

McCuen Fire

Non-Serious Wildland Fire

Lessons Learned Review (LLR)



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Introduction

On July 6, 2011 at approximately 1400, while mopping up the McCuen Fire on the Vermejo Ranch in Northeast New Mexico, a Type 2 crew comprised of USFS/NPS employees from Montana witnessed flames exiting the fire hose which they were utilizing for mop up. With approval, the crew was utilizing water from the El Paso Exploration and Production (E&P) Company's gas well A338 for the last two days, as combustion activities were not taking place. Additionally, earlier that morning, due to scheduled waterline maintenance corrosive and scaling inhibitor chemicals had been injected into the well. This prompted the crew to inquire about the composition of the water they were using. Material Safety Data Sheets (MSDS), provided by on-site El Paso E&P liaison, were also sent to New Mexico Poison Control for evaluation. NM Poison Control noted that although potential doses of these chemicals would not be harmful, they recommended decontamination of skin with mild soap and water and washing clothes with laundry soap after operations ceased. Also if the crew members chose to go to the Emergency Room for medical treatment, NM Poison Control would aid in assistance. This prompted the affected crew members to seek decontamination and medical attention. The crews traveled to Raton New Mexico and were directed to the Incident Command Post (ICP) located at Raton Middle School. After arrival, they showered and changed cloths in the school facilities. Further evaluation from the Raton Fire Department/Haz-Mat response Team determined there was no threat and they are all cleared.

The purpose of the Lessons Learned Review (LLR) is to:

1. Identify facts of the event and develop a chronological narrative of the incident.
2. Identify what was learned and what should or could be done differently in the future.
3. Provide recommendations that may prevent similar occurrences.

Review Process

While this was a low complexity incident, the potential existed for serious consequences that could result from similar situations. Therefore, a Lessons Learned approach is being utilized to gather pertinent information from witnesses, fireline personnel, and subject matter experts to prevent similar incidents in the future.

Background

The McCuen fire was started by lightning on July 4, 2011 in Colfax County New Mexico on the Vermejo Ranch. An ICT3 was ordered to take command of the fire. Several other lightning ignited fires in the local response area were also reported the same day.

Chronology of Events- July 4-6, 2011

The following chronology is provided to describe the actions taken by the involved parties. Times are derived from Dispatch/Unit logs or expressed by participant recollection.

July 4, 2011

1400: All resources arrive on scene at the McCuen after being released from the Bear Fire. Crew works in conjunction with 2 Type 6 engines on severity assignment from Oregon Department of Forestry (ODF).

1415: Representative from El Paso E&P Company instructed crews that it was ok to utilize water at well site A338, water was then fed into the engine and subsequently pumped out from engine(s) to support suppression operations.

1715: Started mopping up 50' along fire line, split crew in half; 10 on Division A and 10 on Division B. Division A used hose directly from gas well and Division B used water from Type 6 engines filled off tenders.

1900: Operations continued until end of shift without incident.

July 5, 2011

0700: Crews commence suppression/mop-up operations, same break up of crew as the previous day's mop up operations.

0851: Philmont water tender shows up on fire, was not able to refill tender as couplings from well to tender did not match.

1200: Shut down water and operations for lunch.

1900: Fire 90% mopped up crew retires for the evening.

July 6, 2011

0600: Broke down camp. Crews commence operations for the day believing that by the end of the day the fire will be completely mopped up and they can return to the Bear Fire.

0700: Entire crew continued mop-up operations in the interior of the fire using the hose lay connected to the Natural Gas Well.

0830: Shut down water and operations to eat breakfast. One crew member vomited after eating.

0900: Continued mop-up and water use. Vermejo engine 153 assisted with pump from engine refilling at the gas well.

0855: Transfer of command from ICT3 to ICT4

1430: Crews experience the existence of flames in the water being applied to the fire.

1446: First call placed to dispatch regarding problems with the water (fireball from hose).

1446: Call to New Mexico State District FMO from IC regarding water/flame issue.

1513: CA-2 forms filled out by crew.

1523: ICT4 is directed to take crew to (Raton) hospital to get checked out and to complete all accident forms at ICP. Everyone should fill out accident forms.

1537: El Paso E&P (Production) Supervisor was contacted to find out what was in the water to cause such an event.

1608: Discussion between FMO and El Paso Production Supervisor noted that the very low concentration of chemicals used should not have flared. The direct hose connection, however, most likely flared due to natural gas from the well directly placed on the fire.

1729: Raton Fire received call from District FMO regarding Haz-Mat exposure.

1745: Raton Fire Chief setting up decontamination trailer for response.

1800: Raton Fire/Haz-Mat departs for ICP to meet up with crews upon their arrival. Affected crew members shower and change clothes. Fire/Haz-Mat Chief notes there is no threat and they are all clear.

1843: Crews arrives at Raton Hospital after going to ICP first. ITC-3 reports everyone is fine, no symptoms.

2010: Crews are released to RON in local hotels, do laundry and then meet with ICT to finish accident paperwork at 1000 the next day (July 7, 2011).

Discussion:

This section will discuss in further detail the circumstances surrounding the event and its outcome. Information was gathered from parties involved through interviews both in person and phone.

Water from well A338 was used on the fire for two days without any incident of methane ignition. This was due to water being transferred from the well into 2 type 6 engines working the fire and subsequently pumped from the engines onto the fire. This allowed for any “entrained gas” (methane) in the “produced water” to be vented off prior to being exposed to any ignition source. A liaison from the El Paso E&P Company authorized the use of the water from well A338. Under normal operating procedures there would have been water tenders available to supply water to the fire. As this was a holiday the normal compliment of tenders were on delayed response (over a 2 hour turnaround time), therefore leading to the decision to utilize the water on site.

On the third day of operations crews were well into the mop-up stage of the fire and there had been no issues with using the water from well A338. A different liaison from El Paso E&P was working with the crew on the morning of July 6th. At some point during the day shift an attempt was made to transfer water to a Philmont, NM water tender that had arrived on the fire, but the proper couplings were not readily available. A hose lay was set up coming directly off the well to deliver water straight to the fire. Water was used in this fashion until the “entrained gas” in the hose was ignited when it made contact with a heat source on the fire. At this point use of water ceased and concern of the water source among the crew, started to rise.

As naturally occurring methane gas has no odor and with the lack of onsite natural gas operations knowledge among suppression personnel, there was no way for crews to determine what caused the water to ignite. Calls to New Mexico State Forestry, Vermejo Ranch and El Paso Production were made to ascertain what if any chemicals were in the water from the well. Within 30 minutes from initial calls, MSDS sheets were provided by the El Paso Production Supervisor and made available to IC and crew. After reading the precautions and warnings on the MSDS sheets concerns arose by suppression personnel regarding exposure to hazardous materials.

Arrangements were made to transport personnel to Raton for decontamination and medical treatment. A decision was made to re-route personnel to the Bear Fire ICP, due to size limitations at the hospital and the potential for Haz-Mat exposure to hospital staff and patients. Raton Fire and Emergency Services was notified and dispatched to ICP where crews were sequestered for evaluation. All personnel that did not decline evaluation or treatment were taken care of. Crews were instructed to launder their clothing and take showers, which they

did. The following morning crews returned to work on the Bear fire and the McCuen fire was patrolled by ranch personnel.

The El Paso E&P Production Superintendent, located in Raton, NM, noted that well A338 was treated on July 6th, 2011 with chemicals that are used to protect the well casing from corrosion, scale, and biological impacts. This is done on a regular basis every 14 days to maintain treatment effectiveness. The following chemicals were pumped down the backside (annulus) of the well:

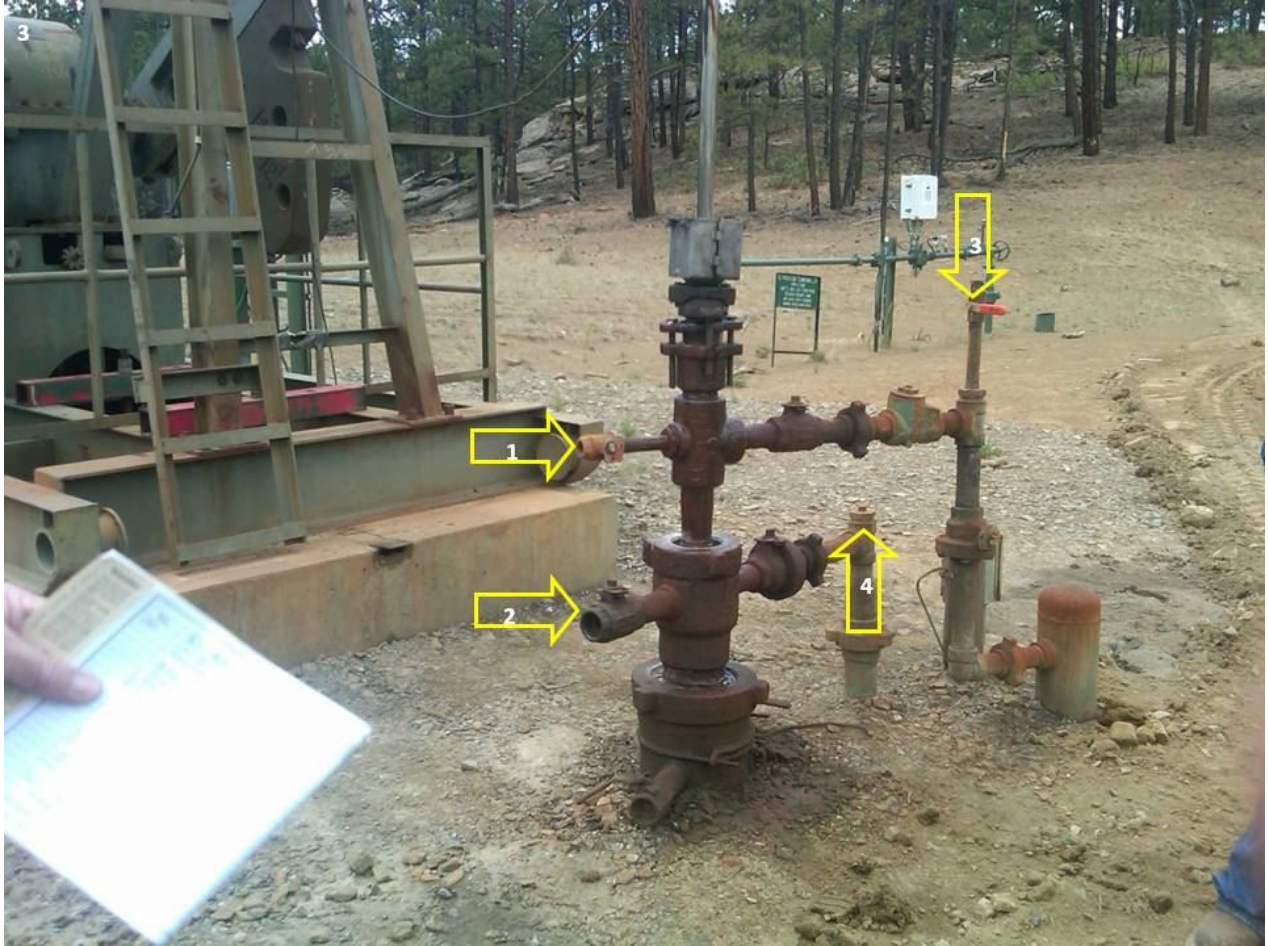
- 1.5 gallons CRO381 Corrosion Inhibitor
- 2.5 gallons SCW4057 Scale Inhibitor
- 1.5 gallons XC302 Bactericide (Biocide)
- 20 gallons Produced Water

Once the chemicals are pumped into the well they mix with the existing underground water and are pumped back to the surface as “produced water” at the rate of 450 Barrels per day (18,900 gallons). Spread this over the 14 day period when the well would be at its “Minimal Effective Concentration” the actual concentrations of applied chemicals are very low. That being said, on July 6th the concentrations would have been at the “Maximum Effective Rate” but still at very low concentrations for potential short term impacts due to exposure. The well was initially drilled in 2007 and that is when it was initially “fracked”.

Fracking or hydro fracking (hydraulic fracturing) mining is used to penetrate the shale to natural gas deposits in shale formations, including the Marcellus and Utica. To achieve this, millions of gallons of water are used under pressure and laced with a cocktail of (trade secret) chemicals, to fracture shale and release gas. This process is normally conducted at the beginning of the well production efforts.

Coal bed methane wells and tight oil/gas sand wells often times require hydraulic fracturing (fracking) to stimulate the well production to achieve commercial rates of hydrocarbon flow to the well bore. Water (carrying agent), sand (proppant) and ~1% by weight chemical additives (mixtures) to achieve desired fluid properties to facilitate a good frack job are pumped down the well and into the producing formation under high pressures. 20 to 30% of the injected volume comes back as flowback after the formation is hydraulically fractured. Minor amounts of this flowback water is then subsequently produced over the life of the well along with the produced water.

After production has started the chemicals, as discussed above, are then used to continue well production efforts by inhibiting corrosion, scale and unwanted bacteria in the gas and well.



Well A338

1. Outflow valve of “produced water”. This is the valve that crews used to obtain water to put on fire.
2. Outflow valve for gas.
3. Valve to send “produced water” to nearby tank battery where it will be re-injected into the ground.
4. Valve for sending marketable gas to delivery lines.

Lessons Learned:

1. There are still many unknown factors when working in and around oil and gas operations. Many of the well sites differ in the processes that are used and the myriad of chemicals that are potentially on site.
2. Initial reports of crew using “fracking water” on the fire and subsequent exposure proved to be false.
3. As an interagency wildland fire community there is a lack of clear guidance for Haz-Mat exposure procedures.

Recommendations

1. Prepare and disperse a “Safety Gram” or other such publication to advise fire crews to abstain from using any water associated with oil and gas operations.
2. As drilling and production operations vary widely, develop local operating plans to clearly establish fire/industry roles and responsibilities.
3. Explore current interagency Haz-Mat exposure/ decontamination protocols and provide those to Haz-Mat response professionals to see if they are adequate or if they exist. If there are no such protocols, buoy this issue to a national level working group, to identify course of action that needs to be taken.
4. Add guidance concerning gas well “produced water” to Red Book Chapter 7 and more in-depth Haz-Mat protocols. <http://www.nifc.gov/PUBLICATIONS/redbook/2011/Ch07.pdf>
5. IAPs, when fires are adjacent to oil/gas operations, should include local Haz-Mat response procedures.
6. Ensure IC/Team Safety Officers have a broad scope of knowledge to handle a Haz-Mat incident-within-Incident (IWI) response.
7. Hazard Communication and MSDS training according to 29 CFR 1910.1200 should be widely understood by all fire personnel.

Acknowledgements

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- Thanks to Chief David Pasquale and his unsung heroes of the Raton Fire Department and NM State Hazardous Materials Response team for responsiveness to the accident, support to the firefighters during their anxiety over potential chemical exposure, and

their input to timelines, recommendations and lessons learned, and other details of the incident.

- Thanks to Mark Kossler, Vermejo Park Ranch General Manager and his crew members for allowing this LLR team onto the ranch and well-head site to conduct this LLR. His experience and wealth of knowledge about the area and willingness to support this LLR is greatly appreciated.
- Thanks also go to Phil Ladner, Joe Araiza, and Michael Mattorano. These members of the El Paso E&P Company team provided clear information about the well's operation and describing in detail how and what the most prevalent reason was for the flames at the end of the hose water stream.