

**SUMMARY OF BUREAU OF INVESTIGATIONS  
INFORMATION GATHERING EFFORTS  
CHEVRON LANCO PAD A GAS WELL FIRE**

*Introduction.*

The Bureau of Investigations (BOI) was tasked with gathering information related to the February 11, 2014 gas well fire at Chevron Appalachia, LLC's ("Chevron") Lanco A Pad. Through interviews, document review, physical evidence examination and other sources BOI has documented circumstances which may have contributed to the February 11, 2014 accident.

The BOI is an investigatory unit housed within the Department of Environmental Protection's (DEP's) Office of Chief Counsel (OCC). BOI is primarily a fact finding resource. BOI investigations, like this one, are closely coordinated with assigned counsel from OCC. BOI was engaged to investigate the events related to this matter on or about February 14, 2014.

*Background Overview.*

Chevron is the owner of the Lanco A pad located in Dunkard Township, Greene County. It is also the permittee and operator of three gas wells located on the pad, Wells 6H, 7H and 8H (Permit Nos. 37-059-25887, 37-059-25888, 27-059-25889). Each of these wells had been drilled, fracked and shut in. None of the wells had produced gas. In early February 2014, Chevron commenced activities to bring the wells into production. Specifically, the company made arrangements with various contractors to install "production tubing" in each well. The purpose of production tubing is to remove water from the well.

The first task in this process was removing the tubing hanger. This job that was performed by employees of Cameron International Corporation ("Cameron"). Cameron also manufactured the well heads. After the tubing hangers were removed, workers from other contractors (Schlumberger Oil Field Services ("Schlumberger"), Key Energy Services and Baker Hughes) attempted to determine that the well bores were clear of obstruction so that a packer could be installed at 5,000 feet depth. However, "hydrates," frozen hydrocarbons, formed in the wells, which created obstructions. In Well 7H a tool, called a guide ring, became stuck 7 feet below ground surface. Several heating methods were used to dislodge it (heated glycol, heated brine and blowing heated air on the well). On February 10, the guide ring was freed from Well 7H. A gouge was observed on the ring.

On February 11, 2014, prior to the daily "safety meeting," Well 7H began to leak gas and the gas ignited. Several ignition sources existed on the pad, including a Rapid Hot truck, which was heating brine, and heated air blowers. When Well 7H began to leak gas a Cameron employee ran toward the well, and died in the fire. A Key Energy Service employee who was also on the pad as Well 7H began to emit gas, was rescued from his vehicle and survived. Subsequently, Well 6H also burned. The fires were extinguished by February 15, 2014. By February 23, 2014 all three wells had been capped.

*Lanco fire.*

One lock pin assembly (“lock pin”) was ejected from the Tubing Spool Assembly (TSA), a part of the well head on Well 7H, on the morning of February 11, 2014. The ejection of this lock pin created a hole that allowed gas to escape from the well. The gas was ignited by some ignition source. The lock pins are used to hold the tubing hanger in place. These pins were manipulated several days earlier when tubing hangers were removed from all three wells. The lock pin has two threaded parts, a pin, which penetrates into the well bore and holds the tubing hanger, and a gland nut, which connects to a hole in the well head.

No mechanical cause for the lock pin ejection was identified by the investigation. The ejected lock pin was found after the fire was extinguished. An examination of the pin by Chevron’s consultant, Stress Engineering Services, Inc., of Houston, TX, showed that the threads on the gland nut portion of the lock pin had not been damaged.

Cameron informed BOI that the TSA, including lock pins, was tested to 1.5 times its rated capacity at one of its American Petroleum Institute (API) certified manufacturing facilities. The TSA was shipped as a unit to Pennsylvania and installed as a unit on Well 7H.

*BOI Investigation.*

Upon being engaged to investigate events surrounding this accident, BOI personnel immediately went to the vicinity of the Lanco well site. All told, BOI interviewed 35 persons. BOI also obtained and reviewed documents, including photographs, logs, manuals and policies, primarily from Chevron and Cameron. In addition, BOI personnel observed the well heads involved and similar unaffected equipment, and performed research into entities and issues related to this matter.

BOI was tasked with gathering facts and information related to the incident. It was not tasked with determining the root-cause(s) of the accident or making inferences about the root cause. The purpose of this Report is to identify circumstances that may be relevant to the accident.

*Observations.*

A. Chevron Well Site Managers.

Most of the workers on the Lanco A site were not Chevron employees. Rather, they were employed by various contractors who provide specific services to Chevron. The activities of these contractors are overseen by Chevron’s Well Site Managers (WSM). WSMs are Chevron’s representatives on site, and are generally Chevron employees, though some are employed by third parties, who provide these services to Chevron. The WSM is critical to the smooth functioning of the job site and to the successful completion of tasks. Among other things, WSMs oversee the work of contractors, conduct safety meetings, evaluate contractor employees

(particularly, inexperienced ones), scheduling contractors' work, communicating with upper management about problems encountered, procuring equipment, and otherwise fostering operations. In addition, WSM's are required to document activities using Chevron's database, Wellview.

Interviews suggested that WSMs did not provide the desired oversight at Lanco A:

1. **Experience.** WSM's possess a wide variation in experience and training. Some of the WSMs had decades of experience in the oil fields. However, others had virtually no background in the oil and gas industry. They worked, for example, in information technology, food service, or as a construction laborer. Having limited oil field experience reduces effectiveness of the oversight a WSM can provide.
2. **Oversight.** The level of contractor oversight provided by WSM's is not consistent. Some WSM's regard close oversight of contractors as their duty. Others considered occasional "checking in" with contractors to be sufficient. Some WSMs viewed the contractors as the pros and believed that it was not their job to tell the contractors what to do. The amount of attention to the tasks becomes more important, when inexperienced workers are handling potentially critical components. At least one WSM was described as spending most of his time in a trailer while work was performed by contractors elsewhere on the well site. Because of the limited oversight of contractors it is impossible to determine how the lock pins on the Well 7H TSA were manipulated and if anyone other than Cameron employees manipulated them. For example, another contractor, Schlumberger, worked on the well using a gauge-ring, following Cameron's work on the tubing spool assembly. It is possible that actions taken during the course of this work affected the condition of the Well 7H's lock pin assembly. However, the specific time-spent on the well-site and at the wellhead by each of the multiple contractors through February 10, 2014, as well as the WSM's review of each contractor's work, is not documented with specificity.
3. **Workload.** Several well site managers expressed some frustration about the demands on their time. Several stated that documentation and paperwork took an inordinate amount of time. Another WSM said that he was preoccupied making calls to obtain equipment or trying to determine the whereabouts of delayed equipment and personnel. One WSM stated that observing all of the contractors working on site to be daunting task, though one former WSM found the challenge manageable. Workload and distractions may explain why a contractor's employee with no well-site experience was allowed to work on a pressurized well even though he was not approved for any work, as required by Chevron policy.
4. **Lack of Continuity.** In the time period leading up to the February 11, 2014 accident, WSMs assigned to Lanco A changed frequently. It appears that no fewer than seven persons served as WSM during the period of interest (February

4, 2014 - February 11, 2014). WSMs were being shuttled in and out of this Site where three wells were being prepared for production, significant problems were being encountered, and the weather was bitterly cold. It is unclear if “hand off” procedures were followed or if incoming WSMs familiarized themselves adequately with the job. Chevron only provided one set of “handover notes” in response to BOI’s request, even though multiple “handovers” occurred. In addition, there are not specific handover procedures with regard to SSE/“greenhat” personnel onsite.

B. Inexperienced Worker.

Two Cameron employees reported to Lanco A to remove the tubing hangers from the TSA portions of the wellheads. One employee was an experienced technician (3 years field work) However, the other was an inexperienced worker or “greenhat.” The experienced worker asked for help to pull the tubing hangers at Lanco A. Cameron’s dispatcher sent the “greenhat” because no one else was available.

1. **Short Service Employee Policy.** Chevron employs a Short Service Employee (SSE) policy. Under the policy any worker with less than 6 months experience must be approved by the WSM (along with identified protective measures). When the ratio of inexperienced workers to experienced workers is high Chevron upper management must approve SSE workers. At Lanco A, the inexperienced worker’s SSE Form was never reviewed by Chevron or approved by Chevron and remains unsigned. Chevron’s Wellview system does not identify an inexperienced worker for Cameron for this time-period.
2. **Absence of specific limits on “greenhat” work.** When the “greenhat” was dispatched to go to Lanco, he was not advised of any limitation on his work. The only instruction was to do what his mentor (experienced worker) told him to do.

The “greenhat” was directed by the more experienced worker to back out lock pins from the TSAs on Wells 6H, 7H and 8H to allow the experienced worker to remove the tubing hanger. One of the lock pins manipulated was ejected from the 7H Well several days later, allowing gas to discharge from the well and ignite. It is unknown if anyone else subsequently manipulated any of the lock pins.

Individuals asked uniformly agreed that a worker with no field experience and limited shop experience should not use any tools on a pressurized well. Such employees should watch and provide support, like getting tools for an experienced worker.

3. **Inadequate supervision.** The “greenhat” was not supervised closely as he manipulated the lock pins. The “greenhat” had not been trained on this procedure, or any other well procedure.

The experienced worker observed the “greenhat” from a “manbasket,” a platform attached to a hydraulic lift. He was elevated above the “greenhat” and observed the “greenhat’s” work from this location. The experienced worker could not see the “greenhat” at all times. He was not observing the work at the “greenhat’s” shoulder as several persons stated is the proper procedure.

Chevron’s WSM also did not oversee the “greenhat.” The WSM “checked-in” occasionally, but spent most of his time in the trailer attending to paperwork or other matters.

4. **Unfamiliarity with specifications.** The “greenhat” had not been trained on the techniques for manipulating the lock pins, nor was he familiar with torque specs for the pin or gland nut parts of the lock pins. His mentor from Cameron was also not aware of torque specifications for lock pins. A Cameron manual from the year 2000 includes torque specs for gland nuts and lock pins. Subsequent to February 11, 2014, Cameron provided the experienced worker with torque specifications.

ALATex-Bossier Drilling reported that a lockdown pin was ejected from a well in December 2008.

(<http://www.4cornerssafety.com/uploads/8MZBsk6epQIV3Je0Eqw3TCO04t0aIeXV.pdf>, last visited 7/9/14) It was determined that the lock pin was fully “backed out;” no threads on the gland nut portion of the ejected lock pin were engaged into the well. In this incident, the workers were not aware of procedures and specifications for manipulating the lock pins.

C. Accounting for Risk.

The tubing installation procedure chosen for the Lanco A wells required working on pressurized wells. This work can apparently be performed on pressurized wells safely if adequate attention and care is exercised. However, the practices noted here, such as allowing inexperienced workers to manipulate pins and gland-nuts on the pressurized wells with limited supervision by co-workers or WSMs increase the safety risk.

D. Completion Delay.

The completion of tubing installation on Wells 6H, 7H and 8H was delayed by several days because of condensate (frozen hydrocarbon) obstructions in the wells. Thus, for several days the wells were pressurized awaiting completion, after removal of the tubing hangers. The absence of torqued-down tubing hangers increased the risk that loss of one of the eight lock pins could have caused a release of gas and a fire.

The wellhead manufacturer told BOI that the tubing hanger is designed to create a seal between the outer surface of the tubing hanger and the inner surface of the wellhead. (The tubing hanger is a tapered machined steel part). In addition, the company asserted that removal of a single lock pin would not compromise this seal. Gas migration through the center of the hanger is prevented by a back-pressure valve, prior to completion, and by the production tubing apparatus after completion. Thus, it appears that if the tubing hanger were in place and held by seven properly torqued lock pins, even if the eighth hole were open it might not have been available as a conduit for gas to discharge to the atmosphere.

*Conclusion.*

This summary offers factual circumstances that may bear upon more complete evaluation of the Lanco A Well Fire and its cause(s). BOI does not represent that any circumstances reported above necessarily caused or contributed to the fire's causation. Rather, these observations have been shared because they may be germane to evaluating the cause of the fire and crafting future preventative measures.