Schoolhouse Fire
ATV Fatality

Learning Review Report

Santa Fe National Forest ~ August 30, 2013

"I'm not going to second guess Token. He chose to take that route based on his experience and what he was seeing at the time."

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Executive Summary

On August 30, 2013, 41 year old Token Adams, an Engine Captain with the Jemez Ranger District on the Santa Fe National Forest was searching for a reported fire near Schoolhouse Mesa when he died as a result of an ATV accident. Captain Adams was familiar with the area, having recently served as a Type 4 Incident Commander Trainee on another large fire in that area for several weeks. He was working with two other experienced firefighters who searched for the reported smoke separately, each on ATVs. They were in radio communication almost constantly throughout the morning and early afternoon. The three were last physically together at about 1040 when they were refueling and discussing other locations to look for the fire. At 1213, Token spoke to his wife on his cell phone. Later at 1344, Captain Adams contacted one of the other firefighters by radio, sounding relaxed and confident, giving his current location and direction he was planning to head. This was his last known transmission.

Smoke from the new fire was seen by one of the firefighters about 15 minutes later. This firefighter called to redirect the other two firefighters to the new fire, but Captain Adams did not answer this call. Two firefighters arrived at the scene of the new fire about an hour later. Having not heard from Token over that hour, they advised dispatch that their priority was no longer the fire - but rather it was to locate Token.

Around 1415 it appears from physical evidence that Captain Adams was thrown or jumped from his ATV as he negotiated a slight rise. The ATV rolled onto him resulting in fatal injuries.

An extensive search of the areas where Captain Adams had been, and was believed to be, was conducted throughout the afternoon and evening. A State Search and Rescue operation was ordered at 1900 and took over the search around midnight. Captain Adams wasn't found until a week later.

This report is the product of the Coordinated Response Protocol (CRP)[1] Team convened by the Chief of the United States Forest Service. This review focuses only on the accident and the events leading up to the accident. A review of the Search and Rescue Operation may occur later outside of this CRP review. The CRP Team interviewed or facilitated a discussion with many of the individuals involved in this accident. The Lessons Learned came out of these interviews and represents their ideas. The story is pieced together from the interviews and physical evidence from the accident scene.

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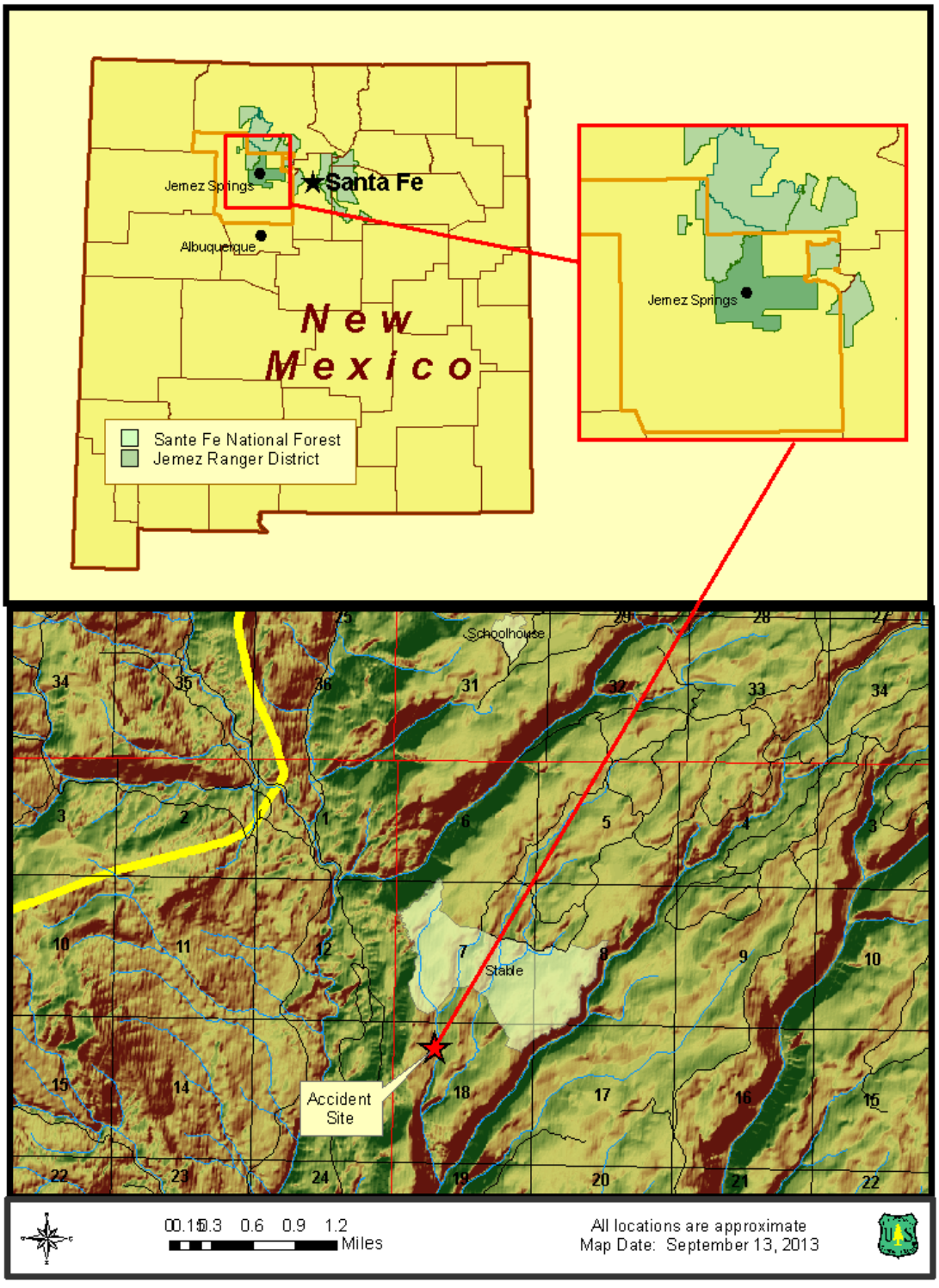
[1] The CRP is a comprehensive accident response protocol developed as a *"…deliberate approach to incident review and, as much as possible, to minimize bias in the way we approach data gathering, synthesis, analysis and sensemaking."* (Draft CRP Guide (9/19/2013) page 2). The Protocol integrates the accident investigation process with employee health & wellness, law enforcement investigation and other actions taken in response to a serious accident. The Team used the 2013 FLA Guide *(*2013 FLA Guide *)* as the technical and procedural guide for executing the investigation and developing the report.

Vicinity Map



The Story

(Except for Token Adams, all names are fictitious.)

Background

Token Adams was a Navy veteran and a former member of the Kings River Hotshots in California. He began working for the U.S. Forest Service in 2002. His first job was as a fire apprentice on the Sequoia National Forest and he went on to work for the National Forests in Florida and the National Forests in Texas before coming to the Jemez Ranger District of the Santa Fe National Forest in February of 2012 as an Engine Captain.

Token's fire qualifications included Engine Boss, Incident Commander Type 4 Trainee, ATV Operator, Prescribed Fire Crew Member, Helicopter Crewmember, and Plastic Sphere Dispenser Operator. He had a reputation for a very deliberate and thorough style when it came to work.

Over the last month, Token had been working a fire on the Stable Mesa. (Figure 1, page 6) The general area consists of high elevation mesas ranging from 6,000 to 9,200 feet, bisected by deep drainages, and is dominated by Ponderosa pine and oak.

> *"Token knew the Sable Mesa area intimately. He'd ridden up and down every drag line, old dozer line and road in the area.*

Although the area contains a series of high mesas, line of site is very limited and communication is known in the area as *"hit or miss."* Firefighters noted that you can have a cell signal or radio contact in one spot and move 2 feet away and have no signal at all. The area around the accident site is at 7,200 feet and is dominated by a medium Ponderosa pine canopy with some open stands and many dense "dog hair" thickets of younger trees. The surrounding area is relatively rocky, with outcrops and scattered boulders.

The Jemez District employees had been on edge the past few years in the wake of a series of complex fires. In addition, Jemez hosted numerous off unit resources over the last few months, an exhausting effort. The drought hit New Mexico hard, but the monsoons had arrived and were providing some much needed relief. Even this late in the season, afternoon

thunderstorms were common. There were the usual lightning caused "*single tree*" fires, with some fires getting a little larger. The Monsoons were over and things were beginning to dry out a bit.

By late July, many firefighters were away assigned to fires out of Region. In Late August, the National Planning Level had just dropped from the highest level 5 to 4. Token's engine and crew were assigned to fires in Montana. Token stayed behind because his wife was expecting their second child any day.

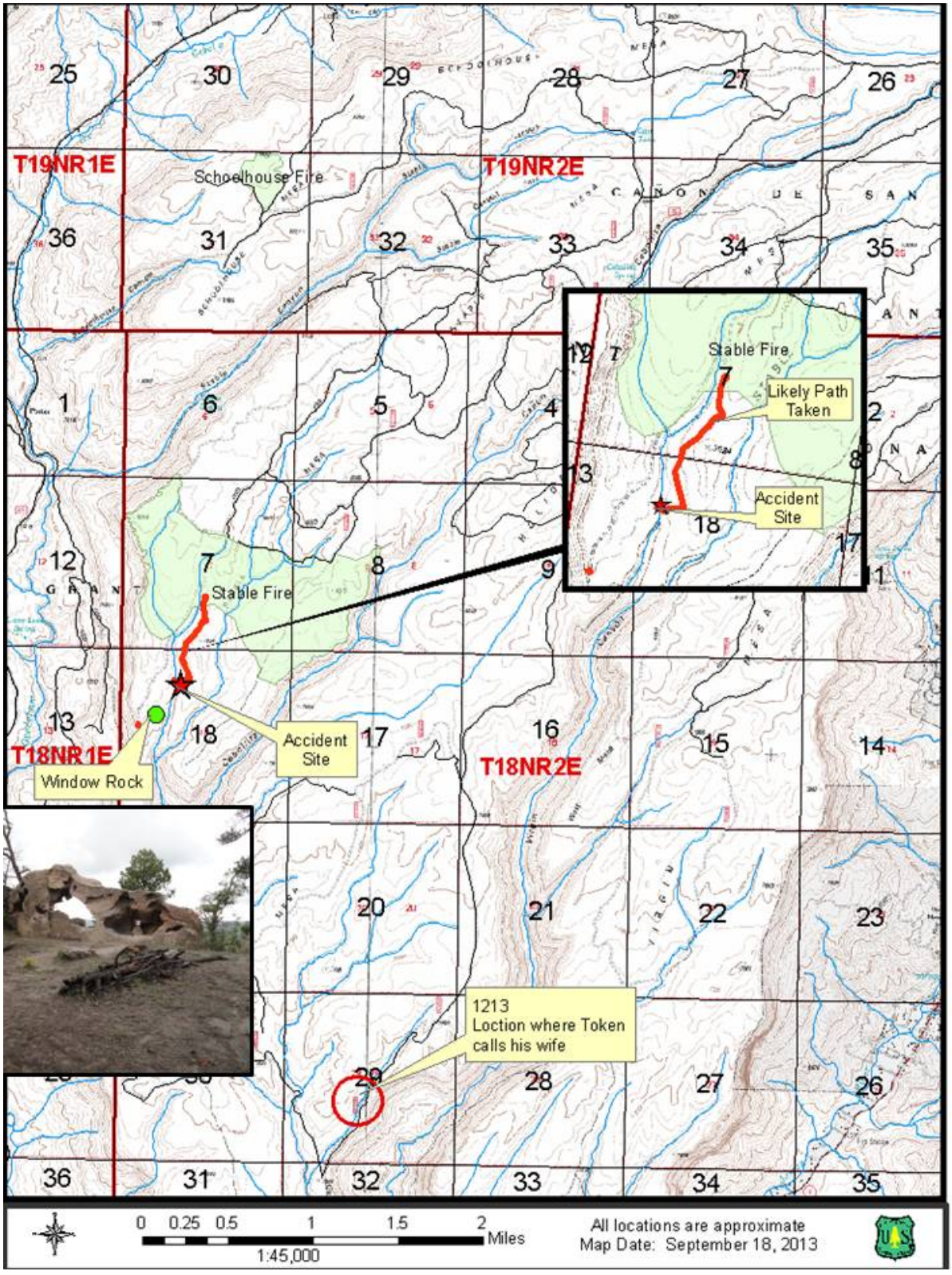
As noted above, Token had worked on the Stable Fire for the past few weeks. He served as the Type 4 Incident Commander Trainee. In fact, on this incident he completed all the tasks in the ICT4 task book. The fire had been in a monitoring status, so Token was in the area frequently, checking the fire by ATV.

"Was Token under any stress? Oh no. Token was on Cloud 9 with a baby girl on the way and a long hard season winding down."

On Thursday August 29th, some firefighters from a neighboring unit assisted Token in prepping for a prescribed fire in another area on the south side of the District. The conditions were right to allow them to begin a very large prescribed fire project. At the end of that day of prepping for the prescribed fire, one of the fire fighters commented on Token's conservative approach to ATV riding, mentioning how *"…he stuck to the roads and rode slow. If there were a lot of rocks, he'd walk."*

On Thursday afternoon, August 29th, at about 1700, a military aircraft called in a smoke report. Based on the estimated coordinates, the fire managers placed the fire in the vicinity of the Stable Fire. Often, military and other pilots just estimate coordinates as they fly by and don't actually fly over the fire to get an accurate location. From past experience they knew the fire could be miles off from the reported location. Members of the Jemez District fire staff figured the smoke had to be "roll out" from the Stable Fire because lightning maps over the past 72 hours showed no lightning in the area. Because there was a high likelihood the smoke was from the Stable Fire, and because of the higher humidity and moisture, the decision was made to check the smoke the next morning. They took time to pull up Google Earth and strategize about how to get into and search the area since travel was difficult with the canyons and washed out roads.

Figure 1, Map


T19NR1E
T19NR2E
Schoolhouse Fire
Stable Fire
Likely Path Taken
Accident Site
Stable Fire
Accident Site
T18NR1E
Window Rock
T18NR2E
1213
Loction where Token calls his wife
0 0.25 0.5 1 1.5 2 Miles
1:45,000
All locations are approximate
Map Date: September 18, 2013

August 30th Tactics

Token and two senior members of the Ranger District, Terry and Chris, began work at 0700 that day with the goal of locating the smoke that was reported the evening before. The Forest fire organization was at 'draw-down' levels because firefighters were supporting other fires in the West. The three well-qualified firefighters, with collective experience of over 50 years, loaded up and drove to the staging area set up for the Stable Fire. Token pulled a trailer with a UTV and an ATV. The other two firefighters each had an ATV loaded in the bed of their trucks. The UTV was a large 6-wheeled unit equipped with a pump and 50 gallons of water for suppressing fires. The weather forecast called for isolated thundershowers throughout the day and into the evening, with temperatures expected in the mid to upper 80s and 5-10 mph winds.

"It was a gorgeous day. Token was doing exactly what he loved doing."

The Haines Index (an index that measures the potential for large fire growth) was predicted to be "very low" in the morning and "low" in the afternoon. The crew described the day as *"beautiful, the perfect day."* Token and the two firefighters unloaded 3 ATVs at the staging area around 0800 and made plans to scout the area around the Stable Fire together; they eventually headed in 3 different directions in order to cover more ground. Although Token had both the UTV and the ATV on his trailer, he made the decision to take the ATV so that he would have more maneuverability. Token rode a red Polaris 400 ATV with a combi tool strapped to the rear cargo rack, along with other fire and personal gear in a day pack.

The ATV is 4-wheel drive and weighs just over 600 pounds with fuel and oil. Token was an experienced ATV rider, and as noted had ridden throughout the area over the last month while working the Stable Fire. All District firefighters go through ATV training annually, exceeding Agency requirements. Token had completed his last ATV training in April 2013. Each of the three firefighters were wearing full-face helmets along with their other required PPE. They each carried a radio and cell phone. Once outfitted, the firefighters soon split up and covered roads, dozer lines and drag lines[2] within and around the Stable Fire.

The group checked in with each other regularly, as was their custom. As a supervisor said later, *"Token was so good about checking in with Dispatch on the Stable Fire, that I had to turn down my radio so that I could concentrate."* The firefighters on the Jemez Ranger District were

[2] A drag line is a fire line constructed by dragging a heavy object behind an ATV. It is a fast and effective way to build fire break in light fuels such as pine litter. See Glossary.

known for checking in and out regularly with the Interagency Dispatch Office. The District has high visitation and their share of troublesome visitors, in addition to spotty cell phone and radio coverage, so they mitigated by checking in with each other frequently by radio.

Having seen no hint of smoke, at 1040 the three firefighters met back at the trucks to refuel and discuss a new search area and strategy. They decided to search south along Holiday Mesa. A fire lookout had given a bearing on the smoke earlier that morning, but the distance was difficult to estimate and the lookout was uncertain which district the fire was on. After a short time, the firefighters headed out separately, starting south, down the west side of Holiday Mesa and taking spur roads to look over the adjacent canyon between Holiday and Stable Mesas. Although communication was hit or miss, Token was able to make a cell phone call to his wife at 1213. He checked to make sure she was doing all right and mentioned that he was in a place above town where he could look down on the area they lived. For Token, frequent check-ins with his wife were also routine, given how close his wife was to her due date.

After about an hour and half of searching, Terry made the call to leave Holiday Mesa and head towards Window Rock on Stable Mesa. Window Rock is a place that offers a good view of the area west of Stable Mesa. Chris called Token on TAC2 to tell him to head to Window Rock. Chris recalled thinking that Token sounded "*a little frustrated,*" replying that he was way down on the south end of Holiday Mesa and it would take him a while to get there.

At 1341, a firefighter from the neighboring district relayed a compass bearing of the smoke that was crossed with the Lookout's bearing. Based on this information, the fire was west of Stable Mesa, but squarely on the Jemez Ranger District. Soon thereafter Terry tells Chris and Token to head to Window Rock (a well-known vantage point) to look for the smoke.

At 1344, after the neighboring District confirmed the fire was on Jemez Ranger District, Token contacted Terry by radio. The following radio transmission was the last heard transmission from Token. Token sounded relaxed and confident.

> Terry: "*Go ahead, Token*."
>
> Token: "*Yeah, I've just made it down into Stable and I'm gonna hit that dozer line and head down to the south end point there."*
>
> Terry: *"I'm surprised; somewhere around, I guess where the 608 Fire was."*
>
> Token: *"Yeah, I copy. I'll take a look and let you know."*

"Token is very much mission driven. You give him a task and he does it. If there's any deviation, he asks for further direction."

At about 1400, Terry saw the smoke north of the Stable Fire. Terry contacted Chris by radio and said he'd spotted the smoke and was now trying to work his way into it. Terry relayed that the fire was actually north on Schoolhouse Mesa. Apparently Token did not hear this communication because he continued south and west towards Window Rock.

The ATV that was used by Captain Adams on August 30th, 2013

The Accident; Between 1345 and 1500

Token rode south along fire lines and roads through the middle of Stable Mesa. Just past the Stable Fire, he drove cross-country and connected with a drag line. He turned west on this drag line as he knew it would connect with a road that would lead to Window Rock. Along this drag line, he dipped into a small drainage. The drag line crossed the dry drainage and continued straight up a steep slope on the other side. Token likely believed there was an easier and less steep way to get to the road. He turned right and drove up the drainage about 60 feet where he saw a gentler route to drive up the other side of the drainage. The angle of this slope was short and about 30%, a slope easily traversed on an ATV. As he began his climb, he needed to ascend over a small rock ledge. It appears that his left front tire contacted the rock ledge first. The right tire then went up on the right edge of the rock ledge and slipped off. That caused the center of gravity to shift to the downhill side. Based on the angle of approach, the location of the left tire on the rock, and the right tire slipping off the rock on the downhill side, the ATV began to roll to the right, causing Token to either jump or fall off.

The Rock Ledge - Arrows indicate location where right and left front ATV tires encountered the Rock ledge. Note scuff marks at the right arrow where the right tire slid off the ledge. This picture was taken a week after the accident and following a hard rain. It is likely the rock was covered with more pine straw at the time Captain Adams chose this route.

The ATV then rolled over Token and hit a tree and settled back on him. The ATV rear cargo rack landed on his neck, impacting just below his helmet, and he died instantly.

Position of ATV after accident

The following link will take the reader to a two minute video. The video consists of a sand table simulation of the accident and then a movie showing the path that Captain Adams likely took leading up to the accident site from three different perspectives. While the video may be disturbing, it is hoped that ATV riders across the country will use it as a training exercise. The video powerfully demonstrates that ATV operations, in fairly benign terrain, can result in a catastrophic outcome.

http://youtu.be/ea50QXHdE48

The Schoolhouse Fire and Search for Captain Adams

Terry called Token and gave him the actual location for the fire. He heard a garbled transmission back and assumed Token had copied and just had bad radio reception.

At some point, Chris called into the office and was told that Token's wife was taken to the hospital in Albuquerque by a District employee who is a personal friend. Chris told the caller, *"We don't have radio communication with Token right now."*

At 1510, Terry was on scene at the new fire, named Schoolhouse, and contacted Dispatch with the size up; reporting he was on the fire scene, it was 10-20 acres, it looked to be 50-75% cold, and had an active head with 1 foot flame lengths. At about 1516, Chris was also on scene and both he and Terry tried again to contact Token. Both were concerned about how long they'd gone with no radio contact with Token. There were numerous attempts by Terry, Chris, and the Lookout to contact Token between 1546 and 1556. All were unsuccessful. They suspected his radio was broken or lost and perhaps his ATV was broken down. Both Terry and Chris agreed that finding Token was more important than the Schoolhouse Fire. At 1611, Terry told Dispatch that they were going to disengage from the Schoolhouse Fire to look for Token.

> *"After about an hour and a half of no contact I started to get worried, especially with a guy like Token."*

Terry and Chris decided to first head back to the truck, hoping Token would be there. When they got to the truck and Token was not there, they decided to systematically cover all the roads and fire lines within the Stable Fire where they knew he was headed. Meanwhile, more resources were called in to assist. After no success on the Stable Fire, they began searching Holiday Mesa at Token's last known location. Additionally, for over an hour, the lookout and the Jemez Ranger District office began continually calling Token by phone and radio every 5 minutes. All attempts to contact Token were unsuccessful.

By 1700, personnel were spreading out on ATVs, back-tracking where they believed Token had been. They each marked their routes with flagging in order to keep track of which areas had been searched. The Forest FMO began ordering resources for the next day: back up dispatchers, crews to suppress the Schoolhouse Fire, and personnel to assist with the search. Communications between personnel on scene, Dispatch, the Forest FMO, District Ranger and Forest Supervisor and Deputy were constant during this time period. At 1900, the District Ranger contacted Token's wife and informed her that Token was missing and search and rescue was officially requested.

By 2300, New Mexico State Search and Rescue were on scene and briefed around midnight. By this time, there were about 40 people searching for Token.

"It's almost worthless to search at night. All you can see is what's directly in front of you. You'd have to run over somebody to find them."

The Forest Service officially turned the search over to the State at that time. One week later, on Friday September 6 at 1145, Token's body was located by one of the 250+ searchers that had been scouring the area for the last 7 days. The searcher who found Token was a member of the Jemez Eagles, a crew that Token had helped train.

Lessons Learned Analysis

Interviews were conducted with key personnel involved with the Schoolhouse Fire ATV Fatality. At the conclusion of each interview, each person was asked a series of questions regarding what they learned for themselves from this event and what they believe the greater wildland fire community and Agency could learn from the event. The following are the lessons that the participants shared with the CRP Team that they believe could benefit others.

The Lessons Learned Analysis (LLA) is the CRP Team's analysis of relevant facts and lessons learned by the participants. Its aim is to try to overcome hindsight bias and understand the conditions that may have contributed to the outcome. This section of the report relays the Team's analysis of the individual, organizational and workplace conditions that are related to how the people involved perceived and interpreted the risks they encountered and made the choices they made related to the accident.

The conditions were grouped into three categories: Safety Culture, ATV Operations, and SAR Response by the Forest Service.

Lesson Learned	Context
SAFETY CULTURE	
Employees are not sharing all their near misses and close calls with Line Officers.	During the SAR, line officers spent a lot of time with employees in reflective conversations. During these, employees shared experiences concerning close calls and minor accidents involving ATVs. There were several of these instances shared that were shocking to line officers.
I am going to ask my employees for their ideas on using ATVs and UTVs.	Some line officers felt frustrated that they do not fully understand the risks involved in ATV or UTV operation. There is a feeling that something must change; but they don't want to react without fully engaging employees.
ATV OPERATIONS	
Need to better understand the risks associated with ATVs.	As noted above and elsewhere, it is shocking to realize that such a tragedy could occur on a relatively benign slope by an experienced and safety conscious rider. We want a *Lesson* out of this but don't know where to find it. We need a deeper understanding of ATV risks.
Need to understand the potential use for and capability of GPS/send/spot devices and other tracking technology for fire applications.	While tracking technology wouldn't have made any difference in saving Captain Adams, it would have made a difference for 200+ searchers. Fire personnel didn't consider the need to use such devices because they are routinely in communications with each other. Their standard procedure is to always know where each other is, and always be able to call for help if needed.

Lesson Learned	Context
SAR RESPONSE BY THE FOREST SERVICE	
Need to review and better understand the SAR agreement between the Forest and the State.	This was the first time many of the Forest Service employees involved had ever had any dealings with the State Search and Rescue. The process and rational was confusing at first, and there is still a desire to know how to best deal with them if the need should ever arise again.
Having a relationship with other Forest Service employees is critical. Having these relationships before an emergency is key.	The relationship of the employees involved with their supervisors and coworkers was one of trust, support and openness. During the tragedy many felt that the strength of this relationship helped immensely to sustain them.
GPS/Send/Spot devices should be used by all ATV/UTV users. I would like to see a device on every piece of mobile equipment that can track it or on each radio device that sends a GPS location every time the MIC is keyed.	Not being able to find Captain Adams seared the hearts of all his family, co-workers and friends. That is something no one ever wants to have to repeat ever again.

Put Yourself in the Participants' Place

Throughout the analysis, the CRP Team members performed a "substitution test," asking themselves: *"Could another competent employee or supervisor meeting the Agency's qualification standards make the same decisions leading to the same outcome?"* In reading this report, the reader is asked to try and understand why it was that people saw things the way they did. Recognize that because you know the outcome, you are already affected by "hindsight bias"—or the distorted idea that you could have predicted it. To really learn how susceptible you may be to such an event, put yourself in the participants' place and consider how you would react—if you only had the information that they had available to them at the time. If you recognize similarities in your reactions, then consider that it is plausible that you may be at risk of experiencing a similar outcome.

Safety Culture

The Jemez Ranger District should be recognized for their proactive mindset of managing safety: their entire organization has attempted to institute defenses against operational upsets, incidents and accidents.

One fact that the CRP team identified was that some employees are not sharing many ATV minor accidents, near misses or close calls with the local line officer. There is a "gap" between what the line officer perceives is happening on the ground and what the practitioners

are doing at the sharp end[3] to accomplish the job at hand. This was identified by the Ranger after several employees from other areas shared with her several near misses, close calls and minor accidents, while operating ATVs. This surprised the Ranger. She reflected on this new information, *"[Now] I don't know what the right answer is. I don't know that I understand the hazards of using these ATVs. Some of the things I heard suggest a lot of problems. I don't have the expertise to make a judgment call as to whether or not ATVs are a reasonable tool to use."*

The key to a learning culture is an open reporting culture. Why would this happen on such a progressive, safety-minded unit? Based on conversations with employees, there is a concern that if they report all the ATV accidents and close calls, *"ATVs will get jerked away from us."* In other words, employees perceive they understand the risks and rewards of ATV use and they have determined that the risk is worth the gain afforded by this tool. However, employees also believe that management, being distant from the field work and from ATV operation (blunt end), might not make that same evaluation if they knew about all the near-miss and minor accidents employees were having, and consequently restrict or eliminate ATV use. This will be discussed further below. There is also a concern by employees with how cumbersome the SHIPS accident reporting system is and how it is not user-friendly, further hampering reporting.

ATV Operations

Not unlike other ranger districts, there is a tremendous amount of ATV/UTV use on the Jemez Ranger District. ATVs/UTVs are considered a very valuable tool not only by the fire organization but by other disciplines as well. District Staff have appropriately conducted job hazard analyses to identify risk and hazards relative to operations.

Additionally, the District fire organization has come a long way over the past few years in accelerating their fuels management program. The Jemez Ranger District fire organization is very proud of their accomplishments and recognizes the fuels workload needing to be accomplished to restore ecosystems and perpetuate funding into the future. ATVs, they believe, are essential to this success. *"It would take 20 hand crews to build the line I can do in one day, on an ATV, pulling a drag".*

Aware of the risk of losing ATVs if management perceives they are too dangerous, District Fire Managers have gone over and above in complying with safety protocols and manual direction relating to ATV/UTV use. The District provides training, certification/recertification and assures

[3] Sharp end refers to the field practitioners who are in direct contact with operational risks. They are the actualizers of a work program designed and organized by those at the blunt end. Employees at the sharp end are those who make real-time, operational risk management decisions. Those at the blunt end are the supervisors, and administrators who are engaged in strategic risk management.

that ATV/UTV operators have appropriate PPE, and carry radios and cell phones when riding. The Jemez District is attentive to operational safety and risk management, one of many examples of their efforts to manage this program is that the District exceeds Agency recertification requirements; once every year versus the requirement of every 3 years.

The District Ranger does not use either ATVs or UTVs on, or off, the job. She understands that they are a valuable tool. Based on interviews, the other managers involved at the Forest and Regional level are also not operators. Only the practitioners on the ground are operating at a skill based performance mode when operating ATV/UTVs. Aside from the undisclosed close calls and minor accidents, there have been two other significant ATV accidents over the past 2 years. This is a signal that there are risks in operating ATVs that may not been appreciated.

During the analysis of this fatality, several of the experienced ATV riders on the CRP team told stories of their near misses and close calls. Indeed, the *most* experienced riders stated that near misses and minor accidents are commonplace. This is an indicator that having near misses and accidents may be acceptable, expectable, and a normalized part of ATV operations.

In learning to operate an ATV, a rider moves quickly from rule and knowledge-based performance to skill-based. Skill enhancement over time is rapid and continues as long as the rider tries new things, pushing and testing the limits of their skills. Analogous to a person learning to ski, juggle or ride a horse (or any number of other skill-based physical performances) when an ATV rider has an accident or near miss, the rider learns from their individual experience. That is, as a result of their accident /near miss, they become *more* skilled and *less* likely to have a similar accident. Riders may also become more confident in their skills and thus more likely to try and extend their limits of their performance or '*push outside the envelope;'* which in turn may result in additional accidents/near misses. Unlike other classes of accidents, (such as automobile accidents) many (perhaps the vast majority) ATV accidents do not result in any 'reportable' damage to the ATV or the rider. While stories of close calls and minor accidents shared among peers for social and altruistic reasons, there is little incentive to share upward. The Forest Supervisor and the Ranger don't ride so they don't hear these stories. They're not included in a network of employees who have a socially constructed understanding of the risks involved in ATVs.

This lack of upward reporting is certainly not unique to ATV use. There are numerous instances where employees do not share stories of accidents or near miss information with line officers simply because the line officer doesn't have the background to understand context or appreciate the trade-offs made by employees at the sharp end. There is always a gap between what managers at the *blunt end* think are risks, compared to what the employees at the *sharp end* (who experience the actual risks) think are risks. Nevertheless, effective corporate risk

management depends crucially on establishing a reporting culture. Employees appear to have not reported near misses, close calls and possibly other minor accidents in part because the cumulative effect of these accidents involving ATVs over the past several years may threaten or constrain the use of the equipment the workers have become attached to and dependent upon.

Search and Rescue (SAR) Response

This review was limited to the events that involved the accident; essentially the time period between the afternoon of 8/29/2013, up until the State SAR arrived at 2400 on 8/30/2013. Firefighters on the District began looking for Token at around 1600 and several of the firefighters continued searching for him through the night, even after SAR had assumed management of the incident. Once the state SAR took over, the Forest Service employees felt that they were being displaced searching for a member of their Forest Service family. Many Forest Service employees continued to participate in the search up to the time that Token was found. Numerous lessons learned were shared with the CRP team concerning this SAR. Virtually all employees related the emotional frustration of the SAR and the day-after-day experience of not finding Token. A supplemental document of Team Lessons Learned and observances will be provided to the Southwest Region when this Learning Review Team debriefs the regional staff.

The condition identified that is related to this frustration is simply that Forest and District employees did not know how SAR operates as well what are the specifics in the State SAR agreement. This was a novel experience for these employees. For instance, Forest Service employees are frequently called to support emergency operations (fires and other natural disasters). When they do so, they are trained and expect to be operating under the Incident Command System. Although the State operates under an incident command process, it is not the same system that wildland fire management agencies have honed throughout the years. Another is that the norm for SAR operations is to manage an incident up to 72 hours and if the victim is not discovered by that point, SAR disengages. Disengaging was unthinkable to the Forest employees emotionally tied to looking for and bent upon finding Token.

Enquiry and Analysis

Captain Adams was an experienced ATV rider. He was well known to be conscientious and conservative. Based on comments from his co-workers, he probably had much more experience than the average Forest Service ATV rider. The ground he was covering was relatively gentle rolling terrain, less rugged compared to much of the Santa Fe National Forest. The area he was searching could be described as ideal for ATV operations. Weather and other environmental conditions were good. Captain Adams was within work/rest guidelines and he knew the area intimately, having performed ATV operations as a Type 4 IC trainee in that area for the past couple of weeks. All personal protective equipment was worn and all of the known hazards were mitigated by leadership and Captain Adams. A risk assessment on the operation planned for August 30 would indicate this is a low risk operation. Relative to many things firefighters do, this operation involved much less risk. This was a *safe* operation in spite of the fact it did not end *safely*.

Learning from Tragedy

Expert ATV riders on the Learning Review team all agreed the path that Captain Adams chose with his ATV was also a *safe*[4] one. The evidence is clear that he was not driving fast or aggressively. All the evidence confirms that the angle and speed and weight position of the rider had to be perfectly aligned to cause a tip violent enough to throw Captain Adams and then cause the ATV to roll over top of him. One expert stated, *"If Token had taken that exact same path a hundred times; 99 times I don't think he would have had any problem."* Highly experienced ATV riders on the team (as well as many novice riders) stated they would not have hesitated to take the path Captain Adams took. One member of the review team stated the rock that threw Captain Adams is very similar to the course that is set up for Region 5's, Prairie City ATV certification training. In other words, for employees in R-5 to pass an ATV certification course, they have to demonstrate they can ride a path similar to what Captain Adams took. It's hard to imagine that R-5's Certification Course (where they certify novice riders) is *unsafe*.

If the operation was safe, how could such a tragic accident happen? The 2013 Facilitated Learning Analysis Guide quotes from James Reason's text, *The Human Condition,* answering this question. *Accidents arise out of conditions that create tension between production and protection; and, conditions that permit chance conjunction of local events that breach all barriers and safeguards*.

[4] The word 'safe' is used here to connote an activity that is reasoned to have a very high certainty of the intended outcome. In this context the word safe equates to sound and appropriate risk management. Such was the case with respect to Token Adams' actions on August 30th and actions of the other firefighters involved in locating the Schoolhouse Fire as well. Because of the outcome however, using the word *safe* is counterintuitive. Our emotional wiring does not accommodate it. How can we be safe and yet have a tragic outcome? Does 'safe' mean good risk management or does it mean we all go home in good condition?

On August 30th the need to locate the Schoolhouse Fire created the need to accept some risks (alternatively stated, there was tension between production and protection). Often risk is a byproduct of production. Here are some of the more obvious risks managers and firefighters accepted in order to locate the fire:

> First, they accepted the risks associated with driving out to the staging area. This involved highway speed vehicle operations, dirt-road operations, loading ATVs, use of gasoline, etc., all of which has caused fatalities to others in the past. There is no way to calculate the exact risk of this operation (or probability of harm), but intuitively we believe it is a *very* small risk and therefore *very* acceptable. Driving to worksite locations is a routine task, so routine as to be considered *safe*, in spite of the fact that sometimes we have accidents.
>
> Second, they accepted the risks of being in a fire area and not knowing exactly where the fire was. In the right circumstances this could be extremely dangerous. But there are huge efficiencies gained in finding a fire while it is still. The firefighters' experience and training told them it was *safe* to be working in an area where they knew there was a fire but didn't know where.
>
> Third, they used ATVs to increase the efficiency of locating the fire. This is the classic production vs. protection tradeoff. Production (or efficiency) is increased by sacrificing a measure of protection (or safety). ATVs clearly increase the risk to the firefighter using the equipment, but as noted above, ATVs also *substantially* increase the efficiency of their task.
>
> Fourth, they all agreed to search separately with agreed upon periodic rendezvous. This decision added some small risk to the firefighters but also *tripled* their efficiency. Yet another production vs. protection choice made to enhance efficiency that can *only* be accomplished by trading off a small measure of safety.

Their only zero risk, or perfectly 'safe' option, for the three firefighters would have been to refuse the assignment and not leave the fire station. Could they have flown the fire to locate and assess it? Or could they have just planned on letting future rains put the fire out? Yes. But each of these alternative options would have resulted transferring risk to others. In hindsight, the choices made on August 30th may have been the safest choices (i.e., the best management of risks) available to them.

The next ingredient in most accidents is the chance conjunction of local events that breeched all barriers and safeguards.

As noted, this accident happened because Captain Adams drove his ATV at just the right angle speed and direction to hit a relatively small rock in such a fashion that it caused one tire to slip off the rock, the ATV to tip, throwing him off, or causing him to jump off, then the ATV (weighing over 600 lbs.) rolled over the top of him.

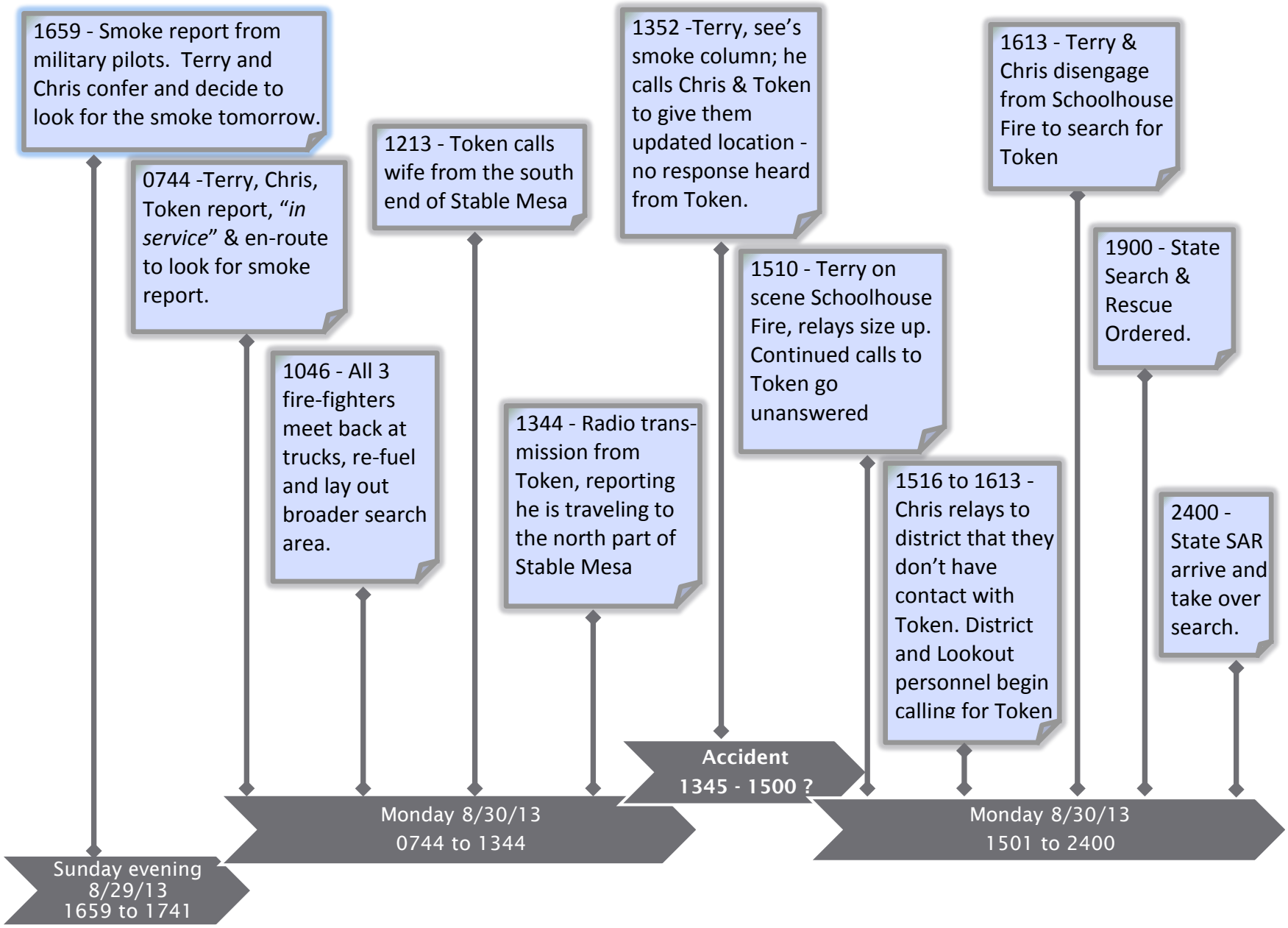
According to ATV experts on the review team, factors such as speed, angle of approach, weight balance, throttle response and many others conditions, all had be to precisely aligned for Captain Adams to fall in the position he fell, and for the ATV to roll precisely the way it rolled, to result in the subsequent lethal consequences.

The *safeguards* of his cautious attitude, his training, his physical fitness, etc. were all breeched by this chance conjunction or alignment of local events. The particular way that the ATV rolled over Captain Adams' neck negated the value of his helmet (breeching a barrier). The fact that he was likely killed instantly negated the value of the unit's safeguards with respect to their preplanned emergency medical response.

- -

It is hoped that ATV riders across the country who read this story and watch the videos, will be able to relate so closely with Token's experience that they are affected. The intent is experiential learning; a new slide etched into memories with an emotional attachment. The lesson is powerful. Riding an ATV in relatively benign terrain can result in the ultimate tragedy - even if all reasonable precautions are taken. This is what is meant when we refer to many wildland fire operations as safe but inherently risky.

Time Line


1659 - Smoke report from military pilots. Terry and Chris confer and decide to look for the smoke tomorrow.
0744 -Terry, Chris, Token report, "*in service*" & en-route to look for smoke report.
1046 - All 3 fire-fighters meet back at trucks, re-fuel and lay out broader search area.
1213 - Token calls wife from the south end of Stable Mesa
1344 - Radio trans-mission from Token, reporting he is traveling to the north part of Stable Mesa
1352 -Terry, see's smoke column; he calls Chris & Token to give them updated location - no response heard from Token.
1510 - Terry on scene Schoolhouse Fire, relays size up. Continued calls to Token go unanswered
1516 to 1613 - Chris relays to district that they don't have contact with Token. District and Lookout personnel begin calling for Token
1613 - Terry & Chris disengage from Schoolhouse Fire to search for Token
1900 - State Search & Rescue Ordered.
2400 - State SAR arrive and take over search.
Sunday evening 8/29/13 1659 to 1741
Monday 8/30/13 0744 to 1344
Accident 1345 - 1500 ?
Monday 8/30/13 1501 to 2400

Epilogue

Token Mark Adams lost his life in a tragic accident while scouting a fire on the Santa Fe National Forest at age 41 on Friday, August 30, 2013. He was born in Oakhurst, CA on September 19, 1971, to Kenneth Adams and Hendrika Anderson. Captain Adams will be remembered as a loving and devoted husband and father who cherished every moment with his family. He had an infectious and uplifting personality, a contagious smile, a sense of humor that could get anyone laughing, a heart that was so full of generosity and love. He made friends everywhere he went, and liked to travel. Token served his nation in both the U.S. Navy and later the U.S. Forest Service.

Token was a very hardworking, respected and reliable employee who loved his Forest Service job. He was an Engine Captain on the Jemez Ranger District on the Santa Fe National Forest in the Southwest Region of the U.S. Forest Service. He was a wildland firefighter for 10 years, including previous experience as a hotshot. During Token's Forest Service career, he served in California, Texas, Florida, and New Mexico. He joined the Santa Fe National Forest, Jemez Ranger District for the past year and half after experiencing the southwest (on a fire assignment) he ultimately deciding this is where he wanted to be.

His co-workers and friends, remember Token for his leadership and easy connection to people. He was loyal and committed to his engine crew and admired for his concern for co-workers and their safety.

Token's leadership extended beyond the engine crew and he provided training and mentoring to firefighting crews in the local communities and Pueblo.

Token is survived by his wife Heidi a 3 year old son Tristan Andrew and two children from a previous marriage, daughter Kristy Adams, and son Sean Adams. He is also survived by his mother Hendrika Anderson; father Kenneth Adams, two brothers Cruz Adams and Kyle Adams, and Sister Kobie Anderson. Token and Heidi's second child, a daughter they named Isla Skye was born September 19, 2013 on Token's birthday. He is also survived by his Forest Service family and the entire wildland firefighter community.

He will be missed.

Appendix A – SEND Devices

Satellite Emergency Notification Device (SEND) Utilization

One of the many questions that arose during the learning review of the tragic death of Token Adams was "why wasn't Token using a SEND device that day while working in the field?" While it wouldn't have changed the outcome in this accident, it would have shortened the search and the associated stress it placed on family and co-workers.

Nonetheless, the short answer to the question is that communication between Token, the other firefighters and Dispatch was consistently available throughout the day via radio. Additionally, cell phone usage in this particular area of the Forest was spotty, but available. Within the fire community, rarely do employees work alone in the field and they usually work in groups or teams. These factors combined lead to a risk-based decision where SEND devices are not critical for these types of work activities when compared to employees who work alone, work in remote areas, not in continuous communication or who work in communication dead zones.

Discussion Points:

The Agency purchased 6,000 of these devices, clearly not enough to issue to every employee. However, most employees do not need these devices for their daily work. The SEND units were purchased with the intent of providing them to field-going employees based on a risk assessment that considers the following factors:

- Employees working in remote field locations
- Employees working in known communication dead-zones
- Employees who will be working alone (outside visual and voice range of other people)

When the above conditions are met, a conscious decision should be made regarding whether to allow employees to work in the field with or without a SEND unit.

Although the Agency purchased and distributed 6,000 SEND units in 2012, as of September 2013, it appears the intent behind the use of these devices is misunderstood by some, capability of these devices is not well known, and deployment and utilization of these devices is spotty. Another consideration is whether or not to allow employees the discretion to activate the GPS tracking feature on the device prior to beginning their work in the field. The reason this decision is so critical is that employees who might

become critically injured, knocked unconscious, or otherwise injured to the point they are unable to activate this feature of the SEND device would not be in a position to let others know where they can be located. This is an important benefit of the SEND units that is rendered useless unless an employee physically activates the feature. Some employees fear this feature will be used as a supervisory method to monitor their day-to-day whereabouts and activities, a practice which clearly violates the intent of the MOU signed by the Agency and NFFE.

Although these devices provide another tool in the employee's tool box should they find themselves in an emergency situation, these devices do not provide 100 percent assurance an employee would be located in an emergency. Reasons for this include: the level of canopy the employee is working in as heavy canopy can block or obscure satellite signals, the position of the SEND device can block signal transmission, for example, if an employee were injured and came to rest with their body on top of the SEND device, if the batteries had not been replaced on the device and so on. However these devices do provide another resource, in addition to two-way radios and cell phones that increase the odds they could be located and rescued in an emergency.

Initial MT&DC Evaluation – 2008:

In 2008, MTDC conducted an evaluation of the feasibility of using SEND devices for field going employees. The small, rugged global positioning system (GPS) device allows users to send an "OK" (check-in), HELP, or Alert 911 distress message with their current GPS location.

The SPOT device was tested in 2008 under three different canopy types at designated GPS test courses throughout the United States. The device was also tested to determine such things as reliability, ease of use, transmission capabilities, and to gather users' overall impressions.

Four different tests were conducted at each site to determine how many messages were transmitted successfully. Tests included Check-In, HELP Tests, 24-Hour Horizontal Tracking and 24-Hour Vertical Tracking. The following table shows the results from the three test locations. Nearly all the check-in messages were successfully sent at all the test points.

Table 1—The percent of SPOT messages sent successfully during tests at the three GPS courses in western Montana and northern Idaho.

Test	Percent of Messages Sent Successfully		
	Open Canopy	Medium Canopy	Heavy Canopy
Check-in Feature	100 (9 of 9)	89 (8 of 9)	91 (10 of 11)
HELP Feature	100 (13 of 13)	46 (6 of 13)	31 (4 of 13)
24-Hour Tracking (Horizontal)	97 (140 of 145)	81 (110 of 136)	49 (71 of 145)
24-Hour Tracking (Vertical)	80 (115 of 144)	54 (78 of 145)	14 (21 of 145)

Based on the results of the MT&DC tests, the SPOT messenger was determined to be an effective transmitting device, even under heavy tree canopies.

2012 Safety Journey Memorandum of Agreement:

The Memorandum of Understanding signed in September 2012 by the Agency Chief Information Officer and NFFE Vice President clearly indicated the devices were to be used as a backup to Forest Service approved two-way communication devices. The MOU also stated, "The primary purpose of the SEND GPS Locators is to ensure the security and safety of field going crews. It will primarily be used in emergency situations where two-way communication devices are unavailable to employee(s)."

Appendix B – ATV's Versus UTV's

White Paper

All-Terrain Vehicles (ATVs)

Versus

Utility-Terrain Vehicles (UTVs)

Historical Perspective:

- In the past ten years, the Forest Service has sustained 55 on-duty, work-related fatalities. Including the recent loss of Token Adams, four of these fatalities were associated with ATVs.

- ATVs are inherently risky machines to operate. According to the web site ATVSafety.gov, and the Consumer Protection Safety Council (CPSC), there have been over 3,000 ATV fatalities across the United States over the past five years. In a rough comparison, the CPSC reported 116 deaths on UTVs between 2003 and August 2009.

ATV-Related Deaths and Injuries for All Ages
(ATVs with 3, 4 or Unknown Number of Wheels)

Year	Reported Deaths[1]	Estimated Deaths	Estimated Number of Emergency-Room Treated Injuries
2011	*327*	*	107,500
2010	*590*	*726*	115,000
2009	*684*	765	131,900
2008	*741*	837	135,100
2007	822	890	150,900

- Even when ATV riders are highly experienced, well-trained, and wearing proper Personal Protective Equipment (PPE), the potential for a fatal accident is prevalent.

Discussion Points:

- ***Why does the Forest Service utilize ATVs?*** ATVs provide enhanced mission capacity for the U.S. Forest Service based on their smaller size as compared to motorized vehicles (pick-ups), ability to get into remote areas, and their agility.

- One factor that contributes to the seriousness of injuries sustained by ATV riders who are involved in accidents is the lack of rollover protection.

- Some employees claim the decision to ride ATVs over UTVs is based on the size of the equipment in that ATVs are smaller in width to UTVs and can better traverse Forest Service trails. In a February 2011 MTDC Tech Tip titled "All-Terrain and Utility Terrain Vehicle Safety: Alternative Vehicles for Towing Trail Grading Equipment" published by Ellen Eubanks, Landscape Architect, it was stated Forest Service trails are limited to 50 inches in width. In her paper the Polaris Ranger RZR 800 was evaluated since it was less than 50 inches in width and could be used on Forest Service trails. There truly might be circumstances where an ATV is the only piece of equipment well suited for the task at hand but the rationale and justification should be very clear and well documented.

- ***Equipment Costs***: It has been reported the decision to utilize ATVs versus UTVs is based on overall cost. The cost of a standard trail ATV can range from $5,000 to $7,500 while trail model UTVs range from $10,000 to $15,000. This can be a significant difference for districts and Forests that operate on limited budgets but the costs associated with employee serious accidents and fatalities far exceed these costs.

BLM Engineering Study & Forest Service Application:

- In 2007-2008 the Bureau of Land Management conducted an engineering study to evaluate the risks and differences associated with operating ATVs and UTVs in a land management environment.

- The Forest Service adopted the information from the BLM study and followed suit when they issued an interim directive, 6709.11-2012-2[5] regarding off-road highway vehicle (OHV) usage.

- This policy prohibits the use of ATVs for "industrial use" applications effective June 13, 2013. The Agency defined industrial use as follows: "Industrial Use. An activity or process requiring an ATV or UTV which is used as an integral part of that activity/process, including but not limited to, the following: pesticide or fuel firing device application or transportation of greater than 15 gallons of liquid cargo."

[5] FSH 6709.11.2012-2 was superseded on September 19, 2013

- What is not addressed in this policy is guidance that mandates units who utilize ATVs for other than industrial operations to conduct risk assessments to determine which work activities actually require the use of an ATV as opposed to performing those job tasks using UTVs or other equipment. These risk assessments should also address whether the task truly needs to be accomplished at all.

Risk Management:

- Based on available data and information it appears UTVs provide additional employee protection by the inclusion of the Rollover Protection System (ROPS) that increases employee likelihood to survive a rollover crash where ATVs do not. This critical safety feature alone should prompt considerable debate as to whether the ATV is the "best tool" for the job.

- The Agency has not banned ATV operations and this paper is not making any such recommendation. However, the decision to operate ATVs as opposed to UTVs should be deliberate, well thought out, and based on factual information as to why a UTV simply cannot accomplish the same work.

- To tie this conversation in with the Agency's safety journey, which focuses heavily on risk management (hazard identification, management, and mitigation), risk-based decisions should look at the potential benefit (accomplishing the mission) versus the potential cost (employee injuries and fatalities) and ensuring if the work is worth doing then we should ensure employees are provided the proper equipment to perform the job as safely as possible.

Appendix C – Compliance Review

ATV Operations:
The Agency's Off-Highway Vehicle Policy, on August 30, 2013 was WO ID 6709.11-2012.2, effective Feb 22, 2012. While it expired on Aug 22, 2013, it had not yet been superseded.

Reference #1) Paragraph 13.1 - Four-Wheel-Drive Vehicles states, "***Four-wheel-drive vehicles are designed to provide extra power and traction for traveling at a slow speed over rough or unusual terrain… Four-wheel drive should be used only when greater traction and power are required than can be provided by a standard transmission in low gear. Use it in steep off-highway operations, in snow or on icy roads, in mud or sand, or other conditions that require extra traction to travel at slow speed***."

Observation 1) Token's ATV was discovered in 2X4 mode as opposed to 4X4 mode which was appropriate for the terrain and environmental conditions he and his team were traveling at the time of the mishap.

ATV Training:
Reference #2) 13.21 – Qualifications, 2. "***Only authorized and certified employees shall operate ATV/UTVs*** (sec. 13.21)." 4. "***Forest Service ATV operators shall successfully complete the ATV Safety Institute (ASI) ATV Rider Course training or equivalent training…***" 9. "***All operators shall be re-evaluated by a certified trainer every three years***…"

Observation 2) Token successfully completed ASI ATV Rider courses on April 5, 2011 and April 15, 2013. His Incident Qualification Card indicated he was Qualified as an ATV Operator through April 15, 2018. In addition, statements received indicated Token was "a very experienced and conservative" ATV operator. He also re-accomplished the AgLearn Defensive Driver's Couse on April 19, 2013.

Personal Protective Equipment (PPE):
Reference #3) 13.22 - Personal Protective Equipment (PPE) and Operating Equipment,
1. Identify PPE and field equipment required for ATV/UTV use in the JHA/RA. At a minimum the following PPE/field equipment must be provided and used:

> ***b. "Personal communications device defined as a two-way radio, cellular phone, or satellite phone…***

c. Helmet. (1) ATV and UTV operators shall wear a full or three-quarter face motorcycle helmet with chin strap properly secured.
(2) The helmet must meet requirements of the Department of Transportation (DOT), ANSI Z90.1 standard, or Snell Memorial Foundation (SMF) standards.

g. Eye Protection(1) ATVs. Safety glasses, goggles, or sunglasses that meet the ANSI Z87.1 standard…

h. Additional rider protection gear identified in the JHA/RA, such as rider pants or knee/shin/elbow guards…"

Observation 3) Token was wearing appropriate PPE for the operation and field environment he was operating in the time. He had a radio, full-faced AFX Off-Road ATV Helmet that met DOT requirements, sunglasses, sturdy shin-high leather boots, Kevlar pants, leather gloves, and long-sleeved shirt that had the sleeves pulled down to his wrists.

Job Hazard Analysis (JHA):
WO ID 6709.11-2012.2, Paragraph 13.04.b. stipulates that project leaders, supervisors, and managers "b. Ensure that a Job Hazard Analysis (JHA)/Risk Management Assessment (RA) (sec. 21.1) is prepared for each type of all-terrain vehicle (ATV) and utility-terrain vehicle (UTV) activity."

The District developed a generalized JHA for ATV/UTV operations dated January 17, 2013 that was signed by the Jemez District Ranger

ATV Serviceability Inspection Results:
The ATV that Token was operating at the time of the accident was a 2010 Polaris 400, VIN Number 4XALH46A0AB797909, approximate dry weight 600 pounds (without fluid or gear).

It was discovered lying on its left side at the accident site. The only visible sign of damage at the site was a pool of oil that had collected inside the left front wheel rim.

The ATV was taken to Santa Fe Motor Sports, 2594 Camino Entrada, Santa Fe, NM, 87507, for a safety (serviceability) inspection following the accident. The inspection summary follows:

"Tech notes: Battery not charged – all tests performed with known good shop battery. Oil at correct level, shocks working-no leaks, driveline working properly, air filter check, coolant level at spec, brakes working properly-within limits, throttle operation in spec, lug nuts tight, bolts attaching front brake rotors to hubs lose-both steering working properly-no binding."

Equipment Inspection:

- The Polaris mechanic who inspected the ATV felt the oil discovered at the accident site must have come from engine oil since the ATV was discovered on its side and the safety inspection following the accident indicated all shocks were working properly.
- The safety inspection report stated the front brake rotors were loose but the mechanic stated this would not have impacted the functionality of the brakes, "they still would have worked properly" but they need to be tightened.
- The only point of physical damage noted on the ATV was a small, approximately 2 inch, burn on the rear plastic below the tool rack support brace.

Glossary

ATV & UTV:
All-terrain vehicle (ATV), also known as a quad, quad bike, or four-wheeler, is defined by the American National Standards Institute (ANSI) as a vehicle that travels on low-pressure tires, with a seat that is straddled by the operator, along with handlebars for steering control. As the name implies, it is designed to handle a wider variety of terrain than most other vehicles. UTV Characteristics differ from ATV's in that UTV's typically have a side by side seating arrangement, many have seat belts and roll over protection.

CISM:
Critical Incident Stress Management (CISM) is an adaptive, short-term psychological helping-process that focuses solely on an immediate and identifiable problem. It can include pre-incident preparedness to acute crisis management to post-crisis follow-up. Its purpose is to enable people to return to their daily routine more quickly and with less likelihood of experiencing post-traumatic stress disorder

Combi Tool:
The firefighter's version (Combination pick and shovel Tool) of a military entrenching tool. A small shovel head which can be folded straight for use as a shovel or folded at 90 degrees for use as a scraping tool or hoe on a 5 foot handle. The pick can also be folded at a 90 degree angle or used in-line with the handle. A large locking bolt secures the shovel in its closed position. Produced in accordance with Forest Service Specification 5100-325A, February 1994.

Drag Line:
A firebreak constructed by literally *dragging* a heavy object behind an ATV or UTV. The object is often an old wheel off of a truck filled with concrete for added weight. Sometimes plow blades are also used for dragging. The technique is very effective in light fuels such as pine litter.

SEND\SPOT Devices:
Satellite Emergency Notification Device (SEND) a portable emergency notification and locating device which uses commercial satellite systems. An example of one such device is "SPOT". The devices use an internal GPS to gather location information. When the SEND is triggered, this information is sent via commercial satellite to a commercial monitoring Agency whose role is to pass the information to an appropriate responding Agency.

TAC 2:
Tactical Frequency (TAC Channels) usually does not use repeaters. Commonly used when there is not an obstacle blocking line of sight for inter-crew communication.