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BSEE Panel Report 2013-002

# **Investigation of November 16, 2012, Explosion, Fire and Fatalities at West Delta Block 32 Platform E**

**Gulf of Mexico Region, New Orleans District  
Lease No. OCS 00367**

**November 4, 2013**



**U.S. Department of the Interior  
Bureau of Safety and Environmental Enforcement**

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## Abbreviations and Acronyms

ABSG	American Bureau of Shipping Group
Black Elk	Black Elk Energy Offshore Operations
BSEE	Bureau of Safety and Environmental Enforcement
DNR	DNR Offshore and Crewing Services Inc.
FLACS	Flame Acceleration Simulator
FWKO	Free Water Knock Out
GOM	Gulf of Mexico
GIS	Grand Isle Shipyard
HOS	Hornbeck Offshore Services
JSA	Job Safety Analysis
LACT	Lease Automatic Custody Transfer
LOTO	Lock-Out-Tag-Out
MOC	Management of Change
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
PIC	Person in Charge
SEMS	Safety and Environmental Management Systems
USCG	United States Coast Guard
WD	West Delta
WGPSN	Wood Group Production Services Network

## **Executive Summary**

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On November 16, 2012, at around 9:00 a.m., an explosion and fire occurred on a platform in the Gulf of Mexico operated by Black Elk Energy Offshore Operations (Black Elk). The explosion and fire, which occurred during welding work that was being conducted as part of construction operations, resulted in the deaths of Ellroy Corporal, Jerome Malagapo, and Avelino Tajonera (three individuals who were working on the platform), serious injuries to others, and the discharge of pollutants into the Gulf of Mexico. (see figure 1).



***Figure 1 – WD 32 E platform after explosion***

Black Elk was the lease holder and designated operator of the D, A, and E platforms located at the West Delta Block 32 lease block (collectively referred to as the WD 32 complex).

As the lessee and designated operator, Black Elk was responsible for conducting safe construction operations at the WD 32 complex in compliance with all applicable regulations issued by the Bureau of Safety and Environmental Enforcement (BSEE). At the time of the incident, the WD 32 complex was not in production. Black Elk was seeking to complete multiple construction projects on the WD 32 E platform prior to restarting production operations. BSEE regulations include specific requirements aimed at ensuring the safety of welding operations and general requirements regarding safety and environmental management systems.

Black Elk retained a number of contractors to complete work on the WD 32 complex, including: Compass Engineering Consultants, L.L.C. (Compass), for management and oversight of the construction work; Grand Isle Shipyard (GIS), for the provision of workers for the various construction projects (GIS subcontracted with DNR Offshore and Crewing Services, Inc. (DNR)); Wood Group Production Services Network (WGPSN), for the management of the production equipment and performance of production-related operations; Shamrock, for mechanical services; and Enviro-Tech Systems, for the removal and replacement of a flotation cell (equipment used to separate oil and water during production). Each of these contractors was also responsible for conducting safe operations in compliance with all applicable regulations. At the time of the explosion, no Black Elk personnel were present at the WD 32 complex.

An investigation panel comprised of professionals from BSEE and the United States Coast Guard (the Panel) conducted an extensive investigation of the incident and identified a number of causes of the explosion and fire. The Panel found that the explosion and fire occurred when hydrocarbon vapors ignited while a GIS/DNR worker was welding on the incoming pipe segment to the wet oil tank located in the Lease Automatic Custody Transfer (LACT unit) area.

The ignition started a chain reaction that caused the wet oil tank and two connected dry oil tanks to explode. These explosions caused the three tanks to separate at their bases, launching the wet oil tank and the first dry oil tank into the Gulf of Mexico and blowing the second dry oil tank into the air. The second dry oil tank then struck the platform crane and

landed back on the WD 32 E platform. The hydrocarbons in all three of the tanks were released onto the platform and into the Gulf of Mexico. The hydrocarbons on the platform subsequently ignited, starting a fire on the platform.

Two GIS/DNR workers were found to be missing immediately following the explosions and the fire. There was evidence that Mr. Corporal died immediately following the explosion, and that Mr. Malagapo died as a result of injuries he sustained in the explosion and fire. On November 23, 2012, at the Baton Rouge Hospital, a third GIS/DNR worker, Mr. Tajonera, also died as a result of the injuries caused by the explosion and fire. A number of other workers sustained serious injuries. The explosion also created an oil sheen approximately one half-mile by 200 yards in the Gulf of Mexico that resulted from the discharge of some of the hydrocarbons contained in each of the tanks that were blown off of the platform.

The Panel identified a number of decisions and actions by Black Elk and its contractors that led to the ignition of hydrocarbon vapors during the welding work near the wet oil tank. The Panel found that there was both a failure to comply with welding requirements (30 CFR § 250.113) and adherence to basic safety management tenants:

- *Conducting “hot work” without taking proper safety precautions.* Black Elk had a documented procedure that was to be followed prior to conducting “hot work” (which includes welding). Those procedures include the inspection of the work area, the use of gas detectors, and other precautions. The Panel found no evidence that any such precautions were taken.
- *Failure to ensure proper communication among contractors and to establish an effective safety culture.* Black Elk engaged multiple contractors to conduct different construction operations at the WD 32 complex. Black Elk and its contractors failed to communicate about operations, hazards, risks, and safety precautions.

- *Failure to isolate hydrocarbons inside the wet oil tank.* At the time of the incident, no one had taken steps to install any type of device that would ensure that the area where the welding was being conducted was properly protected from possible contact with hydrocarbons. The Panel found that GIS/DNR workers proceeded with the welding work based upon a faulty assumption that appropriate safety measures had been taken, including purging all necessary piping of hydrocarbons.
- *No worker invoked his “stop work” authority despite apparent anomalies.* The Panel found no evidence that any of the workers on the WD 32 E platform on November 16, 2012 exercised stop work authority. According to witness statements, a number of these workers consistently worried about losing their jobs if they raised safety concerns.
- *Failure to identify hazards associated with construction operations.* The Panel found that there was inadequate planning for the work to be conducted on November 16, 2012. The Panel found no evidence that Black Elk or any of its contractors conducted a job safety analysis or prepared a hot work permit that covered the actual work to be performed.

The Panel’s investigation yielded a number of recommendations aimed at improving the safety of offshore operations. The Panel recommended that all operators at each manned Outer Continental Shelf facility conduct a safety stand down of operations to discuss the events surrounding the explosion and fire at the WD 32 E platform, emphasizing the following:

- *Improving communications.* Operators must facilitate communications among all workers on a facility and ensure that all personnel are aware of any work being done on the facility, particularly modifications to the facility. Training should reinforce that communication failures are one of the leading causes of offshore incidents;
- *Define the chain of command.* Operators should clearly articulate the chain of command for



all operations, particularly those involving one or more contractors. For welding operations, operators should clearly designate a welding supervisor or person in charge as outlined in 30 CFR § 250.111;

- *Safe hot work practices.* Operators should require all operations and contract personnel involved in hot work to participate together in all safety meetings. The meeting should involve the initiating of the hot work permit and should ensure that the complete job scope is understood, all hazards are identified, and policies, regulations, contingencies, and communications are properly understood and implemented; and
- *Stop work authority.* Operators, contractors (including sub-contractors), and service companies should review methods of initiating a “stop-work” event to ensure that the system adopted will be effective and will encourage stoppage of work to prevent unsafe operations.

The Panel recommended that BSEE evaluate Black Elk’s compliance with its safety and environmental management systems (SEMS) requirements. Within weeks of the explosion and fire, BSEE demanded specific performance improvements from Black Elk, including conducting a comprehensive third-party audit. BSEE will continue to closely scrutinize all aspects of Black Elk’s performance and will carefully evaluate all audit results.

The Panel’s investigation revealed evidence that Black Elk, Wood Group, GIS/DNR, and Compass violated a number of BSEE regulations through their respective actions leading up to the explosion November 16, 2012. BSEE will issue Incidents of Non-Compliance to these companies after this Report is released.

## **Introduction**

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### **BSEE's Investigation**

Pursuant to 43 U.S.C. § 1348(d)(1), (2) and (f) [Outer Continental Shelf Lands Act, as amended] (OCSLA) and Department of the Interior regulations 30 CFR Part 250, the Bureau of Safety and Environmental Enforcement (BSEE) is required to investigate and prepare a public report of this incident. Panel members included Kevin Sterling (chair), Otho Barnes, Andrew Black, Lee Carter, Keith King, Robert Ranney, and Parris Stratton (United States Coast Guard) (USCG).

The Panel collected and reviewed large volumes of electronic and written material, including data, emails and other records related to Black Elk and its contractors' equipment, management systems, supervision of employees and contractors, communications, performance and training of personnel, relevant company policies and practices, and work environment. The Panel conducted a substantial number of interviews of individuals and collected over 187,000 pages of documentation.

The purpose of this investigation was to identify the causes of the explosion and fire at WD 32 E and issue recommendations in order to reduce the likelihood of a similar event in the future. Throughout this report, the Panel classifies the factors that contributed to the explosion as cause, contributing causes, or probable contributing causes. The Panel also makes other findings, conclusions, and recommendations relevant to the explosion on November 16, 2012.

### **Companies Involved**

The following companies were involved in the events that were related to and/or led to the explosion at the WD 32 complex on November 16, 2012:

- **Black Elk** was the designated operator for the WD 32 complex. Black Elk is an oil and gas company headquartered in Houston, TX and owns interests in properties located

offshore in the Gulf of Mexico. According to its website, it owns “aggregate interest[s] in more than 1,060 wells on 121 platforms.

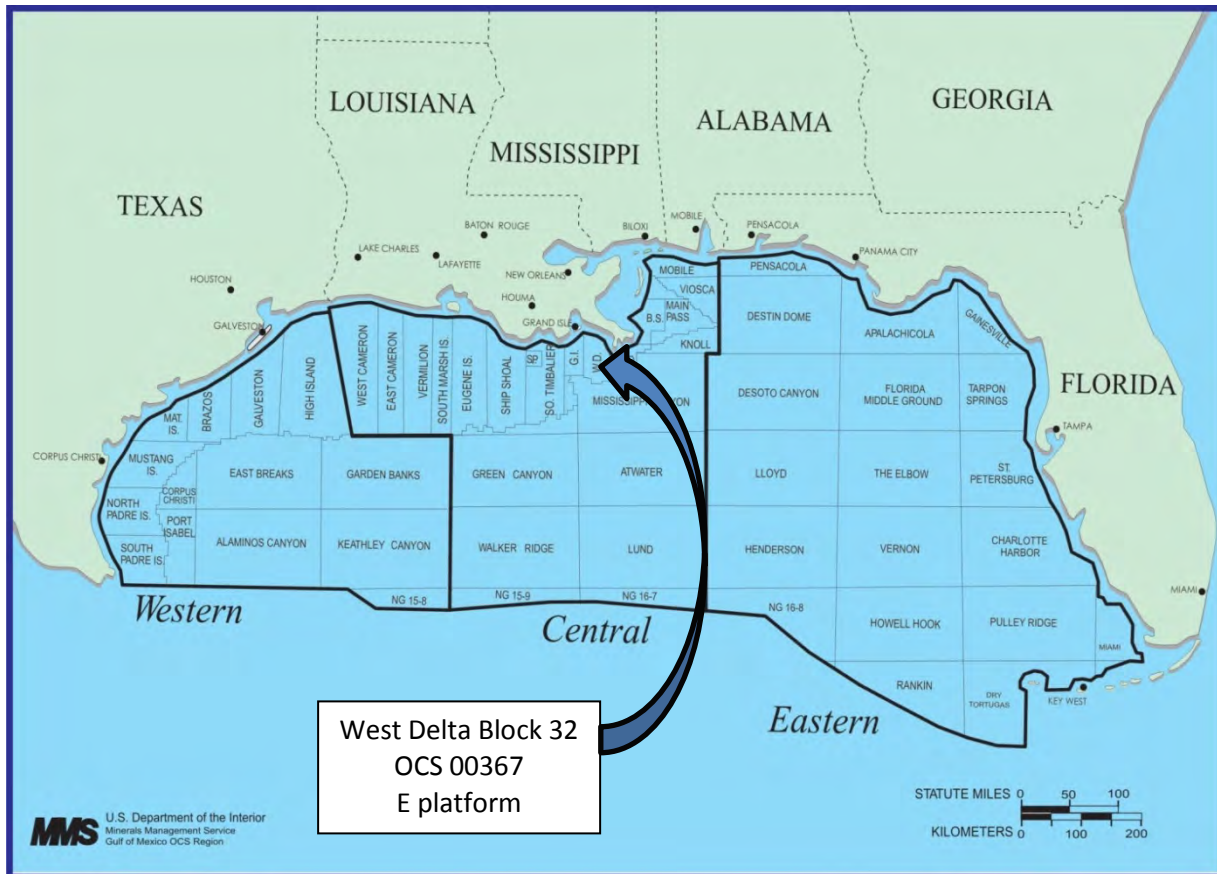
- **Compass** was retained by Black Elk to manage and oversee construction work at the WD 32 complex and to coordinate work among the contractors working at the facility. Compass is based in Lafayette, LA and provides engineering and project management services to oil and gas production facilities, as well as other industrial operations.
- **Grand Isle Shipyard** contracted with Black Elk to provide workers for the various construction projects at the WD 32 complex. GIS provides construction services to offshore companies and is headquartered in Galliano, LA.
- **DNR Offshore Crewing Services** contracted with Grand Isle Shipyard to recruit workers from the Philippines. DNR is headquartered in the Philippines and offers to provide “competent offshore work force and ship crewing personnel.”
- **Wood Group** contracted with Black Elk to manage production operations at the WD 32 complex. Wood Group provides services to offshore companies, including facility operations and maintenance services. Wood Group operates in over 50 countries and is based in Houston, TX.
- **Shamrock** was retained by Black Elk to provide mechanical services at the WD E platform. Shamrock is headquartered in Houma, LA and provides a variety of services to offshore companies, including production operations.
- **Enviro-Tech** contracted with Black Elk to replace the existing flotation cell on the WD E platform with a replacement flotation cell. Enviro-Tech provides services related to separation equipment dealing with waste water treatment and is based in Covington, LA.

## **Applicable Regulatory Requirements**

BSEE regulations require that all operations – including construction operations – be performed in a safe and workmanlike manner and that all equipment and work areas are maintained in a safe condition. Welding operations are covered by 30 CFR § 250.113, which sets forth the specific the procedures that personnel must follow while welding. BSEE regulations also set forth, in 30 CFR § 250.1909, the general responsibilities for operators in establishing a safety and environmental management system.

## **Background**

Lease OCS 00367 covers approximately 2500 acres and is located in the West Delta (WD) Block 32, Gulf of Mexico (GOM), off the Louisiana Coast (*see figure 2*). The Lease was purchased in 1981 by Shell Offshore Inc., acquired in 1995 by Seneca Resources Corporation, and acquired in 2002 by Maritech Resources, Inc. On March 20, 2008, Black Elk Energy Offshore Operations (Black Elk) purchased the lease from Maritech Resources, Inc. The Black Elk WD 32 complex sits in 63 feet of water approximately nine statute miles from shore at latitude 29.1285430, longitude -89.69060000, and consists of three bridge-connected platforms (A, D, and E). The D platform housed the crew quarters, helipad, dining area, and was the main muster area in the case of an incident. The A and E platforms were both production platforms handling 15 wells. The 9 wells on the A platform had been plugged for some time prior to the incident. The E platform handled operations associated with the remaining 6 wells capable of producing hydrocarbons.



**Figure 2 – Location of Lease OCS 00367, West Delta Area Block 32 E platform**

## Timeline

In September 2011, a Black Elk Measurement Supervisor stated in an email that Energy XXI threatened to shut in production at WD 32 E platform unless upgrades were completed on the Lease Automatic Custody Transfer (LACT) system. (Note: all of the hydrocarbons produced by the WD 32 complex are sold to the neighboring Energy XXI platform.)

In November 2011, Black Elk developed the LACT upgrade project.

In January 2012, Black Elk completed its construction planning for the WD 32 E platform.

On February 20, 2012, Black Elk had Grand Isle Shipyard (GIS) workers in place and ready to begin the LACT upgrade, but Black Elk's Operations Supervisor canceled the work. Black Elk

stopped the LACT unit project for several reasons. One of the reasons was that the safety flow diagrams had not been submitted for BSEE approval. Other reasons for canceling the work included the need to identify how the project could be completed without welding in the field (to remove unnecessary hazards associated with hot work on the facility) and not having had a Black Elk offshore supervisor walk the project with a Wood Group Production Services Network (WGPSN) Operator from the platform.

In May 2012, Black Elk sent an Application for Modification to Existing Surface Safety Systems for the WD 32 E platform to BSEE. These modifications included installing a divert valve on the LACT unit and associated piping spools to tie-in to the existing piping that connected the sump discharge to the wet oil tank (see figures 3-7).

During June 2012, at least one Black Elk employee questioned whether the company should continue to operate the platform in its current condition. On June 27, 2012, Black Elk's Operations Supervisor stated in an internal email that he was "bending the rules" by allowing the WD 32 complex to remain on line and to allow continued production. He further stated that "the platform should not be flowing in this condition. BSEE should not have to be the one to shut down the platform and fine us when we... have the common sense to know that it should not be flowing in this condition," and "I know how important production is to us as a company... so I have allowed myself to bend a little in that direction."

On July 18, 2012, BSEE approved the Application for Modification to Existing Surface Safety Systems.

In August 2012, the WD 32 complex was shut in due to hurricane damage to the nearby Energy XXI platform that received all of the production from the WD 32 complex. With the WD 32 complex being shut in for an extended period of time, Black Elk decided to upgrade several of the systems on WD 32 E including: replacing the flotation cell with a newer flotation cell, repairing the production manifold, conducting revisions to upgrade containment for the Free Water Knockout (FWKO) and chemical tanks (pollution pans added), which were located on the same skid as the flotation cell, and removing an out-of-service separator. This was in addition to the construction modifications of the LACT unit (see figures 8 and 9).

On October 31, 2012, Energy XXI stated in an email to Black Elk's Asset Manager that it

was still on schedule to complete pipeline repairs for November 15, 2012. Note: Once Energy XXI had completed the pipeline repairs, Black Elk expected it would also return to production.

On November 7, 2012, Black Elk's Construction Superintendent stated in an internal email he had, "8 days to 10 days' worth of work and cannot afford to be delayed." Note: At this time, Black Elk was still under a November 16, 2012 project completion deadline.

From November 7, 2012, through November 9, 2012, GIS, DNR, and WGPSN personnel arrived at the WD 32 complex.

From November 7, 2012, through November 9, 2012, GIS and DNR employees received safety orientations for the WD 32 complex. Workers were told by the Compass Engineering Consultants L.L.C. (Compass) consultant that the WD 32 E platform was shut in, pipes were purged, and the platform was safe.

On November 9, 2012, Energy XXI stated in an email that they were "still on schedule for mid next week completion." (Note: This email shows Black Elk was still attempting to complete all of their upgrades and meet Energy XXI's deadline)

November 10, 2012, through November 16, 2012, the WGPSN Person in Charge (PIC) assigned the responsibility of completing and issuing hot work permits to the WGPSN C operator. (Note: The C operator is an entry level position which normally does not have sufficient knowledge or experience to evaluate complex or potentially dangerous activities)

On November 10, 2012, The Compass consultant was unable to locate the pre-fabricated LACT piping aboard the WD 32 complex.

On November 12, 2012, the Compass consultant ordered new LACT piping fabrication from GIS. The Compass consultant told GIS it needed to be at the WD 32 complex by Wednesday morning, November 14' at 6:00 am.

On November 13, 2012, the Black Elk Construction superintendent stated in an email sent to the WD 32 complex email address, that the LACT piping would arrive on Thursday, November 15' and would be installed by the end of the day on Friday.

Data records extracted from the GIS-owned gas detectors indicate that November 14, 2012 was the last date the GIS-owned gas detectors were turned on.

On November 14, 2012, the GIS supervisor directed a GIS worker to build scaffolding for

work to be done on piping next to the LACT unit and storage shed.

On November 15, 2012, between 12:00 p.m. and 2:00 p.m., the scaffold builder completed erecting the scaffolding for the LACT piping.

## **November 16, 2012**

Between the hours of 6:00 a.m. and 7:00 a.m., the GIS/DNR morning safety meeting was conducted and one hot work permit was issued by the WGPSN C operator for the entire platform.

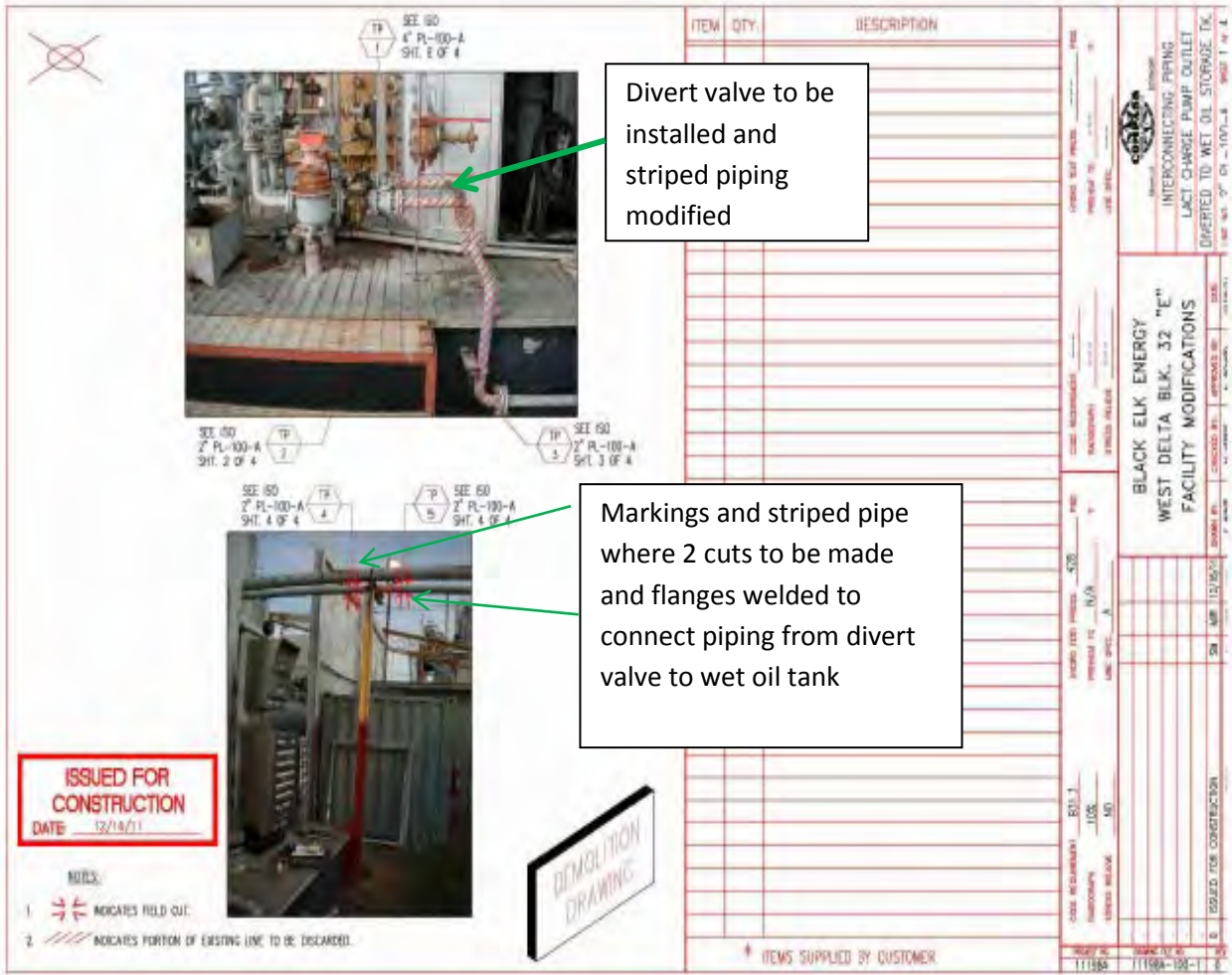
Between the hours of 7:00 a.m. and 9:00 a.m., construction work on the flotation cell unit, production manifold, and the LACT unit projects was underway. On the LACT project, two cold cuts were made with a pneumatic saw to remove a section of the 4" piping connecting the sump line to the wet oil tank. The 4" piping was prepped with an electric grinder for the welding work to install flanges which would connect the divert line to the sump and wet oil tank piping.

On or around 9:00 a.m., the welding work to install a flange on the inlet piping to the wet oil tank commenced and the explosions occurred. Directly following the three explosions and fire, the workers aboard WD 32 E platform mustered at the designated location on the WD 32 D structure.

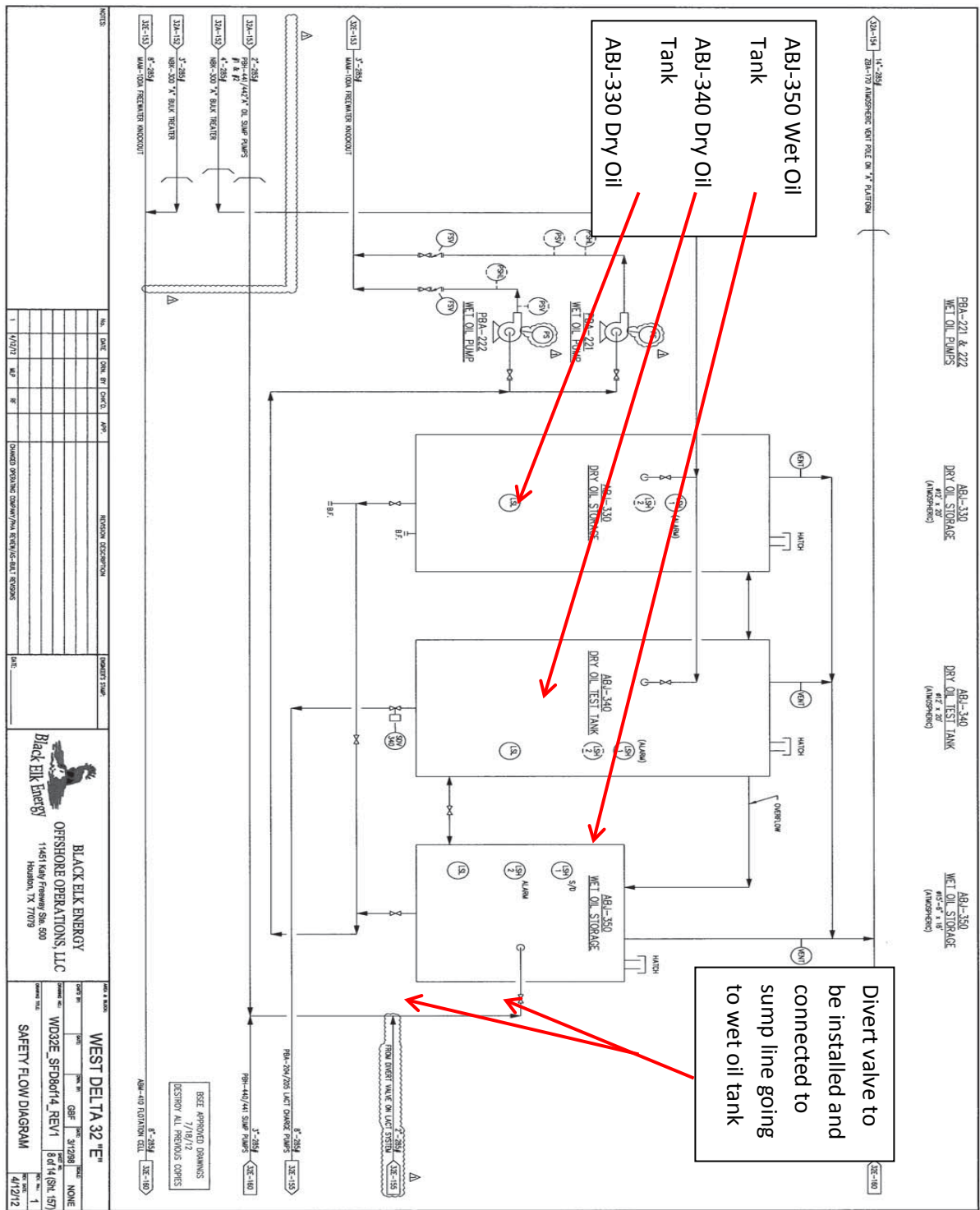
After arriving at the D structure muster area, the workers began to provide first-aid to each other and focused on medical evacuations for the severely injured. The WGPSN operators proceeded to conduct fire suppression in conjunction with responding field boats while the Compass consultant made notifications.

BSEE and the USCG arrived on scene to provide support and started their investigation.



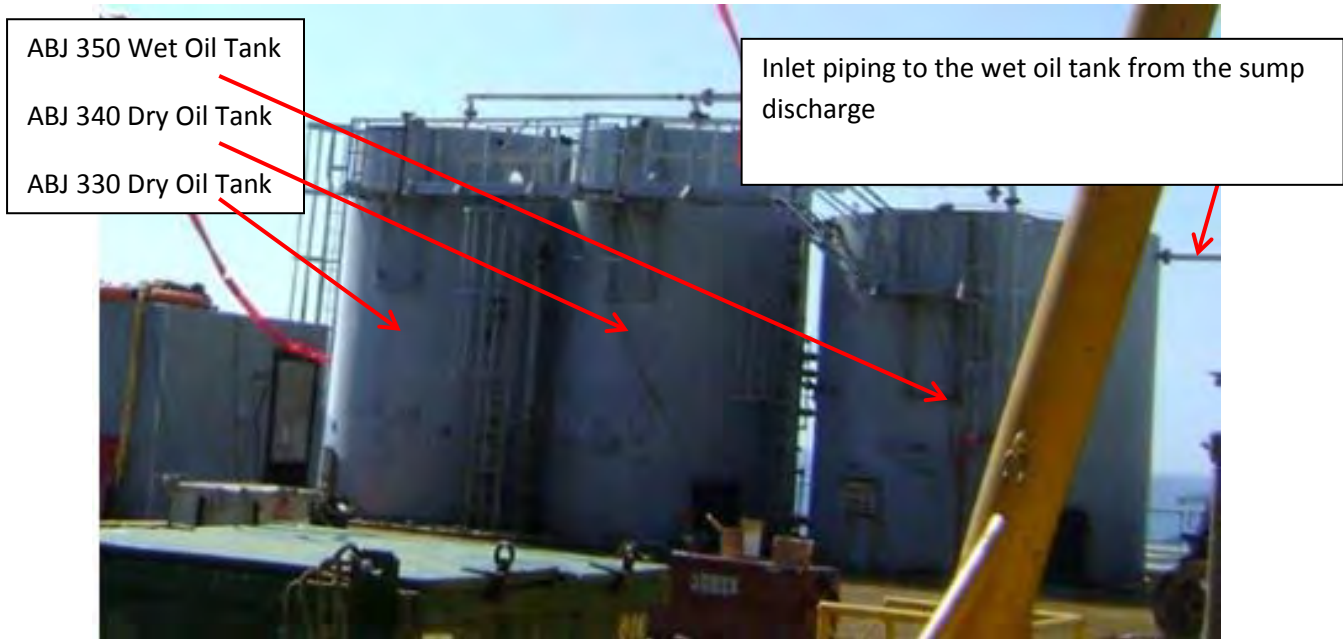


**Figure 3 – Photo illustration submitted with MOC to install divert valve and make two cuts in line, weld flanges, and install piping from divert line on LACT unit to wet oil tank**

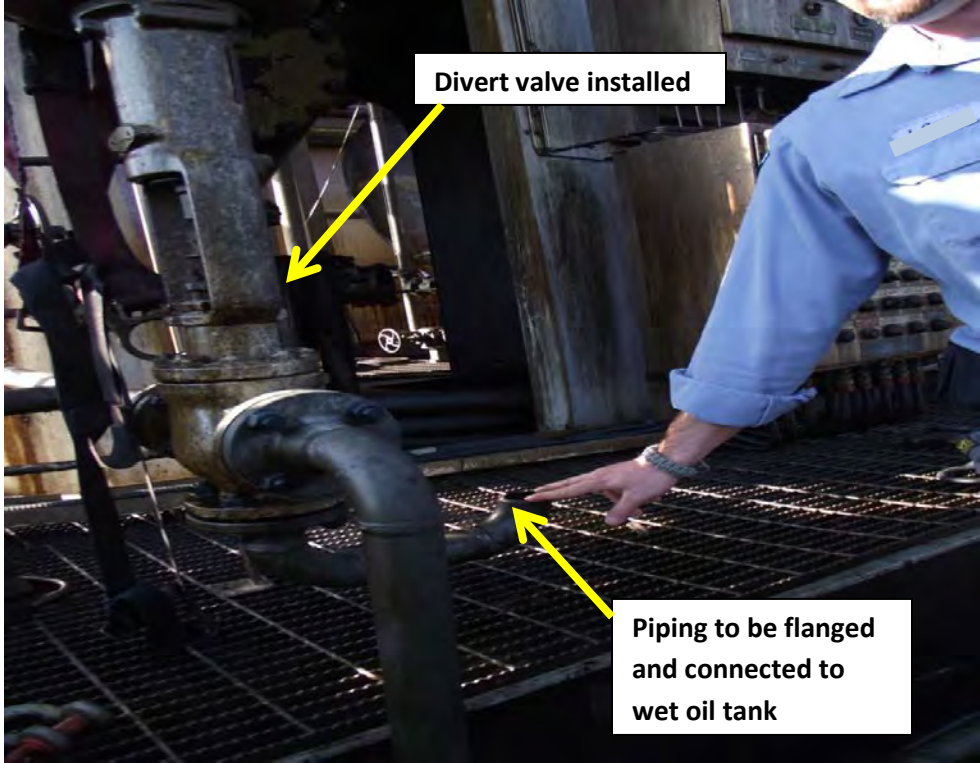


WEST DELTA 32 "E"  
 W032E\_SF080614\_REV11 8/14/12 (S) 197  
 SAFETY FLOW DIAGRAM 4/12/12

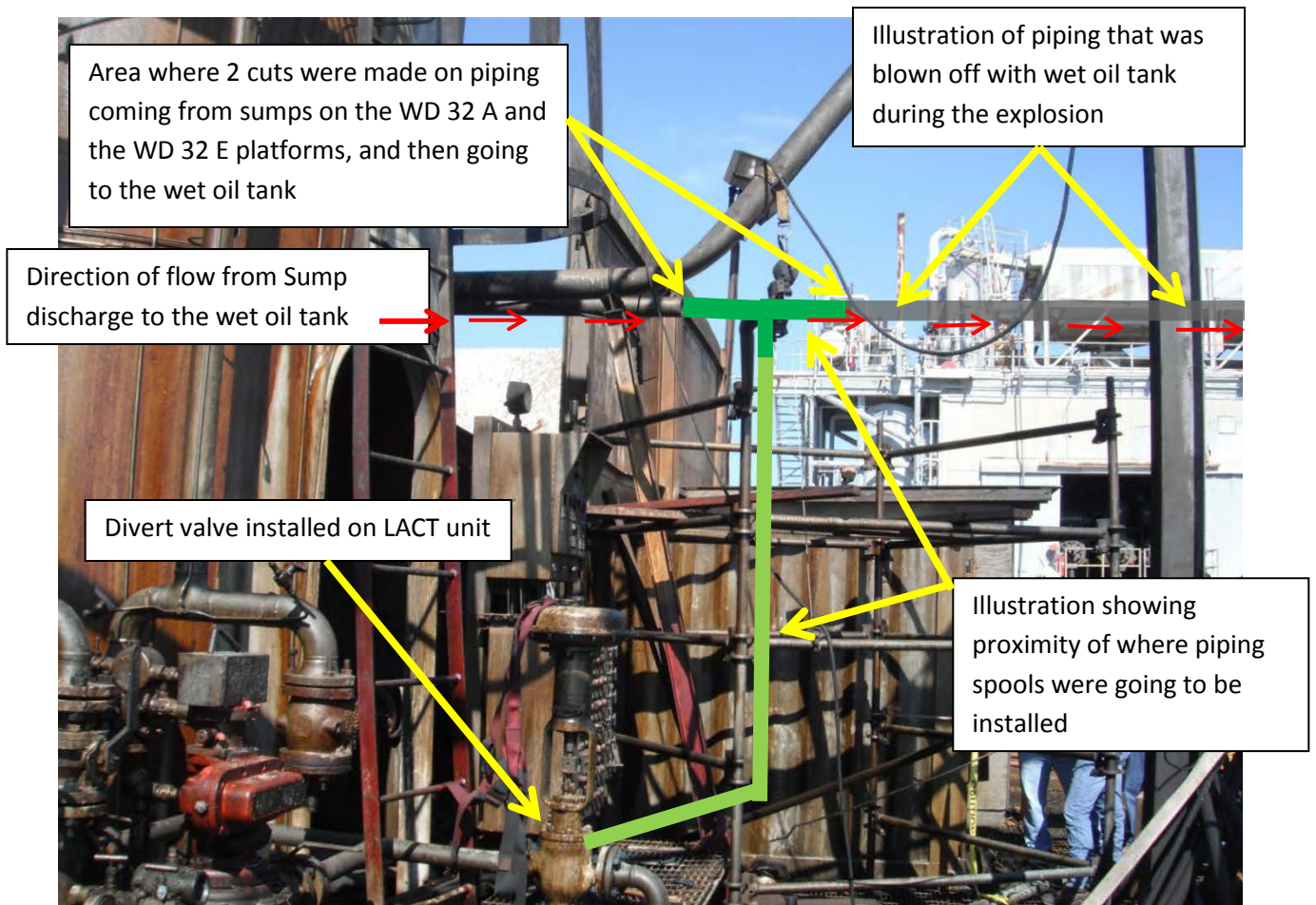
Figure 4 – Schematics for LACT MOC to install divert valve, showing the wet oil tank and both dry oil tanks



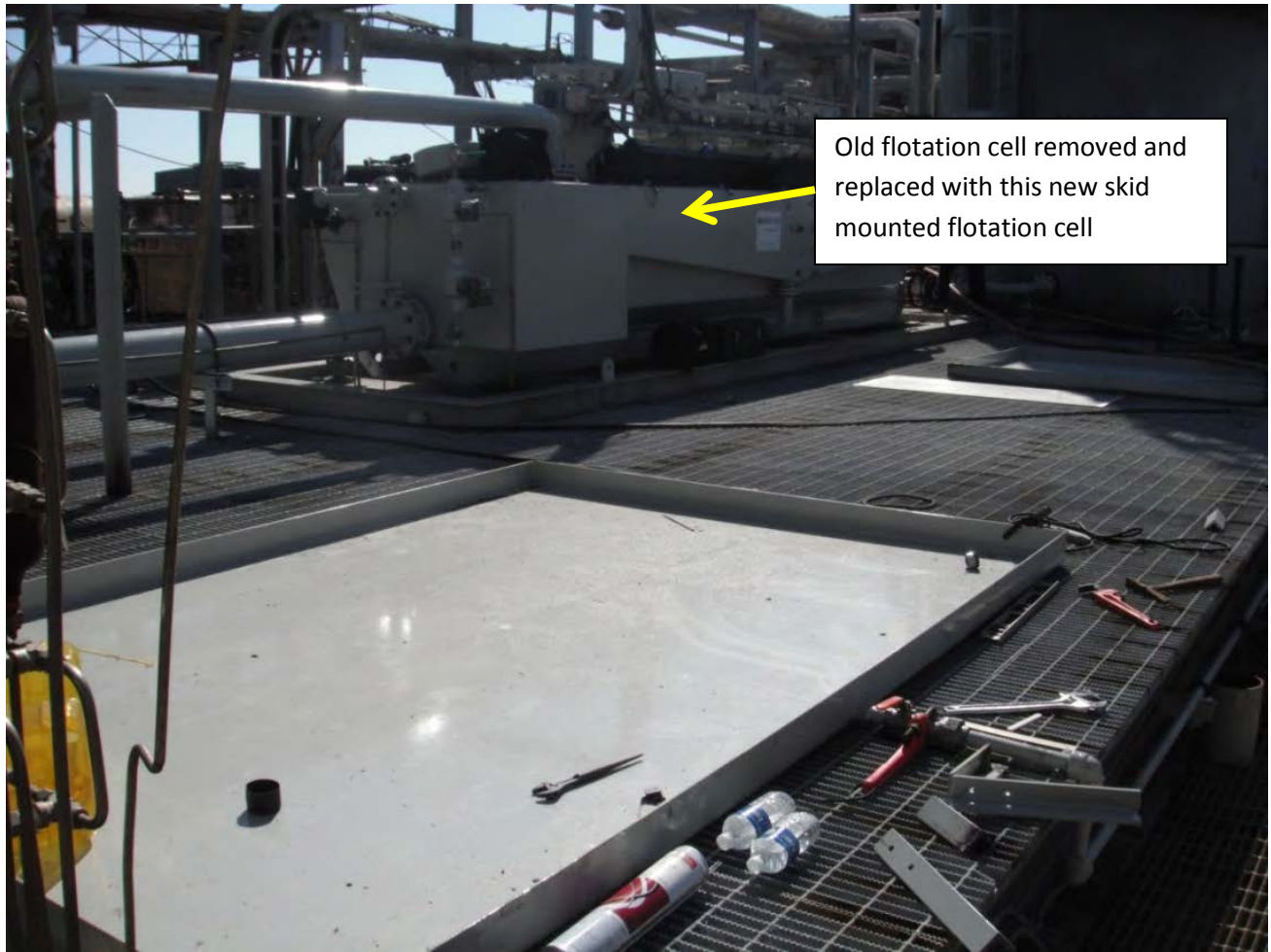
***Figure 5 – Illustration showing the wet oil and dry oil tanks along with the inlet piping from the sump discharge***



*Figure 6 – Divert valve installed on LACT unit, and from there will go to the wet oil tank*

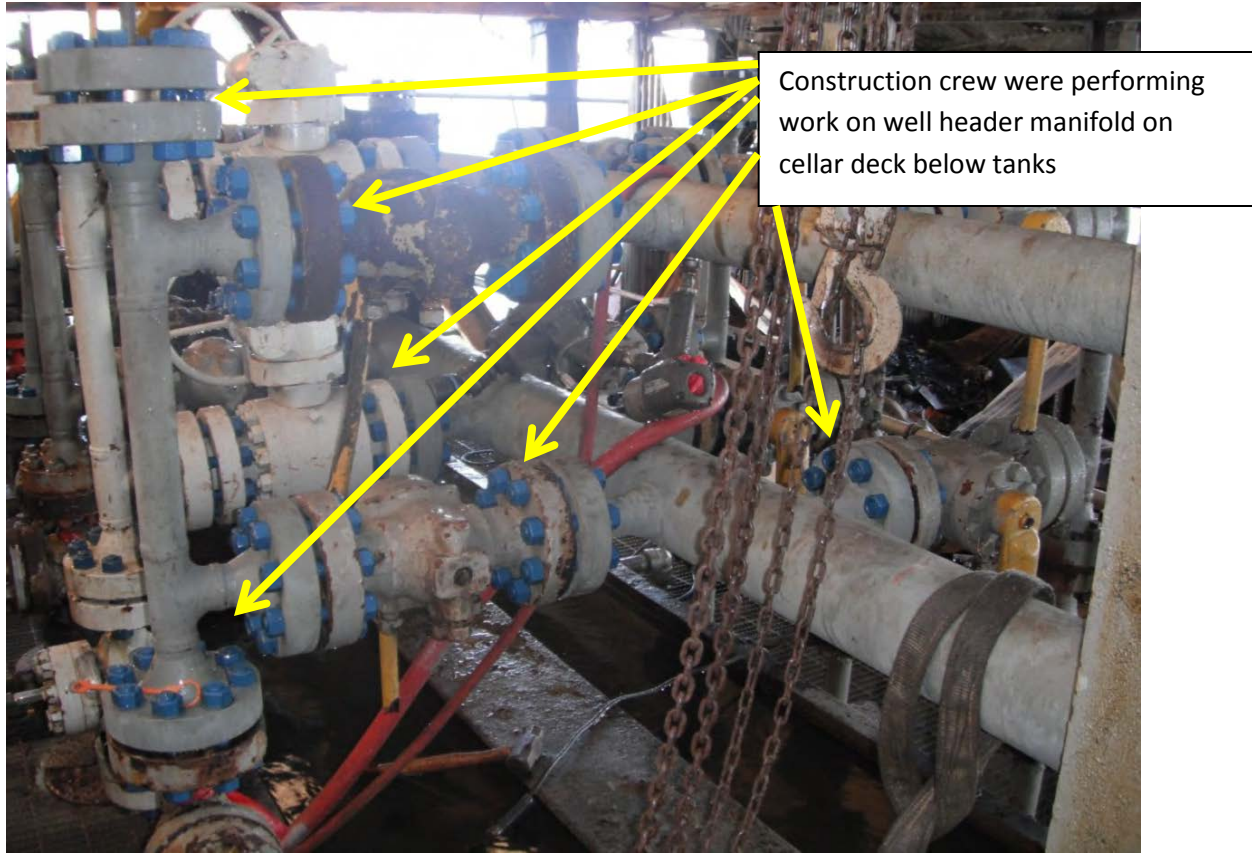


**Figure 7 – Illustration showing proximity of piping to be installed on LACT unit divert valve work**



Old flotation cell removed and replaced with this new skid mounted flotation cell

***Figure 8 – Replaced old flotation cell with a reconditioned flotation cell on WD 32 E***



***Figure 9 – Construction crew installed flowlines and performed work on manifold system on cellar deck***

## Investigative Findings

### Contractor Assignments

Black Elk contracted Compass to manage and oversee the construction modifications and to coordinate with all of the various companies working on the WD 32 E platform. Black Elk contracted GIS to provide the construction workers needed for the various construction projects on the WD 32 E platform. Along with providing workers from the United States, GIS also subcontracted with DNR to recruit workers from the Philippines. Black Elk contracted WGPSN to manage production equipment, and perform production related operations for the WD 32 complex in a safe manner. At the time of the incident WGPSN was also assigned the role of PIC for the WD 32 complex. WGPSN was responsible for preparing hot work areas by purging, isolating the areas, and monitoring the hot work. Shamrock Energy Solutions L.L.C. (Shamrock) was contracted to provide mechanical services to the WD 32 complex. Finally, Black Elk contracted Enviro-Tech Systems to replace the existing flotation cell on WD 32 E platform with a reconditioned flotation cell.

The WGPSN PIC stated to the Panel he knew of the following work to be performed on the WD 32 E platform (*see figure 10*):

- Replace and repair flotation cell – hot work;
- Install divert valve on LACT unit using pre-fab piping;
- Install well flow lines on production manifold on the cellar deck – hot work;
- Replace overboard water line; and
- Work on the FWKO – hot work.

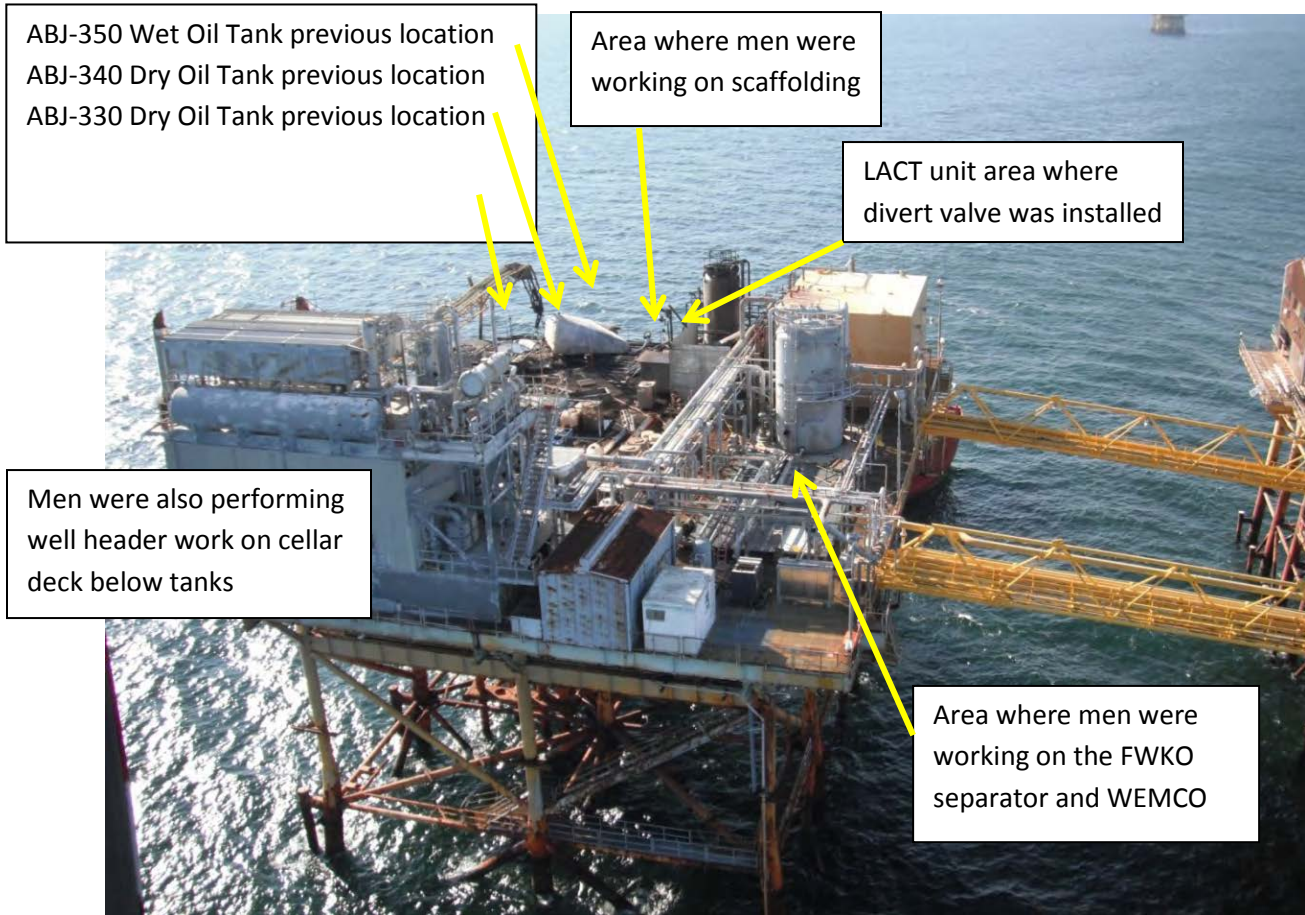
From the Panel's interview of the WGSPN PIC, the following information was provided:

- (1) The flotation cell had been Locked-Out-Tagged-Out (LOTO) and made safe for hot work.
- (2) The production manifold system had been isolated by valves being placed in the close position, wells were shut-in, and hydrocarbons had been bled off allowing



the safe performance of hot work.

- (3) The WGPSN PIC had no knowledge of any hot work being performed or scheduled to be performed on or near the LACT unit. The WGPSN PIC knew the LACT unit divert valve was being installed and the GIS/DNR crews would also be installing piping used to connect the new LACT unit divert valve to the wet oil tank.
- (4) All of the LACT unit work was supposed to be cold work, or simply put, the GIS/DNR workers would only bolt on the new piping and divert valve.
- (5) The GIS/DNR workers should have never been performing hot work near the LACT unit.
- (6) Neither the WGPSN PIC nor any of the other WGPSN operators had taken any steps to make the LACT unit work area safe for performing hot work.



**Figure 10 – Areas where work was performed on WD 32 E platform**

## **Safety Meetings and Job Safety Analysis**

The WGPSN PIC gave the GIS/DNR crews a safety orientation upon arriving at the WD 32 D platform. This safety briefing was supposed to cover all safety related devices, means of egress, and any known safety hazards on the WD 32 complex. Each person working or staying on the WD 32 complex should have been shown the locations of the life vests and firefighting equipment, and given emergency alarms sound recognition orientation. According to witness statements, workers were only shown a short “safety” video which did not include information about means of egress, life vests, or other safety related topics. The “safety” video included information about preventing pollution by not disposing of trash in the GOM. The workers

were given emergency alarm sound recognition training when they arrived on the platform. While on the Black Elk WD 32 complex, the GIS/DNR workers never participated in any type of fire or man overboard safety drills, and were never informed by the WGPSN operators of any hazards present on the platforms. According to the GIS/DNR supervisor, he and the GIS/DNR workers were told by the Compass consultant, that the WD 32 complex was shut-in, all lines were purged, and the platform had been made safe for construction modifications to commence.

Every morning prior to starting their workday, the GIS/DNR construction crew and the WGPSN operators held separate safety meetings. GIS/DNR held its meeting in the galley aboard the WD 32 D platform while WGPSN would normally hold its morning meeting in the WGPSN PIC's office also aboard the WD 32 D platform. During the GIS/DNR morning safety meeting, the workers were instructed by the Compass consultant and the GIS/DNR supervisor on what work they were to perform that day. According to GIS and DNR employees, during the morning safety meetings they would discuss any issues or problems from the day prior, their supervisor would assign the days' workload, they would review and sign the Job Safety Analysis (JSA), and then they were told to "be safe."

The WGPSN PIC stated, he would have his C operator attend the GIS/DNR daily morning safety meetings and report back to him during the WGPSN morning meetings. The C operator is an entry level position which normally does not have sufficient knowledge or experience to evaluate complex or potentially dangerous activities. On November 16, 2012, the WGPSN PIC did not attend the GIS/DNR morning safety meeting; instead the WGPSN class C operator attended the meeting. According to the WGPSN PIC, on November 16, 2012, he was never informed by his C operator of any hot work that was scheduled to be performed in the LACT unit area. During an interview, the WGPSN C operator state that he was at the November 16, 2012, GIS/DNR morning safety meeting merely out of coincidence. The WGPSN C operator stated that he never received any instruction from the WGPSN PIC to attend the meeting, and that he did not know he was supposed to report on the meeting to his PIC. Since the GIS/DNR morning safety meetings were held in the galley, the C operator said that he was just there for

breakfast and the meeting happened to be going on while he ate. According to the WGPSN C operator, this is why he did not pay attention to what the GIS/DNR crew was discussing.

On the morning of November 16, 2012, the GIS/DNR supervisor instructed the GIS/DNR workers on the work to be performed that day, specifically directing them to work on the flotation cell, the production manifold, and the LACT unit. At no time during the GIS/DNR safety meeting did they discuss safety or hazards related to hot work. During the GIS/DNR morning safety meeting, the Compass consultant informed the workers about how well everyone had been doing and about the work to be completed. The Compass consultant informed the GIS/DNR workers a boat would be coming that day and they would all be going home. Additionally, the JSA's were filled out and signed by the GIS/DNR workers. The GIS/DNR supervisor stated to the Panel he "kinda" read the morning JSAs saying, "they always say the same thing." (Note: WGPSN held its morning safety meeting at a later time and in the PIC's office.)

### **Hot Work Permits and Gas Detectors**

Under Black Elk's hot work procedures, prior to conducting any hot work, a hot work permit must be completed and issued by a WGPSN PIC and given to the GIS/DNR supervisor. From November 10, 2012 through November 16, 2012, all Black Elk hot work permits were completed and issued by the WGPSN C operator. The C operator stated that hot work permits dated from November 10, 2012, through November 16, 2012, were the very first ones he had ever completed and issued. According to the WGPSN PIC, the WGPSN C operator was given on the job training by him, on how to complete a hot work permit.

From the Panel interview of the WGSPN C operator, the following information was provided. The C operator's on the job training consisted of the WGPSN PIC telling him to simply 'copy' the previous day's hot work permit and to come ask him if he had any questions. The C operator did not receive any other on the job training related to hot work permits. The C operator did not have his hot work permits reviewed or approved by the WGPSN PIC. The

WGPSN C operator would sign the hot work permit and then provide it to the GIS/DNR supervisor, who would then give it to the designated fire watch.

From November 9, 2012, through November 16, 2012, the GIS/DNR supervisor received only one hot work permit per day. The GIS/DNR supervisor believed these single hot work permits were intended to cover multiple hot work areas. The planned hot work areas on the permits were not in close proximity to each other, and only one fire watch was made available. Additionally, the hot work permits did not list or show the LACT unit as an authorized hot work area. The GIS/DNR supervisor stated that he did not have any concerns about only having one hot work permit, nor was he concerned about the permit not having the LACT unit work area listed. The GIS/DNR supervisor also stated that he believed it was okay to have only one permit and that one permit could cover hot work for an entire platform.

On November 16, 2012, a single hot work permit was filled out and signed by the WGPSN C operator who then gave it to the GIS/DNR supervisor. The WGPSN PIC did not review or sign the hot work permit.

Several GIS/DNR employees stated the two GIS-issued gas detectors were not functioning properly during their hitch. Specifically, one detector's battery did not last more than half a day and the second detector alarmed constantly. The GIS/DNR employees brought these issues and concerns to the attention of the GIS/DNR supervisor and were subsequently told by him not to worry about the detectors. According to the DNR workers, the GIS/DNR supervisor instructed the construction workers to hang the non-functioning gas detector up like a "decoration" so everyone could at least see that they had one. When asked about the two GIS gas detectors, the GIS/DNR supervisor stated they were both in good working order, except for one which did not have a long-lasting battery. According to the GIS/DNR supervisor, if the detector ran out of power he had his workers place it on the charger and use the second detector. The GIS/DNR supervisor stated if the second detector was not working then he would have his workers stop any hot work. Based on information the Panel collected from the GIS-owned gas detectors, and statements made by GIS and DNR workers, the Panel did not find the GIS/DNR supervisor's above statements about the GIS owned gas detectors to be credible.

When questioned by the Panel about how his workers who were working in multiple hot work areas could effectively monitor the gas readings with only one detector, the GIS/DNR supervisor responded by saying if the reading on the top deck was okay, then the readings on the cellar deck should also be okay. Again, the GIS/DNR supervisor explained his belief that only one hot work permit was good for all hot work on the platform. The GIS/DNR supervisor was asked why the LACT unit area was not listed on the hot work permits. The GIS/DNR supervisor stated a hot work permit need only say WD 32 E platform, and a person would be covered to perform hot work anywhere on the WD 32 E platform. This statement about one hot work permit covering an entire platform is in direct contradiction to the Black Elk established hot work policy.

According to a GIS/DNR worker interviewed, on November 15, 2012, both of the GIS owned gas detectors were placed in their chargers. The chargers were located on the WD 32 E platform in the Gauger Shack. On December 6, 2012, both of the GIS-issued gas detectors were recovered from their chargers still plugged into an outlet on the wall of the Gauger Shack. According to multiple witnesses, the GIS owned gas detectors were not seen in use on November 16, 2012. The GIS/DNR supervisor stated during his November 16, 2012 “tailgate” meetings that he did not witness the gas detectors present or being used in the LACT unit work area. The GIS/DNR supervisor stated he “believed” his workers had the detectors and would use them when performing hot work. Data recovered from the two GIS-owned gas detectors indicated they were not used on November 16, 2012.

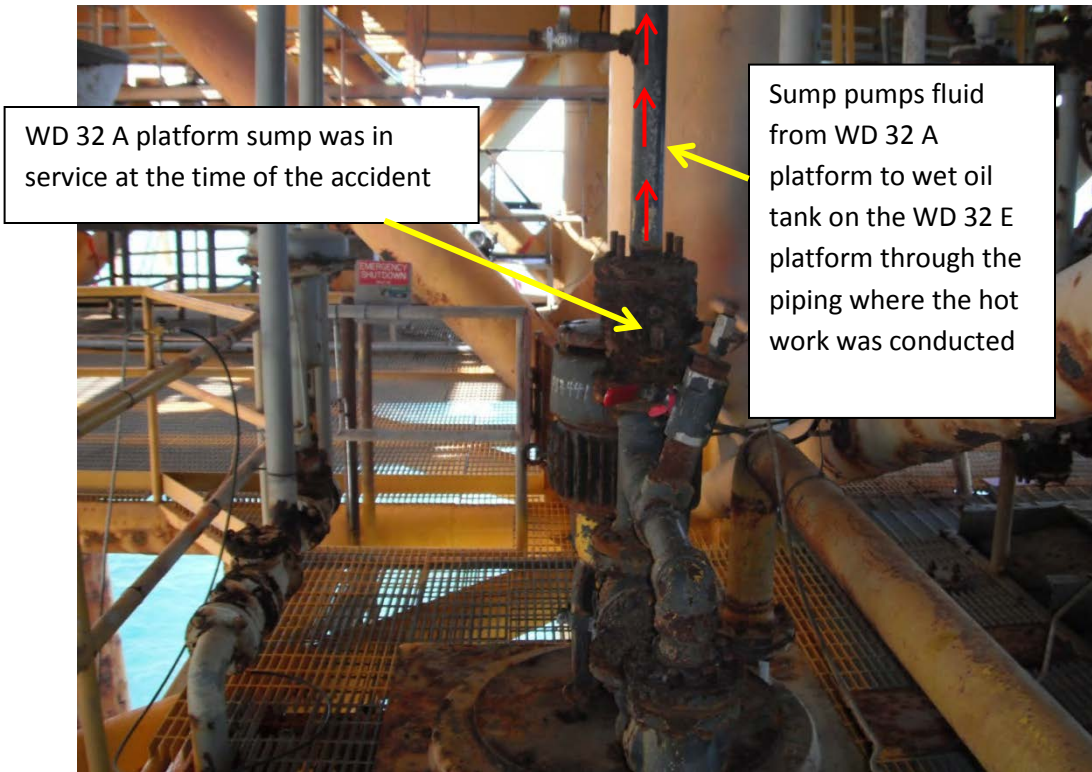
### **LACT Unit Construction Modifications**

The GIS/DNR supervisor stated that on the evening of November 15, 2012, that he and the Compass consultant went to the WD 32 E platform LACT unit area. According to the GIS/DNR supervisor, the Compass consultant provided instruction to the GIS/DNR supervisor about what work needed to be done in the LACT area the next day, including the hot work. Also according to the GIS/DNR supervisor, the GIS/DNR supervisor and the Compass consultant both walked the LACT unit piping to its lowest level on the WD 32 E platform cellar deck where

the GIS/DNR supervisor witnessed the Compass consultant check the piping, and bleed water from a bleeder valve. According to the GIS/DNR supervisor, this was done as a “double check” to ensure the LACT unit piping was safe to perform hot work on. The GIS/DNR supervisor confirmed he did not check with the WGPSN PIC on the LACT unit piping safety; he thought the piping was safe to perform hot work on. This belief of the piping being safe for hot work came from his initial briefing provided by the Compass consultant where, he stated the platform was safe, shut in, and all piping had been purged.

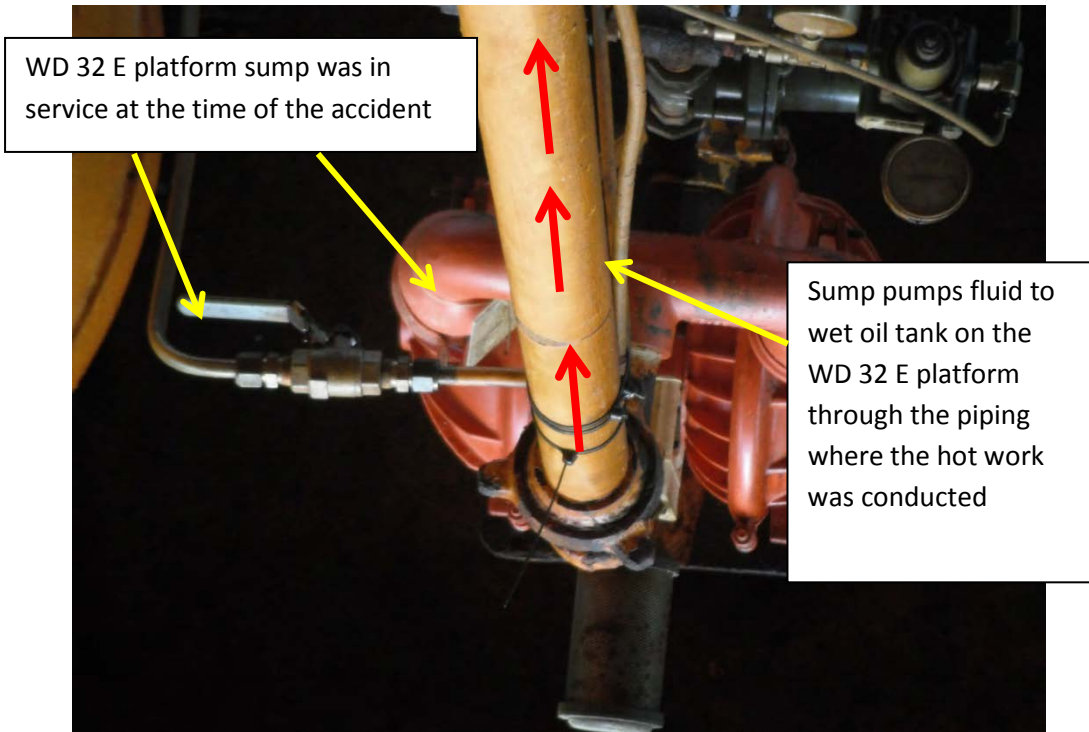
The Compass consultant confirmed he and the GIS/DNR supervisor met at the LACT unit area on the WD 32 E platform top deck on November 15, 2012, to talk about the next day’s workload. According to the Compass consultant, he instructed the GIS/DNR supervisor to complete the divert valve installation, but to wait on installing the piping until the flotation cell replacement had been completely finished. The Compass consultant confirmed he did not consult with the WGPSN PIC about making the LACT unit area piping safe for performing hot work. The Compass consultant stated he had intended to consult with the WGPSN PIC later in the afternoon on November 16, 2012, once the flotation cell replacement project had been completed. The Compass consultant said he had no knowledge of the GIS workers performing hot work on the LACT unit area on the morning of November 16, 2012. The WGPSN PIC stated if he had known about the hot work being performed in the LACT unit area, his crew would have made the area safe for hot work.

The BSEE investigation identified that the sump systems on both the WD 32 A and E platforms were still in service the day after the explosion/fire (see figures 11 and 12). The Panel concluded that having both sump pumps in service at the time of the incident posed a significant risk. However, based on the evidence gathered, the sump pumps did not contribute to the cause of the incident.



**Figure 11 – The WD 32 A platform sump was in service while the construction crew performed hot work**



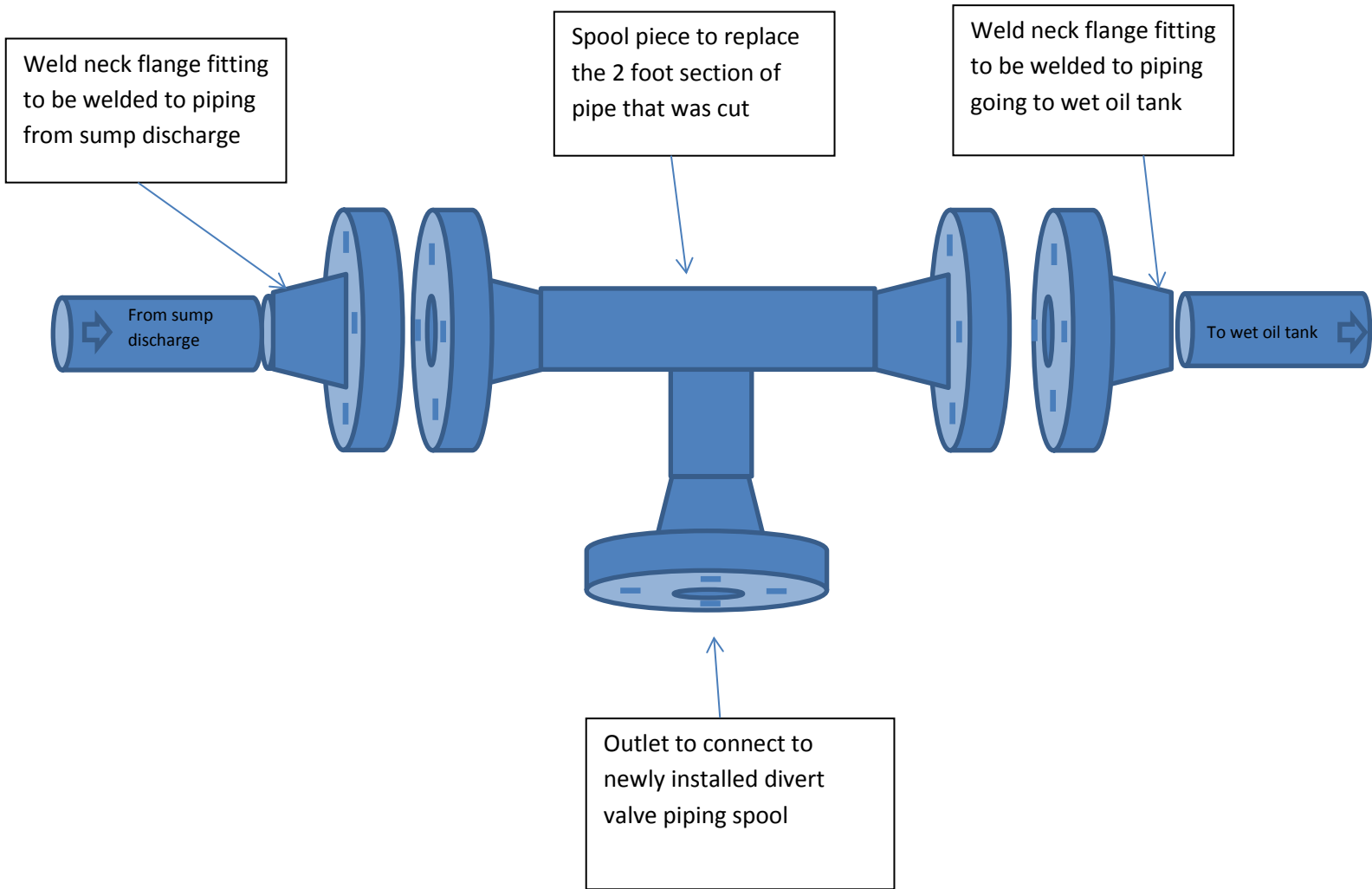


**Figure 12 – The WD 32 E platform sump was in service while the construction crew performed hot work**

After the GIS/DNR safety meeting on the morning of November 16, 2012, the GIS/DNR supervisor stated he went over to WD 32 E platform and performed “tailgate meetings” where he instructed the GIS/DNR construction crews on what work needed to be performed. The GIS/DNR supervisor said he was then called to the main office to take a phone call. (Note: no other GIS/DNR employee corroborated the GIS supervisors’ claim of conducting “tailgate” meetings). In addition, the GIS/DNR supervisor commented that, after he performed his “tailgate” meetings with all of his workers at each of their work sites, he witnessed his workers making cuts into the piping coming from the sump pump to the wet oil tank. This cutting was done to allow the installation of the new piping. These cuts were made with an pneumatic handheld saw that did not produce heat and was considered to be cold cutting work. When his workers started cutting into the piping coming from the sump pump to the wet oil tank, the GIS/DNR supervisor witnessed water flowing from the first cut. The GIS/DNR supervisor stated

he thought this water was condensation coming from the pneumatic saw. Shortly after witnessing this cut, the GIS/DNR supervisor was called back to the office for a phone call. The GIS/DNR supervisor stated he did not witness any worker perform any hot work in the LACT unit area prior to leaving. The surviving GIS/DNR workers who were performing the cuts confirmed water did start flowing from the first cut of the piping coming from the sump pump to the wet oil tank, but the flow had stopped by the start of the second cut. The water flowed from the cut at a rate significant enough to cause the GIS/DNR workers who were not on the scaffolding to place a bucket under the cut to capture the flowing liquids.

According to the GIS/DNR supervisor, he returned to the main office located on WD 32 D platform where the Compass consultant was also located. The GIS/DNR construction workers located in the LACT unit work area continued to make the necessary cold cuts until a two foot section of pipe had been removed. After the two feet of piping had been removed, a GIS/DNR construction worker used an electric powered grinder to smooth and prep the exposed piping edges for the welding of the two flanges (see figure 7). This grinding is considered hot work and according to witnesses produced a significant amount of sparks. Around 9:00 a.m., the GIS/DNR construction worker completed all of the grinding work and was joined on the scaffolding by two other GIS/DNR construction workers. These three workers were all standing on the scaffolding, preparing to start welding work. One of the GIS/DNR workers held the flange in place while another worker squared the flange and the third GIS/DNR worker was set to weld the flange into place. The welder was supposed to place several tack welds on the flange. These tack welds would be used to hold the flange in place as the welder completed the permanent welds. In an interview with Panel members, one GIS/DNR worker stated that it is at this point in time, just before the tack welding began, another GIS/DNR worker asked the other two workers if they smelled a gas like odor and received no response. The GIS/DNR welder then started to make the first tack weld, which ignited the flammable vapors present.



**Figure 13 – Illustration of the fabrication, assembly, and tack welding location**

### **Explosion/Fire**

The American Bureau of Shipping Group (ABSG) was contracted by Black Elk to independently investigate this incident and to provide Black Elk with a report showing its findings. ABSG also worked directly with BSEE when obtaining, preserving, and testing a wide range of evidentiary materials. ABSG coordinated the testing of all evidence with BSEE. The results of these tests were provided to BSEE, and were used to help the Panel form some of the

conclusions discussed in this report. According to ABSG modeling, in a matter of seconds the flame propagated through the piping into the wet oil tank, and then into the two dry oil tanks. All three of these tanks were connected by a common vent line, which allowed the ignition to continue from one tank to the next without obstruction. Based on ABSG flame propagation modeling, it took less than two seconds from the ignition of these hydrocarbon vapors for a chain reaction to occur that caused the wet oil tank and two connected dry oil tanks to explode. Due to the explosive pressure inside each tank, all three tanks separated at their base welds. After the tanks separated, the wet oil tank and one dry oil tank were launched by this force from the platform into the GOM (see figure 14). The second dry oil tank was launched into the air striking the platform crane causing it to land back onto the platform. The released liquid hydrocarbons ignited on the platform. These explosions contributed to the death of three workers, injured multiple other workers, created an oil sheen approximately one half mile by 200 yards, and caused platform damage. Based on the volumes of liquid present in each tank at the time of the incident, the Panel estimated that a total of 500 barrels of liquid hydrocarbons were contained in the tanks at the time of the explosion.



**Figure 14 – One of the tanks that landed in the GOM**

Immediately after the explosion and ensuing fire, the workers working on WD 32 E platform began egressing to the WD 32 D platform muster area. Once in the muster area, workers identified that two GIS/DNR men were missing, they identified who was injured, began providing first aid, and prepped workers for evacuation. At the same time, two workers stated they had seen a single man in the water near WD 32 E platform. One of the Enviro-Tech workers claimed he witnessed a man in the water while crossing onto the A platform. The Enviro-Tech worker went to the lowest level of WD 32 A platform where he witnessed a man in the water waving his arms and struggling to stay on the surface of the water. The man went under the surface of the water several times as he drifted away from WD 32 E platform towards WD 32 A platform. The Enviro-Tech worker said he witnessed the man go under the water and never re-surface. After several minutes of scanning the area where the man was last seen, the Enviro-Tech worker returned to WD 32 D platform, where he reported his observations to the WGPSN PIC. The Shamrock mechanic stated, as he was crossing the cat-walk between WD 32 A

platform and WD 32 D platform he observed what he thought was a man in the water, but was not completely sure. He reported this observation to the WGPSN PIC.

While the injured workers were being evacuated via helicopter from the WD 32 D platform, the WGPSN PIC and the A operator along with the Shamrock mechanic returned to WD 32 E platform, and started fighting the fire. The injured workers were taken to medical facilities in Marrero and Baton Rouge, Louisiana.

The fire was eventually extinguished by the WGPSN operators along with several boats in the area (see *figure 15*). BSEE and the USCG responded quickly to the scene to investigate the explosion/fire. BSEE observed an oil sheen approximately one half mile by 200 yards. (see *figure 16*).



***Figure 15 – Work boats in the area helping to extinguish fire on WD 32 E platform***



***Figure 16 – Sheen from Black Elk Energy WD 32 E platform after explosion and fire***

The USCG and Black Elk initiated an extensive search and rescue effort to try to locate the two missing men. The body of Mr. Corporal, a GIS/DNR worker, was recovered from the GOM by Black Elk contracted divers on November 17, 2012. On November 26, 2012, the body of Mr. Malagapo, a second GIS/DNR worker was recovered from the GOM by the USCG. On November 23, 2012, Mr. Tajonera, a third GIS/DNR worker died as a result of his injuries at the Baton Rouge Hospital.

## **Conclusions**

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### **Cause of Explosion/Fire**

The failure to properly secure the oil tanks, purge their pipelines, and follow established hot work procedures allowed the flammable vapors to reach a hot work area. The flammable vapors originating from these oil tanks reached the area where the GIS/DNR workers were tack welding a flange. Once the vapors were ignited by the welding work, the flame traveled from tank to tank due to the tanks' piping configuration. Due to the headspace in each tank, a combustible atmosphere inside each tank was created. Once this combustible atmosphere ignited, the increased pressures created inside each of the tanks could not be released fast enough through the vent system. These increased pressure levels exceeded the structural strength of the tanks and caused the tanks to fail at their base welds. This increased pressure and failure at the base welds resulted in two of the tanks breaking away from their base and launching off of the WD 32 E platform, eventually landing in the GOM. The third tank also broke away at its base weld and launched from the platform, however this tank struck the platform crane and landed back on the WD 32 E platform. The liquid contents of all three tanks were released from the bottom of each tank onto the platform and into the GOM. The flames that traveled through the tanks also ignited these hydrocarbons as they were released onto the platform and into the GOM.

### **Contributing Causes of Explosion/Fire**

#### **Probable Contributing Causes**

- Black Elk, Compass, GIS, and WGPSN did not adhere to welding and burning regulations outlined in 30 CFR 250.113 and did not follow Black Elk's Hot Work Plan:
  - The Compass consultant, WGPSN PIC, and the GIS/DNR supervisor failed to inspect the area in which the work was to be performed for potential fire and explosion hazards;



- The WGPSN PIC did not issue written authorization for the work using the company's Welding and Burning Authorization Form;
  - Black Elk, Compass, GIS/DNR and WGPSN allowed hot work to be performed on piping that contained a flammable substance, but did not isolate or render the piping inert. The designated PIC determined that area was safe for welding or burning;
  - There was no one properly designated as a Fire Watch in each of the areas where welding operations were in progress. The Panel found evidence that showed only one hot work permit was issued for multiple hot work locations. There is evidence that showed only one person was assigned to perform fire watch duties for three separate hot work areas. These hot work areas were on multiple decks and too great a distance from each other to effectively be managed by one person. While multiple hot work areas can be covered under one hot work permit, this is usually only done when the work areas are very close to each other and can be overseen by one fire watch; and
  - The Fire Watch did not have a portable gas detector in use the day of the incident. The Panel confirmed through laboratory analysis of the gas detectors in addition to witness statements, that the fire watch never used the GIS gas detectors on the day of the incident. The Panel found no evidence that the GIS owned gas detectors were properly functioning or in use at the time of the explosion. After the incident, the gas detectors were recovered from the Gauger Shack still in their charging units.
- There was a lack of supervision by Black Elk, Compass, GIS, and WGPSN. Black Elk was responsible for ensuring that all personnel on the facility followed Safe Work Practices. The GIS/DNR workers performed welding operations and hazardous hot work without adequate supervision and guidance from Black Elk, Compass, WGPSN, or GIS/DNR supervision. Without active supervision by experienced personnel, the workers proceeded with the welding work based upon a faulty assumption the appropriate

safety measures had been taken. The WGPSN PIC placed an inexperienced C operator in charge of issuing hot work permits without providing him critical training and guidance.

- Black Elk, Compass, GIS, and WGPSN were not properly involved in the planning and execution of the hot work being performed. No one checked to make sure the Hot Work Permit was issued correctly or the white copy returned at the end of the day; and
- WGPSN operators did not properly engage in the management of the Production Operations. The WGPSN operators did not take responsibility for ensuring the construction workers were engaged in safe activities on the WD 32 complex.

### **Possible Contributing Causes**

- There was inadequate planning by Black Elk to properly complete LACT modifications. Black Elk, Compass, WGPSN and GIS could not produce any specific procedures plans or documentation to perform the work. The JSA and hot work permits were not written specific to the job tasks. The Panel found the JSA's and hot work permits to be very vague in their description of work. The GIS/DNR supervisor did not fully read or go over all aspects of the JSA's. Hot work permits were filled out improperly, contributing to the failure in identifying associated hazards. Additionally, the hot work permits were not reviewed nor completed by the WGPSN PIC, allowing the errors to go uncorrected.
- WGPSN operators were inadequately trained to perform the work safely. The C operator, instead of the PIC was allowed to issue hot work permits. The C operator was provided inadequate on the job training and supervision on how to properly prepare and issue hot work permits. The C operator is an entry level position which normally does not have sufficient knowledge or experience to evaluate complex or potentially dangerous activities.
- There were communication failures. The Panel found the Compass consultant failed to effectively communicate all of the construction project changes and the potential hazards related to those projects, with the other contractors onboard the WD 32 complex. The WGPSN PIC failed to communicate effectively with the other contractors

aboard the WD 32 complex by not taking an active role in understanding the scope of the construction projects. This failure by the WGPSN PIC is most evident in his failure to participate in other safety meetings and not performing regular walkthroughs of the construction sites. The GIS/DNR supervisor failed to ensure effective communication was maintained among his workers by relying solely on the few DNR workers who spoke English to pass along critical job and safety related information to the non-English speaking DNR workers. The GIS/DNR supervisor failed to verify the safety status of the hot work areas with the WGPSN PIC and relied solely on outdated communication from the Compass consultant.

- No worker invoked his “stop work” authority despite apparent anomalies. The Panel found evidence, immediately prior to welding, one of the GIS workers asked the others if they smelled gas. The Panel found no evidence the other workers responded or that anyone took steps to suspend operations to investigate further. Some of the construction crew workers for GIS expressed concerns about the possibility of one of the gas detectors not functioning properly. There was no clear explanation of what was done to remedy this situation. Throughout the course of BSEE panel interviews several GIS and DNR employees expressed a fear of losing their jobs. The GIS and DNR employees worried that if they continued to “complain” about work related issues while working on the WD 32 platforms, they would be sent home.

## **Safety Culture**

Black Elk, as the lessee and operator of the WD 32 complex, was responsible for ensuring that all of its contractors worked together to operate in a safe and environmentally responsible manner. If an operator can create a robust safety culture, it is typically easier to meet this obligation. The Panel found the safety culture aboard the WD 32 complex at the time of the incident to be poor at best. Due to Black Elk’s failure to manage its contractors and the contractors’ collective failure to adhere to established policies, the Panel found the lack of a safety culture aboard the WD 32 complex to be a contributing cause of the explosion/fire. The

Panel found there was inadequate supervision on the WD 32 complex that led to a complete degradation of the safety culture aboard the WD 32 complex. Black Elk did have a BSEE approved hot work plan; however they failed to perform the necessary actions to ensure this plan was being followed. The Compass consultant did not effectively communicate changes in the construction projects to the other contractors aboard the WD 32 complex. The Compass consultant failed to properly perform walkthroughs of the construction project areas resulting in a reduced ability to identify the hazards associated with the construction projects. Due to the lack of leadership by Compass, GIS/DNR, and WGPSN, critical hazards associated with the work were not identified and managed. The WGPSN operators failed to maintain adequate control over the WD 32 complex. WGPSN operators failed to take an active role in all phases of the construction projects and to maintain effective communication with all workers onboard the WD 32 complex.

The WGPSN PIC did not attend the daily GIS/DNR morning safety meetings; instead, he directed the WGPSN C operator to attend these meetings and to report any concerns back to him. The WGPSN PIC did not regularly walk the areas where construction projects were ongoing. The WGPSN PIC did not coordinate with the GIS/DNR construction supervisor or workers about the projects, their needs, or any safety concerns. The WGPSN PIC failed to properly train or instruct the C operator on the issuance of hot work permits. The WGPSN PIC did not follow or enforce the established Black Elk hot work plan.

During the morning safety meeting held by GIS/DNR, the workers would discuss the previous day's work, the current work would be assigned, and the workers would sign the JSA. The Compass consultant would briefly attend these meetings, but did not sign the JSA's. The WGPSN PIC signed several of the GIS/DNR JSA's without fully reading them. The GIS/DNR supervisor could not confirm if all of his workers read and understood the JSA's. He could only state that they signed them, so he believed they read them. The GIS/DNR supervisor made no effort to communicate with the WGPSN PIC or operators about his work projects. The GIS/DNR supervisor made no effort to check on the safety of the work areas. The GIS/DNR supervisor made no efforts to ensure hot work areas were clear of hydrocarbons or other flammable

materials. The GIS/DNR supervisor's relaxed attitude towards safety was carried over to the GIS/DNR workers. Multiple DNR workers stated they did not perform safety checks because they believed if the GIS/DNR supervisor told them to perform hot work, then it was safe to do so.

The surviving GIS/DNR construction workers who performed the cutting and hot work at the LACT unit, all confirmed they knew what proper safety procedures needed to be taken prior to performing any hot work on a piping that contained hydrocarbons. When the GIS/DNR workers were asked if any safety steps had been taken by them prior to the start of hot work, they all responded "no." When asked why they would conduct hot work knowing these safety steps had not been taken, the workers responded by saying they trusted their supervisor.

Interviews of GIS/DNR workers provided multiple examples of incidents where safety was lacking aboard the WD 32 complex prior to the incident. Specifically, several workers had expressed their concern over safety while using the platforms crane to lift deck grating. This incident and the workers' safety concerns were corroborated by the GIS/DNR supervisor. The GIS/DNR supervisor stated he stopped the work; however the GIS/DNR workers claim they were told not to worry and to continue with their work. Several GIS/DNR workers also talked about how one man stepped through rusty deck grating. This incident was also corroborated by the GIS/DNR supervisor. The GIS/DNR supervisor said his corrective actions were to have red caution tape placed around the rusty deck grating and to instruct his workers to only walk on the main beams.

Several DNR employees stated the two GIS owned gas detectors were not functioning properly during the hitch. The DNR employees brought these safety concerns to the attention of their GIS/DNR supervisor. The DNR workers were subsequently told by the GIS/DNR supervisor not to worry about the detectors.

A review of the data records from the GIS gas detectors showed they had not been used on November 15, 2012, the day prior to the explosion/fire, nor on November 16, 2012, the day

of the explosion/fire. On November 15, 2012, WGPSN issued a hot work permit and witness statements confirmed GIS/DNR workers had performed hot work that day.

Black Elk, WGPSN, Compass Consultant, GIS/DNR all failed to comply with established safety policies and procedures. From November 9<sup>th</sup> through November 16<sup>th</sup>, the GIS/DNR supervisor received only one hot work permit per day. These single hot work permits were used to cover multiple hot work areas. None of the three primary hot work areas were in close proximity to each other and could not have been properly controlled by one fire watch. Additionally, the hot work permits did not list or show the LACT unit as an authorized hot work area.

### **Black Elk Energy Safety and Environmental Management Systems (SEMS)**

The Black Elk Safe Work Manual states *“Management of risk is a continuous process and the cornerstone of all the SEMS Elements. We continuously identify the hazards and assess the risks associated with our activities. In addition, we take appropriate action to manage the risks and thus prevent or reduce the impact of potential accidents or incidents.”*

- Black Elk, as the operator, failed to demand accountability for implementation, or provide the necessary resources for carrying out an effective SEMS program.
- The Black Elk SEMS program failed to include a mechanism for the establishment and implementation of safe work practices designed to minimize the risks associated with operating, maintenance, and modification activities and the handling of materials and substances that could affect safety of personnel and the environment.
- The Black Elk SEMS program failed to include a mechanism to ensure Compass, GIS/DNR, and WGPSN follow Black Elk safe work practices.
- Black Elk, as the operator, failed to document the existence of an agreement with Compass, GIS/DNR, and WGSPN on appropriate contractor safety and environmental policies and practices before the contractors began the work at the WD 32 complex in accordance with Black Elk SEMS program.
- Black Elk, as the operator, failed to verify that Compass, GIS/DNR, and WGPSN were

properly using established safety procedures while conducting their activities in accordance with Black Elk SEMS program.

- Black Elk, as the operator, failed to make certain that Compass, GIS/DNR, and WGPSN personnel had the skills and knowledge to perform their assigned duties, and were conducting these activities in accordance with the requirements set in the Black Elk SEMS program.
- Black Elk SEMS program failed to include procedures and verification that Compass, GIS/DNR, and WGPSN personnel understood and could perform their assigned duties for activities such as, but not limited to:
  - (1) Installation, maintenance, or repair of equipment;
  - (2) Construction, startup, and operation of your facilities;
  - (3) Turnaround operations;
  - (4) Major renovation; or
  - (5) Specialty work.
- Black Elk, as the operator, failed to inform the contractors of any known hazards at the facility they were working on including, but not limited to, hazardous or flammable chemicals in accordance with the Black Elk SEMS program.

## **Regulatory Recommendations and Related Findings**

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Under the Outer Continental Shelf Lands Act (“OCSLA”), 43 U.S.C 1348(b), the Secretary of the Interior is authorized to manage and regulate the leasing, exploration, development, and production of resources on the Outer Continental Shelf (“OCS”). The Secretary has delegated this authority to BSEE. OCSLA provides that lease or permit holders have an affirmative duty to:

- (1) maintain all places of employment within the lease area or within the area covered by such permit in compliance with occupational safety and health standards and, in addition, free from recognized hazards to employees of the lease holder or permit holder or of any contractor or subcontractor operating within such lease area or within the area covered by such permit on the OCS;
- (2) maintain all operations within such lease area or within the area covered by such permit in compliance with regulations intended to protect persons, property and the environment on the OCS; and
- (3) allow prompt access, at the site of any operation subject to safety regulations, to any inspector, and to provide such documents and records which are pertinent to occupational or public health, safety or environmental protection, as may be requested.

This Section sets forth the Panel’s findings related to both the involved companies’ regulatory obligations, as well as their obligations under the welding plan Black Elk has in place on November 16, 2012.

### **Hot Work Plan Not Followed**

During its investigation, the Panel found evidence that Black Elk, WGPSN, GIS/DNR, and Compass did not adhere to the approved hot work plan. According to the BSEE approved Black Elk Welding, Burning and Hot-Tapping Safe Practices and Procedures Plan, prior to any hot work



being performed outside of a designated welding area the work shall be performed in compliance with the following:

- Prior to the commencement of any welding or burning operation on a structure, Black Elk Energy's designated PIC at the installation shall personally inspect the qualifications of the welder or welders to assure that they are properly qualified in accordance with the approved company qualification standards or requirements for welders.
  - The WGPSN PIC failed to inspect any of the worker qualifications.
  - The WGPSN PIC would only communicate with the Compass consultant about the construction work.
  - The WGPSN PIC delegated the hot work permit responsibilities to a C operator with little to no training on properly completing a hot work permit.
- The designated PIC and the welders shall personally inspect the area in which the work is to be performed for potential fire and explosion hazards.
  - The WGPSN PIC failed to inspect the hot work areas.
  - The C operator who completed the hot work permit failed to inspect the work areas.
  - The GIS/DNR supervisor and DNR workers failed to coordinate the hot work with the WGPSN PIC.
- After it has been determined that it is safe to proceed with the welding or burning operation, the designated PIC shall issue written authorization for the work using the company's Welding and Burning Authorization Form.
  - The WGPSN PIC never determined if it was safe to proceed.
  - The hot work permits were issued by an inexperienced C operator.
  - The WGPSN PIC never reviewed the hot work permit.
  - The hot work permits failed to detail the work to be performed and the location of the work.

- During all welding or burning operations, one or more persons as necessary shall be designated as a Fire Watch. Persons assigned as a Fire Watch shall have no other duties while actual welding or burning operations are in progress.
  - Only one person was performing fire watch for three hot work areas on multiple levels of the platform.
  - The hot work permit did not designate who was responsible for performing fire watch duties.
- Prior to any welding or burning, the Fire Watch shall have, in his possession, fire-fighting equipment in a condition ready to use. If a gas detector is not in the area where welding is being performed, the Fire Watch will have a portable gas detector in use.
  - The GIS-owned gas detectors were not used prior to or during the hot work operations.
  - WGPSN gas detectors were not used by GIS/DNR.
- No welding shall be done on containers, tanks, or other vessels which have contained a flammable substance unless the contents of the vessels have been rendered inert and determined to be safe for welding or burning by the designated person-in-charge.
  - The WGPSN PIC never determined the LACT unit area to be safe for performing hot work.
  - The contents of the piping or tank were never made inert or properly isolated.
- All production equipment located between 10 feet and 35 feet of any welding or burning operation will be protected with flame-proofed covers or otherwise shielded with metal or fire resistant guards or curtains. If any of the production equipment is in a Class I Division I area, special attention will be given to assure that the equipment is rendered safe before welding.
  - None of the equipment was rendered safe for performing hot work.
- Equipment containing hydrocarbons or other flammable substances shall be relocated at least 35 feet horizontally from the work site. Similar equipment located at a lower elevation where slag, sparks, or other burning materials could fall shall be relocated at

least 35 feet from the point of impact. If relocation is impractical, either the equipment shall be protected with flame-proof covers or otherwise shielded with metal or fire-resistant guards or curtains, or the contents shall have been rendered inert.

- Contents of the equipment were never made inert.
  - Areas below the hot work were not protected.
- All water discharge point sources from hydrocarbon handling vessels shall be monitored in order to stop welding and burning operations in case flammable fluids are discharged as a result of equipment upset or malfunction.
  - The sumps were still active at the time of the incident.
  - There was no evidence to show the water discharge point sources were monitored.

## **Recommended Violations**

Based on the evidence gathered during the investigation, the Panel recommends that the following Incidents of Non-Compliance be issued:

### **Black Elk Energy**

- G-110 (Enforcement Action–Facility Shut-in) – Construction activities being completed onboard the facility were not performed in a safe and workmanlike manner to protect health, safety, property and the environment when welding operations were conducted in close proximity to piping containing hydrocarbons. 30 CFR 250.107(a).
- G-110 (Enforcement Action–Component Shut-in) – Operations were not conducted in a safe and workmanlike manner because there was open-ended sump discharge piping and the sump was active while personnel were conducting work nearby. 30 CFR 250.107(a).
- G-112 (Enforcement Action–Component Shut-in) – Lessee did not take necessary precaution to protect all personnel from hydrocarbon accumulation and fire hazard during the construction operations. 30 CFR 250.107(b).

- G-116 (Enforcement Action– Facility Shut-in) – Lessee failed to conduct operations in accordance with the approved welding plan. 30 CFR 250.109.
- G-303 (Enforcement Action–Component Shut-in) – Lessee did not ensure the removal or protection of equipment containing hydrocarbons and other flammable substances within 35 feet from the point of impact of slag, spark, or burning materials. 30 CFR 250.113(a).
- G-309 (Enforcement Action–Component Shut-in) – Lessee did not produce written authorization to commence welding operations in the area of the LACT system and overhead piping. 30 CFR 250.113(c)(1)(i).
- G-310 (Enforcement Action–Component Shut-in) - Lessee did not render the contents of the affected piping inert and safe prior to commencing welding activities at the area of the LACT system and overhead piping. 30 CFR 250. 113(c)(3).
- G-311 (Enforcement Action–Component Shut-in) – Lessee did not designate adequate quantity of personnel to conduct duties of a fire watch during welding. 30 CFR 250.113(c)(2).
- G-312 (Enforcement Action–Component Shut-in) – The welding operation was conducted in an area not equipped with a properly functioning gas detector and Lessee did not maintain continuous monitoring with portable gas detection equipment during the welding operations in the affected areas. 30 CFR 250.113(c)(2)(iv).
- G-317 (Enforcement Action–Component Shut-in) – Lessee did not monitor water discharge point sources from hydrocarbon handling equipment in the event flammable fluids are discharged. 30 CFR 250.113(b).
- E-100 (Enforcement Action–Facility Shut-in) – Lessee failed to take measures to prevent unauthorized discharge of pollution into offshore waters. 30 CFR 250.300(a).

#### **Wood Group Production Service Network**

- G-110 (Enforcement Action–Facility Shut-in) – Construction activities being completed onboard the facility were not performed in a safe and workmanlike manner to protect

health, safety, property and the environment when welding operations were conducted in close proximity to piping containing hydrocarbons. 30 CFR 250.107(a).

- G-110 (Enforcement Action–Component Shut-in) – Operations were not conducted in a safe and workmanlike manner because there was open-ended sump discharge piping and the sump was active while personnel were conducting work nearby. 30 CFR 250.107(a).
- G-112 (Enforcement Action–Component Shut-in) – WGPSN did not take necessary precaution to protect all personnel from hydrocarbon accumulation and fire hazard during the construction operations. 30 CFR 250.107(b).
- G-116 (Enforcement Action–Facility Shut-in) – WGPSN failed to conduct operations in accordance with the approved welding plan. 30 CFR 250.109.
- G-303 (Enforcement Action–Component Shut-in) – WGPSN did not ensure the removal or protection of equipment containing hydrocarbons and other flammable substances within 35 feet from the point of impact of slag, spark, or burning materials. 30 CFR 250.113(a).
- G-309 (Enforcement Action–Component Shut-in) – WGPSN did not produce written authorization to commence welding operations in the area of the LACT system and overhead piping. 30 CFR 250.113(c)(1)(i).
- G-310 (Enforcement Action–Component Shut-in) - WGPSN did not render the contents of the affected piping inert and safe prior to commencing welding activities at the area of the LACT system and overhead piping. 30 CFR 250. 113(c)(3).
- G-311 (Enforcement Action–Component Shut-in) – WGPSN did not designate adequate quantity of personnel to conduct duties of a fire watch during welding. 30 CFR 250.113(c)(2).
- G-312 (Enforcement Action–Component Shut-in) – The welding operation was conducted in an area not equipped with a properly functioning gas detector and WGPSN did not maintain continuous monitoring with portable gas detection equipment during the welding operations in the affected areas. 30 CFR 250.113(c)(2)(iv).

- G-317 (Enforcement Action–Component Shut-in) – WGPSN did not monitor water discharge point sources from hydrocarbon handling equipment in the event flammable fluids are discharged. 30 CFR 250.113(b).
- E-100 (Enforcement Action–Facility Shut-in) – WGPSN failed to take measures to prevent unauthorized discharge of pollution into offshore waters. 30 CFR 250.300(a).

#### **Grand Isle Shipyard**

- G-110 (Enforcement Action–Facility Shut-in) – Construction activities being completed onboard the facility were not performed in a safe and workmanlike manner to protect health, safety, property and the environment when welding operations were conducted in close proximity to piping containing hydrocarbons. 30 CFR 250.107(a).
- G-110 (Enforcement Action–Component Shut-in) – Operations were not conducted in a safe and workmanlike manner because there was open-ended sump discharge piping and the sump was active while personnel were conducting work nearby. 30 CFR 250.107(a).
- G-112 (Enforcement Action–Component Shut-in) – GIS did not take necessary precaution to protect all personnel from hydrocarbon accumulation and fire hazard during the construction operations. 30 CFR 250.107(b).
- G-116 (Enforcement Action–Facility Shut-in) – GIS failed to conduct operations in accordance with the approved welding plan. 30 CFR 250.109.
- G-303 (Enforcement Action–Component Shut-in) – GIS did not ensure the removal or protection of equipment containing hydrocarbons and other flammable substances within 35 feet from the point of impact of slag, spark, or burning materials. 30 CFR 250.113(a).
- G-310 (Enforcement Action–Component Shut-in) - GIS did not render the contents of the affected piping inert and safe prior to commencing welding activities at the area of the LACT system and overhead piping. 30 CFR 250. 113(c)(3).

- G-311 (Enforcement Action–Component Shut-in) – GIS did not designate adequate quantity of personnel to conduct duties of a fire watch during welding. 30 CFR 250.113(c)(2).
- G-312 (Enforcement Action–Component Shut-in) – The welding operation was conducted in an area not equipped with a properly functioning gas detector and GIS did not maintain continuous monitoring with portable gas detection equipment during the welding operations in the affected areas. 30 CFR 250.113(c)(2)(iv).
- E-100 (Enforcement Action–Facility Shut-in) – GIS failed to take measures to prevent unauthorized discharge of pollution into offshore waters. 30 CFR 250.300(a).

### **Compass Engineering Consultants**

- G-110 (Enforcement Action–Facility Shut-in) – Construction activities being completed onboard the facility were not performed in a safe and workmanlike manner to protect health, safety, property and the environment when welding operations were conducted in close proximity to piping containing hydrocarbons. 30 CFR 250.107(a).
- G-110 (Enforcement Action–Component Shut-in) – Operations were not conducted in a safe and workmanlike manner because there was open-ended sump discharge piping and the sump was active while personnel were conducting work nearby. 30 CFR 250.107(a).
- G-112 (Enforcement Action–Component Shut-in) – Compass did not take necessary precaution to protect all personnel from hydrocarbon accumulation and fire hazard during the construction operations. 30 CFR 250.107(b).
- G-116 (Enforcement Action–Facility Shut-in) – Compass failed to conduct operations in accordance with the approved welding plan. 30 CFR 250.109.
- G-303 (Enforcement Action–Component Shut-in) – Compass did not ensure the removal or protection of equipment containing hydrocarbons and other flammable substances within 35 feet from the point of impact of slag, spark, or burning materials. 30 CFR 250.113(a).

- G-310 (Enforcement Action–Component Shut-in) - Compass did not render the contents of the affected piping inert and safe prior to commencing welding activities at the area of the LACT system and overhead piping. 30 CFR 250.113(c)(3).
- G-311 (Enforcement Action–Component Shut-in) – Compass did not designate adequate quantity of personnel to conduct duties of a fire watch during welding. 30 CFR 250.113(c)(2).
- G-312 (Enforcement Action–Component Shut-in) – The welding operation was conducted in an area not equipped with a properly functioning gas detector and Compass did not maintain continuous monitoring with portable gas detection equipment during the welding operations in the affected areas. 30 CFR 250.113(c)(2)(iv).
- E-100 (Enforcement Action–Facility Shut-in) – Compass failed to take measures to prevent unauthorized discharge of pollution into offshore waters. 30 CFR 250.300(a).

This list of violations is based upon the evidence gathered by the Panel’s investigation, findings, and conclusions. Further evidence may reveal additional violations. After this Report is released, BSEE will issue Incidents of Noncompliance based upon evidence contained in this Report and/or other relevant evidence.



## **Recommendations**

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### **Safety Alert**

It is recommended that BSEE consider issuing a Safety Alert to operators that includes these elements:

- 1. A brief description of the accident;*
- 2. A summary of the causes; and*
- 3. List the following recommendations to operators and their contractors:*

It is recommended that operators conduct a safety stand down for all of their operations and discuss the events surrounding the explosion/fire that occurred on Black Elk's WD 32 E platform, and specifically address with personnel the following issues:

- Operators should be aware of the need to properly communicate and comprehend all operations, especially modifications to their facilities, in order to identify potential hazards that can negatively affect personnel, equipment or the environment;
- Operators should ensure a precise chain of command for any work involving contractors on their facilities. For welding operations, operators should clearly designate a welding supervisor or person in charge as outlined in 30 CFR 250.111;
- Operators should require all operations and contract personnel involved in hot work participate together in all safety meetings. The meeting should involve the initiating of the hot work permit and should ensure that the complete job scope is understood, all hazards are identified, and policies, regulations, contingencies and communications are properly understood and implemented;
- Operators, contractors including sub-contractors, and service companies should review methods of initiating a "stop-work" event to ensure that the system adopted will actually be effective;
- Operators and all service companies and contractors should emphasize in training that inadequate, incomplete communications remains one of the most common causes of major accidents, especially when performing hot work.

The Panel recommended that BSEE evaluate Black Elk's compliance with its safety and environmental management systems (SEMS) requirements. Within weeks of the explosion and fire, BSEE demanded specific performance improvements from Black Elk, including conducting a comprehensive third-party audit. The Panel underscores the importance of the comprehensive audit of Black Elk's SEMS program. BSEE will continue to closely scrutinize all aspects of Black Elk's performance and will carefully evaluate all audit results.