Near Miss Investigation
Confined Space Training
Englewood, Florida
June 03, 2010

Safety Investigation Report
Prepared by the Safety Section
Bureau of Fire Standards and Training
Florida Division of State Fire Marshal

Issued: Date October 22, 2010

Safety Investigation Report

I. Authority, Purpose, and Scope

The Department of Financial Services, Division of State Fire Marshal ("Division") is authorized by the provisions of Section 633.803, Florida Statutes, to provide assistance to firefighter employers with respect to firefighter safety. The purpose of this investigation is to provide assistance to the Englewood Fire Department as requested. The scope of this investigation is to identify factors leading to the serious incident that could have resulted in severe injury or death of a firefighter.

II. Background and Methodology

The Englewood Fire Department ("Englewood") asked the Division to jointly investigate the factors contributing to a near miss incident involving one of its firefighters during training and to make recommendations to avoid similar incidents in the future. Englewood's Investigative Report, witness statements, interviews, applicable standards and photographs were used to conduct this investigation.

III. Summary

Englewood employed Rescue Resource, LLC ("Rescue Resource") to provide confined space training to its certified firefighters. The training program designed by Rescue Resource consisted of 8 hours of confined space awareness, 40 hours of rope operations, and 32 hours of confined space operations. The course was properly submitted to the Division and approved. The classes were to be delivered at Englewood's training center. The instructors provided by Rescue Resource were members of Florida Urban Search and Rescue Task Force 6 and certified by the Division as instructors.

Training proceeded without incident until the last day of training, June 3, 2010. At around 0900 hours on June 3, the two instructors told their 16 students that the plan for the morning consisted of a mandatory "confidence crawl" off-site through a 169 foot section of underground storm pipe along Pine Street. The instructors had selected the location the night before but had never inspected or obtained permission to use it. The instructors expected that it would take 15 – 20 minutes for each student to complete the crawl.

The class left the training center and arrived at the Pine Street location at about 1000 hours. During equipment set-up, clouds were noted building to the south of the site. The lead instructor stated, during interview, that he was incident commander and that both he and his assistant shared the safety officer function. Students self-assigned themselves to tasks and entry preparations were made. These preparations did not include checklist utilization, lockout / tag out (making the confined space safe for entry), conducting a pre-entry /safety discussion, having a rescue plan or having a rescue team standing by.

The first student ("entrant") entered through the manhole ("entry point") with a full body harness, supplied air, an escape bottle, proper personal protective gear and a retrieval line connected to the upper D-ring on the full body harness. Communications equipment, previously required for all entries, was not used because the instructors felt that it would take too long to complete the exercise if it was used. The entrant was only able to enter the pipe (later determined to be 18" in diameter) in a prone position with his arms extended in front of him and the escape cylinder in his hands. In order to advance about four inches, the entrant had to pull himself forward with his elbows while pushing with his toes. This maneuver would have to be done over 500 times to complete the 169 foot crawl.

Early into the entry, a student told the lead instructor that "we were going to be rained on". After 11 minutes, the entrant was breathing hard. As the entry point was unable to communicate with the entrant, a student entered the street drain junction box ("exit point") to make visual contact and encourage him to keep going. After 21 minutes the entrant was about half way through the pipe but tired and requested assistance exiting the pipe. The retrieval line was not used because of a concern that its use might further entrap or injure the entrant. The instructors developed a plan to send another student, of slight build, from the exit point with a line that would be used to pull them both out.

At 25 minutes into the entry, and just prior to the second student entering, it began to rain. What started as a drizzle quickly became a down pour. Water started to flow down the gutters from north and south into the exit point. A student once again entered the exit point to reassure the entrant and slow the entry of water into the pipe with a section of plywood. Other students attempted to divert the water flow by any means available. As the pipe started filling with water, the need to rescue the entrant was realized. The lead instructor started to put on his harness, but his assistant told him to stay outside the pipe as incident commander.

Called to the scene by a student, Englewood Assistant Chief Lane arrived and started making arrangements for acquiring additional resources while trained personnel donned equipment to make a rescue of the entrant via the exit point. When the rescue team was ready to make entry, the plywood used to limit the amount of water entering the pipe was removed. The resultant rush of water into the pipe pushed the entrant back to the entry point where he was removed by fellow students.

The entrant had been engulfed by water for between 3 and 5 minutes. He survived by remaining calm, keeping his supplied air system mask in place and maintaining control of his escape bottle. The entrant was medically evaluated shortly after removal and found to be fit for duty with only minor scrapes to his knees, elbows and left shoulder.

IV. Findings

Finding 1. During his interview, the lead instructor described the overall attitude of the class as "complacency". He explained that he was instructing seasoned firefighters who

knew what to do and therefore the class did not have to be as strict or structured. Student statements described the attitude as "laid back".

- The length of the class, in hours, was in conflict with the delivery attitude expressed. The normal confined space operations class includes the awareness level class for a total of 24 hours. The class as delivered by Rescue Resource included a separate awareness class of 8 hours and a 32 hour operations level class for a total of 40 hours.

Finding 2. There was no contact with Sarasota County Public Works to obtain a confined space entry permit. No physical inspection was conducted of the section of storm drain pipe selected for the confidence crawl. (CFR 1910.146 (c)(8) & (9) violation)

Finding 3. The site chosen for the confidence crawl was not treated as a permit-required confined space entry in an uncontrolled environment.

- According to the lead instructor, a Confined Space Entry Checklist, completed for all entries the first three days of class, was not utilized for this entry. One of the checklist items for consideration is engulfment.

Finding 4. There was no plan or preparation for a rescue.

- According to student statements, a rescue team was not standing by ready to enter. Once the need for rescue was recognized, a team had to form and outfit in preparation for entry.
- The retrieval line was functionally useless. This was recognized by the lead instructor who would not allow the retrieval line to be used to rescue the entrant. The retrieval attachment point (highest connection point on the back of the harness) was poorly placed for horizontal retrieval, not accessible to the entrant and its use could have further trapped or injured the entrant.
  (CFR 1910.146 (c)(8) & (9) violation)

Finding 5. There was no command in place and the instructors demonstrated a lack of situational awareness.

- The instructors did not recognize an emergent situation when the entrant requested assistance exiting the pipe. Need for rescue was not realized until the storm pipe started filling up with rain water.
- The initial action of the lead instructor once the need for rescue was realized was to don a harness to make the rescue rather than take command, organize, plan and direct.
- Students stated that they were not directed. They took it upon themselves to act.

Finding 6. There were no formalized communications during the exercise.

- The communications equipment used throughout training to maintain contact between the entry point and the entrant was not used. The reason given by the lead instructor was that it would take too long to change out between students. (CFR 1910.146 (h)(3) violation)
- In order to communicate with the entrant, students had to enter the exit point to have voice contact with the entrant. This constituted a second confined space entry.

Finding 7. There is no training objective, standard, or common practice to support the validity of conducting the confidence crawl. A review of National Fire Protection Association Standard 1670, the standard covering confined space rescue, revealed that the confidence crawl was not consistent with operations level training and capability:

- Annex A.7.3.3(6), of the standard, states that operations-level teams are not to perform hazardous entries.
- Annex A.7.3.3(6)(c), of the standard, requires that rescuers can pass easily through the access/egress opening(s) with room to spare.
- Annex A.7.3.3(6)(d), of the standard, requires that the space can accommodate two or more rescuers in addition to a victim.

V. Recommendations

A. For the fire service in general

Recommendation A1- The terms "complacent", "laid back" or their derivatives have no place in, during or regarding any type of hands on training. This is especially true in light of the International Association of Fire Chiefs recent call for a safety stand down because of recent USA and Canada confined space deaths and injuries.

Recommendation A2- A confined space trained safety officer, with no other duties, must be designated for all confined space training.

Recommendation A3- The Confined Space Checklist must be fully utilized to maintain a safe working environment and completed for all entries.

B. For Englewood

Recommendation B1- Reconvene the Englewood class to review the lessons learned and the proper process for Confined Space entry.

C. For Rescue Resource

Recommendation C1- Any space that has restricted entry and exit, is not designed for continuous occupancy and can entrap, engulf or have a non-breathable atmosphere must be treated as a true permit-required confined space entry and nothing less.

Recommendation C2- Permission to use any space, area or facility for training must be obtained from the owner or the authority having jurisdiction before it is used. A thorough inspection and plans review must be conducted prior to commencing any hands on training.

D. For the Bureau of Fire Standards and Training

Recommendation D1- Conduct a review of the Florida Urban Search and Rescue instructional system and develop specific training objectives for each level of confined space rescue.

Recommendation D2- Conduct a review of the ability of Rescue Resource and its instructors to safely deliver confined space programs.

Recommendation D3- Widely publicize the lessons learned from this incident. In addition, utilize it as a rescue scenario for table-top discussion or training center hands-on exercise. This is recommended in support of the International Association of Fire Chiefs focus on confined space entry injuries and fatalities.

Recommendation D4- All confined space courses shall differentiate the knowledge, skills, and abilities required for Confined Space Operations and Confined Space Technician levels.

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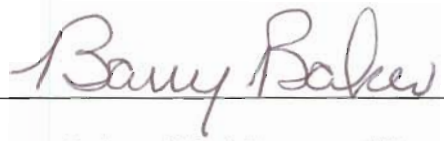

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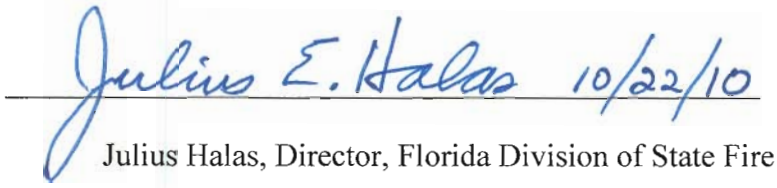

Julius Halas, Director, Florida Division of State Fire Marshal