Summary Report of an Incident Within an Incident,
Near Miss Event, Serious Accident, or Significant Injury

GREEN SHEET

Unified Fire Authority Green Sheet

Oxygen Tank Explosion and Subsequent Fire

8/19/2024 Approx 1100

Snowbird

MA113 and ME113

SUMMARY

On 08/19/2024 just before 1100, two employees were installing a new medical controlled substance safe into MA113. This process included drilling a pilot hole through the side wall of the ambulance from the inside of the patient compartment and into the exterior compartment which houses the large patient oxygen tank.

While drilling the pilot hole, the oxygen tank was impacted, creating an explosion and subsequent fire, injuring the two employees and damaging both MA113 and ME113. Both employees were transported to the hospital with non-life-threatening injuries.

CONDITIONS

This incident occurred inside the apparatus bay at Station 113 and no weather conditions were identified as a factor to this incident.

SEQUENCE OF EVENTS

During the 2024-2025 budget process, Medical Division applied for and received funding for purchase of controlled substance safes to comply with DEA requirements to be installed in both ambulances and heavy apparatus. The project was scheduled to begin on July 1, 2024.

To start the installations, Medical Division coordinated with BioTech, I.T. and Fleet. The process began shortly after July 2024 when a “pilot” safe was installed, ensuring that it would work with all the wireless, RFID, and mechanical needs. Due to other demands, mechanics were not available to assist or supervise the installations (to be discussed under ‘Identified Factors’). The Communications Specialist and BioTech Specialist (referred to as Employees hereafter) conducted the installations which included the removal of the oxygen tank, the drilling of two to three pilot holes and the use of 0.75” self-tapping screws to the attach the safe. The pilot holes and screws were placed inside the patient compartment and extended into the exterior compartment storing the large, H-size, 2000 psi steel oxygen tank. The first several installations were done with no issue, with many of the installs being done into a double wall which separated the compartment with the oxygen tank. The self-tapping screws were generally 0.75” in length and the type generally used to secure sheet metal or similar items.

The Employees had installed safes in fifteen (15) ambulances to the date of the incident and to this point, no issues have occurred. Pressure was building to get the safe project completed due to the looming P25 radio changes that were coming up in less than a month. The safe installs were taking anywhere from a one to three hours each and consisted of the BioTech Specialist drilling pilot holes and doing the install in the patient compartment with the Communications Specialist running the wiring, Wi-Fi setup and electronic configuration. The Communications Specialist has years of experience on running radio installs and conducting similar-types of installations with emergency light and radio packages. Both employees have also installed several safes either together or independently, based on what was occurring with one or the other’s work schedule for the day. All the installs prior to this one had been done at Logistics for access to tools and other necessary resources.

With Medic Ambulance (MA) 113, consideration was given to the constraints of being up the canyon and not wanting to take the ambulance out of service for more than the time

needed to complete the project and not wanting to perform a changeover. With these considerations, the decision was made to do the installation at the station. On Monday, August 19, 2024, the Employees arrived around 0900 and started the installation process. Part of the crew was in the living quarters while others were participating in PT, so none were in the bay assisting the Employees with the installation.

After some preliminary work, the installation from the inside of the patient compartment began. The employee that was drilling the pilot holes decided to use a drill bit they normally hadn't used, primarily due to having different equipment and tools at 113. Due to the experience gained through completed installs of 15 safes and being conscientious of the time they were keeping MA113 out of service, the decision was made to complete this install as quickly as possible. During the first few installs, none of the oxygen tanks from the D1 compartment had been removed, as it was identified that they weren't impacted by the work being done. In most other ambulances, the large oxygen tank sits towards the compartments forward-end (towards the driver). In the Dodge ambulances with the Frazier boxes, the oxygen tank sits in the rear of the compartment with a single wall (as opposed to a double wall) configuration. None of the previous installs had raised concerns about the oxygen tanks.

In the haste to get the project completed, and having experienced no issues on previous installs, there was some self-identified complacency on the part of the Employees. Also, due to not being at Logistics, the drill bits on hand were slightly different from those previously used. As one of the employees started the wiring and the other began drilling the pilot holes. The employee doing the wiring had the smaller compartment open (driver-side compartment #2 or D2) with the drop-down door to the electrical equipment open and had their head in the area working on the electrical connections (see Image 5).

The employee in the patient compartment chose to use a different drill bit than they had been using on the other installs and began the drilling process without inspecting the area to be drilled. The employee stated they had just gotten to the needed depth and were backing the drill bit out when the compartment erupted in flames with an explosion.

The employee performing the drilling was thrown backward against the other side of the patient compartment and reported seeing a wall of flame wrap around the ambulance as the rear doors were open. The fire also breached the interior access panel that can be seen in image 1.

The employee on the ambulance's exterior still had their head within the D2 compartment, with the interior shelf dropped down (images 5 and 6), working on some wiring when the explosion occurred. When the massive flame and explosion occurred, the employee sought safety in the back of the bay, away from the fire.

The interior employee escaped out of the single access door of the ambulance and began searching for the employee working on the exterior. Upon exiting, the employee began yelling for his counterpart, thinking that they had gotten blown backward or underneath the engine that was parked adjacent to the ambulance.

The crew members that were upstairs heard what they described as a rumble coming from what they thought was the mezzanine. Something akin to an avalanche, or a heavy truck passing by, but one that kept going and didn't slow down or stop. They ran downstairs and saw the fire coming from the ambulance.

One of the crewmembers grabbed a fire extinguisher and started suppressing the fire. The other members of the crew assisted in triage and ensured no other problems were found, either with the Employees or the fire/explosion. The Captain was doing PT at the time and received a phone call to come back to the station. They notified the Captain that there had been a fire. The Captain notified the Battalion Chief, and the Battalion Chief notified both the Ops Chief and the Safety Officer. The Employees were assessed on the scene for injuries and then transported to the hospital with the intent to rendezvous with a valley-based UFA ambulance. The crew transported the Employees in the pickup truck assigned to the Communications Specialist as both apparatus in the station were damaged. The Employees were transported to IMC for further evaluation and treatment. The Employees were released that afternoon for home care and follow-up evaluation.

The Safety Officer and on-call Ops Chief arrived at Station 113 and started the investigative process while other Command Staff members and a representative from Human Resources met the Employees at the hospital.

DAMAGES/INJURIES

The fire and explosion severely damaged the box on Medic Ambulance 113. The most significant damage occurred to the two exterior compartments, the front (driver's side front, or D1) and the half door directly behind it (driver's side mid-door, or D2). The oxygen tank blew out of the compartment and all equipment in the oxygen compartment was destroyed, including shovels, ropes, helmets, gear and a stair chair. Within the patient compartment, most of the medical equipment was damaged beyond use, repair, or salvage. A pair of turnouts was burned in the fire and explosion. Medic Engine 113 was parked next to the ambulance and received severe damage and melted plastic across the passenger side, although no structural damage was noted.

The employee working on the interior of the ambulance sustained bumps, bruised and concussive like injuries from being thrown across the compartment. The employee

working on the exterior received similar injuries, including a burn to their left ankle and foot due to their shoe being melted by the ensuing fire.

SAFETY CONSIDERATIONS FOR REVIEW

Any time a modification of heavy apparatus or ambulances needs to occur, it is recommended that a mechanic is involved in at least the initial process of laying out the installation plan and provides oversight while the changes to the apparatus are being made. Consideration may be given to previous experience of the individuals doing the install, in which a mechanic may not need to provide immediate oversight, but a mechanic should be involved throughout the process.

Any time drilling into an ambulance or apparatus is occurring, it is critical to identify what is on the other side of the area being drilled. Visual inspection of the entire project site prior to drilling is necessary to ensure there is nothing that could be impacted. Additionally, removing oxygen tanks that are next to the wall being drilled should be considered best practice.

Using self-tapping screws on a project of this nature may not be the best way to secure the safes or similar items in the future and should be only utilized when necessary. This also creates snag hazards and rub areas (Images A1&A2) that can wear down equipment or tanks that are resting up against the self-tappers day-to-day.

IDENTIFIED FACTORS

The following items were identified through the investigative process and the contributing cause analysis as elements that led up to the he explosion of the oxygen tank and the issuance of this Green Sheet.

Discussion: It was identified that best practice and recommendation is to have a mechanic providing the oversight and install of changes to apparatus, and this is the intent of Fleet and Logistics when major changes are occurring with apparatus.

Background: The limited availability of mechanics due to their full daily schedules of managing both emergent maintenance and preventative maintenance needs likely led to the inability of a mechanic to be utilized for the installation of the controlled substance safes. This job was then given to the Communications Specialist and BioTech Specialist being tasked with a project that could be considered as being beyond of their regular scope. They would be part of the team of installers, but it's not likely they would be performing the actual installation if other experienced personnel were available to assist.

Recommendation: Any modifications to apparatus where drilling through walls or installation of equipment should only be done by qualified mechanics or under the oversight of qualified mechanics, particularly when it isn't radio or communications equipment.

A mechanic needs to be well involved in the process of the install. If a mechanic isn't available for oversight, it is recommended that similar projects are sent to a third-party vendor, which will cost more and create a delay. If this isn't a viable option, then there needs to be a consideration on future asks or requirements that may need to be funded to ensure the safety of our employees.

INCIDENTAL ISSUES / LESSONS LEARNED

It has been identified that UFA had unknown close calls on a couple of the ambulance modifications. This is primarily with the Dodge chassis and the Frazier box setup. Several of the oxygen tanks were nearly drilled into on the sidewall, which most likely would have been more catastrophic. All ambulances should be checked following this incident. If any self-tapping screws are identified, make note of this immediately in Fleetio and inform the station officer of the identified issue. See the images below for an example:

Images A1 & A2

ADDITIONAL IMAGES

Image 1 - Pilot Holes from Patient Compartment

Image 2 - Pilot Hole Close-up

Image 3 - View from the Front of MA113

Image 4 - Side View of MA113

Image 5 - View of MA113

Image 6 – Side View of MA113

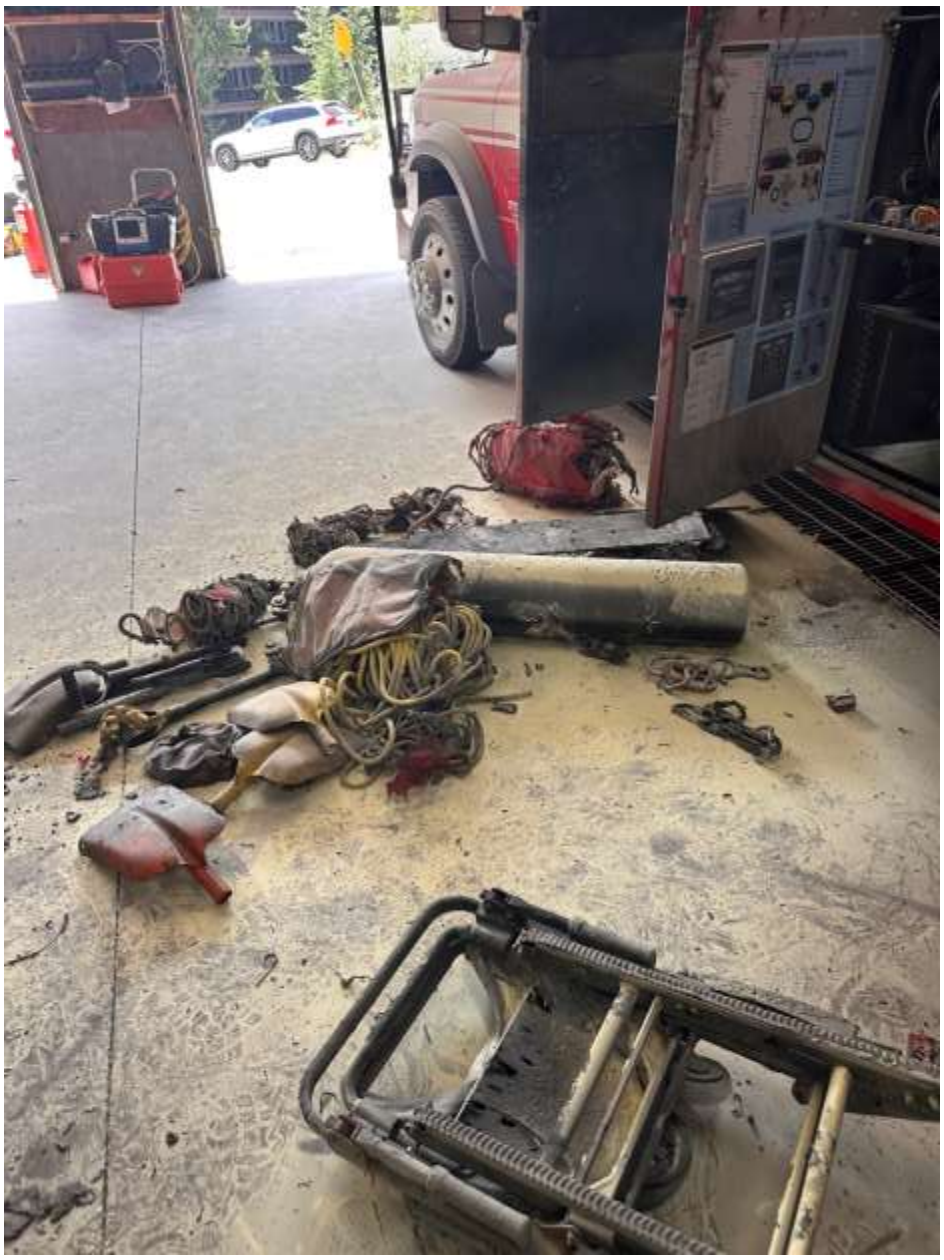

Image 7 – View of MA113, Damaged Equipment

Image 8 – View of Damaged Oxygen Tank

Image 9 – View of Damaged ME113

Image 10 – View of Damaged ME113 Compartments