



Kitsap County Technical Rescue Team

Polices and Guidelines

Title: 2.2, Confined Space, Version 1.2

Section/Topic: Operations

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Classification: Operating Guideline

Purpose

To establish a common and standardized operational approach for Kitsap County Technical Rescue Team (KCTRT) members responding to a confined space rescue incident.

Scope and Applicability

This guideline provides operational guidance for the safe and effective use of Kitsap County Technical Rescue Team (KCTRT) personnel and equipment at incidents that involve confined space operations. This guideline is used in conjunction with WAC 296-305 and NFPA 1670, 1006 and 1983.

This guideline is intended to apply only to KCTRT personnel and while Kitsap county fire districts are welcome to adopt and use these guidelines, they are not intended to supersede individual department policy or guidelines, or to alleviate an individual agency's right and responsibility as the Authority Having Jurisdiction (AHJ).

Definitions

Confined Space: Any space which is not intended for continual occupancy, has limited means of egress, has the potential for physical or chemical engulfment and/or may have a toxic atmosphere.

Rescue Group Supervisor: A competent individual trained to the appropriate level, responsible for coordinating rescue operations and the associated activities within the rescue area. Serves as the on-site "competent person" and reports to the Incident Commander.

Technical Rescue Safety Officer: A competent individual trained to the appropriate level, responsible for monitoring safety in the Technical Rescue operational area. Reports to the Rescue Group Supervisor or Incident Safety Officer.

Lead Rigger: A competent individual trained to the appropriate level, responsible for planning and directing technical rigging operations. Reports to the Rescue Group Supervisor.

Entry Team Leader: A competent individual trained to the appropriate level, responsible for victim disentanglement and removal operations, as well as for controlling access into the confined space. Responsible for completing (or delegating its completion) the Confined Space Entry Permit and recording atmospheric readings. Reports to the Rescue Group Supervisor.

Air System Manager: A competent individual trained to the appropriate level, responsible for running the air system manifold and hard wire communications system. This assignment may be supported by operations level personnel. Reports to the Rescue Group Supervisor.

Equipment Manager: A competent individual trained to the appropriate level, responsible for the organization and deployment of Technical Rescue equipment. This assignment may be supported by operations level personnel. Reports to the Rescue Group Supervisor.

Entry Attendant: A competent individual trained to the appropriate level, responsible for ventilation, atmospheric monitoring (as assigned), and de-watering operation supervision. This assignment may be supported by operations personnel. Reports to the Rescue Group Supervisor.

LEL/LFL: Lower explosive limit/lower flammable limit; the leanest mixture of fuel and oxygen that will permit ignition.

PEL: Permissible exposure limit; the exposure, inhalation, or dermal permissible exposure limit specified in 29 CFR Part 1910, Subparts G and Z.

General Guidelines and Safety

When the KCTRT is utilized as a specialty resource, the Incident Commander shall assign a competent, appropriately qualified individual to serve as the Rescue Group Supervisor. The Rescue Group Supervisor will make position assignments in accordance with the Kitsap County TRT Guidelines and Mobilization Plan as required by the needs of the incident.

Atmospheric monitoring shall occur before and during all confined space entries. Air monitoring shall be done at 10 foot horizontal and 4 foot vertical intervals, beginning at the lip or edge of the space.

All confined space atmospheres shall be tested for IDLH environments and results shall be recorded on a Technical Rescue Worksheet or CS Entry Permit. Spaces shall be tested for at least the following hazards:

- + Oxygen
- + Carbon Monoxide
- + Flammable gasses
- + Hydrogen Sulfide

Should any of the following atmospheric readings be recorded, TRT members shall only enter the space with appropriate respiratory protection:

- + Oxygen levels of <19.5% or >23.0%
- + Hydrogen sulfide or other toxicity marker above PEL
- + Flammability at 10% of LEL

Whenever possible, attempts should be made to monitor the space concurrent with the start of ventilation so long as such attempts do not delay ventilation of the space. Ventilation will be in place whenever possible prior to entrants entering the space.

The Rescue Group Supervisor may alter the intervals for atmospheric testing from above once the Entry Team has entered the confined space and additional assessments have been made.

The Rescue Group Supervisor will assign a competent, qualified individual to perform atmospheric monitoring and coordinate actions with the Technical Rescue Safety Officer. The TR Safety Officer has the authority to stop any and all rescue site actions deemed unsafe and immediately report to the Incident Commander.

Entry Teams may be removed from the confined space at any time the Rescue Group Supervisor or TR Safety Officer determines that atmospheric readings are unsafe.

Respiratory protection is required during all confined space entries where the potential for atmospheric hazards exists.

An appropriately trained and equipped two-person Back-up Team shall be established prior to entry. Back-up team members' level of respiratory protection shall meet or exceed the level of protection utilized by the entry team.

Whenever possible, aluminum hardware should be used for all rigging and hauling operations in order to minimize the risk of sparking.

The Kitsap County Passport Accountability System shall be used by all TRT members on site.

KCTRT personnel are responsible for ensuring that rescue site security has been provided during all rescue operations.

KCTRT members should ensure that the following safety guidelines have been met or completed by first arriving units:

- + Provide rescue site security
- + Consider ventilating the general work area around the confined space
- + Consider opening additional openings to the space to assist with the ventilation process
- + Provide fire control measures as needed
- + Limit ignition sources

Operational Guidelines

First Arriving KCTRT Personnel

1. Size Up the incident and attempt to gather the following incident information:
 - + General description of the incident and type of space.
 - + Type and configuration of the confined space.
 - + Potential electrical, mechanical, and/or chemical storage hazards.
 - + Location and number of victims.
 - + Mechanism of entrapment or nature of illness.
 - + Decide whether this is a rescue or recovery.
 - + Number of entry points and locations.
2. Decide: Live rescue or body recovery
3. Initiate atmospheric monitoring and ventilation of the space if possible and if not already completed by first arriving units
4. Attempt to obtain blue prints, maps or have site personnel draw a sketch of the site.
5. Assign and start a Confined Space Rescue Permit / documentation sheet.
6. Request the following personnel and equipment as needed:
 - + Additional TRT resources
 - + Law enforcement for scene control
 - + Additional fire resources for manpower
 - + Additional EMS resources for victim and rescuer treatment

Operations Level Personnel

If the following conditions are met, KCTRT Operations level personnel may attempt a rescue at the discretion of the incident commander:

- + A reasonable expectation of live rescue exists
- + A competent back up team trained to at least the operations level is available on site
- + At least two rescuers can occupy the space simultaneously without obstructing the egress
- + The victim is within 25 feet of the opening and is visible
- + Access is horizontal only
- + Entrants wear an SCBA and can fit into the space without removing SCBA; or the atmosphere has been monitored, is being consistently monitored and no atmospheric hazards exist
- + A retrieval rope is attached to the rescuers
- + All hazards in and around the confined space have been identified, isolated, and controlled.

Technician Level Personnel

1. First arriving Technician level KCTRT members should conduct or repeat the technical rescue size-up.
2. Technician level personnel should ensure lock out, tag out, blank out procedures are complete.
 - + All fixed mechanical devices and equipment capable of causing injury shall be placed in a zero-mechanical state (ZMS).
 - + All electrical equipment (excluding lighting) shall be locked out in the open (off) position with a key type padlock.
 - + The key shall be given to the TR Safety Officer.
 - + In cases where lockout is not possible, equipment shall be properly tagged and physical security provided.
 - + All locked out utilities shall also be tagged with an approved Confined Space Tag system.
3. Consider posting security personnel at areas tagged and blanked or blinded.
4. All personnel who enter the confined space site will be equipped with proper respiratory protection unless the atmosphere has been determined to be safe.

5. Except in situations where the size of the confined space prohibits it, or staffing is limited, personnel will work in teams of two. In situations where the confined space allows only one to enter the confined space or there is limited staffing, there will be one Entry Team member with a Back-up Team of two. The Entry Team member shall be rigged so that they can easily be retrieved if necessary.
6. When more than two Entry Team members are to be using a SABA System, the Back-up Team will use a second air manifold. The Patient Air System may be connected to either manifold.
7. Non-intrinsically safe devices will not be allowed in the confined space unless approved by the TR Safety Officer prior to entry, based on the results of atmospheric monitoring.
8. All personnel entering the confined space should be equipped with a class III harness
9. If the Entry Team must enter a vertical shaft of greater than 10 feet, each member will be attached to a fall arresting system upon entering the space or be placed on belay.
10. Each entry team at minimum shall be equipped with the following items:
 - + A hardwired communications system in place (Con Space), worn with the SABA if applicable.
 - + Portable radios may be substituted if a "Con Space" type system is unavailable or impractical.
 - + 2 intrinsically safe lights each, or 1 light and 1 Cyalume light stick per person.
 - + 1 Atmospheric monitor
 - + Personal protective equipment deemed necessary by the TR Safety Officer or RGS. Minimum requirements are flame resistant coveralls, nomex hood, harness, boots, gloves and helmet.
 - + An entry / egress line to be anchored at the furthest point of penetration. This may later be used for the extraction of the victim.
 - + A rapid extrication harness for a victim.
 - + A supplied airline, mask and regulator for the victim.
11. If members are to work over or around water, consider placing personnel in Personal Flotation Devices. Due to the already cumbersome equipment, inflatable PFD's may be preferable.

12. All Rescuers (entrants) will utilize a tag line attached to the dorsal connection on their harness. An extension may be girth hitched from the harness D ring to allow for the rescuer to reach behind him/her to connect and disconnect the tag line in the event it becomes entangled. The connection will be made with a locking carabiner.
13. All belay lines will be attached to the entrants and victims with locking carabiners so that if lines become entangled they can be disconnected. Belay lines may also serve as tag lines
14. All rope operations in the confined space environment will comply with Kitsap County TRT SOG 1: Rope Rescue Operations.
15. When rigging the tripod, TRT members should consider pre-rigging a “set of fours” with a pulley attached to the anchor at the tripod head prior to entry of personnel. This can be used if a tag line needs to be converted to haul line. The COD pulley can be raised to the top of the tripod with the pre-rigged set of fours.
16. When using a tripod or other high directional with SABA equipped entrants, consider routing the entrants’ umbilici and the victim’s airline through a set of large Kootenay Carriage type pulleys secured to the high directional connection point, allowing for an unencumbered entry area.
17. The Entry Team Leader will determine the best method and location for entry. Entry decisions will be made based on known locations of victims, safety of the opening, atmospheric readings and viability of recovery points. If possible, attempt a two-prong attack to reach the victim(s) if their location is known or suspected.
18. Prior to entry, each team member shall be logged on a Confined Space Entry Permit with his or her time of entry. This function shall be assigned to one Firefighter who shall keep the Entry Officer informed of the status of each team.
19. Teams should be limited to thirty (30) minutes in any confined space. High heat and cramped spaces will shorten that time. Each team will be assigned to rehab upon removal from the space until re-hydrated and vital signs are within normal limits.

20. Once inside the space:

- + Check Entry Team communications and communications with exterior operations.
- + Mark movement patterns and egress with chalk, Cyalumes or other method as required by the situation.
- + Proceed towards the suspected victim location as a team.
- + Be cautious of elevation differences and unstable footing.
- + Be cautious to avoid entangling air lines with each other and the patient.

21. Once the victim has been located, make the following assessment and communicate the information to the Entry Officer:

- + Determine if this is a rescue or recovery.
- + Determine if the patient SABA unit can be placed on the victim.
- + Determine if the victim can be moved towards the opening with the equipment carried by the team.
- + Determine if additional manpower is needed to move the victim.
- + Protect the victim from further harm if possible

22. Whenever victims are being moved through narrowed points of egress, entry team personnel should, if possible, navigate the narrowed point before the victim in order to ensure their means of egress is maintained.

23. In situations where it is not possible to station the Entry Team on the egress side of the opening during patient extrication, efforts must be made to minimize the time the opening is blocked. All personnel involved in the extrication must be aware of the removal plan prior to blocking the space and all air lines and connections must be clear of the victim and the path of movement to avoid obstruction of air flow.

24. Personnel should rely only on mechanical devices for victim and rescuer removal. Hydraulic and electric winches and similar devices should be avoided.

25. Upon completion of the event, the Rescue Group Supervisor should ensure:

- + All personnel are accounted for
- + All equipment has been removed from the confined space and inventoried
- + All damaged equipment has been placed out of service
- + All personnel and equipment has been properly decontaminated
- + The contractor, owner, investigator or other responsible party has been appropriately briefed on the operations and any remaining hazards, and that the site has been secured or made safe.

Technician Level Operations - SABA System Guidelines

1. When Rescue Technicians enter a space using SABA units, perform a regular check of the personal emergency air cylinder to ensure it is in the "OFF" position as it may accidentally be turned on while crawling or moving equipment through the confined space.
2. In the event of a SABA air-line failure, the Entry Team will immediately exit the confined space, notify the Entry Officer and identify the problem and correct it. Attempt to use conservation technique breathing. Never leave a partner in trouble unless you must clear the way for their exit
3. When an airline emergency exists, and the escape bottle is getting low consider using the patient airline if not in use as a source of air.
4. If the Entrant is having difficulty getting out of the space in a timely manner, every effort should be made to get a second airline/regulator to the Entrant having the air supply emergency.
5. Entrants and Rescuers need to recognize the difference between an air emergency of an unencumbered vs a trapped team member. Team members that become trapped or stuck in a position that are having an air emergency must have a secondary airline brought to them immediately until they can be freed and removed from the space. All personnel not physically trapped need to use their escape bottle and immediately exit the space.
6. The maximum length of a SABA air-line from the manifold will be no more than 300 feet. Air-lines will be connected with duct tape with a 2-inch flap of tape at the connection to their regulator to ensure that the airline does not accidentally get disconnected and for ease of removal during emergencies.
7. When running the air manifold, once the low air alarm sounds the bottle will be changed immediately to ensure that there is always a full bottle in reserve. Only one cylinder will be turned on at a time to ensure that both bottles do not get used at the same time.
8. When possible a backup Air Manifold, SABA unit and 5 gas air monitor will be available at the on-site gear cache in the event of an equipment failure

APPENDIX A: CONFINED SPACE OPERATIONS CHECKLIST

LOCATION _____

DATE _____

COMMAND _____

UNITS RESPONDING _____

Answer the following 4 questions;

- | | | |
|--|---|---|
| 1. Is the space large enough so a person can bodily enter? | Y | N |
| 2. Does the space have a limited means of entry or egress? | Y | N |
| 3. Is the space NOT designed for continuous occupancy? | Y | N |
| 4. Are there any recognized safety hazards?
<i>Electrical, mechanical, atmospheric, flammable, etc.</i> | Y | N |

If the answer to all 4 questions is yes, this is a permit required confined space

- Isolate area from bystander, media, etc. (flagging tape, etc.)
- Identify base & staging areas
- Locate & secure job foreman or a reliable witness
- Determine number & location of victims
- Get blueprints of space or have witness draw a sketch
- Determine nature of problem (entrapment, medical, etc.)
- Determine Rescue or Recovery
- Locate all possible entry points
- If equipped, Monitor the space for Oxygen, Flammables, & Toxics
- If equipped, use an electric ventilation fan to ventilate the space
- Determine, with help of foreman, lockouts needed for entry team
- Start a Confined Space Rescue Permit if available
- If there is not a permit present, take notes on the back of this sheet

APPENDIX B

CONFINED SPACE RESCUE GROUP SUPERVISOR OPERATIONAL CHECKLIST

DATE _____ TIME _____

- Size up the incident
- Provide for air monitoring and ventilation as needed
- Provide for de-watering systems as necessary
- Ensure utilities are controlled and identified
- Begin Entry Permit
- Determine rescue vs. recovery
- Assign Technical Rescue incident management positions
- Develop rescue or recovery plan
- Consider a Technical Rescue 2nd alarm
- Consider requesting additional EMS resources for victim and rescuer care
- Establish entrant communications plan
- Relay the rescue or recovery plan to the Incident Commander
- Brief all personnel on plan of action
- Ensure proper PPE, to include respiratory systems, are available and appropriate for the operation
- Consider additional personnel for prolonged operations to provide for crew rotation and rehabilitation
- Ensure that adequate air supplies are available for prolonged operations

APPENDIX C: KCTRT Confined Space Rescue Scope of Operations

TRT members qualified at the Confined Space Rescue Operations level shall be trained in and may conduct the following operations:

- + Initiate a search and rescue operation inside a confined space provided:
 - A reasonable expectation of live rescue exists
 - A competent back up team trained to at least the operations level is available on site
 - At least two rescuers can occupy the space simultaneously without obstructing the egress
 - The victim is within 25 feet of the opening and is visible
 - Access is horizontal only
 - Entrants wear an SCBA and can fit into the space without removing SCBA; or the atmosphere has been monitored, is being consistently monitored and no atmospheric hazards exist
 - A retrieval rope is attached to the rescuers
 - All hazards in and around the confined space have been identified, isolated, and controlled
- + Perform a size-up of a confined space rescue incident
- + Conduct air monitoring of the confined space
- + Control hazards to include electrical hazards, using lock-out/tag-out methods
- + Apply an atmosphere supplying respirator to a victim
- + Properly package a victim for removal from a confined space
- + Assemble a tripod or similar portable high connection point
- + Assemble and operate or direct the operation of rope systems in accordance with KCTRT SOG 1: Rope Rescue Operations
- + Ventilate a confined space
- + Initiate and manage a confined space entry permit
- + Perform remote de-watering operations

TRT members qualified at the Confined Space Rescue Technician level shall be trained in and may conduct the following operations:

- + All Operations level activities
- + Initiate a search and rescue operation inside a confined space, including those in which vertical access and egress are necessary, the victim is not visible from the entry, the space provides limited access to personnel, or hazards cannot be eliminated
- + Apply and use Supplied Air Breathing Apparatus (SABA) both as an entrant or as an Air System Manager

Appendix D: KCTRT Confined Space Rescue Permit (Pg. 1)

Assessment			
Date: Time:	Location:		
Responsible Party/Contact:			
Number of Victims:	Time Last Seen:	Condition:	
<input type="checkbox"/> Original Entry Permit Available <input type="checkbox"/> Rescue <input type="checkbox"/> Recovery			
Description of Space			Access Point:
Contents of Space			<input type="checkbox"/> MSDS Available
Hazards in Space:			
<input type="checkbox"/> Mechanical <input type="checkbox"/> Electrical <input type="checkbox"/> Pneumatic <input type="checkbox"/> Hydraulic <input type="checkbox"/> Other			
Initial Atmospheric Hazards			
% Oxygen	% LEL	PPM CO	PPM H ₂ S
Time Tested:	Person Testing:	Last Calibration Date:	
Pre-Entry			
Rescue Group Supervisor:		Rescue Safety Officer:	
Hazard Control			
Ventilation	<input type="checkbox"/> Positive Pressure	<input type="checkbox"/> Exhaust	<input type="checkbox"/> Local Exhaust <input type="checkbox"/> Local Supply
Mechanical	<input type="checkbox"/> Block Linkage	<input type="checkbox"/> Disconnect	<input type="checkbox"/> None
Electrical	<input type="checkbox"/> Lockout	<input type="checkbox"/> Tagout	<input type="checkbox"/> None
Pneumatic	<input type="checkbox"/> Lockout	<input type="checkbox"/> Tagout	<input type="checkbox"/> None
Piping	<input type="checkbox"/> Blind	<input type="checkbox"/> Disconnect	<input type="checkbox"/> None
Hydraulic	<input type="checkbox"/> Lockout <input type="checkbox"/> Tagout	<input type="checkbox"/> Bleed	<input type="checkbox"/> Disconnect <input type="checkbox"/> None
Equipment Required			
Respiratory	<input type="checkbox"/> SCBA	<input type="checkbox"/> SABA	
Entry/Extrication	<input type="checkbox"/> Tripod	<input type="checkbox"/> Rope MA	<input type="checkbox"/> Belay
Victim Packaging	<input type="checkbox"/> SKED	<input type="checkbox"/> Harness	<input type="checkbox"/> Litter <input type="checkbox"/> Halfback <input type="checkbox"/> Backboard
Communications	<input type="checkbox"/> Visual	<input type="checkbox"/> Con-Space	<input type="checkbox"/> Radio

