HRO Review of the Rattle Fire Snag Incident
September 10, 2008

On September 10, 2008, a crew member from a Pacific Northwest Interagency Hotshot Crew (IHC-2) was injured during a snag incident on the Rattle Fire. The crewmember sustained a fractured jaw joint and six fractured ribs.

The intent of this analysis is to offer multiple perspectives of the events that lead up to and during the injury incident in an effort to provide an opportunity to learn in two different ways. The first is to provide an opportunity for sharing and storytelling from the two crews involved. This gives us an opportunity to understand the conditions that were setting up within the organization in the weeks leading up to the day of the injury incident. This also gives us the opportunity to utilize both crews' perspectives with some hindsight bias over a year later. (i.e.: knowing what they know now based on the outcome, what decision would they change or not change if in a similar situation). Second, this incident provides us an opportunity to look at the decision making leading up to a "brutal audit" and utilize those decisions as an opportunity to learn as we strive to embrace the HRO principles and discover how we were not mindful of the HRO principles. More importantly however, this incident provides us the opportunity to look at this incident from an "at the stump" perspective and in the broader scope of HRO principles and what we can learn from those by applying them.

Rattle Fire Timeline

8-17-08: Rattle Fire detected at 1900; small smoke; started from lightning.
8-18-08: Small smoke;
8-19-08: Smoke not showing
8-21-08: Spotted smoke again, about .5 acres, deemed not safe for ground attack
8-22-08: Committed DIVS/IC3-1 to Rattle in afternoon; bucket work, fire 5-6 acres by nightfall; deemed not safe for ground attack
8-23-08: Fire grew to 125 acres by 1630, Haines 6 conditions; Complexity determined beyond T3 organization; Forest and Diamond Lake RD negotiated transfer of command to T2 IMT (IMT2-1) for 8-24-08 in the morning
8-24-08: Transfer command at 0600 from IC3-1 to IMT2-1; Delegation of Authority Addendum #1 added Rattle Fire to North Fork Complex managed by IMT2-1
8-31-08: 0600 transfer command from IMT2-1 to IMT2-2
9-5-08: 0600 transfer command from IMT2-2 to IC3-2
9-7-08: 0600 transfer command from IC3-2 to IMT2-3 (Type 2)
9-10-08: Rattle snag incident
9-20-08: 0600 transfer command from IMT2-3 to T1 IMT -1
10-2-08: 0600 transfer command from T1 IMT-1 to IC3 -3

In the following pages this review looks at the incident from three different perspectives. The first, from IHC-1 in the weeks prior to the event. IHC – 1 was working in the area prior to the event and raised concerns about the unmitigated snag hazards associated. Second, pertinent factual information, is utilized in this analysis to provide the factual events of the injury incident. The third, and final perspective, is a retrospective account from IHC-2 involved in the incident.

In their own words*: IHC-1*

On August 23, 2008, we were assigned to the Rattle Fire on the Umpqua National Forest in the Boulder Creek Wilderness. The fire was approximately 200 acres burning in a remote area inside the 1996 Spring Fire. At the time, IMT2-1 was managing the North Fork Fire on the North Umpqua RD and took over management of the Rattle Fire. Due to the location of the fire in steep, rugged terrain, and the extreme hazards posed by the burned snags that were still standing from the 1996 burn, the decision was made (by the team and the Forest) to construct indirect line to lessen the exposure of firefighters to the threat of the snags.

Snags from 1996 Spring Fire

There were numerous IHC crews and professional timber fallers on the fire prepping and snagging the roads around the Boulder Creek Wilderness. After watching the fallers work and talking to them it was apparent that the snags they were felling from the 1996 burn were extremely hazardous. The snags were very large in diameter, most had broken tops and were rotten from one quarter of the way up from the base. Many of the trees broke apart in mid-air as they were falling after being cut. After talking with a number of the fallers about the situation it was clear that nobody was really comfortable with having to fall the number of trees that was required along the road due to the hazardous condition of the snags.

As IMT2-1 timed out the fire was transitioned to another Type 2 IMT (IMT2-2). We took two days off and were reassigned the Rattle Fire when we became available. Our assignment was to hold until the fire reached set trigger points: we would then burn out roads and handlines that had been established with the previous team. It was brought to my attention that the current team had a group of rappellers working inside the Boulder Creek Wilderness on the Boulder Creek Trail. This trail had not been maintained since the 1996 fire and was mostly within the boundaries of the burn scar from 1996. The area was covered in snags. The Boulder Creek Wilderness is known for rugged terrain and is composed of sharp ridges and steep drainages. There were only a couple of locations with the ability to land a Medivac if there was a need. When we asked what the Rappellers were doing in there we were told they were opening the trail for a control line. The amount of unmanaged risk exposure due to the snag hazard and lack of places for medivac sites in the area concerned me.

On September 5, the fire had transitioned again, this time to a Type III organization (ICT3-2) and plans for the fire changed again. Work was stopped on the Boulder Creek Trail due to the hazards involved, including lack of good safety zones, escape routes, and snags. My crew was instructed to hike into Pine Bench and monitor the fire across Boulder Creek. We hiked in and arrived at Pine Bench which had also burned in 1996 Spring Fire. On the northern end of Pine Bench there were numerous snags left from the Spring Fire. There was a falling module with us and we assessed the area that the crew would be monitoring from and had the fallers remove some of the more hazardous snags. Fire activity was moderate that day, backing down into Boulder Creek. We were utilizing Type 1 helicopters to slow the spread and keep the fire from crossing the Boulder Creek drainage. I had a short squad hike up the

trail to keep an eye on another area where the fire was backing down and work helicopters as needed. At this time I saw the work the rappellers had done on the trail. It had been reopened and cut out, but none of the snag s had been removed.

That afternoon, as fire activity started to pick up, I walked up the trail with the Task Force Leader assigned to us. One of our squad bosses on the trail north of us called and said they had a spot fire across Boulder Creek. It was below the trail and burning actively in the brush and deadfall. By the time the TFLD and I arrived at their location I could see at least 7-10 spots above and below the trail that were burning very actively. There were at least six snags that had fire in the tops of them. I pulled the crew out and we tried to get the Type 1 helicopters in to cool them down. We moved the rest of the crew up the trail to assist the short squad as needed. It quickly became apparent there was nothing we would be able to do with the current fire behavior, steepness of the slope, and the amount of burning snags. We backed off and observed the fire as it started moving in a SE direction towards Highway 138. The wind was blowing from the NW 5-15 mph. Myself, one squad boss, and the TFLD were standing on the trail in a snag patch and the crew was back down the trail to the south. The crew called and said that with the wind coming up they had three tops come out of snags and land very near them. They asked if they could pull back to Pine Bench where there was a large opening. As the TFLD and I watched the fire moving south a limb or top came out of a snag barely missing the TFLD head and shoulder and hit the ground missing his boot by less than 2 inches. The top was about 8 inches in diameter and 16 inches long. At this point we all hustled out to Pine Bench and to the highway. The fire had made about a one mile run and spotted across the North Umpqua River and Highway 138.

Rattle Fire Activity as viewed from 1996 Spring Fire

Due to the complexity, a new Type II management team was ordered (IMT2-3) and took over the fire two days later. On September 10, we were assigned to swing shift in order to conduct burnout operations as needed. We were assigned to Division A on our first shift. At 1245 I contacted Division A supervisor by radio where he instructed us to go to Pine Bench and construct handline downhill from Pine Bench to the road we were parked on. The weather that day showed possible winds from the NE 5-15 mph. Having had near misses on Pine Bench with snags coming down in the same conditions five days earlier, I had some concerns. I relayed my concerns over the radio to the division supervisor. There was already an IHC crew coming down from Pine Bench, so I instructed my crew to anchor off the road and build line uphill. Myself and one squad boss proceeded up the trail to Pine Bench.

I met the Division A supervisor on the trail where the other IHC crew had come down with their handline and crossed the trail. He briefed me on the plan to construct line across Pine Bench to the road at the bottom and burn it out that day. His intention was to complete the burnout that shift due to another burn operation planned on the other side of Division A the following day. It was almost 1400 and the plan was to start the burnout by 1730. He explained that we were to anchor handline into a rock outcropping above Boulder Creek, bring it across

Pine Bench and down to the road. At this time I relayed my concerns about the old snags on Pine Bench. I told him that from halfway up the trees were rotten, soft, and weak and that we had several close calls previously in the area with tops falling out in the wind. I told him we had been on the fire for almost three weeks and even professional fallers had concerns about the threat these snags posed to crews working around them.

My squad boss and I scouted the proposed line placement and reviewed the plan for burnout operations on Pine Bench. There was one stretch of the proposed line that went through a large section of old snags from the Spring Fire. There was very little to no fire activity on Pine Bench at the time and a small amount of active fire in a snag patch on the north end of the bench. There was also a small active piece on the south end of the bench where the handline came up from the bottom. The rest of the bench was cold. I decided that I would rather have my crew working on the handline from the bottom up to Pine Bench rather then working in the old snags. We still did not have a good anchor point for our lines and I felt the priority was to get the line tied in from the road up to Pine Bench with IHC-3 and get that secured. I knew IHC-2 would be arriving shortly and they could bump to the top to do the line on Pine Bench.

IHC-2 arrived shortly after and briefed with the division supervisor, TFLD, IHC-3, and myself. IHC-2 decided to go with Division A and the TFLD to scout out Pine Bench for the line placement. I had talked to the superintendent of IHC-3 and indicated the snag hazards, but when IHC-2 and Division A returned and we all briefed again, I didn't voice my concerns. I had indicated to IHC-2 several days before on another part of the fire about working in the area of the Spring Fire due to the conditions the snags were in. As the group split up, my squad boss and I headed back towards the crew and were monitoring some snags burning above them.

Our handline tied into Pine Bench around 1800 and we were getting ready to burn out. At about 1900 we were ready to burn when a call came over the radio that a Medivac ship was needed on Pine Bench immediately for an extraction; someone had been hit by a snag. After confirming with my crew that all of our people were accounted for, I pulled them off the line to secure their locations, told them to keep radio chatter to a minimum, and sent our EMT's to see if they were needed to assist. We helped clear the path to the evacuation site and assisted with handling the patient.

Incident Day

Environment: The incident occurred in the Pine Bench area of the Boulder Creek Wilderness on the Umpqua National Forest. This area had previously burned in 1996 and was heavily congested with hazard snags from that fire. The weather was clear and winds were projected to be 15 mph from the NE.

Background: Concerns for firefighter safety, exposure to hazards, and risk management were recognized and considered by the Forest and Incident Management Teams and were incorporated into the strategies. The fire was burning in heavy dead and down fuels resulting from the Spring Fire of 1996 where fuel load estimates ranged from 30 to 50 tons per acre. Snag quantity varied but ranged up to 125 snags per acre. Steep slopes, cliffs and rocky bluffs in a remote and inaccessible area contributed to hazardous conditions. Direct attack options were limited while indirect attack options continued to present obstacles and expose fire fighters to additional risks.

Strategy: A long term suppression plan was completed for the Rattle Fire on August 30 and was validated on September 9. The initial strategy was to protect the greatest values at risk (private lands south and west and power transmission and distribution lines south). The intent was to contain the fire within the wilderness area and prevent spread of fire to the south and west by preparing indirect lines on Pine Bench and Eagle Ridge. There was a very low probability that fire would spread north and east. The strategy changed from going primarily indirect to going direct in some areas once the fire crossed Boulder Creek to the east, burned onto Pine Flat, and crossed Highway 138 to the south. The strategy then became containing the fire south of the river using dozer lines, hand lines and roads, checking western spread north of the river using Eagle Ridge and roads, and checking eastern spread north of the river using dozer line, hand lines and roads. Boulder Creek Trail was initially opened for access and as a contingency. When fire crossed onto Pine Flat, the teams used the opened trail as part of the fire line for burning out and also constructed additional line. Snags would be felled by qualified fallers only when they posed a threat to safety.

What Was Planned? Three Interagency Hotshot Crews were to construct a fire line from the 011 Road through the Pine Bench area to prepare for a firing operation and burnout. Portions of the fire line along Pine Bench included snag patches. All snags that had the potential to catch fire, fall, and breach the fire line were to be removed. Firing operations were expected to begin as close to 1730 as possible and the burnout was to be completed by end of shift. The intent was to keep the fire in check and prevent it from spreading to the south and west. The tree that was being cut when the incident occurred was one of three trees that IHC-2 had left to fall before firing operations on Pine Bench were to begin. There was general agreement that the strategy could be implemented safely using appropriate mitigation measures, but there were differences of opinion on the tactics.

What Happened? IHC-2 was working in Division-A with IHC-2 and IHC-3 to build a line from the 011 road to Pine Bench in order to conduct the burnout operation. The timeframe was tight for completing line construction in order to begin firing operations as close to 1730 as possible.

The increasing numbers of snags occurring along the Pine Bench fire line were discussed with the Division Supervisor and the line location was changed and considered viable. The use of professional fallers for falling snags was also discussed, however, under the intended timeframe, there was not enough time for professional fallers to get to the site and be used effectively.

IHC-2 faller (Faller-2) and swamper (Swamper-2) were on one of the last three trees that the crew had identified as having the potential to breach the fire line once the burnout operations on Pine Bench began. They sized up the tree three times. The tree was located between the fire line a few feet to the west and the fire edge about 20 feet to the east. They had scouted the area and were aware of several other snags near the control line but within the fire area that were weakened and/or burning.

During the size up a crew member met up with the saw team. Swamper-2 asked the crew member to bump back up the line to act as a trail guard. The crew member went approximately 75 yards south of the saw operations to where the trail and handline

connected. Once the crew member was in position, he radioed Swamper-2 that it was clear to begin saw operations. Faller-2 sized up the tree one more time.

Swamper-2 said he retreated back about 20 – 30 feet and the faller began to cut. As soon as the tree started to go over, Faller-2 escaped the stump to the location of Swamper-2. As the tree fell, it brushed against another tree and broke branches off both trees. The faller and swamper said they waited for 60 – 90 seconds until the debris had stopped falling till they went back to the stump.

Faller-2 started toward the stump with swamper-2 about 3 feet behind. As they reached the stumped swamper-2 looked down to give the all clear on the radio and before the swamper-2 could key his radio, he looked up and saw a snag fall, landing directly on top of the faller-2 and only missing the swamper by about a foot. Faller-2 was not hit by the tree he was cutting, he was hit by a small snag from approximately 40 feet within the interior of the fire.

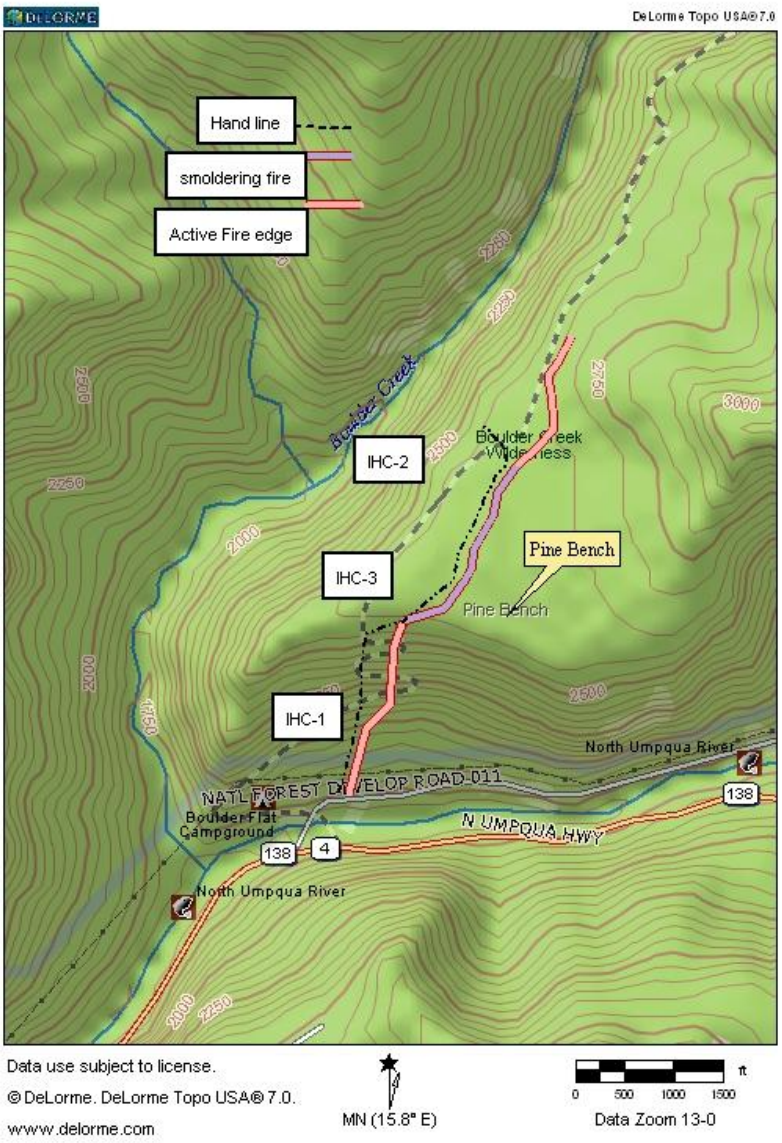
Faller-2 was hit on his left side, he remained standing for a brief period of time and then collapsed. He landed on top of his saw with his head resting on the snag that had hit him. He was within a foot or two from the stump. Swamper-2 immediately got on the radio and asked for the two crew EMTs to respond. Swamper-2 reported that the faller was unconscious and bleeding from his head.

Faller-2 was evacuated via helicopter to Roseburg and suffered injuries to the left-side head/temple area as well as 6 fractured ribs.

It is not know why the snag fell, but in the previous weeks snags were falling due to vibration from work in the area, winds, etc.

In Their Own Words: IHC–2

On September 10, 2008 we parked down on the 011 road near the Umpqua River and hiked into Pine Bench. IHC-1 was digging line, burning and using helicopters to keep the fire in-check on the slope from the river up to the top of Pine Bench. They were fully engaged with active fire and had the top 1/4 of their line construct and burn. I (IHC-2 Superintendent) tied in with the Assistant Superintendent from IHC-1 and he gave me a quick run down of what was going on. The hike appeared to be risky at 2 points due to active fire below and the portion of the trail that went through the black had not been snagged. Once we scouted the trail and we determined that exposure was minimal to hike in through IHC-1's operations.



When we arrived on top of Pine Flats, we received a briefing from Division Supervisor A, with IHC-1, IHC-3, the TFLD, and us. The communicated priority was to complete the line and burn during that operational shift. Division A's first priority that was communicated to all resources involved was to complete the burnout. In the briefing Division A discussed risks (snags), lookouts, fire behavior, weather, LCES, the Time frame for completion, and divisional assignments. We were the last resource to arrive due to our swing shift and were assigned to the top of the division. We all agreed on the general plan to secure the line to stop the spread of the fire to the west in order to keep it from getting into the old Spring Fire. We were going to stay on swing shift to secure the line after Division A left and was briefed by Operations and Branch.

After the briefing and scouting the fire location, locating safety zones, medivac site, fuels and hazards, we meet with Division A again and agreed on tying into a rock outcropping as a natural barrier into the Boulder creed drainage. The use of professional fallers was discussed with Division A and the TFLD but due to the time frame the Fallers would not make it to Pine Bench until the end of day shift. This decision was made knowing that it would not stop the fire to the north but would slow it down and would minimize the exposure to the snags. (the distance from the rock to the trail was approximately 150 feet of indirect line placing all the snags on the fire side and gave us the time to prep the line before the burn out or the fire reached that location) It took us approximately one hour to scout, devise the plan and brief the crew. The indirect line to the active fire edge was 100-175 feet away. Only a small area had active fire in it that was just north of the rock we were tying into and to the East of it (about 5 acres all in a large snag area within the old fire scar). The remainder of the line we were going direct on was not part of the old fire scar and had minimal fire activity (creeping and smoldering). The majority of the trees from that point were a healthy older stand of large diameter conifers. We felt this was a safe and viable operation mitigating the snags. The line location placed all the snags on the north side of our hand line. The largest area of snags was between the rock and the hiking trail. The fire was still 100- 175 feet away. At this time we felt that the small area of snags and distance from the fire edge allowed us enough time to construct the indrect line away from the snags and still allowed us to tie our line into the natural barrier. From there we were going direct and tying in to IHC-3's hand line who was working toward us on pine bench.

Prior to starting work on the hand line, and burn out. We briefed the crew again on the plan, risk implication and mitigations, knowing the plan was to slow the fire spread and not stop it. The current plan was the best place to slow the fire growth to the south and may not have been the optimal location due to the amount of time we had to implement the plan.

We had taken the time to scout and snag the line in front of the diggers on the line between the rock and trail and then from the trail to IHC-3. During the size-up, the snags in the felling area were recognized but the crew made risk based decision to not go past the rock outcropping to evaluate any further due to the fact we felt the risk of entering into the old burn area to evaluate any hazards was much higher then the risk of completing the cutting operations and leaving the area.

We anchored into the rock with hand line and had progressed about 500 feet from the rock when one falling team (Faller-2 and Swamper-2) stayed behind to snag 150 feet of line from the rock to the trail, the other two falling teams continued to construct direct hand line goint to the south along the smoldering fire edge.

Shortly after starting the falling operation Division A questioned the falling team (Faller-2 and Swamper-2) on their timeline for completation and reiterated again for them to meet the intended time line.

There was a perception of sense of urgency from Division A to complete the line and start the burn prior to all the line being tied in and sections completed between the three crews. All crews made the decision to hold off on burning till all sections of line were completed. Once we tied in to the cooler edge of the fire just off the trail the indirect line was running east-west and the direct line turned south-south east and was smoldering and creeping from there to IHC-3. As we continued working on line completion it became evident the set timeframes to complete the line and burnout were unreal expectations.

At approximately 1915 we were 8 chains from IHC-3 when the snag struck Faller-2. IHC-1 was still working on their line below pine flats. We notified Division A and requested a medivac. We shut down all operations and moved to the accident site and began treatment and packaging of Faller-2 for transport to the Medivac site. At this time Faller-2 and his equipment had to be moved due to the fire location and the need to move him during day light hours. We implemented our Crew medical plan and the lead EMT took charge of the medical scene. I (IHC-2 Superintendent)began relaying information to Division A . Our EMT(i) arrived with IV and took charge of the patient. Once the patient was packaged transport to the Medivac site was started (about ¼ mile) half way to the Medivac site the Paramedic arrived from the Helicopter. The patient was transferred to a backboard and then to the Helicopter at 1953 the patient was loaded and the Helicopter was lifting off.

Evaluating Our HRO Principles

As a Region committed to making the cultural shift to a Safety Culture and a commitment to High Reliability Organizing, it should be expected that we would take a hard look at accidents and near-misses. When confronted with an incident such as this accident, our principles require we explore what happened; both from an "at-the-stump" perspective, and from the larger organizational and possible safety systems perspective. By being preoccupied with failures, avoiding simplification, being sensitive to operations, relying on expertise, and committing ourselves to being resilient, we will be mindful as an organization. When we are not mindful of operations, we expose ourselves to a "brutal audit".

Rarely does an incident of this scope occur that does not have deeply rooted system, organizational or cultural conditions, that work against our employees and their successful use of risk management and exposed them to unacceptable risks. To not explore these issues promptly and with full involvement is an indicator that we may lack the ability and/or willingness to be resilient once failures have been identified. As such, it prevents important lessons learned from reaching the field in a timely manner. In this instance we were not faithful to our HRO principles. We missed the chance to fully exploit the organizational value of a significant failure. Unfortunately, the conditions that exposed our employees to great risk remain unexamined and thus, it is likely they remain with our system.

From a positive perspective, this review exposed some weak signals of conditions that can be of high value for future discussion. Discussing these signals in a team or group setting will help build a shared understanding of the risks we face and how we should manage these risks corporately and individually.

Below is a listing of some of the more obvious weak signals alluded to in the report. These signals are categorized by HRO principles. A good use of this report would be to bring a group of firefighters together, have them read the report and then discuss these questions in an open facilitated dialogue.

Tracking Small Failures

- Did we take notice of the indicators (small failures) that led up to the incident?: previous close calls with the snags; timeframe for meeting the objective on day of incident; lost intelligence from previous teams or crews; multiple strategies over time on same piece of ground
- Did we create an environment between crews and IMT that incorporated and encouraged multiple perspectives
- Was the communication environment between the crews and the IMT overhead a positive or negative factor in effectively identifying small errors?

Reluctance to Simplify

- Were the operations on the day of the incident too mission-focused or simplified ("We've done this before so we know what to expect")?

- Were adversarial perspectives heard and considered during the day of the incident or on the days leading up to the incident.
- Why were the perceptions of the crews not matching those of the Div Sup and IMT?

Sensitivity to Operations

- Was our collective Situational Awareness disabled by our over-simplification and inability to identify small errors? Could input and previous experience have been utilized better in order boost our SA?
- Both from an on-the-ground and incident-wide perspective, continual updating is imperative in order to maintain achievable and risk-managed objectives. Did we do everything in our power to have all the information we needed to make the right decisions leading up to and including that day?

Commitment to Resilience

- As it became apparent that the timeframe of the mission on the day of the incident was unachievable, did we have all the information and input we needed to be flexible with our operations?
- Once the incident occurred, did we take every opportunity possible to learn from the event, in order to prevent it from occurring again tomorrow?

Deference to Expertise

- Did we use the experience and input from the crews, contract fallers, local expertise and previous IMT's to make the most-informed decisions, both tactically and strategically.