

## **Appendix A. Felling Operations Subject Matter Expert Report**

On June 26, 2009, Engine 1613, Engine 1419, and Squad 1 arrived at the Freeman Reservoir at 1430 hours for tree felling training. Shortly after arriving, the engine and squad captains decided that trainees would be divided into four teams consisting of a qualified Faller B at a minimum as the trainer. The leaders further decided that the trainers would work with trainees other than their regular crew members to achieve diversification of instruction and evaluation. Providing additional reviews and evaluators strengthens the training process and is consistent with the Position Task Book process.

Team 4 would be made up of a trainer who was the 1613 Engine Captain and two trainees from Squad 1.

Before departing the parking area, Team 4 Trainer conducted a Tailgate Safety Session reviewing the hazards and objectives (training) that the team would be focused on while at the Freeman Reservoir Recreation Area. Team 4 departed the parking area at approximately 1445 hours, heading in a southeasterly direction looking for suitable trees for this instructional period.

Prior to arriving at the tree where the fatality occurred, the Team 4 trainees had cut down four to five trees between them. At this time the weather was overcast with light rain and drizzle. The working conditions were damp but not muddy.

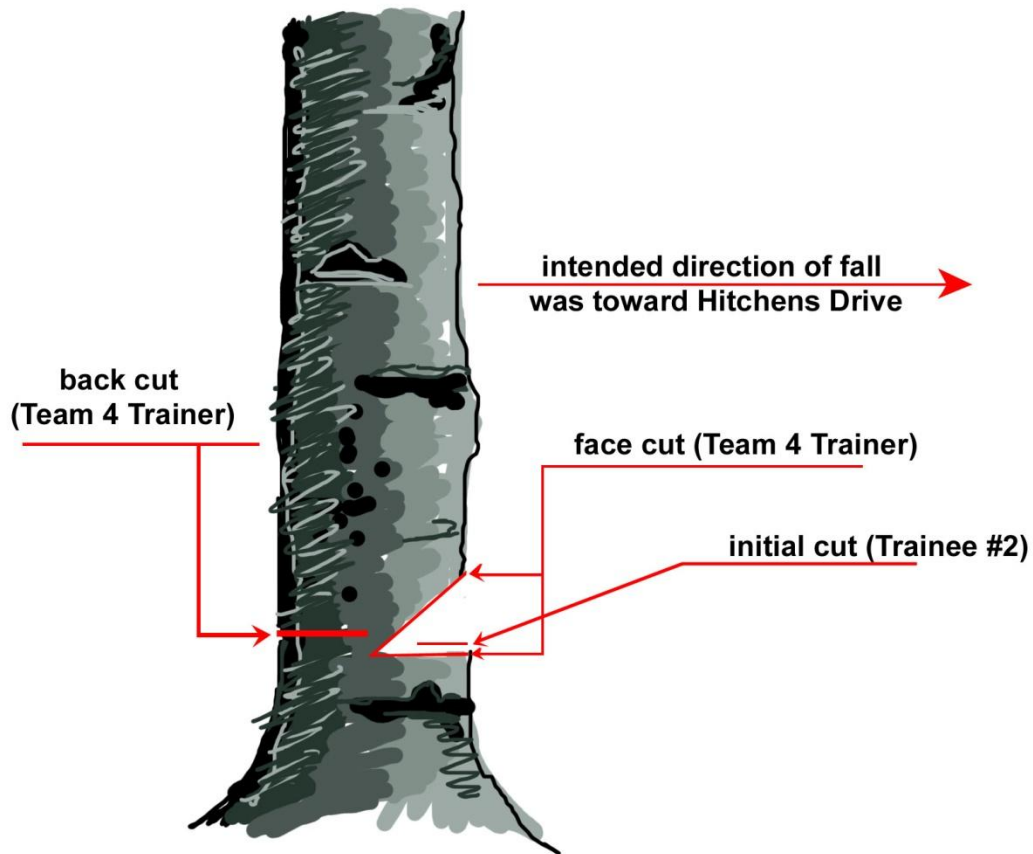
At approximately 1600 hours, Team 4 arrived at the tree where the fatality would occur. All three members of Team 4 observed a large, dead, standing aspen tree that leaned towards Hitchens Drive, a gated road 36 feet away from the tree. During this daily instructional period, both trainees had alternated falling trees; and it was Team 4 Trainee #2's turn to fall the tree. All the Team 4 members discussed and evaluated the tree for lean, branch distribution, and falling procedures. The tree was later determined to be approximately 68 feet tall with a 23-inch diameter breast height (DBH).

Before initiating any falling actions, Team 4 Trainee #2 created a safe working area around the intended tree, as well as removing material in two separate directions for escape routes. All three Team 4 members gathered around after the safe cutting area was created and talked specifically about the two separate escape routes (see B2 photo in Appendix B).

After the tree size-up discussion, Team 4 Trainee #1 moved approximately 22 feet from the Team 4 Trainer (right side of the tree) where he could act as a spotter for the falling operation. Team 4 Trainer moved to a location that was 5 feet to the right side of the tree which was the cutter side of the tree to instruct and observe Team 4 Trainee #2. Team 4 Trainee #2 picked up the saw and moved to the right side of the tree to begin falling operations. Team 4 Trainee #2 started the saw and began the horizontal cut to start the face cut.

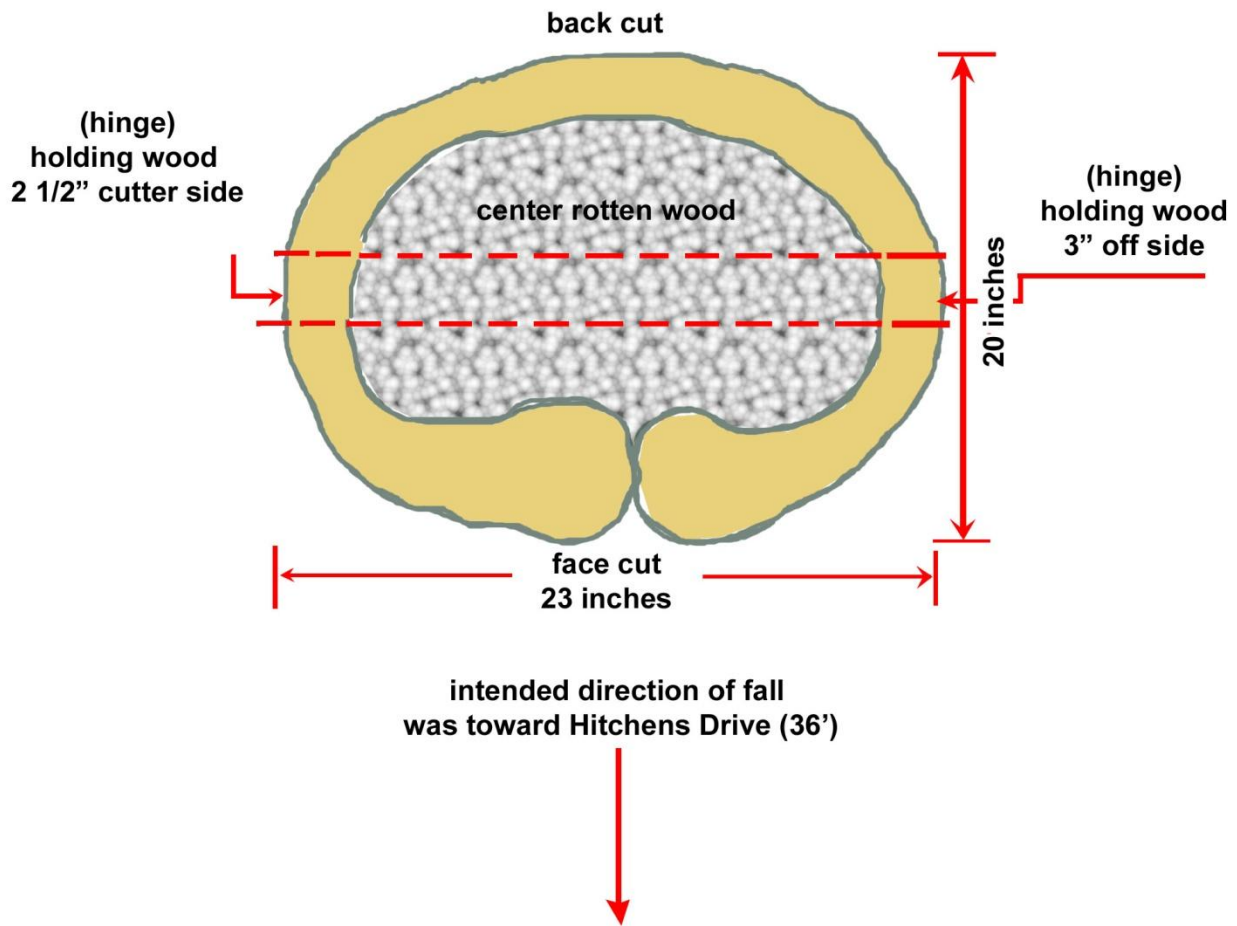
Reports differ on why Team 4 Trainee #2 stopped cutting and was relieved by Team 4 Trainer. Team 4 Trainer took the saw and Team 4 Trainee #2 moved to a safe location. Team 4 Trainee #1 stayed in the same location where he was located when Team 4 Trainee #2 was cutting.

The dead tree was the first tree of the day that Team 4 Trainer cut. Team 4 Trainer started the saw and cut the horizontal portion of the pie cut approximately ½ inch below the horizontal cut that Team 4 Trainee #2 had started (see Figure 1).



**Figure 1: Initial cut made by Team 4 Trainee #2 and subsequent face cut and back cut made by Team 4 Trainer.**

The SAIT was unable to determine why Team 4 Trainer dropped ½ inch below the initial horizontal cut. Team 4 Trainer finished the face cut which was well-aligned and had good matching points. Team 4 Trainer removed the cut out and realized that the 23-inch diameter tree was rotted inside and only had approximately 3 inches of solid wood around the outside of the tree (see Figure 2).



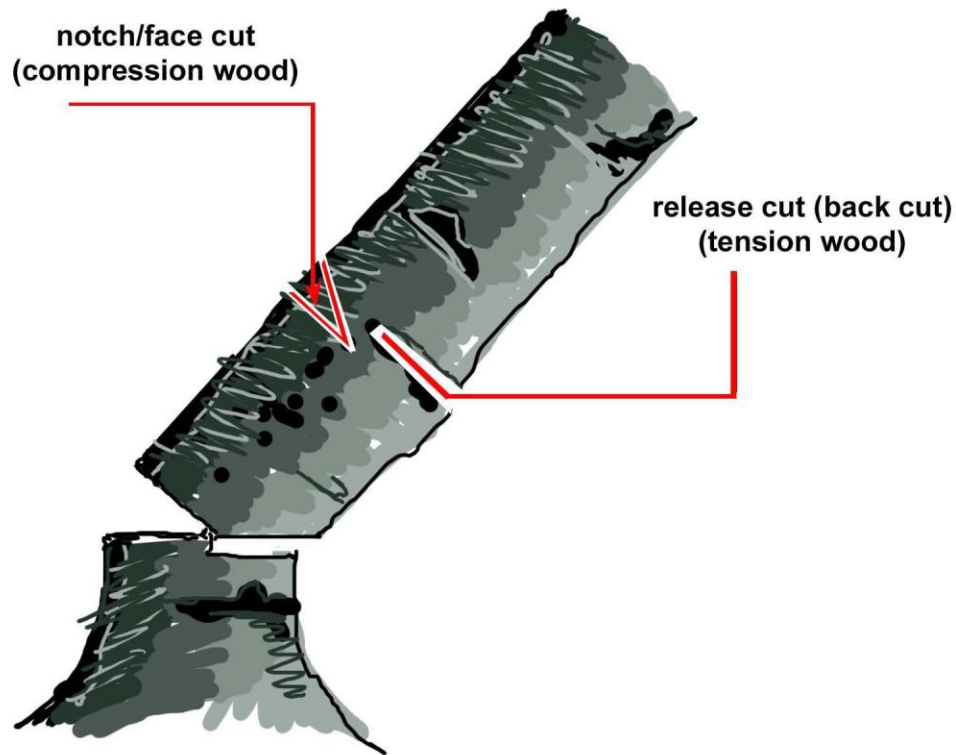
**Figure 2: Stump analysis (downward view)**

Reports also differ on whether Team 4 Trainer then shut the saw off and took a 4- to 5- minute break to educate both Team 4 trainees on what he had done, the condition of the tree on the inside, and the direction of the fall or only took a momentary pause before starting his back cut.

Team 4 Trainer completed 8 inches into his back cut when the tree began to fall in the intended direction. As the tree started to fall it became hung up when some of the crown limbs got caught up in a live aspen tree that was located 32 feet from the stump towards Hitchens Drive and approximately four feet to the right of the intended direction of fall. This caused the tree to stop falling and remain connected to the stump with approximately 3 inches of holding wood on the off side and 2 1/2 inches on the cutter side. The cut tree was securely hung up, in an approximately 95 foot tall, 13-inch diameter, live aspen tree. This live aspen tree bent 5-6 feet under the weight and pressure of the leaning tree until it came to rest against another living tree of the same approximate size.

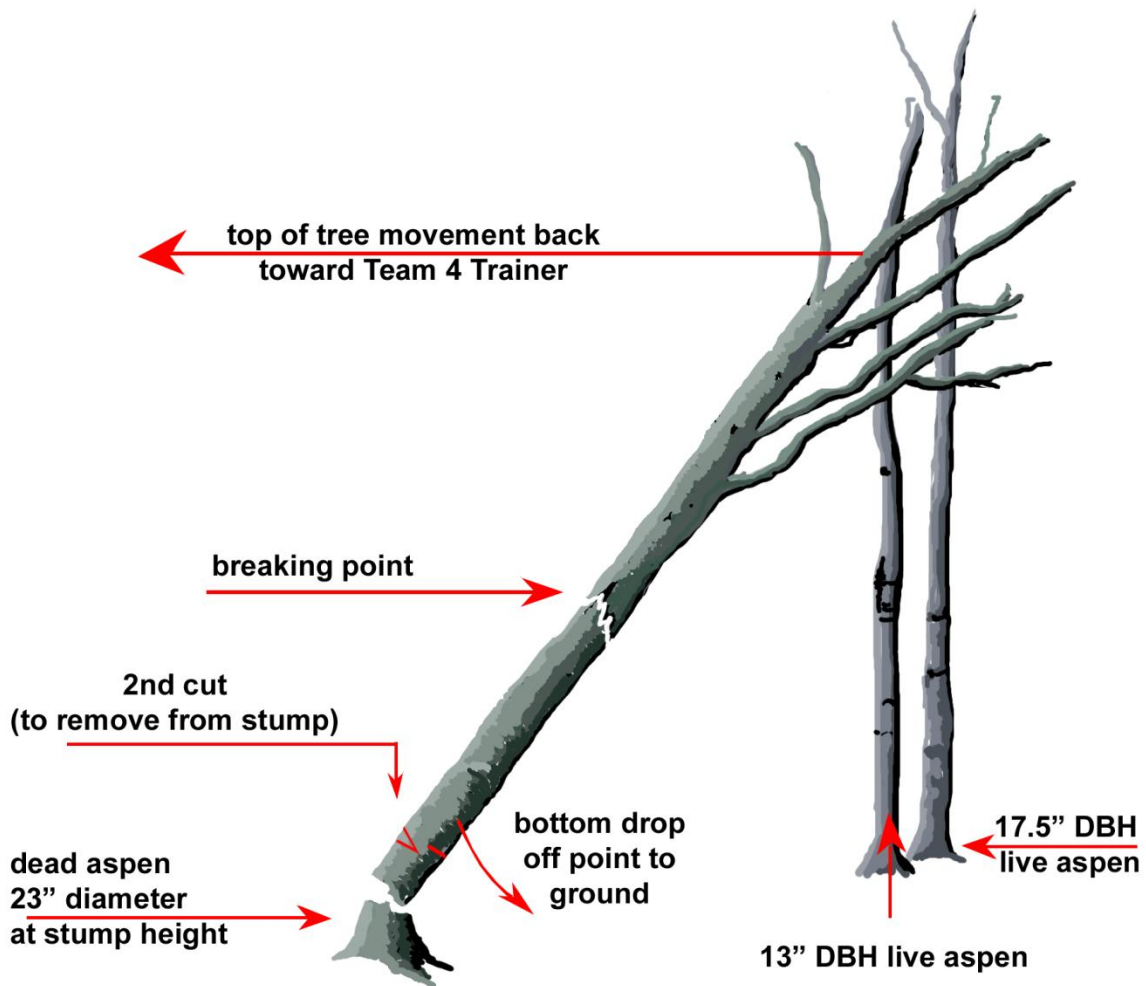
Team 4 Trainer paused for a brief moment, surveyed the situation, and proceeded to cut the remaining 3 inches of holding wood on the off side in an attempt to free the tree. This action did not cause the tree to fall or untangle from the live aspen tree. Team 4 Trainer moved 1 to 2 feet

along the tree trunk toward Hitchens Drive and initiated a second cut to free the tree from the stump and put the tree on the ground. Team 4 Trainer cut a pie-shaped notch approximately 18 inches above the original back cut to make space for the compression wood on the top side of the tree (see Figure 3).



**Figure 3: Close-up of Team 4 Trainer’s second set of cuts after the tree got hung-up**

After the notch face cut was completed, Team 4 Trainer initiated a tension release cut by utilizing the top of the saw bar and coming up from the bottom towards the previous cut. The tension release cut was approximately 3 inches above the flat cut on the notch face cut (see Figure 3). This action caused the tree to fall off the stump and simultaneously caused the portion between the original cut and the tension release cuts to split in two and be pushed out to the cutter side. When the tree fell off the stump and came into contact with the ground, the force was great enough to cause the tree trunk to break into two pieces approximately 20 feet up from the second cut (see Figure 4).



**Figure 4: Profile of cutting area showing action of broken top during second cut by Team 4 Trainer**

The lower portion of the dead aspen measured 20 feet, 4 inches long; and the upper portion measured 37 feet, 8 inches long. The remaining length of the tree consisted of broken limbs and the stump.

As the tree broke, the pressure on the live aspen that the tree was hung up in was released. Acting like a catapult, the live aspen threw the crown of the dead aspen tree back toward the direction of the stump and Team 4 Trainer's position. As the upper portion came back towards the stump and the Team 4 Trainer, the bottom end of the upper portion was driven into the ground at an angle towards the cutter. When the tree fell off the stump and broke, the spotter Team 4 Trainee #1 yelled at Team 4 Trainer to get out of the way. Team 4 Trainer turned and began retreating in the general direction of the escape routes.

Team 4 Trainer took approximately three steps in the general direction of his escape route. Neither his movement nor his retreat was inhibited by environmental conditions. While retreating in an upright position, with chainsaw in hand, the tree struck the back of his head and body, crushing him to the ground. The impact immediately rendered Team 4 Trainer unconscious and unresponsive (reference Photo 1 below).



**Photo A1:** This photo shows the location of Team 4 Trainer and the top portion of the tree.

**Point A indicates the location of Team 4 Trainer when he was struck. Point B indicates top portion of the tree (7 ½ - 8 inches diameter) that struck Team 4 Trainer. The tree was moved to this location in order to provide medical assistance to the victim.**

Upon witnessing the event, Team 4 Trainee #1 and Trainee #2 rushed to his aid. Team 4 Trainee #2 lifted and rolled the tree off Team 4 Trainer. Team 4 Trainee #1 used the radio to request help from the BLM EMTs on the other saw teams in the area.