Wyoming FACE 93WY15
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Oilfield Worker Drowns in Flash Flood in Wyoming - Not Preventable!

SUMMARY

A 52 year old male oil well service owner died from injuries suffered while circulating a well with a crew of four workers. While attempting circulation, a lightning storm came up and the workers took shelter either in their vehicles or in a building adjacent to the rig, called a "doghouse". After the lightning had passed, the workers again began the circulation process. Rain was still falling, but there were signs of the clouds breaking up to the northwest - the direction from which the storm had come. The rig location was near a dry creek that occasionally filled during heavy rains. Large culverts had been built into the roadway near the rig to allow water to flow past the rig site. As a precaution, the victim had ordered vehicles to be moved from the low ground of the rig site to higher ground so that they would not get mired in mud caused by the rainstorm.

Unbeknownst to the workers, heavy rain clouds had stopped over some hills to the southeast of the rig location, dropping excessive amounts of water on to that highground area. As the water flowed downhill it followed the path of the dry creek turning it into a turbulent river bed. When the workers saw large amounts of debris flowing down the river, they began shutting down the system. Three of the workers sought shelter in the doghouse, while the victim and another worker were shutting down the system on the circulator. One of the workers in the doghouse left to get a rope from the rig, saw the victim and a co-worker caught up in waist deep water, and attempted to help.

The two co-workers were washed downstream and were able to hang onto a guy wire until they could gain sufficient strength to make their way to higher ground. The workers in the doghouse were protected by the enclosure. The victim's clothing was snagged by debris, pulling him under the water, where he drowned.

Employers may be able to minimize the potential for occurrence of this type of incident through the following precautions:

- **Maintain constant watchfulness during inclement weather conditions, particularly at rig sites in lowland areas near creek beds**
- **Discontinue work processes when there is impending danger from a storm**
- **Always expect the unexpected and have procedures that can be quickly implemented in the event of an emergency.**

INTRODUCTION

On a Thursday afternoon, August 19, 1993 a five person work crew was attempting to circulate a well at a rig site near a dry creek bed. At around 4:30 in the afternoon a lightning storm came out of the

northwest and the workers took shelter either in their vehicles or in the doghouse. A company representative was at the site, and he and the victim (who was the owner of the well service and the crew supervisor) talked during the storm about the problem they were having in circulating the well and whether they should keep trying or shut down for the night. After approximately 45 minutes, they could see the clouds breaking up in the northwest and decided to try again to achieve circulation before it got too dark to work. Rain was still falling, but the lightning had stopped.

Witnesses agree that, during a conversation , between the victim and the company representative, the victim was asked if he would be able to get the well circulated that day. However, witnesses give different interpretations about the victim's response. A general interpretation is that it was the victim's decision to continue the operation but that he said he wished they didn't have to continue.

The victim told his crew that the circulator had been hit by lightning and that a tornado was reported to have touched down in an area where one of the workers lived several miles away. Within a few minutes of restarting the operation, they got circulation to the well and began circulating the hole. The victim told workers to move their vehicles to higher ground, and as they were returning from parking on the hill, they saw the water start to rise over the road. As they completed the circulation, the water was 2' to 3' deep and debris was beginning to flow up to the rig site. The workers hooked a winch to the circulation line that runs from the circulator to the well to raise the line above the water and debris level. Three of the workers went into the dog house for shelter. One of the sheltered workers was afraid the doghouse would be picked up by the water and carried downstream, so left to get a rope to tie the doghouse to the rig.

While looking for a rope at the rig the worker saw the victim near the circulator holding another worker out of the water, and went over to the circulator to help. He saw that the victim's jacket was snagged on the circulation line which was also under water. Despite the victim's strength and swimming ability, he could not loose himself from the line or continue to hold the other worker above the water. He lost his grip on the other worker, who washed downstream but caught himself on a guy wire. The victim was seen struggling to get above water for air, but was too exhausted and entangled to succeed.

Both of the workers who were outside the doghouse were washed downstream to the guy wire. One was then swept by the current to a point where he could wade to shore. The company representative had reached the edge of the water by then and called to the other worker that he had called 911 and help was on the way. The worker said he was letting go of the guyline, and the company representative said to hang on until he could position himself downstream to pull him to shore. When the worker released his grip, the current pulled him to the center of the flow, and out of rescuer's reach. He was swept about a half mile downstream before he could get his footing and wade to shore. The current then forced the victim's body loose from the circulator line and he floated with the debris further downstream where he was found later by search and rescue team members.

INVESTIGATION

The WY-Wyoming FACE Project became aware of this incident through media releases on August 20, 1993. The Project Coordinator requested and received reports from local officials and conducted an on-site investigation.

The weather forecast was for scattered showers and thunderstorms in the area with temperatures from the high seventies to the mid-fifties and a 40% chance of rain. The storm actually came in from the northwest and travelled in a southeasterly direction, with the wind dying down as the storm entered a hilly area several miles beyond the rig site. Without the wind to move the storm further to the southeast, an excessive amount of rain fell into the hills and flowed downhill turning a normally dry creek into a river with strong currents and high water.

Because the dry creek bed fills with water during storms to the southeast of the rig, large culverts have been placed along the bed adjacent to the rig site. Normally water that flows through the creek bed flows through the culvert and past the rig site. Due to excessively large amounts of water from the unanticipated rain fall in the hills, the water in this instance flooded over the culverts and rose quickly in the rig site, increasing from a few inches to waist high water in a matter of minutes.

The victim, who was the owner of the well service operation, was strong and athletic, quite muscular, standing over 6' tall with a weight of approximately 220£. He was well known in the community and was considered to be a good swimmer and weight lifter. He had apparently been caught by debris or snagged by the connecting line between the rig and the circulator. His body was located the next day 3/4 mile from the rig site lodged against a cottonwood tree. The force of the current had torn his clothes away and his body was wedged in and held against the tree branches and trunk.

A representative of the company that had hired the well service to circulate the well was on site during the storm and had asked the victim whether the well would be circulated that day so that he could know whether to order additional equipment for the next day. The representative was heard to suggest a different procedure to try to get the circulation completed. The victim was responsible for deciding whether to continue operation, and he had decided to try to complete the circulation before nightfall. The workers felt that there was inferred pressure on the victim to get the job done, but there was no direct pressure to prohibit the victim from ordering the job to be shut down.

The company representative was parked on the hill above the rig site, filling out a report, when the flood waters rose above the road and onto the rig site. When he saw that there were people being carried by the heavy current, he called for emergency help and went down the hill to assist in the rescue.

Emergency rescuers responded from a distance of approximately 25 miles from the incident site. A tornado had struck in the town where the responders were located, and heavy rains were falling in the area between the town and the rig site. The 911 call was received around 30 minutes after the flood waters had begun to rise above the road adjacent to the rig site. First responders were at the site within 10 minutes and emergency medical services were at the scene within 45 minutes of the initial call.

Search and Rescue operations were begun within two hours of the incident and continued until the body was located at around 4:00 the following morning. Rescuers were able to get to the workers sheltered in the doghouse by using a boat. The two workers who were washed downstream were able to wade ashore and were given treatment by rescue workers. Around 3:30 am, rescuers spotted the victim's body as the water had begun to recede. Using safety ropes and safety gear, they were able to wade through the waist-high water and bring the body to dry land.

Investigators noted that the rig pad is elevated about 5 feet above the creek bed. Workers on the site at the time of the flood indicated that they were in water up to five feet deep, as would be evident from scum lines on the rig and equipment. That indicates that the dry creek bed was carrying water up to 10 feet deep.

CAUSE OF DEATH

The Medical Examiner listed the cause of death as asphyxiation due to accidental drowning.

RECOMMENDATIONS/DISCUSSION

It appears that in this incident, the persons involved did everything that should reasonably have been done to avoid injury from an occupational incident. The victim, who was the owner of the well service company, and a company representative who was on site at the time of the incident, discussed the potential for an orderly shut down or continuation of the operation, and a decision was made to continue. The fact that the lightning had ended and there were visible signs of clearing was a factor in the decision. The potential for the excessive rainfall in the hills was neither forecast nor anticipatable.

Once it became apparent that the waters might rise to flood stage, workers were sheltered as quickly as possible. Three workers were in the doghouse where they were protected. The fourth worker was moving from the circulator to the doghouse when he was caught in the waters. The victim was helping his workers to safety when caught in the flood waters. The sole exception to the safety precautions was a worker leaving the safety of the doghouse to search for a rope to tie the doghouse to the rig. Injury to that worker could be seen as preventable since he left a place of safety to enter a less safe environment. However, the death that is being investigated appears to have resulted from circumstances that were beyond reasonable human control.

While it appears that all reasonable precautions were taken in this incident, employers in similar environments should we alerted to certain precautionary measures to minimize the opportunity for parallel events. When inclement weather approaches, constant watchfulness should be employed to insure that events don't exceed the controllability of the work crew. In this instance, the water rose five feet in a matter of minutes once the creek bed was over run. Conditions that change that quickly are difficult to manage and employers should anticipate that potential and plan for it.

When there is an impending danger from a storm or other acts of nature, employers should seriously consider the need for an emergency shut down of equipment. While there is a financial disincentive to shutting down for storm threats that don't come to pass, there is far greater human and economic loss to consider if the storm actually hits with the destructive power of this one. In this instance, forecasters could not have anticipated the volume of water that would come from the suddenly stationary position of the rain clouds; nor would workers have anticipated that the stream would fill so rapidly as to exceed the 5' depth that the stream bed could accommodate.

The best course to take is to expect the unexpected, and have procedures in place that can be quickly implemented in the event of an emergency. Business decisions must be made for both economic and safety reasons, and employers must balance those decisions between cost containment and worker safety. The human equation usually requires an emphasis on worker safety.

FATAL ACCIDENT CIRCUMSTANCES AND EPIDEMIOLOGY (Wyoming FACE) PROJECT

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatal Accident Circumstances and Epidemiology (Wyoming FACE) investigations when a participating state reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

States participating in this study include: Kentucky, Maryland, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia.

NIOSH Funded/State-based Wyoming FACE Projects providing surveillance and intervention capabilities to show a measurable reduction in workplace fatalities include: Alaska, California, Colorado, Georgia, Indiana, Iowa, Massachusetts, New Jersey, Minnesota, Missouri, Wisconsin and Wyoming.

Additional information regarding this report is available from:

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Please use information listed on the Contact Sheet on the NIOSH FACE web site to contact In-house FACE program personnel regarding In-house FACE reports and to gain assistance when State-FACE program personnel cannot be reached.