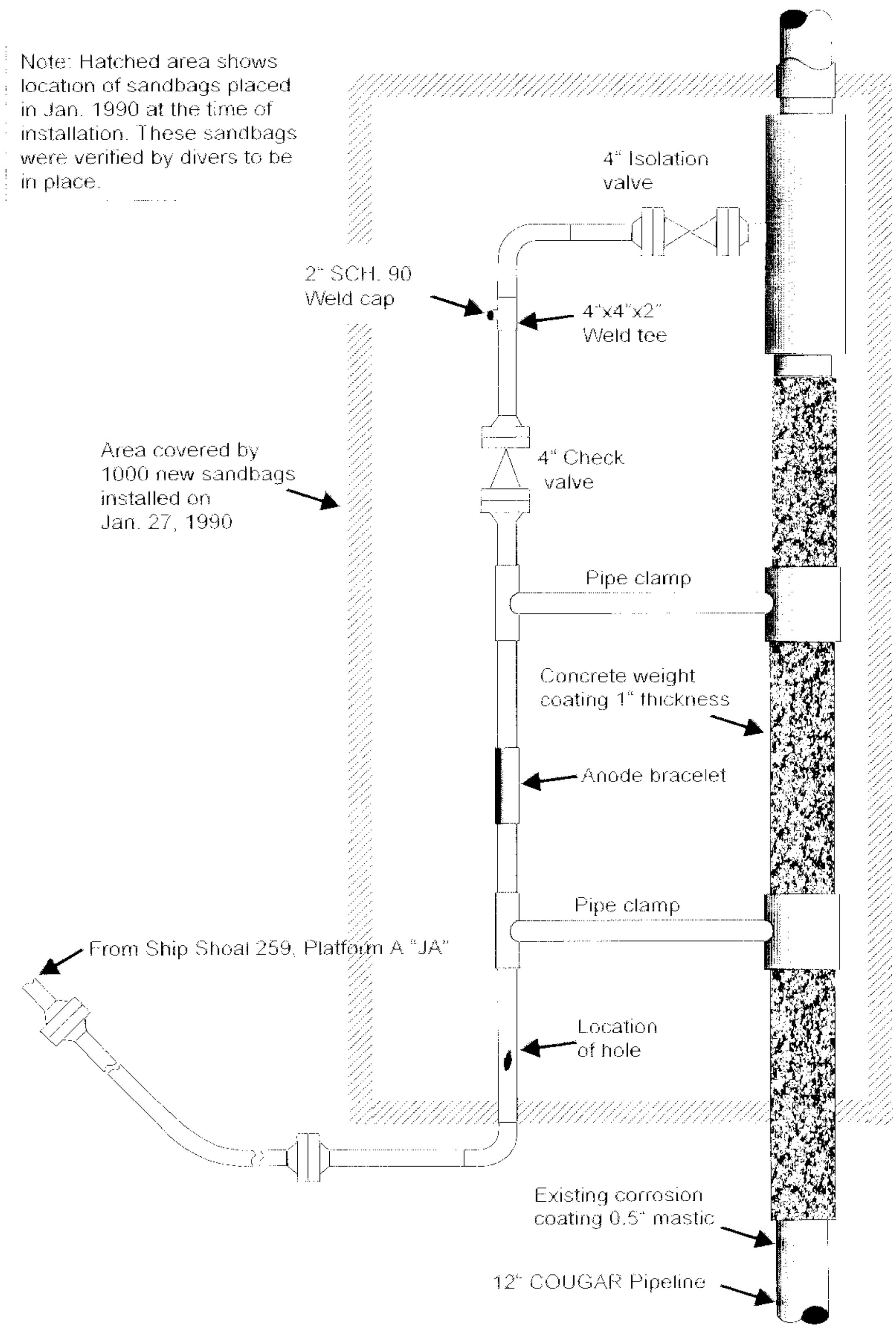
Attachment 1

Cougar pipeline system

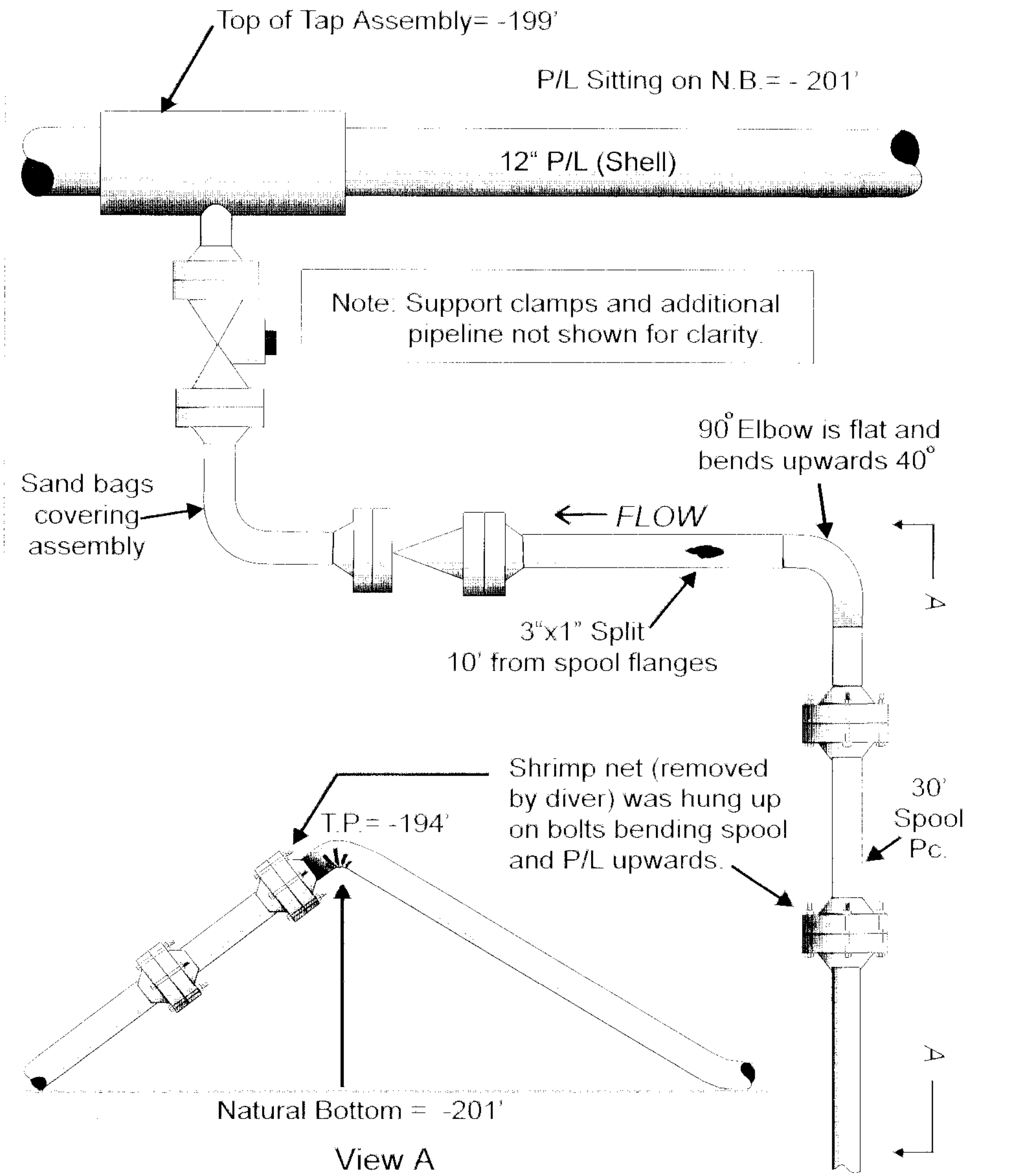




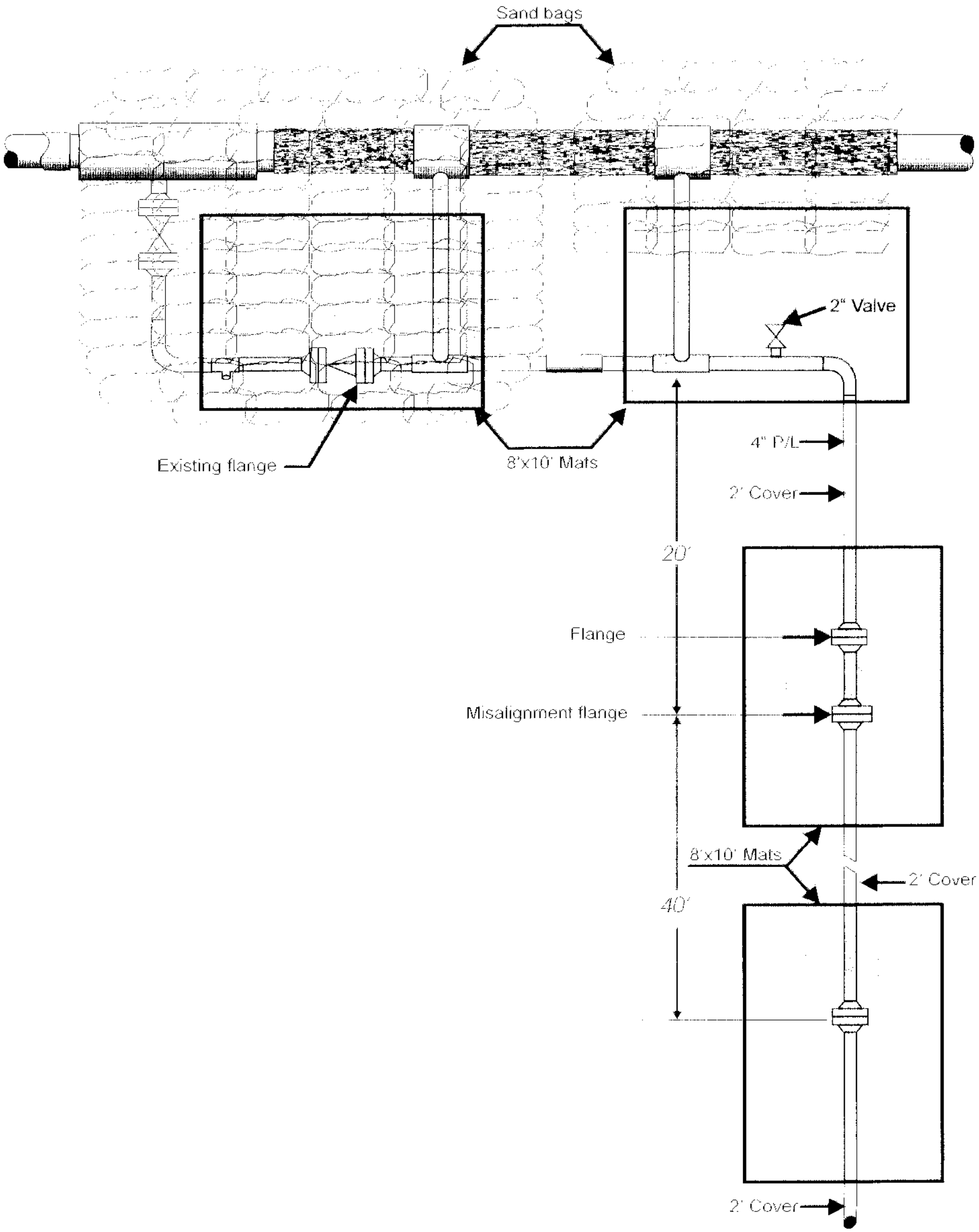
Attachment 2 Hobbit pipeline



Attachment 3 Hobbit subsea tie-in assembly cover prior to incident



Attachment 4 Hobbit damaged subsea tie-in assembly



Attachment 5 Hobbit subsea tie-in assembly cover after incident

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.