MACHINE RESCUE

SCOPE

This procedure establishes a standard structure and guideline for all fire department personnel operating at incidents involving machine rescues. The procedure outlines responsibilities for first-responders, Technical Rescue/Special Operations units, Command Officers, and other fire department personnel responding to such incidents. All other Toledo Fire and Rescue procedures shall apply to technical rescue operations where applicable.

PURPOSE

The purpose of this procedure is to establish guidelines for the response of fire department personnel and equipment to machine rescue incidents. Machine rescue operations present a significant danger to fire department personnel; the safe and effective management of these operations require special considerations. This guideline identifies some of the critical issues which must be included in managing these incidents.

TACTICAL CONSIDERATIONS

- Machine rescue incidents occur when a victim is pinned in or under a portion of a machine or within the machine moving parts.
- Common machine rescue environments include: Industrial facilities, Construction sites, and Agricultural facilities. ***Pre-incident planning is an important factor in preparing to handle these types of incidents.***
- Due to the inherent dangers associated with these operations, Toledo Fire and Rescue's Risk Management Profile shall be applied to all machine rescue operations and shall be continuously re-assessed throughout the incident. A phased approach to machine rescue operations which include; **Arrival**, **Pre-rescue** operations, **Rescue** operations, and **Termination**, can be utilized to safely and effectively mitigate these high-risk / low-frequency events.

UNDER NO CIRCUMSTANCE SHALL ANY PERSONNEL OTHER THAN THE ON-DUTY RESPONDING TECHNICAL RESCUE/SPECIAL OPERATIONS UNITS ATTEMPT TO CONDUCT A MACHINE RESCUE.

DISPATCH

The following units shall be dispatched for all Machine Rescue incidents: (1) Heavy Rescue Squad, (1) Battalion Chief, (1) Safety Officer, (1) Engine or Engine Co.

*Notify the Deputy Chief Special Operations/Battalion Chief of Special Operations, Public Information Officer (PIO)

PHASE I ARRIVAL

I. ESTABLISH COMMAND

A. First arriving TFRD member shall assume Command and begin an immediate size-up of the situation **while isolating the immediate hazard area** and **denying entry to all non-rescue personnel**.

B. First arriving Heavy Rescue Squad Officer/Special Operations Personnel should be assigned Rescue Sector.

***Rescue Sector responsibilities include*:**

- Assuming rescue operations control.
- Identifying hazards and critical factors.
- Developing a rescue plan and back-up plan.
- Communicating with and directing resources assigned to Rescue Sector.
- Informing Command of conditions, actions, and needs during all phases of the rescue operation.

C. Designate a Safety Officer.

A Safety Officer shall be established prior to the implementation of any rescue plan proposed by Rescue Sector.

D. Following the transfer of Command to a Command Officer, a Technical Rescue Advisor from the Special Operations Bureau should be assigned as part of the Command Staff at their location, to assist in managing personnel and resources engaged in the rescue aspects of the incident. The Technical Rescue Advisor is responsible for ensuring that the rescue plan developed by Rescue Sector and communicated to Command is a sound plan in terms of the safety and welfare of both victim(s) and rescuers. Considerations for the Technical Advisor include:

The Technical Rescue Advisor position within the Command Staff should be filled prior to the implementation of any rescue plan proposed by Rescue Sector.

II. SIZE-UP

A. Secure a witness or responsible party to assist in gathering information to determine exactly what happened. If no witnesses are present, Command may have to look for clues on the scene to determine what happened.

B. Assess the immediate and potential hazards to the rescuers.

C. Isolate immediate hazard area, secure the scene, and deny entry for all non-rescue personnel.

D. Establish communications with victim(s).

E. Assess on-scene capabilities and determine the need for additional resources.

III. SECONDARY ASSESSMENT

A. Confirm number of victim(s)

B. Assess victim condition and extent of injuries

C. Consult on-site maintenance personnel

D. Assess the need for other resources such as HAZMAT, Technical Rescue, etc.

E. Determine known hazards present in the rescue area; atmospheric, mechanical, electrical, etc.

F. Perform Lock-Out/Tag-Out utilizing TFRD equipment and procedures, (LO/TO Kits on *Squads* and USAR)

IF AT ANY TIME THE RESCUE AREA IS DETERMINED TO MEET ANY DEFINITION OF A CONFINED SPACE, IMMEDIATELY TERMINATE THE MACHINE RESCUE OPERATION AND TRANSITION TO A CONFINED SPACE RESCUE OPERATION

PHASE II PRE-REMOVAL OPERATIONS

It must be determined if this will be a **RESCUE** operation or a **RECOVERY** operation based on the survivability profile of the victim(s) which include factors such as the location and condition of the victim(s), and elapsed time since the accident occurred.

Pre-rescue operations shall be conducted under the direction of Rescue Sector by trained Rescue Technicians.

I. Equipment

- Minimum PPE; helmet, eye protection and gloves
- Assorted Hand and Power Tools
- Air Bags, Pry Bars, Cribbing, Hydra-Ram Door Opener, *Amkus* Hydraulic Tools, Bottle Jacks, Come-a-Longs
- Medical and Body Substance Isolation (BSI)
- Lighting Equipment and Power Source(s)
- Victim shielding and protection

Develop a Rescue Plan, consultation with on-site maintenance personnel may provide invaluable information. During machinery rescue operations multiple hazards must be addressed prior to beginning removal of the victim. These hazards include, but are not limited to: **stored energy, sudden machine movement, extreme weight, high or low temperature, chemicals, oils/fluids, electrical, noise, sharp edges, limited access and working at heights.**

Do not underestimate the potential for a machine rescue operation to exceed the capabilities of the initial responding units. These incidents can range from simple lifting operations to complex machinery disassembly.

NEVER ATTEMPT TO REVERSE A PIECE OF MACHINERY UTILIZING THE MOTOR DRIVE**,** his action may result in additional victim injury or death.

Always capture any parts of the machine or load from further movement prior to attempting removal operations. Methods of capture to prevent further movement include: cribbing, slinging, strapping down, etc.

Three Methods of Removal

- ***Disassembly*** taking the machine apart in the reverse method that it was constructed
- ***Destruction*** utilizing tools to cut and/or break the parts of the machine trapping the victim
- ***Reduction*** employing either Disassembly and/or Destruction methods for the purpose of reducing the size and weight of the machine into a manageable form that will be transported with the victim still trapped to the trauma center together

PHASE III REMOVAL

Rescue personnel must have a strong mechanical understanding of simple and complex machines and the physics involved in the operation. All machines utilize simple mechanical advantage concepts in the function. Any mechanical advantage system has a trade-off in speed of travel, distance of travel or force applied. Use a high degree of caution during removal operations.

I. Make the Machine Safe

A. Perform Lock-Out/Tag-Out

B. ***Capture*** and ***Contain*** all movement (this step may need to be performed before removing power to the machine in some instances)

II. Victim Removal

A. Stabilize victim physically and provide appropriate level of shielding and protection

B. Conduct medical stabilization

C. Begin the victim removal process

Constant reevaluation of the rescue area, victim and removal techniques are required to maintain an efficient and safe operation. The Rescue Sector Leader must position themselves for a clear view of the scene and operation while not impeding the Rescuers or becoming involved in the hands-on portion of the victim removal.

D. Capture all progress made to prevent movement

E. Utilize a systematic approach

F. Utilize the simplest techniques first and transition to the complex as the removal process dictates

G. Victim packaging and further medical requirements determined as needed

PHASE IV TERMINATION

A. Ensure personnel accountability

B. Remove all tools and equipment used in the rescue/recovery and return to proper apparatus. In cases of a fatality, consider leaving everything in place until the investigative process has been completed.

C. If entry personnel and/or equipment have been contaminated, proper decontamination procedures shall be followed prior to returning to service.

D. Conduct a Post Incident Critique

E. Release companies after turning the scene over to the responsible party and ensuring the scene is secure.

F. Any equipment found to be damaged shall be removed from service and the proper bureau notified.

G. Complete a 214 and forward an electronic copy to Special Operations.