OCS Report
MMS 2008-038

Investigation of High Island Pipeline System Rupture
Pipeline Segment No. 4879, Pipeline Right-of-way OCS-G 5150
Galveston Area Block A-5
24 December 2006

Gulf of Mexico
Off the Texas Coast

U.S. Department of the Interior
Minerals Management Service
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New Orleans
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Angie D. Gobert – Chair
Jarvis Outlaw
Craig Pohler

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Executive Summary

On December 23, 2006, the Liberian oil tanker M/T *Petrovsk* arrived at the Galveston Lightering Area in the Gulf of Mexico. The ship was scheduled to perform lightering operations with another vessel, but operations were postponed because of inclement weather. The ship was to remain at anchor until weather conditions improved. During the early morning of December 24, 2006, the ship began dragging its anchor because of high winds. Around 5:00 a.m., in Galveston Block A-5, the anchor dragged across and ruptured Pipeline Segment No. 4879, a 14-inch oil pipeline that is a part of pipeline Right-of-way (ROW) OCS-G 5150, held by BP Pipelines (North America), Inc. (BP). This pipeline transports all of the oil gathered by the High Island Pipeline System (HIPS) from High Island (HI) Block A-474, Platform A (the last offshore gathering point), to an onshore metering facility in Texas City, Texas. At 5:25 a.m., the Texas City metering facility detected a rapid pressure loss in the system, and by 6:30 a.m., all 29 platforms affiliated with the HIPS were shut in. The investigative panel calculates that this pipeline rupture resulted in an oil spill of approximately 870 barrels.

The investigative panel has concluded, on the basis of the report findings, that the primary cause of the incident was human error on the M/T *Petrovsk*. The ship's master did not provide sufficiently clear and detailed instructions about the weather and the nearby pipeline to the officers on watch in the Night Order Book on the evening of December 23, 2006. For unknown reasons, the 12:00 a.m. to 4:00 a.m. watch did not detect that the ship had begun to drift off location and did not respond to the sounded alarm. After the drift was discovered, the 4:00 a.m. to 8:00 a.m. watch did not adequately monitor the radar, which showed that the vessel was continuing to drift, and claimed that he did not see that the pipeline was shown on the navigation chart.

It is also the conclusion of the panel that the oil spill resulting from this incident was worsened by human error. The required boarding shutdown valves on HI Block A-474, Platform A, for incoming Pipeline Segments Nos. 4885 and 4886 were bypassed and not connected to the high- and low-pressure sensors on departing Pipeline Segment No. 4879. The low-pressure sensor to activate the shutdown valve on the platform for departing Pipeline Segment No. 4879 was set at 40 pounds per square inch gauge (psig), a pressure

too low to detect a leak for at least 25 minutes after the incident began. Furthermore, the shutdown valve on this departing pipeline did not close, even after the pressure bled to less than 40 psig, indicating a defective shutdown valve or low-pressure sensor. In addition, the HIPS Pipeline Operator chose not activate the emergency shutdown remotely by using the Supervisory Control and Data Acquisition (SCADA) system. The panel estimates that providing required safety devices or activating the emergency shutdown could have reduced the amount of oil released into the environment between 486 and 503 barrels.

Introduction

Authority

On December 24, 2006, a liquid hydrocarbon spill of approximately 870 barrels occurred in Galveston Block A-5 in the Gulf of Mexico. *(See Attachment 1.)* The spill resulted from a rupture of a 14-inch oil pipeline, Segment No. 4879, a part of pipeline ROW OCS-G 5150, held by BP Pipelines (North America), Inc. Pursuant to 43 U.S.C. 1348(d)(1) and (2) and (f), Outer Continental Shelf (OCS) Lands Act, as amended, and Department of the Interior (DOI) regulations, 30 CFR part 250, Minerals Management Service (MMS) is required to investigate and prepare a public report of this accident. By memorandum dated January 16, 2007, the following personnel were named to the investigative panel:

Angie D. Gobert, Chairperson – Pipeline Section, Field Operations, Gulf of Mexico OCS Region

Craig Pohler – Lake Jackson District, Field Operations, Gulf of Mexico OCS Region

Jarvis Outlaw – Lake Jackson District, Field Operations, Gulf of Mexico OCS Region

The panel members conferred numerous times throughout the investigation to conduct interviews, review the facts of the incident, draw necessary conclusions, and prepare this report.

Under Section C.6 of the Memorandum of Agreement (MOA) between MMS and the United States Coast Guard (USCG), effective September 30, 2004, MMS has lead investigative responsibility with supporting participation by the USCG for incidents involving OCS pipelines. For this investigation, Lieutenant Jerry Butwid, Senior Investigating Officer, Marine Safety Unit in Galveston, Texas, represented the USCG as the participating agency. In that capacity, he gathered evidence, conducted interviews, developed a timeline, and filed a report.

Background

High Island Pipeline System.

The High Island Pipeline System is an offshore crude gathering and onshore delivery system for transporting crude oil from offshore production platforms to a metering facility in Texas City, Texas. The offshore portion of the HIPS receives crude from multiple platforms in the High Island (HI), East Breaks (EB), Galveston (GA), Garden Banks (GB), and West Cameron (WC) areas of the Gulf of Mexico. The crude oil is transported to Texas City via 29 pipeline segments with a cumulative length of 352.8 miles. *(See Attachment 2.)* The offshore portion of the pipeline ends at the Eight Mile Block Valve on Galveston Island. The onshore portion of HIPS consists of approximately 11.9 miles of pipeline located in Galveston County, originating near Eight Mile Road on Galveston Island and terminating at the metering facilities in Texas City. *(See Attachment 3.)* Nineteen of the pipeline segments in HIPS are associated with Pipeline ROW OCS-G 5150, permitted on February 24, 1978. Minerals Management Service records indicated that BP Pipelines (North America), Inc. was the holder of Pipeline ROW OCS-G 5150. On June 13, 2006, BP notified MMS that effective July 1, 2006, the operatorship for HIPS would transfer from BP to Plains Pipeline, LP (Plains). *(See Attachment 4.)* However, as of December 24, 2006, MMS had not received or approved any assignment to transfer holdership of Pipeline ROW OCS-G 5150 from BP to Plains. But, on June 1, 2007, MMS received an assignment application from Plains Pipeline, L.P. requesting that MMS approve an assignment of pipeline ROW OCS-G 5150 from BP to Plains retroactively effective July 1, 2006. MMS approved this assignment application on December 17, 2007. At the time of the incident, Plains personnel were operating the ROW pipelines associated with Pipeline ROW grant OCS-G 5150. Eight of the pipelines in HIPS are associated with individual pipeline ROW's and various pipeline ROW holders. As holder of these pipeline ROW grants, holders must comply with applicable laws and regulations and the terms of the grant, including compliance with equipment testing and maintenance requirements. The remaining two are lease term pipelines.

Pipeline Segment No. 4879.

The last offshore gathering point for the platforms and pipelines that make up HIPS is HI Block A-474, Platform A. *(See Attachment 5.)* At the time of the incident, the platform was operated by Newfield Exploration Company under lease OCS-G 2366. It is located 91 miles from Texas City. Pipeline Segment No. 4879, which originates at the A platform, transports all of the HIPS crude oil to shore. It was installed in 1978 and is 14 inches in diameter. It traverses several OCS blocks before it crosses the State-Federal boundary in Galveston Block 214, a total length of 300,064 feet (56.83 miles). The average flow rate in this pipeline was determined to be approximately 1,040 barrels per hour. Normal operating pressure is 325 pounds per square inch (psi). The assigned maximum allowable operating pressure (MAOP) is 1,618 psi. This pipeline is under the jurisdiction of the Department of Transportation (DOT).

Pipelines That Deliver to Pipeline Segment No. 4879.

1. *High Island Pipeline System Segments located upstream of HI Block A-474 Platform A.* The following information describes the two pipeline systems and structures that form the part of HIPS located upstream of HI Block A-474, Platform A. These two pipeline systems consist of pipelines and structures that feed directly into the impacted Pipeline Segment No. 4879 at HI Block A-474, Platform A. The descriptions below apply only to those pipelines that are protected by the safety systems on their immediate upstream structure input sources. These systems are of particular concern in this incident because they have no safety systems protecting them downstream, nor could they be isolated from the break in Pipeline Segment No. 4879, except by the safety system located at HI Block A-474, Platform A.

A. *Pipeline Segment No. 4885 and associated pipeline.* Pipeline Segment No. 4885 is one of the two pipeline segments in HIPS that board HI Block A-474, Platform A. It originates at HI Block A-536, Platform C. In addition, Pipeline Segment No. 4877, which originates at HI Block A-563, Platform B, ties into Pipeline Segment No. 4885 subsea in HI Block A-537, at a point downstream of Platform C.

B. *Pipeline Segment No. 4886 and associated pipelines.* The other pipeline segment in HIPS that boards HI Block A-474, Platform A, is Pipeline Segment No. 4886. It originates at a subsea tie-in in HI Block A-546 at the junction of the following pipeline segments:

(1) Pipeline Segment No. 4882, which originates at HI Block A-334, Platform B (Pipeline Segment No. 4878, which originates at HI Block A-340, Platform A, ties into Pipeline Segment No. 4882 subsea in HI Block A-340, downstream of HI Block A-334, Platform B, at a point just downstream of HI Block A-340, Platform A);

(2) Pipeline Segment No. 4883, which originates at a subsea tie-in in HI Block A-547 at the junction at the terminating ends of Pipeline Segment No. 4884 (which originates at HI Block A-573, Platform B) and Pipeline Segment No. 5876 (which originates at HI Block A-571, Platform A);

(3) Pipeline Segment No. 6870, which originates at HI Block A-376, Platform A. The following pipeline segments tie in directly or indirectly to Pipeline Segment No. 6870:

(a) Pipeline Segment No. 9412, which originates at GB Block 189, Platform A, ties into Pipeline Segment No. 6870 subsea in HI Block A-377 at a point downstream of HI Block A-376, Platform A; and

(b) Pipeline Segment No. 13923, which originates at WC Block 661, Platform A, ties directly into Pipeline Segment No. 9412 in GB Block 189 (tying indirectly into Pipeline Segment No. 6870), at a point just downstream of GB Block 189, Platform A.

(4) Pipeline Segment No. 10252, which originates at HI Block A-379, Platform A.

The following pipelines tie in downstream of the originating point of Pipeline Segment No. 4886:

(1) Pipeline Segment No. 9473, which originates at HI Block A-523, Platform A, ties into Pipeline Segment No. 4886 subsea in HI Block A-518; and

(2) Pipeline Segment No. 5811, which originates at HI Block A-443, Platform A, ties into Pipeline Segment No. 4886 subsea in HI Block A-474. Two pipeline segments tie into Pipeline Segment No. 5811 in HI Block A-465, downstream of HI Block A-443, Platform A. They are Pipeline Segment No. 6114, which originates at HI Block A-446, Platform A, and Pipeline Segment No. 7357, which originates at HI Block A-472, Platform A.

2. *High Island Pipeline System segments located downstream of HI Block A-474, Platform A.* The following information describes the three pipeline segments that are located downstream of HI A-474, Platform A. These pipelines tie in subsea to Pipeline Segment No. 4879 and are protected by safety devices at their originating structures.

A. *Pipeline Segment No. 8253,* which originates at EB Block 165, Platform A, and terminates at a subsea tie-in with Pipeline Segment No. 4879 in HI Block A-474.

B. *Pipeline Segment No. 11038,* which originates at GA Block 209, Platform A, and terminates at a subsea tie-in with Pipeline Segment No. 4879 in GA Block 256.

C. *Pipeline Segment No. 11479,* which originates at GA Block 255, Platform A, and terminates at a subsea tie-in with Pipeline Segment No. 4879 in GA Block 256.

Platforms Affiliated with HIPS.

Those platforms with departing pipelines that deliver directly to Pipeline Segments Nos. 4885, 4886, and 4879 are listed in *Attachment 6*.

Safety System Requirements.

Safety system requirements for offshore pipelines are covered in corresponding DOI and DOT regulations. These regulations have provisions to ensure that pipelines are constructed, operated, maintained, and decommissioned to provide safe and pollution-free transportation of fluids.

- In accordance with 30 CFR 250.1004(b)(1)(i), all incoming pipelines to a platform shall be equipped with a flow safety valve (FSV).

- In accordance with 30 CFR 250.1004(b)(2), incoming pipelines boarding a production platform shall be equipped with an automatic shutdown valve (SDV) immediately upon boarding the platform. The SDV shall be connected to the automatic- and remote-emergency shut-in systems.

- In accordance with 30 CFR 250.1004(b)(3), departing pipelines receiving production from production facilities shall be protected by high- and low-pressure sensors (PSHL) to directly or indirectly shut in all production facilities. The PSHL shall be set not to exceed 15 percent above and below the normal operating pressure range. However, high pilots shall not be set above the pipeline's MAOP.

- In accordance with 30 CFR 250.1004(b)(4), crossing pipelines on production or manned nonproduction platforms that do not receive production from the platform shall be equipped with an SDV immediately upon boarding the platform. The SDV shall be operated by a PSHL on the departing pipelines and connected to the platform automatic- and remote-emergency shut in systems.

- In accordance with 30 CFR 250.1004(b)(9), pipeline pumps must comply with Section A7 of API RP 14C. The following requirements are included in this document:

    1. Pressure Safety High (PSH) and Pressure Safety Low (PSL) sensors are provided on all hydrocarbon pump discharge lines upstream of the FSV or any block valve to shut off inflow and shut down the pump. The PSHL shall be set not to exceed 15 percent above and below the normal operating pressure range, but the PSH sensors shall not be set above the pipeline's MAOP.

2. A pressure safety valve (PSV) is provided on all pump discharge lines unless the pump is incapable of generating a head greater than the MAOP of the discharge piping.

3. A check valve (FSV) is provided on the pump discharge line to minimize backflow.

- In accordance with 49 CFR 195.260(c), a valve must be installed on each mainline at locations along the pipeline system that will minimize damage or pollution from accidental hazardous liquid discharges, as appropriate, for offshore areas.

- In accordance with 49 CFR 195.401(b), whenever an operator discovers any condition that could adversely affect the safe operation of its pipeline system, the operator shall correct it within a reasonable time.

- In accordance with 49 CFR 195.402(a), each operator shall prepare and follow for each pipeline system a manual of written procedures for conducting normal operations and maintenance activities and handling abnormal operations and emergencies.

- In accordance with 49 CFR 195.402(e)(4), the required manual must include procedures to provide safety when an emergency condition occurs, including taking necessary action, such as emergency shutdown or pressure reduction, to minimize the volume of hazardous liquid released from any section of the pipeline system in the event of a failure.

- In addition, Executive Order No. 12777 states that “The functions vested in the President by Section 311(j)(1)(C) of FWPCA, respecting the establishment of procedures, methods, and equipment and other requirements for equipment to prevent and to contain discharges of oil and hazardous substances from offshore facilities, including associated pipelines, other than deepwater ports subject to the DPA, are delegated to the Secretary of the Interior.”

High Island Block A-474, Platform A.

High Island Block A-474, Platform A, is an eight-pile, two-decked, fixed production platform that was installed January 1, 1976. It is located in a water depth of 173 feet. Eighty miles from shore, it is located on Lease OCS-G 02366. At the time of this incident, it was operated by Newfield Exploration Company. In December 2006, there were no wells producing because of hurricane damage.

Pipeline Segments Nos. 4885 and 4886 are each equipped with a boarding SDV and a PSH, which are connected to a pipeline emergency shutdown system (ESD), and an FSV. Pipeline Segment No. 4879 is equipped with an SDV and a PSHL which are connected to a pipeline ESD. The ESD's for these pipelines are connected to a SCADA system and can be operated remotely from the Texas City metering facility. *(See Attachment 7.)*

Other Platforms.

All pipelines that depart the platforms associated with HIPS are required to be protected by PSHL's that shut in directly or indirectly the input source(s). Additionally, the pipelines are equipped with SDV's that are connected to a SCADA system and can be remotely operated by the Texas City metering facility. *(See Attachment 6.)*

Findings

Chronology of Events.

1. *December 23, 2006.* At 7:30 a.m., the M/T *Petrovsk* arrives at the Galveston Lightering Zone. The starboard anchor of the tanker is dropped at 28° 48.0' N, 94° 31.8' W and determined to be holding. The ship is scheduled to perform lightering operations with another vessel, but operations are postponed because of inclement weather. The ship is to remain at anchor until weather conditions improve. An Electronic Chart Display and Information System (ECDIS) fix determines that the nearest pipeline is approximately 2.5 nautical miles (nm) from the anchor position. (V. Dikhnov, Ship Master's statement).

2. *December 23, 2006.* At 11:30 p.m., the Ship Master writes orders in the Night Order Book for the Officer of the Watch (OOW) to call him if winds rise to 20 meters per second (approximately Force 8 on the Beaufort wind scale; i.e., gale force winds appearing on water resulting in waves of 13 to 20 feet); or at any case when it will be necessary. (Master's statement).

3. *December 24, 2006.* Between 12:00 a.m. and 4:00 a.m., the wind is Force 7/8 on the Beaufort wind scale, and the vessel begins to drift in a southwesterly direction. *(See Attachment 8.)* (Master's statement).

4. *December 24, 2006.* Between 12:00 a.m. and 4:00 a.m., no call was made by the OOW to the Master, as directed by the Night Order Book. (Second Officer's statement).

5. *December 24, 2006.* At 4:00 a.m., the relieving bridge watch (V. Brekhov, Second Officer) acknowledges that the wind has risen to Force 7/8 on the Beaufort wind scale and determines that the ship has drifted approximately 0.8 nm. He calls the Master to report the drifting of the ship caused by the high winds. The Master gives the order to monitor the anchor dragging within "permissible limits." (OOW between 4:00 a.m. and 8:00 a.m.) (Second Officer's statement).

6. *December 24, 2006.* At 4:00 a.m., the ship Master gives the order to the Second Officer to monitor the vessel's drift until morning time, taking into account that the wind

force should be lower in the morning and the pipeline is located approximately 1.7 nm away. (Master's statement).

7. *December 24, 2006*. At 4:20 a.m., the Second Officer switches off the ECDIS for Electronic Navigation Control (ENC) update, and the anchor watch alarm is switched off. The ship's position is determined now by radar. (Master's statement and OOW between 4:00 a.m. and 8:00 a.m.) (Second Officer's statement).

8. *December 24, 2006*. At 5:00 a.m., according to a radar fix, the location of the vessel is 28° 46.8' N, 94° 34.3 W. (Bell Book).

9. *December 24, 2006*. Prior to 5:25 a.m., the Galveston Block 209, Platform A, ESD valve and pressure alarm sounds at the HIPS Texas City metering facility. (HIPS Pipeline Control Operator No. 1).

10. *December 24, 2006*. At 5:25 a.m., Texas City detects a rapid pressure drop from 171.9 psig at 5:24 a.m. to 0.15 psig at 5:25 a.m. in Pipeline Segment No. 4879. (Time/Flow-rate/Pressure Chart).

11. *December 24, 2006.* Shortly after 5:25 a.m., the Galveston Block 255, Platform A, ESD valve and pressure alarm sounds at Texas City. (HIPS Pipeline Control Operator No. 1).

12. *December 24, 2006*. At 5:30 a.m., Texas City attempts to re-establish pressure and flow on the pipeline by closing the main incoming valve at Texas City. When that was unsuccessful, it begins calling the platforms associated with HIPS to inform them of the pressure loss and to shut in. (HIPS Pipeline Control Operator No. 1).

13. *December 24, 2006*. At 6:00 a.m., the ECDIS is still switched off, but a radar fix is taken. Location of vessel is 28° 46.7' N, 94° 34.7 W. (Bell Book).

14. *December 24, 2006*. By 6:30 a.m., all of the platforms associated with HIPS are shut in. (HIPS Pipeline Control Operators).

15. *December 24, 2006.* At 6:53 a.m., the ECDIS is switched on. (Master's statement).

16. *December 24, 2006.* At 7:00 a.m., a radar fix is taken. Location of vessel is 28° 46.6' N, 94° 34.2 W. Vessel continues to drag anchor. (Bell Book).

17. *December 24, 2006.* At 7:20 a.m., the vessel drift stops. *(See Attachment 8.)* (Master's and Second Officer's statements).

18. *December 24, 2006.* At 8:00 a.m., the ship's Master returns to the bridge and realizes that the ship has drifted across the pipeline location. (Master's statement).

19. *December 24, 2006.* At 8:30 a.m., heaving up the anchor commences. (Bell Book).

20. *December 24, 2006.* At 9:09 a.m., the main engines come on line, and the anchor is heaved up and clears the water's surface at 28° 46.5' N, 94° 35.3 W. (Bell Book).

21. *December 24, 2006.* At 9:15 a.m., the crew observes an oil slick 0.9 nm ahead of the vessel. *(See Attachment 9.)* The Master estimates that the ship crossed the area of the pipeline at about 5:00 a.m. at 28° 46.8' N, 94° 34.2 W. (Bell Book and Master's statement).

22. *December 24, 2006.* At 11:40 a.m., the National Response Center (NRC) is notified. (NRC report).

23. *December 24, 2006.* At 4:38 p.m., the Minerals Management Service Lake Jackson District is notified of the incident. (District Engineer).

24. *December 27, 2006.* At 7:30 a.m., two fast response units (FRU's) and two skimming vessels are on the scene. (Unified Command Center information – Lake Jackson OPA Engineer).

25. *December 27, 2006.* At 5:00 p.m., a Mesotech reading confirms that the pipeline is severed in two. *(See Attachment 10.)*

26. *December 27, 2006.* At 11:20 p.m., divers secure the Texas City end of the pipeline with an inflatable buoy. (Unified Command Center information – Lake Jackson OPA Engineer).

27. *December 28, 2006.* At 12:50 p.m., skimming is discontinued because of inclement weather. (Unified Command Center information – Lake Jackson OPA Engineer).

28. *December 31, 2006.* At 6:15 a.m., divers secure the HI Block A-474, Platform A, end of the pipeline with an inflatable buoy. Isolation of both severed ends of Pipeline Segment No. 4879 is now complete. (Unified Command Center information – Lake Jackson OPA Engineer).

Vessel Activity.

At 7:30 a.m. on December 23, 2006, the M/T *Petrovsk,* an oil tanker, 231 feet in length with 23 crewmembers, arrived at the Galveston Lightering Zone in HI Block A-88. The ship is registered in Liberia and owned by Romantic Navigation, Inc. The starboard anchor of the ship was dropped and determined to be holding. The ship was scheduled to perform lightering operations with another vessel, but operations were postponed because of inclement weather. The ship was to remain at anchor until weather conditions improved. An ECDIS fix determined that the nearest pipeline was approximately 2.5 nm from the anchor position.

Prior to 11:30 p.m. on December 23, 2006, the ship's Master wrote an order into the Night Order Book, which is to be followed by the OOW. This written order directed the OOW to call the Master if the wind force reached up to 20 meters per second (around Force 8 on the Beaufort wind scale), or at any case if it was necessary.

Sometime after 3:00 a.m. on the morning of December 24, 2006, the ECDIS alarm sounded, indicating that the ship was drifting. It is noted by the Master of the ship that the OOW did not react to this alarm.

At 4:00 a.m. on December 24, 2006, the relieving bridge watch (Second Officer) determined that the ship had drifted 0.8 nm and notified the ship's Master. The Master stated that he gave the order only to monitor the vessel's drift until morning since the distance to the pipeline was 1.7 nm and the weather forecast was for the winds to die down.

At 4:20 a.m., the ECDIS was switched off for an ENC update, but radar fixes taken at 5:00 a.m., 6:00 a.m., and 7:00 a.m. showed that the vessel continued to drag the anchor. At 6:53 a.m., the ECDIS was switched back on. At 7:20 a.m., the drift stopped in Galveston Block A-5. At 8:00 a.m., the Master returned to the bridge and determined that the ship had drifted a total of 3.0 nm, and that the vessel had crossed the pipeline area.

The OOW (4:00 a.m. to 8:00 a.m.) stated that he had continued to monitor the vessel's drift but regretted that he did not observe the underwater pipe, even though it is shown on their British Admiralty Navigational Chart and the ENC.

At 9:15 a.m., the crew observed an oil slick 0.9 nm ahead of the vessel. The Master later estimated that the ship crossed the area of the pipeline about 5:00 a.m. Sometime later the Master performed an alcohol test on all officers on watch during the time the vessel was drifting. He reported that the test results for all individuals were negative.

U.S. Coast Guard Report.

As the participating agency, the USCG completed its report (Form CG 2692) and submitted it to MMS on February 14, 2007. In addition, the USCG provided statements from the crew of M/T *Petrovsk*, copies of the ship's logbook (Bell Book), a copy of the navigation chart the vessel was using, and a timeline of the incident. This information provides evidence that while the vessel was drifting and the anchor was dragging, Pipeline Segment No. 4879 was severed, unbeknownst to the ship's crew.

Activity Subsequent to the Incident.

Shortly prior to 5:25 a.m. on December 24, 2006, the ESD valve and pressure alarm for Galveston Block 209, Platform A, sounded at the HIPS Texas City metering facility. At

5:25 a.m. on December 24, 2006, the HIPS Texas City metering facility detected a rapid pressure drop in Pipeline Segment No. 4879. During the one-minute interval between 5:24 a.m. and 5:25 a.m. the pressure had dropped from 172.9 psig to 0.15 psig. Shortly after 5:25 a.m., the ESD valve and pressure alarm for Galveston Block 255, Platform A, sounded at the HIPS Texas City metering facility. At about 5:27 a.m., the first HIPS pipeline operator (No. 1) attempted to re-establish pressure and flow for Pipeline Segment No. 4879 by closing the main incoming valve at Texas City. However, this was unsuccessful. At about 5:28 a.m., a second HIPS pipeline operator (No. 2) arrived on scene. After a few minutes of assessing the situation, the HIPS pipeline operators determined that there was probably a leak but were not sure where it was, although HIPS Pipeline Operator No. 2 thought it was probably on Pipeline Segment No. 4879.

At that time, HIPS Pipeline Operator No. 2 began using the SCADA system to close the ESD valves remotely on the remaining platforms associated with the HIPS. However, poor weather conditions (reported wind gusts of up to 65 miles per hour and 20- to 25-foot seas) were causing widespread satellite communication outages. This made it impossible to determine if the platform was receiving the signal to close, or if the ESD valve did in fact close. Therefore, HIPS Pipeline Operator No. 1 began contacting the platforms by telephone to inform them of the pressure loss and to cease pumping.

High Island Pipeline System Pipeline Operator No. 2 stated that his "rule of thumb" for responding to leaks is to get the platforms down, starting with the biggest producers. He estimated that there were only eight to ten platforms pumping at the time of the incident. Those platforms (including GB Block 189, Platform A, and WC Block 661, Platform A, because of their proximity to the Flower Garden Banks) were contacted first. Later, the platforms not pumping at the time of the incident were contacted to ensure that they did not start. He estimated that all platforms (either remotely by the SCADA system, activation of PSL's, or manually) were shut in by 6:30 a.m. *(See Attachment 11.)*

High Island Block A-474, Platform A, was not shut in during this time either remotely by the SCADA system or by activation of the PSL. The required boarding SDV's for Pipeline Segments Nos. 4885 and 4886 were bypassed. Flow from these segments was

diverted using alternate piping through pig traps, neither of which were equipped with an SDV nor connected to the platform automatic and remote-emergency shut-in systems. As it departed the platform, Pipeline Segment No. 4879 was protected by a PSHL connected to an SDV, but the PSL sensor setting was 40 psig. Since the normal operating pressure range was 150 psig to 780 psig, the PSL sensor should have been set no lower than 128 psig (no more than 15 percent below the lower limit of the operating pressure range). (Note: At the time of the incident, the operating pressure was 325 psig.) It is likely that the pipeline pressure at the platform was much higher than 40 psig for at least 25 minutes following the incident. HIPS Pipeline Operator No. 2 stated that at 5:50 a.m. the pressure at HI Block A-474, Platform A, was recorded to be 38.25 psig, and minutes later it was even lower. Apparently this SDV never did close, even after the pressure bled down below 40 psig, since the HIPS Texas City metering facility never received an alarm. This could indicate a malfunctioning sensor or valve. According to the HIPS Team Leader and the testing procedures prescribed by API RP 14C, this safety equipment was tested monthly.

Nevertheless, HIPS Pipeline Operator No. 2 stated that he did not believe that closing the ESD valve in the middle of the system was the prudent way to shut in the system when the location of the leak was not certain. He was concerned that once the valve closes it cannot be re-opened remotely. If that valve remained closed, the incident could have been aggravated in a scenario where the leak was on either Pipeline Segments No. 4885 or 4886, and its boarding FSV would not hold.

Damaged Pipe Findings.

The impact area of the incident is located 42.5 miles from HI Block A-474, Platform A, and 36.7 miles from the shoreline. The water depth at the site of the incident is 75 feet.

The divers found that the pipeline was buried three feet. They identified that 155 feet of pipe would need to be replaced and observed that the pipeline concrete weight coating in the area of the anchor drag was damaged. According to the Exposed Pipe Inspection Report, the divers were unable to inspect the inside of the pipe visually for internal corrosion beyond two feet.

Damaged sections of the pipeline were recovered and brought to shore for analysis and inspection. Photographs were taken and some of them are attached. *(See Attachments 12 through 16.)*

Spill Volume Determination.

1. *Minerals Management Service Estimate.* The total line fill for the system is 156,673 barrels. The compression factor for crude oil at 35.2° API gravity at 325 psig (the estimated pressure at HI Block A-474, Platform A, when the break occurred) is 1.0017, which gives a compressed volume of 156,939 barrels. Therefore, the volume of oil that was released because of decompression was 266 barrels.

The average flow at the Texas City metering facility for the 7-day period preceding the break was 1,040 barrels per hour. It took approximately 65 minutes to shut in all production from the various input sources that ultimately feed into impacted Pipeline Segment No. 4879. It is estimated that the average time it took to isolate the input sources from the leak for all the HIPS platforms was 30 minutes. Therefore, it is projected that 520 barrels of oil were released because of the volume of flow from High Island Block A-474, Platform A.

The estimated leakage rate, before both ends of Pipeline Segment No. 4879 were isolated, was approximately 0.5 barrels per hour. Since it took about 168 hours to accomplish this, it is estimated that approximately 84 barrels of oil were released before the ends at the breach were completely sealed.

Therefore, the total estimated volume of oil released is 870 barrels (266 + 520 + 84).

2. *High Island Pipeline System Texas City Metering Facility Pipeline Operator Estimate.* Using volumetric meter readings at the Texas City metering facility and losses caused by compression, HIPS Pipeline Operator No. 2 estimated a shortfall of 1,062 barrels. Using a compression factor of 1.0017, he estimated the compressed volume of oil in the pipeline was 303 barrels. Therefore, he estimated that the total volume of oil released was 1,365 barrels (1,062 + 303).

In another exercise, he subtracted the total production of the morning of December 24, 2006 (23,819 barrels) from the metered average for the previous three days (24,937 barrels). This left a shortfall of 1,118 barrels of oil. In this estimate, the total volume of oil released was 1,421 barrels (1,118 + 303).

Safety System Performance.

The High Island Block A-474, Platform A, ESD's are not connected to the pipeline safety systems for Pipeline Segments Nos. 4885, 4886, and 4879. These pipeline safety systems are connected to independent pipeline ESD's and to the SCADA system and can be operated remotely by the Texas City metering facility.

The required safety systems for platform production operations are separate from and independent of the safety systems for Pipeline Segments Nos. 4885 and 4886. This configuration does not comply with MMS requirements.

At the time of the incident, the SDV's for Pipeline Segments Nos. 4885 and 4886 were in a closed position diverting the flow of the product through the pig trap, thereby not providing automatic emergency shutdown protection. During interviews, the HIPS Pipeline Operators' Supervisor and one of the HIPS Pipeline Operators indicated that this diversion of flow, bypassing the SDV's, had been in place for many years. They stated it was configured that way because the pipelines were pigged frequently. Furthermore, the SDV's were not connected to the PSHL on the departing Pipeline Segment No. 4879, a violation of MMS regulations at 30 CFR 250.1004(b)(2) and DOT regulations at 49 CFR 195.260(c).

Although it is not required, both incoming Pipeline Segments Nos. 4885 and 4886 have a PSH installed to protect the system from abnormal high pressure conditions. These would not have functioned during this incident since a pressure loss would have been experienced rather than a pressure increase.

Although it is not required, Pipeline Segment No. 4879 is equipped with an SDV connected to a PSHL and an ESD that can be operated remotely from the Texas City

metering facility. However, the PSL setting of 40 psig was far below the lower limit of the normal operating range (150 psig).

According to HIPS Pipeline Operator No. 2, he chose not to shut in Pipeline Segment No. 4879 remotely, and he also remarked that he did not believe that the ESD would have actuated a shut in. Therefore, the performance of the ESD at the time of this incident can not be determined by this panel investigation.

According to HIPS Pipeline Operator No. 2, only 10 to 12 platforms were pumping oil into HIPS at the time of the incident. This is generally confirmed by the offshore reports received from the various platform operators interviewed by the investigative panel. *(See Attachment 11.)* This also indicates that the PSL's located on the input sources of the associated pipelines, while they may not have responded as quickly as they could have (possibly affected by the pipeline pump PSL settings), they did indeed perform.

Conclusions

Cause

The primary cause of the incident was human error on the M/T *Petrovsk*. The Master did not leave sufficiently clear and detailed instructions about the weather and the nearby pipeline. The 12:00 a.m. to 4:00 a.m. OOW did not detect that the ship had begun to drift off location and ignored an ECDIS alarm. After the drift was discovered, the 4:00 a.m. to 8:00 a.m. OOW turned off the ECDIS and did not adequately monitor the radar, which showed that the vessel was continuing to drift. He claimed that he did not observe that the pipeline was shown on the navigation chart. The pipeline break and the resulting oil spill were caused by the ship's anchor that dragged across the pipeline.

Contributing Cause of Increased Oil Release.

The oil spill resulting from this incident was worsened by human error. The required boarding SDV's on HI Block A-474, Platform A, for Pipeline Segments Nos. 4885 and 4486 were bypassed and not connected to PSHL's on Pipeline Segment No. 4879. The PSL to activate the SDV for Pipeline Segment No. 4879 was set at 40 psig, a pressure too low to detect a leak for at least 25 minutes after the incident began. Furthermore, the SDV did not close, even after the pressure bled to less than 40 psig, possibly indicating a defective SDV or PSL. In addition, HIPS Pipeline Operator No. 2 was in error when he chose not to activate the ESD remotely by using the SCADA system, believing that it was prudent not to do so given the circumstances of the problem.

If the safety devices at HI Block A-474, Platform A, had been properly installed and functioning or had been activated, Pipeline Segment No. 4879 could have shut in and isolated all input sources within one to two minutes (assuming 15 to 75 seconds for the PSL to sense the pressure drop and 45 seconds for the SDV to close). Then the amount released attributed to flow would have been 17 to 34 barrels instead of 520 barrels. It took less than one minute for Texas City to sense the pressure loss. Therefore, according to MMS estimates, the total estimated volume released would have been between 367 barrels (266 + 17 + 84) and 384 barrels (266 + 34 + 84). Properly installed and functioning safety devices and/or activating the ESD could have resulted in between 486 and 503 barrels of oil not being released into the environment.

Recommendations

Recommended MMS Actions.

This investigative panel recommends that MMS should:

- Coordinate with the USCG to determine if there is a practical means of monitoring and notifying ships adrift in the vicinity of offshore pipelines.

- Establish standard operating procedures and areas of responsibility for MMS inspection of ROW pipelines under DOT jurisdiction.

- Review the Memorandum of Understanding between DOT and MMS, dated December 10, 1996, to incorporate uniform standards for inspection, maintenance, and notification of changes (e.g., bypasses or tag outs) of safety devices for all OCS pipelines.

- Initiate communication with DOT to develop a plan of action, including interim goals, in an effort to adopt consistent regulations for offshore pipelines.

- Inspect the functioning of the ESD's associated with Pipeline Segments Nos. 4879, 4885, and 4886.

- Further study and review the possible necessity of installing a PSL on the pipeline, in addition to the PSL on the pipeline pump, and the benefit of and need for setting the PSL on the pipeline pump while it is operating.

- Develop a method to ensure that required industry documentation submitted to MMS is kept up-to-date and that MMS files are complete.

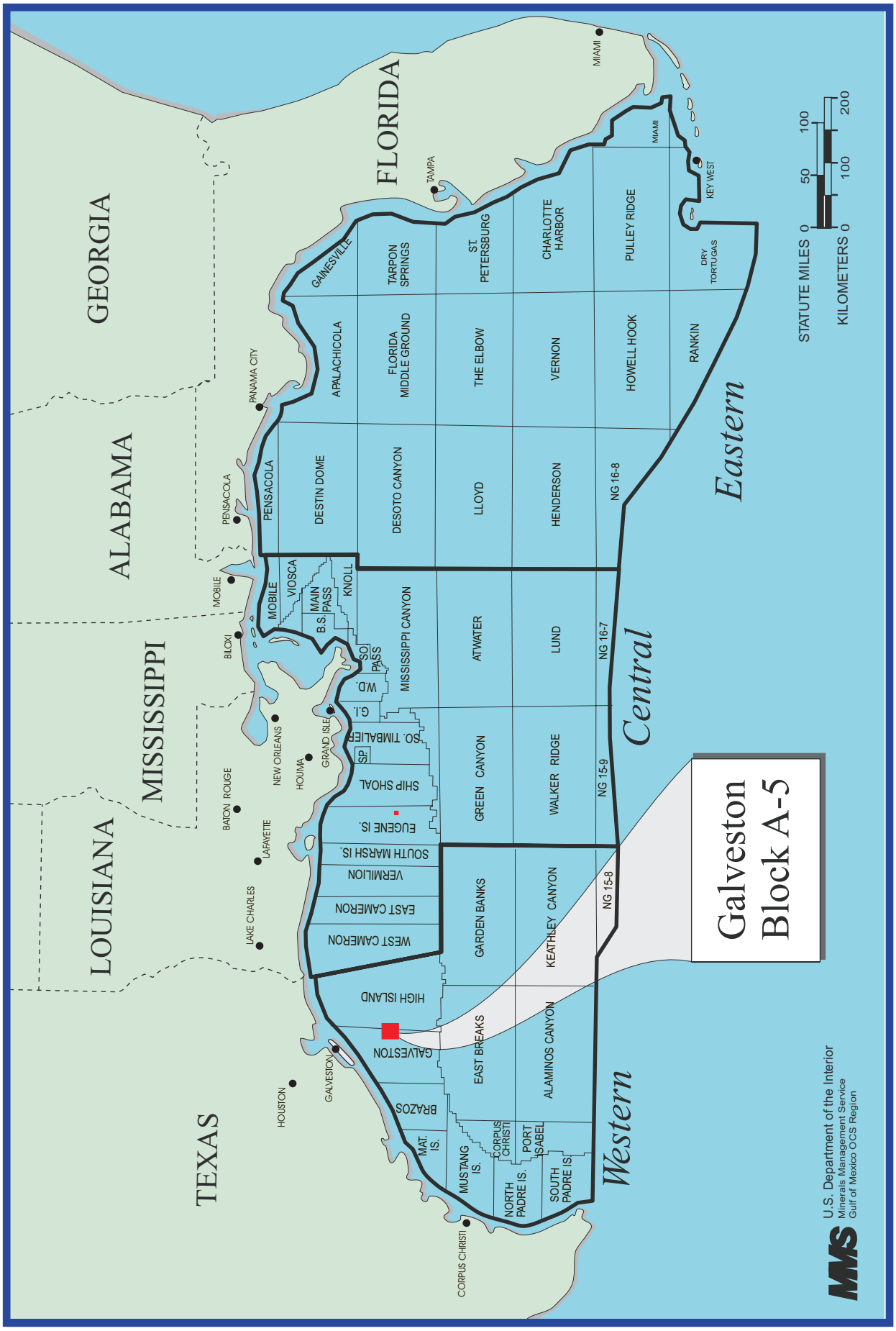
- Send a reminder to all pipeline ROW holders that ROW pipelines are the responsibility of the pipeline ROW holder that MMS has on file until MMS recognizes and approves an assignment of the ROW grant.

- Issue separate pipeline ROW grants for individual pipeline segments.

- Disapprove pipeline segments that both originate and terminate at subsea tie-ins, particularly when the originating pipelines are associated with pipeline ROW grants held by different companies.

Safety Alert.

This investigative panel recommends that MMS issue a Safety Alert to industry regarding this incident. The Safety Alert should briefly describe the incident and identify all the causes. The Safety Alert should also include a recommendation that pipeline ROW holders and lessees and operators consider establishing agreements and communication protocols to ensure that onsite personnel are able to respond to pipeline emergencies. For ROW pipelines under DOT jurisdiction, these protocols would be included in the manual required by 49 CFR 195.402(a) and 195.402(e)(4). Furthermore, it should include a reminder to pipeline ROW holders and lessees and operators to comply with the safety device regulatory requirements found at 30 CFR 250.1004(b)(3), 250.1004(b)(4), 250.1004(b)(1)(i), and 250.1004(b)(2); and DOT regulations found at 49 CFR 195.260(c), which relate to the goal of ensuring that the least amount of oil is released into the environment should an incident like this occur again.



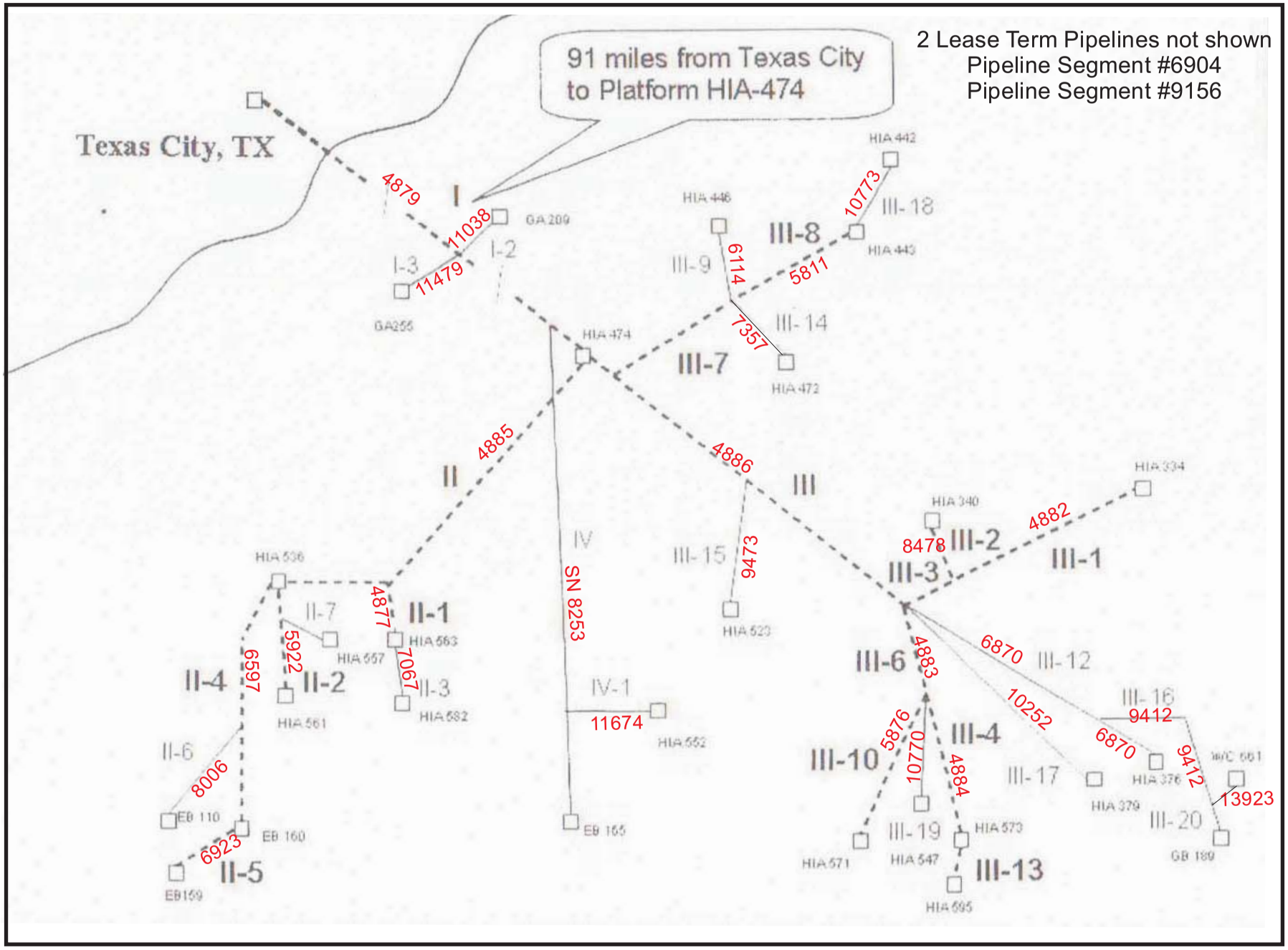
Location of Galveston Block A-5, Pipeline Incident

HIPS Pipeline Segment Summary

Segment No.	ROW Number	Diameter (in)	Approval Date	Length (mi)	MAOP (psig)	Associated Platform
4879	G05150	14	02-24-1978	56.83	1618	HI A-474, A
4885	G05150	10	02-24-1978	21.37	2160	HI A-536, C
4877	G05150	6	02-24-1978	5.76	2160	HI-A-563, B
4886	G05150	10	02-24-1978	20.57	2160	See below
4882	G05150	6	02-24-1978	17.49	2160	HI A-334, B
4878	G05150	6	02-24-1978	2.30	2160	HI A-340, A
4883	G05150	10	02-24-1978	2.98	2160	See below
4884	G05150	8	02-24-1978	7.94	2160	HI A-573, B
5876	G05150	8	09-15-1980	6.23	2160	HI A-571, A
6870	G05150	6	09-06-1983	20.23	2160	HI A-376, A
9412	G13219	8	01-10-1992	34.21	2160	GB 189, A
13923	G24268	6	09-23-2002	4.01	2160	WC 661, A
10252	G14299	8	10-11-1994	13.63	2160	HI A-379, A
9473	G05150	6	09-04-1991	1.58	2160	HI A-523, A
5811	G05150	6	06-09-1980	16.74	2160	HI A-443, A
6114	G05150	6	06-12-1981	4.02	2160	HI A-446, A
7357	G07557	6	01-22-1985	3.07	2160	HI A-472, A
8253	G05150	12	12-16-1987	31.69	1618	EB 165, A
11038	G16053	6	06-14-1996	15.05	1618	GA 209, A
11479	G18800	4	08-21-1997	2.69	1618	GA 255, A
10773	G15676	6	09-08-1995	3.03	2160	HI A-442, A
11674	G19664	6	12/22/1997	3.14	1618	HI A-552, A
8006	G05150	4	05/27/1987	22.18	2160	EB 110, A
6923	G05150	6	12/01/1983	4.79	2160	EB 159, A
6597	G05150	10	04/06/1983	17.47	2160	EB 160, A
9156	-	6	09/24/1990	1.89	2160	HI A-557, A
6504	-	8	07/14/1982	3.49	2160	HI A-595, D
5922	G05150	6	09/16/1980	6.25	2160	HI A-561, A
7067	G05150	6	05/17/1984	2.16	2160	HI A-582, C

The listed associated platforms provide primary safety protection for their departing pipeline segments.
Pipeline Segment Number 4883 begins at a subsea tie in and terminates at a subsea tie in.*
Pipeline Segment Number 4886 begins at a subsea tie in and terminates at HI A 474 Platform A.*
No direct protection for the pipeline. Pipeline protected by the safety systems of connecting pipelines.

High Island Pipeline System (HIPS) summary



Map of HIPS

Attachment 3

bp

BP Pipelines (North America), Inc.
28100 Torch Parkway
Suite 600
Warrenville, IL 60555

June 13, 2006

VIA OVERNIGHT MAIL

Mr. Donald C. Howard, Regional Supervisor
Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

Phone: 504-736-2595

Attention: Mr. Alex Alvarado

Notice of Transfer of Operator – High Island Pipeline System (HIPS)

Dear Mr. Howard:

Notification to the Minerals Management Service (MMS) is hereby provided that effective July 1, 2006, the Operator for the High Island Pipeline System (HIPS) will transfer from BP Pipelines (North America) Inc. (BP Pipelines) to Plains All American Pipeline LP (Plains). Plains is purchasing BP Pipelines' ownership portion in HIPS and will become the Operator of Record on behalf of the owners of HIPS. This letter is a general notification, the appropriate filings will be done separately.

HIPS is an offshore crude gathering and onshore delivery system for transporting crude oil from offshore and Outer Continental Shelf (OCS) production platforms to a Texas City Metering Facility. The offshore portion of HIPS receives crude from multiple platforms in the High Island Breaks, Galveston, Garden Banks, and West Cameron areas of the Gulf of Mexico. The crude is transported via 31 pipeline segments with a cumulative length of 361.7 miles. The offshore portion of the pipeline ends at the Eight Mile Block Valve on Galveston Island. The onshore portion of HIPS consists of approximately 11.9 miles of pipeline located in Galveston County, originating near Eight Mile Road and terminating at the metering facilities at Texas City. Attached is a map depicting the HIPS pipeline system.

BP Pipelines and Plains are working together to ensure a safe and smooth transition on the pipeline system.

The Plains contact for pipeline safety matters is Warren Fusilier in Houston at phone 713-646-4515. Further, should you have any questions, please contact me at 630-836-3498 or BP Pipelines' MMS Coordinator Joe Zotter at 281-366-3791.

Sincerely,

Robert J. Knanishu, DOT Team Lead

Cc: Jerry Schau
Mary Spearman
Joe Zotter
Bill Moore
Warren Fusilier, Plains

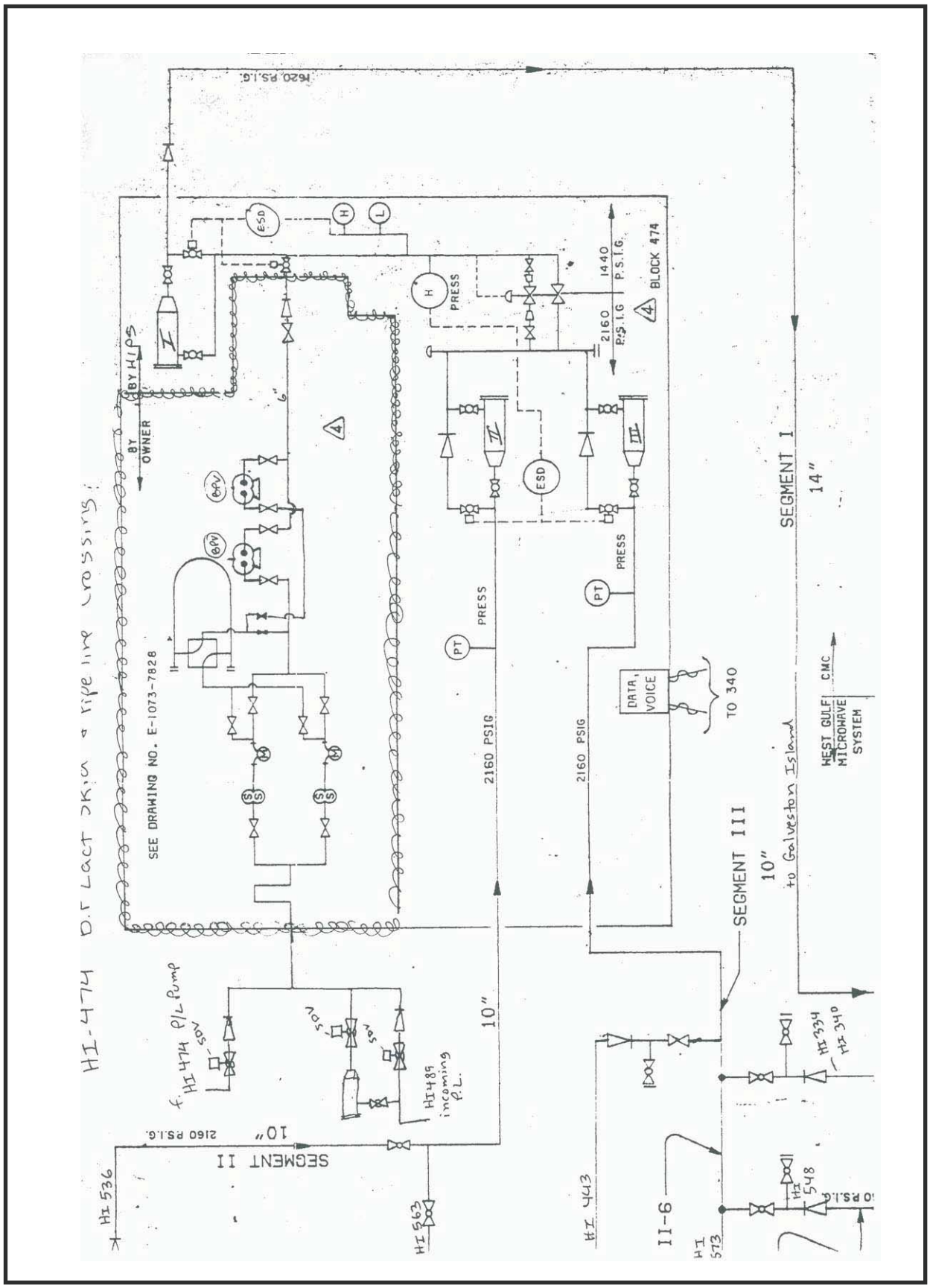
Letter dated June 13, 2006

Photograph of High Island Block A-474, Platform A

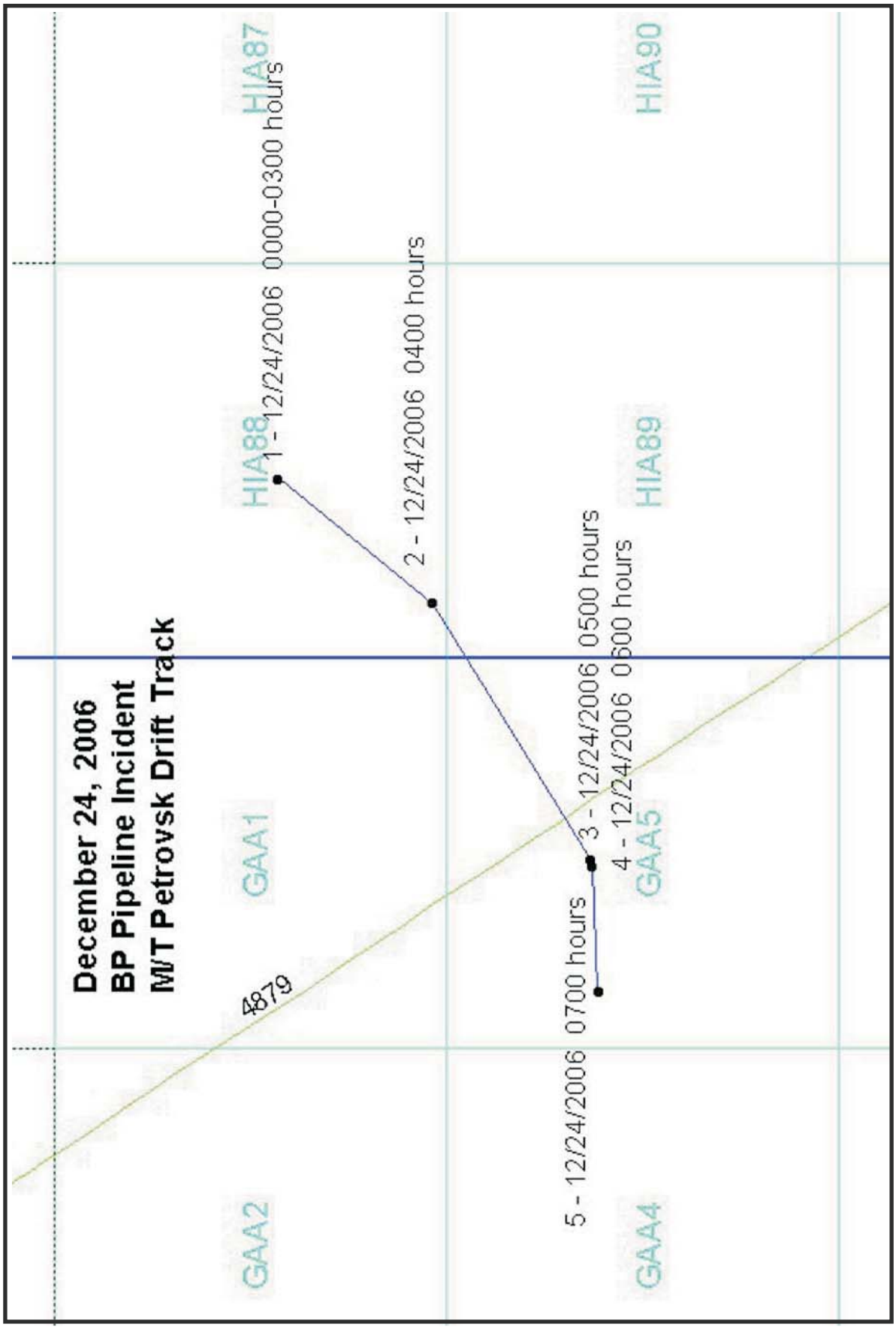
Platform Summary

OCS Block	Lease/ RUE* No.	Name	MMS Comp. ID	Lessee or Operator	Assoc. Pipeline Segment
HI A-474	G2366	A	10074	Newfield Exploration	4879
HI A-536	G2697	C	10088	McMoRan Oil and Gas, LLC	4885
HI A-563	G2388	B	10091	Chevron U.S.A. Inc.	4877
HI A-334	G02423	B	10081	Mariner Energy, Inc.	4882
HI A-340	G23685*	A	10065	Merit	4878
HI A-573	G02393	B	10066	Apache Corporation	4884
HI A-571	G02391	A	10116	W & T Offshore, Inc.	5876
HI A-376	G02754	A	10175	Apache Corporation	6870
GB 189	G06358	A	23760	Chevron U.S.A. Inc.	9412
WC 661	G16224	A	1165	Tarpon Operating and Dev., LLC	13923
HI A-379	G13808	A	28002	Offshore Shelf, LLC	10252
HI A-523	G11390	A	10553	El Paso E & P Company, L.P.	9473
HI A-443	G03241	A	10128	W. & T Offshore, Inc.	5811
HI A-446	G02359	A	10138	Noble Energy, Inc.	6114
HI A-472	G17182	A	10223	El Paso E & P Company, L.P.	7357
EB 165	G06280	A	10297	National Offshore LP	8253
GA 209	G06093	A	10500	ExxonMobil	11038
GA 255	G22025*	A	1050	El Paso E & P Company, L.P.	11479

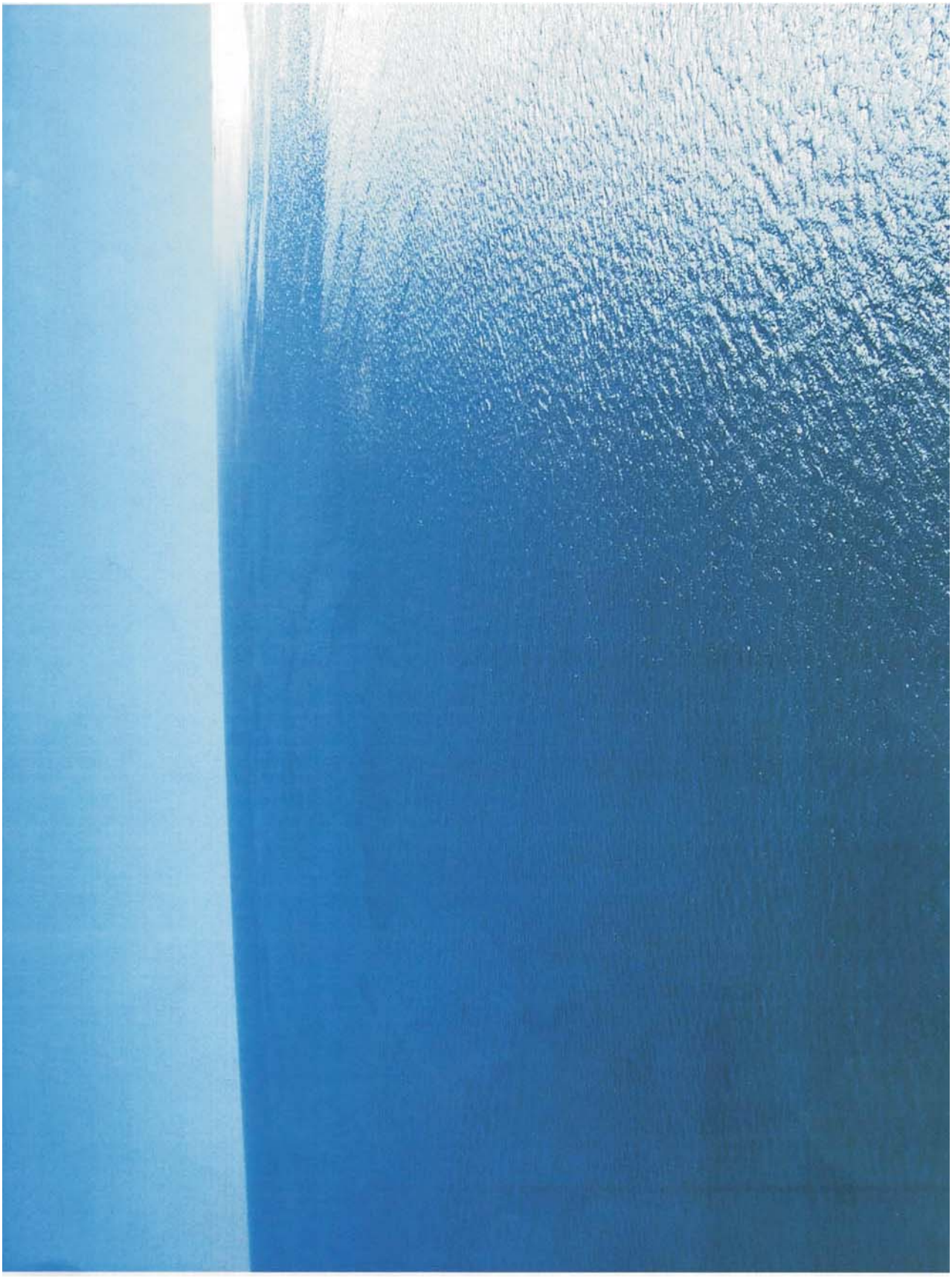
Platforms affiliated with HIPS



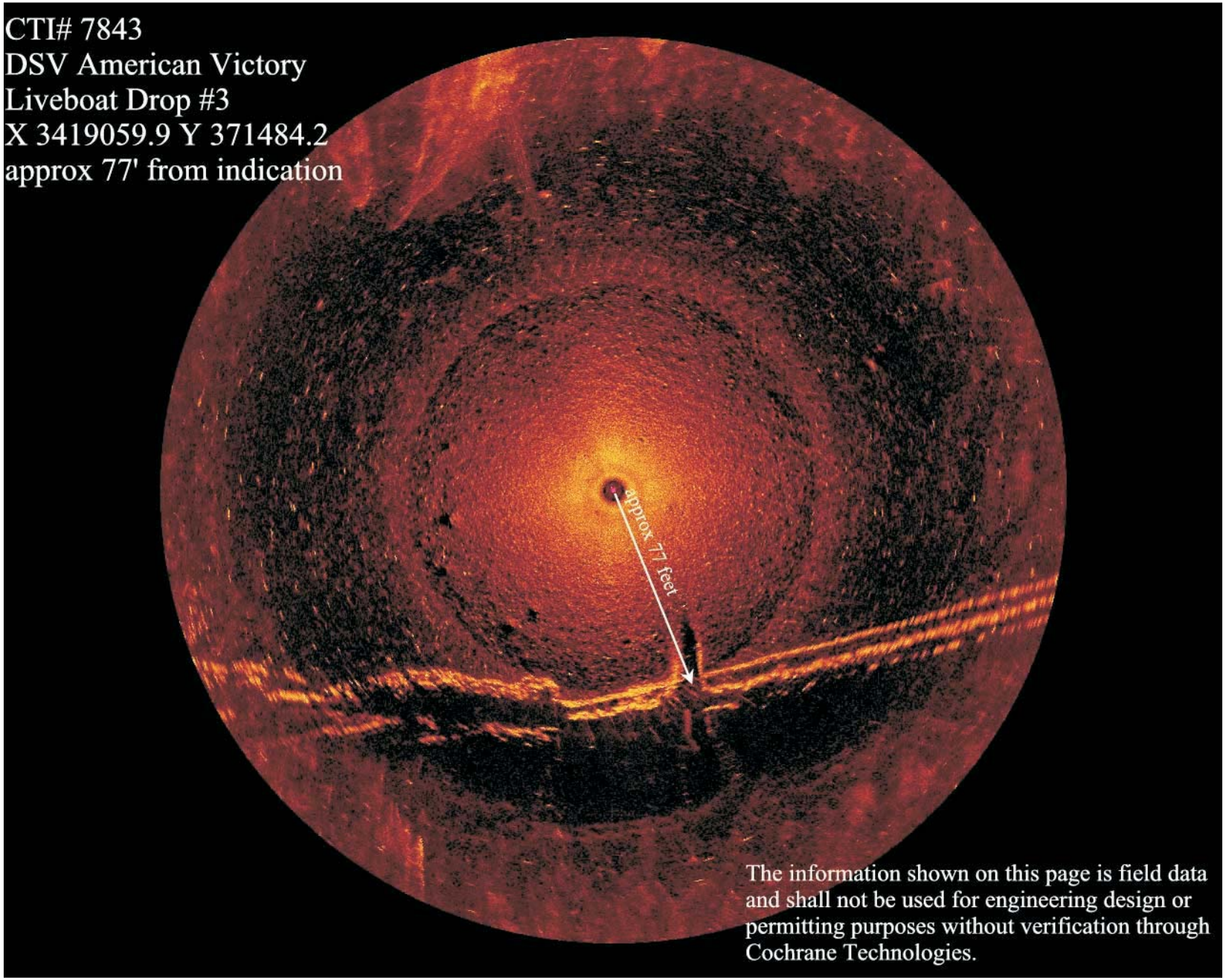
Safety flow schematic for High Island Block A-474, Platform A



M/T Petrovsk drift track



Photograph of oil slick

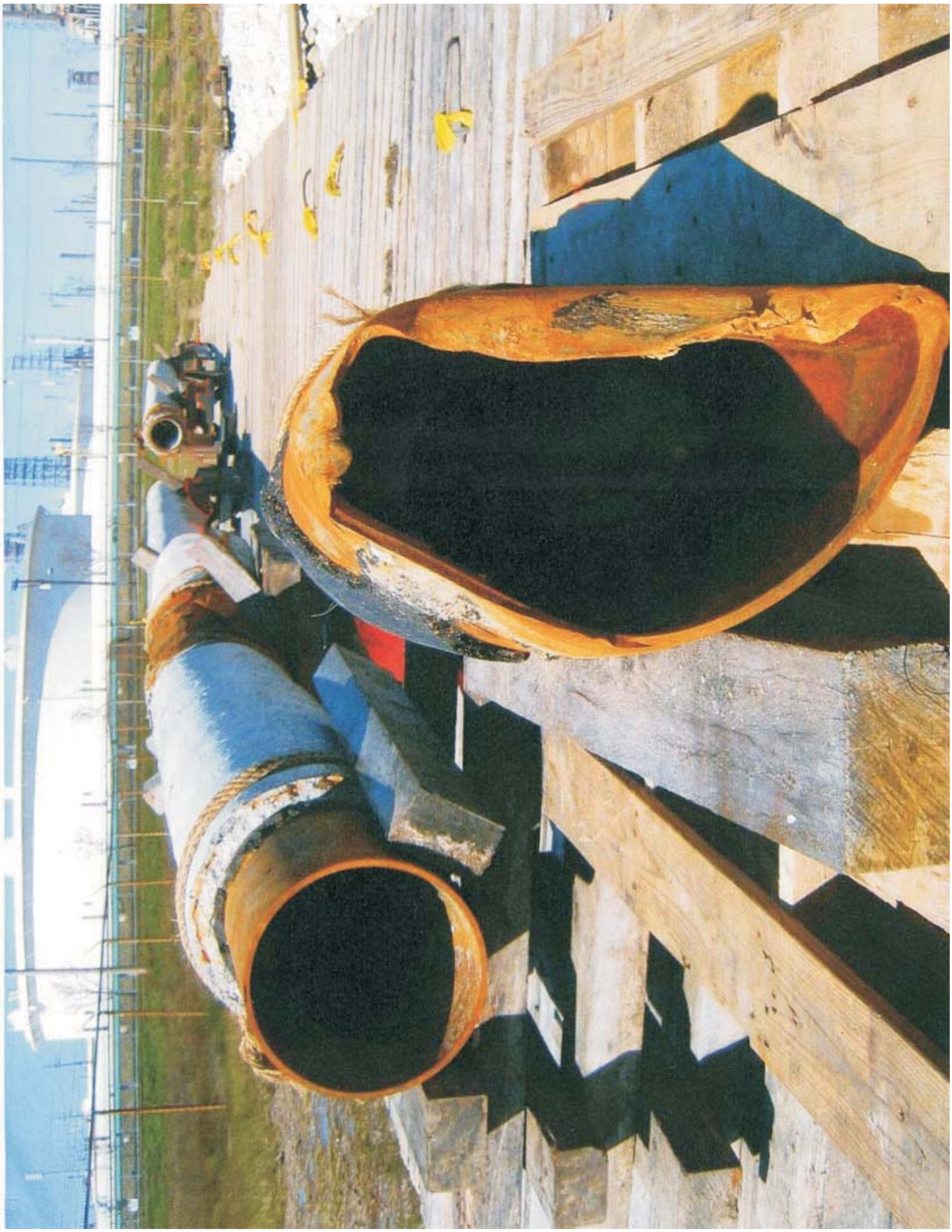


Mesotec image of severed Pipeline Segment Number 4879

Attachment 10

Seg. No.	Associated Platform	Lessee or Operator	Prod. (bbls/day) 12/23/06	MAOP psig	P/L Pump Settings		Shut-in Method	Shut-in Time 12/24/06
					PSH psig	PSL psig		
4879	HI A-474, A	Newfield	0	1618	833	34		
4885	HI A-536, C	McMoRan	256	2160	1035	115	Call	
4877	HI-A-563, B	Chevron	700	2160	1330	10	PSL	6:28 AM
4886	None			2160				N/A
4882	HI A-334, B	Mariner	165	2160	1840	84	Call	
4878	HI A-340, A	Merit	0.5	2160	625	142	Call	Not Pumping
4883	None			2160				N/A
4884	HI A-573, B	Apache	1200	2160	1725	128	Call	6:00 AM
5876	HI A-571, A	W & T	80	2160	1042	78	Call	
6870	HI A-376, A	Apache	843	2160	1978	170	Call	
9412	GB 189, A	Chevron	150	2160	2052	152	PSL	~6:00 AM
13923	WC 661, A	Tarpon	1410	2160	1840	153	Call	
10252	HI A-379, A	Offshore Shelf	500	2160	818	92	Call	
9473	HI A-523, A	El Paso	0	2160			Shut In	N/A
5811	HI A-443, A	W & T	1313	2160	1322	186	Call	
6114	HI A-446, A	Noble	478	2160	1362	77	PSL	6:00 AM
7357	HI A-472, A	El Paso	958	2160	1196	170	SCADA	6:30 AM
8253	EB 165, A	National Off.	2536	1618	1150	115	Call	6:00 AM
11038	GA 209, A	ExxonMobil	2568	1618	607	115	PSL	~5:23 AM
11479	GA 255, A	El Paso	200	1618	511	136	PSL	~5:27 AM
10773	HI A-442, A	Maritech	668	2160	707	77	PSL	
11674	HI A-552, A	Mariner	0	1618			Shut In	N/A
8006	EB 110, A	Panaco	139	2160	1380	25	PSL	6:45 AM
6923	EB 159, A	Chevron	807	2160	985	15	Call	Not Pumping
6597	EB 160, A	UNOCAL	2096	2160	1309	159	Call	
9156	HI A-557, A	ERT	590	2160	1207	85	PSL	~5:30 AM
6504	HI A-595, D	Apache	1607	2160	1411	57	Call	
5922	HI A-561, A	Newfield	622	2160	1000	90	PSL	~6:30 AM
7067	HI A-582, C	Texaco	4360	2160	1009	225	PSL	~6:00 AM
			23,125					

HIPS segment shut-in summary



Photograph of pipeline break – shore side

Photograph of pipeline break – platform side

Photograph of pipeline break – shore side

Photograph of pipeline break – impact detail

Photograph of pipeline concrete coating impact