Technical Rescue Options

for

Industrial Facilities

in

Northern BC

Introduction

On industrial worksites, accidents happen. Despite best efforts, safety protocols are sometimes ignored, equipment malfunctions, and human error comes into play. And when these accidents happen in high-risk environments such as at heights or in confined spaces, the consequences can be life-threatening. Technical rescue teams are rotating units of 2-4 highly-trained rescuers who know how to assess hazards of compromised spaces and perform various types of rescue procedures quickly and effectively while limiting danger to themselves.

The Northcoast region of BC is already a thriving industrial hub with a major manufacturing industry, two of the biggest ports in Western Canada, and highway and railway infrastructure connecting it to the mainland United States. Over the next decade the region will transform from a manufacturing into an energy hub and the local economy will see an influx of thousands of jobs, beginning with major facility construction and moving into permanent positions as facilities and pipelines get up and running. However, many industrial facilities in the area do not currently have a technical rescue plan in place beyond calling 9-1-1 in the event of an incident. This is problematic for several reasons, and as new work in the region further puts a strain on limited emergency department resources, underfunded departments will soon be incapable of meeting local technical rescue needs.

Federal regulations stipulate that rescuers must be in the "immediate vicinity" of confined spaces where work is ongoing[1], with provincial BC legislation further stipulating that if third-party rescuers are "employees of an agency such as a fire department there must be a written agreement detailing the services provided.[2]" No such agreements are currently being honoured by the Prince Rupert Fire Department. Similar regulations govern technical rescue during ongoing work at heights[3].

This report will outline three possible options for technical rescue at local industrial facilities[4]: 1) continue relying on emergency departments; 2) develop technical rescue teams internally; and 3) outsource technical rescue to a third party. By clearly outlining the risks, rewards and costs associated with each of these options, this report can help guide companies towards the best course of action regarding technical rescue at their facilities.

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[1] Government of Canada. [2018]. *Canada Occupational Health and Safety Regulations*. 11.5(1e). Retrieved from https://laws-lois.justice.gc.ca/eng/regulations/SOR-86-304/page-31.html#h-160

[2] WorkSafe BC. [2015]. *OHS Regulation.* 9.37(2). Retrieved from https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-09-confined-spaces#SectionNumber:9.37

[3] WorkSafe BC. [2015]. *OHS Regulation*. 34.8. Retrieved from https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-34-rope-access#SectionNumber:34.8

[4] Beeler, Jeff. [2003]. *Occupational Health & Safety Online.* "To Whom Do You Turn?" Retrieved from https://ohsonline.com/Articles/2003/08/To-Whom-Do-You-Turn.aspx?Page=1

Scenario 1: A Facility Relies On The Fire Department For Technical Rescue

1. Scenario Description:

A local metal manufacturer has never had a major incident that ended in a loss of life and so has never seen the need to implement an on-site technical rescue plan. Instead, they have made sure that all workers are aware that Kitimat Fire & Rescue has a dedicated technical rescue team. **During any confined space work at the plant managers have to contact the local fire department to ensure they have available manpower in the area**. The fire department is 20 km away from the plant and workers have called them on multiple occasions for minor incidents, but this standing agreement has never been formalized with a written contract.

2. Associated Financial Costs:

There are minimal financial costs associated with relying on local fire department for technical rescue. Since fire departments are public services, this facility does not have to invest any money in technical rescue. **However, because there is no written technical rescue agreement in place (in violation of WorkSafe BC OHSA 9.37[2]), an Occupational Safety Officer could assess this facility a significant fine – likely $5,000-$10,000 in the absence of major injury[5] and significantly more following a loss of life incident. WorkSafe BC could also order a work stoppage until a rescue plan is formalized, costing the plant thousands of dollars in lost productivity.**

Startup costs:

None.

Rolling costs:

None.

3. Associated Risks and Benefits:

Risks:	**Benefits:**
Regulatory discipline (i.e. fines, stoppages)	No expense to facility
Insufficient response time	Time savings
Other emergency obligations	
E.R. not trained in technical rescue	
Endangering E.R. personnel	

[5] WorkSafe BC. [2018] *Incident investigations>Penalties>Penalty summaries.* Retrieved from https://www.worksafebc.com/en/health-safety/create-manage/incident-investigations/penalties/penalty-summaries

4. Evaluation:

One of the main advantages of relying on the fire department is that requires no investment from the facility. The facility saves on the time, energy and cost required to evaluate safety options and implement a technical rescue plan. Workers at the plant also feel secure in the belief that a professional emergency responder will be available to respond to any incidents that do arise.

However, there are many reasons that relying on the emergency department is not ideal for this manufacturing facility. As mentioned above, provincial legislation requires that third-party rescuers (including fire departments) have a written contract in place before work commences, which the plant does not have. Even if the facility were to approach the fire department with the appropriate paperwork, they would need to follow up by informing the department of all dangerous work ongoing at the facility and the department would likewise need to keep at least two firefighters on standby for technical rescue purposes. While meeting all these criteria might technically be feasible, the subsequent arrangement would be impractical for everyone involved.

Beyond legislative reasons, one of the biggest issues with relying on local emergency services is that they simply don't have enough time to respond to a life-or-death incident. It is estimated that in a situation where the air in a confined space drops to 6-8% oxygen (around a third of the normal atmospheric level), death can occur within 8 minutes[6]. If an oxygen depravation incident occurs at the facility and first responders take 10 minutes from the time of the call to arrive at the scene, that does not leave them any time to save a victim. Even if travel time from the fire station is just five minutes, that likely doesn't leave enough time to both execute a technical rescue and perform lifesaving procedures. As one anonymous contractor plainly put it, "If a contractor or facility is putting "Call 9-1-1" as their rescue plan, they are only planning for a body recovery."[7]

Additionally, local emergency services lack the manpower and training to handle technical rescue, and when firefighters not trained in technical rescue attempt to execute rescues, they put themselves at risk. Per NFPA guidelines, Operations-level confined space rescuers must have:

> The ability to select and interpret size-up information, conduct interviews, choose and utilize PPE, operate monitoring equipment, identify hazard mitigation options, identify probable victim location, perform

[6] Naranjo, Edward. [2007]. *EHS Today*. "Oxygen Deficiency: The Silent Killer." Retrieved from https://www.ehstoday.com/fire_emergencyresponse/ehs_imp_77598

[7] O'Conner, Adam and Tomb, Jeff. [2013]. *EHS Today.* "Rethinking Using 911 As Your Rescue Plan." Retrieved from https://www.ehstoday.com/emergency-management/rethinking-using-9-1-1-your-confined-space-rescue-plan

> risk/benefit analysis, recognize characteristics and hazards of confined spaces, and evaluate specific rescue systems.[8]

And also:

> The ability to immobilize a victim's spine; package victims in litters…perform basic management of various traumatic injuries and medical conditions; support respiratory efforts; and treat modalities as required by environment.[9]

Firefighters are trained in a wide range of skills, but not all emergency responders have practical confined space training. While Kitimat does have a dedicated technical rescue team, they only have 24 full-time first responders on staff (including paramedics)[10], while Prince Rupert has just 20 full-time firefighters[11]. Other emergency departments in the region are similarly limited in their scope of emergency response. These local departments are designed to service rural and small-town emergencies, and when other obligations arise, they have limited remaining resources to allocate to technical rescue.

Additionally, when emergency responders attempt to perform confined space rescues for which they lack the appropriate training, they put themselves at risk. According to National Institution for Occupational Health and Safety statistics, around 60% of confined space fatalities occur among would-be rescuers[12]. By calling in emergency workers to resolve a situation that they are not equipped to handle, the manufacturing facility may be putting lives directly at risk.

On a long-term basis, relying on 9-1-1 for technical rescue is not a viable long-term solution for the manufacturing facility, as the costs saved are more than offset by the liability risks and loss of life concerns. **While the fire department is an important secondary resource when incidents occur, the facility should develop a primary technical rescue solution**.

[8] National Fire Protection Association. [2017]. *NFPA 1006: Standard for Technical Rescue Personnel Professional Qualifications.* 7.2.4[b].
[9] *Ibid*. 7.2.11[b]
[10] Kitimat Fire and Rescue. [2018]. Retrieved from https://www.kitimat.ca/en/our-community/fire-and-rescue.aspx#Technical-Rescue-and-Specialty-Response
[11] City of Prince Rupert Fire Department. [2017]. Retrieved from http://www.princerupert.ca/city_hall/departments/fire_department
[12] National Institute for Occupational Health and Safety. [1986]. *Preventing Occupational Fatalities in Confined Spaces.* Retrieved from https://www.cdc.gov/niosh/docs/86-110/default.html

Scenario 2: A Facility Creates A Technical Rescue Team Internally

1. Scenario Description:

A unionized energy facility will be undergoing construction over the next three years and is projected to be up-and-running by 2022. Facility management understands that they will need a technical rescue team on hand regularly for the duration of the large and potentially dangerous construction project, which will include extensive work at heights. While there will be fewer full-time workers on hand once the facility is up and running, there will continue to be H2S hazards to monitor and dangerous confined space work to monitor. The facility still has much of their start-up capital available and would like to keep many aspects of operation in-house. They believe that creating their own technical rescue team will be a worthwhile long-term investment, as it will create growth opportunities internally, remove messy renegotiations with outside contractors and allow management to have tighter control over operations.

2. Associated Financial Costs:

Since this oil and gas facility is starting their technical rescue team from scratch, they must invest quite a bit of money in hiring, training and equipping the technical rescue team. According to NFPA 1670 guidelines[13], confined space rescue teams operating at the Technician level (i.e. trained to enter and perform rescues in confined spaces that are potentially hazardous) require a staffing of at least 6 rescuers, while those at the Operations level (trained to execute rescues in low-risk confined space environments) require at least 4 rescuers[14]. For practical purposes, this means that a confined space rescue team for a shift-based facility will require at least 10 rescuers on staff, and likely up to 12[15].

Startup Costs:

Startup costs are significant and include three major concerns: training wages, training fees, and equipment. All rescue technicians require Confined Space Operator or Technician training and many also require advanced first aid training as well. Companies can expect to budget $2500 per rescuer on these training fees alone: CMC Pro offers a Confined Space Technician course for around $1300[16], while St John's Ambulance offers Advanced First Aid training for around $1200[17].

[13] National Fire Protection Association. [2004]. *NFPA 1670: Standards on Operations and Training for Technical Search and Rescue Incidents.* 7.4.2.
[14] *Ibid.* 7.3.2
[15] Roco Rescue. [2011]. "Confined Space standby teams: How many members?" Retrieved from https://www.rocorescue.com/roco-rescue-blog/confined_space_stand-by_teams_how_many_members
[16] CMC Pro. "Confined Space Rescue Technician." Retrieved from https://www.cmcpro.com/classes/confined-space-rescue-technician/
[17] St John's Ambulance. "First Aid & CPR Courses." Retrieved from https://stjohn.ab.ca/first-aid-and-cpr-courses/emergency-standard-and-advanced-first-aid-courses/

In addition to fees for the training itself, technicians-in-training are a drain on wages. According to Neuvoo[18], rescuers in Canada average a wage of $17 per/hr. Even at this relatively affordable cost, 12 rescue technicians requiring 120 hours of training plus an additional 80 hours of orientation can cost a parent company more than $40,000 in training wages alone.

Additionally, as the facility is investing in a technical rescue team from scratch, they need to buy all necessary rescue equipment, including extra equipment to inure against breakage/malfunction and to prepare for any unexpected large-scale rescue operations.

A recommended set of start-up rescue equipment might include[19]:
-2 $3500 Confined space rescue kits
-1 $1500 belay/retrieval kit
-2 $700 confined space harnesses
-8 $200 fall protection harnesses
-10 $200 full-face respirators
-1 $1000 set of 12 radios
-4 $1000 gas detection monitors
-3 $500 spineboards/stretchers

Start-up Investment	**Cost:**
Training wages for 10-12 rescuers	$40,000*
Training fees for 10-12 rescuers	$30,000*
Investment in rescue equipment	$20,000
Total start-up cost:	**$90,000**

*Training wages based on 12 technicians requiring 120 training hours + 80 orientation hours at $17/hr.
*Training fees based on 12 technicians requiring CS Rescue Technician Level training ($1300) and Advanced First Aid training ($1200)

Rolling Costs:

Once the technical rescue team is up and running, the facility must also be mindful of the ongoing costs of wages, re-training, and maintenance.

According to Zip Recruiter, the average technical rescuer in the U.S. earns $42,000/yr[20], which translates to more than $50,000 Cdn. For a 12-member rescue team, that works out to annual wages in excess of half a million dollars. Additionally, most certifications must be renewed every 1-3 years. If each employee needs one recertification per year, that could be an extra $12,000-$15,000 in training fees for the facility. Equipment also needs to be stored, maintained and replaced as needed – if one major piece of rescue equipment needs to be replaced per year, annual costs could easily run another $5,000-$10,000.

[18] Neuvoo. [2019]. Retrieved from https://neuvoo.ca/salary/?job=rescue
[19] Most prices from PK Safety. https://pksafety.com/confined-space-kits/
[20] Zip Recruiter. [2019]. Retrieved from https://www.ziprecruiter.com/Salaries/Rescue-Technician-Salary

Rolling commitment:	Cost:
Annual wages	$600,000/yr.*
Annual recertification – 12 rescuers	$12,000/yr.*
Annual equipment maintenance	$6,000/yr.
Total technical rescue team rolling costs:	**$668,000/yr.**

*Wages based on 12 rescuers earning $50,000/year. *24/7 operations may require 10-60 trained personnel to maintain levels during vacation and sick days. A good basis is to see how many OFA3 attendants are required to maintain operational requirements.
*Recertification fees based on 12 rescuers receiving one annual recertification at $1000/person

3. Associated Risks and Benefits:

Risks:	Benefits:
Expensive start-up investment	Direct management control over operations
Ongoing equipment/training/payroll costs	Rescuers have intimate knowledge of facility
Liability concerns	Rescuers can be cross-trained
Potential union interference	No contract renegotiation with supplier
Rescuers preoccupied with other tasks	Long-term rescue strategy
Possible lack of subject matter expertise	Jobs filled internally

4. Evaluation:

Implementing a technical rescue strategy is a major expense, but under the right lens this expense can be viewed as a savings for the company. Once established, technical rescue teams operate comfortably within the facility's hierarchy and report directly to upper management. As they are comprised of existing workers, they have an intimate understanding of the facility's environment, including specific local hazards and previous on-site incidents. For example, after dealing with a hydrogen sulfide leak, a permanent technical rescue team can orient future resources towards better managing future H2S incidents. Because they can develop a long-term technical rescue strategy, an internal technical rescue team may be best equipped to handle rescue at a facility.

However, the costs of developing a technical rescue team internally are exorbitant. Even if this facility has a hundred thousand dollars readily accessible for the primary investment, the technical rescue team will continue to be a major drain on payroll and other financial resources after being established, as rescuers will require constant re-training and regular equipment maintenance. **According to NFPA 1670 guidelines, confined space rescue teams operating at the Technician level (i.e. trained to enter and perform rescues in confined spaces that are potentially hazardous) require a staffing of at least 6 rescuers, while those at the Operations level (trained to execute rescues in low-risk confined space environments) require at least 4 rescuers. For practical purposes, this means that a confined space rescue team for a shift-based facility will require at least 10 rescuers on staff, and likely up to 12.**

Additionally, the fact that the oil and gas facility is unionized complicates matters. The union may insist that unionized workers be trained as rescuers, whether or not that are the best candidates. These workers will out of necessity be taken away from their areas of expertise to be trained in technical rescue. And while an internal technical rescue team may theoretically be best equipped to handle rescue at a facility, this is entirely dependent on rescuers being trained to NFPA standards and maintaining a high level of subject matter expertise – unionized workers trained across multiple disciplines may struggle to maintain these standards as they find themselves preoccupied with other tasks.

And finally, **operating rescue internally opens the facility up to liability in the event of an incident that causes a debilitating injury or loss of life. The responsibility for ensuring that an internal technical rescue team is up to all standards and handles all incidents correctly falls on upper management, and if there is a failure anywhere in the chain of command the facility will take the blame – leading to fines, stop work orders and other potential work stoppages**[21].

Ultimately, training and staffing a technical rescue team internally is a viable option for the energy facility but may not be the optimal one. The significant financial costs, potential union complications and associated liability risks outweigh the benefits of management control and internal growth.

[21] Hosier, Fred. [2017]. *Safety News Alert*. "3 die in confined space; OSHA fines employer $119K." Retrieved from http://www.safetynewsalert.com/3-die-in-confined-space-osha-fines-employer-119k/

Scenario 3: A Facility Outsources Technical Rescue

1. Scenario Description:

An established natural-gas power plant in the region only requires technical rescue during turnarounds and shutdowns. The facility understands that relying on the fire department in no longer a tenable option, but while they are profitable, they do not have capital readily available to invest in a technical rescue team. For their next turnaround, they decide instead to outsource technical rescue to a third party.

2. Associated Financial Costs:

Startup Costs:

As the power plant is not taking ownership of the operation, there are no start-up costs.

Rolling Costs:

The rolling costs consist of an hourly fee paid out directly to the third-party company, which is only paid out when a technical rescue team is required (i.e. during shutdowns). A facility that only needs rescue during shutdowns and other maintenance can expect to pay a $75/hr fee for 24 hours a day for between 30 and 60 days.

Rolling commitment:	**Cost:**
Hourly Fees	$75/hr
Total rolling costs:	$50,000-$100,000*

*On-call fees vary depending on the amount and type of work performed

3. Associated Risks and Benefits:

Risks:	**Benefits:**
Poor communication with management	Cost savings
Potential lack of familiarity with facility	Services tailored to site needs
Lack of direct management control	No hidden or extraneous costs
Lack of internal growth opportunities	No union interference
Potential lack of a long-term rescue strategy	Rescuers come fully equipped and trained
Possible gap in service when contract expires	No liability (or limited liability)

4. Evaluation:

The main benefit to this approach is cost savings[22]. Not only does the facility save hundreds of thousands of dollars annually compared to supporting their own internal technical rescue team, they also get cost certainty, as the burden for equipment maintenance and re-training falls directly on the safety provider. Additionally, the standby rescue team can be called in as needed, meaning there is little downtime associated with outsourcing technical rescue.

In addition to cost savings, by outsourcing technical rescue the power plant also reduces their liability in the event of a serious incident[23]. If the facility can demonstrate that they had a written technical rescue plan in place, then any burden of responsibility for failures in rescue operations will fall on the rescue provider rather than on facility upper management.

Perhaps most importantly, a rescue provider can ensure that their rescuers are trained to NFPA standards, equipped with the highest standard of equipment and have the subject matter expertise to manage the type of rescues required at the facility. The best rescue teams need the time and money to equip and train themselves above and beyond established standards[24] – after all, rescuers quite literally have lives in their hands. Because private organizations are not not bound by union obligations, they can hire the best technical rescuers available and tailor their rescue plans specifically to the needs of each site. And while an internal rescue team may need to bring in consultants to stay up-to-date, private organization dedicated to safety apprised as regulations and best practises change. **Additionally, they can operate either directly on-site or at a nearby off-site location – fulfilling the "immediate vicinity" legislative requirement and giving them a better likelihood of saving a person in respiratory distress.**

Of course, there are some risks to this approach. Third-party rescuers may not be intimate with facility operations and may not understand the scope of certain hazards present on the worksite. By outsourcing technical rescue, a facility also leaves itself vulnerable to a gap in service should either side choose to break off the agreement. While valid, these concerns can be alleviated by forming a good working relationship with the third-party safety provider. If both parties follow all relevant legislation (including the requirement for a written rescue agreement) and the facility helps orient the rescue team on-site, outsourced rescue teams can provide a standard of service comparable to or even superior as compared with internal rescue teams.

For the cost-conscious power plant, outsourcing technical rescue is the optimal solution. Minor concerns about rescue team orientation and the lack of management control are manageable

[22] Capstone Fire & Safety Management. [2018]. "Benefits of Outsourcing Industrial Safety Services." Retrieved from https://capstonefire.com/2018/01/benefits-of-outsourcing-industrial-safety-services/.
[23] Safety Now ILT. [2019]. "Preventing Confined Space Injuries and Liability." Retrieved from https://ilt.safetynow.com/preventing-confined-space-injuries-liability/
[24] Ronin Rescue. [2016]. "Special Ops – Part 3 – Support Required for a fire service technical rescue team." Retrieved from http://www.roninrescue.com/2016/02/18/special-ops-part-three-support-required-fire-service-technical-rescue-team/

and easily offset by significant cost savings, a higher standard of training and relief from liability concerns.

Conclusion:

In the recent past, facilities in the Prince Rupert/Kitimat region have largely turned a blind eye to legislative technical rescue requirements, believing that existing services can offer the support that they require. But as more industry develops in the region, a problematic situation will only grow even more untenable. Emergency services in Prince Rupert will no longer be able to keep up with rescue demands, placing lives at risk and leaving companies vulnerable to fines, lawsuits and other potential legal concerns.

Looking forward, local facilities both old and new will will need to take a different approach to technical rescue. This report examined three of the available options. Scenario 1 outlined a number of the risks associated with continuing to rely on local emergency departments for rescue and concluded that it is no longer a viable option, while Scenarios 2 and 3 offered potential solutions. Scenario 2 illustrated that staffing a technical rescue team internally might work well under specific conditions but is not necessarily cost-effective and comes with significant risk. Scenario 3, on the other hand, demonstrated that outsourcing technical rescue is cost effective, uncomplicated and can be just as effective as developing technical rescue internally.

While both options are preferable to the status quo, there are many factors suggesting that outsourcing technical rescue may be more practical than developing a technical rescue team. Technical rescue is a skilled trade that takes years to perfect and training an existing workforce up to NFPA standards is time-consuming, expensive and unnecessary. Additionally, very few facilities require technical rescue on a year-round basis, and by only offering service on an as-needed basis an outside contractor can provide excellent technical rescue operations at a fraction of the price of what a facility would pay by staffing it internally. **Finally, outsourcing technical rescue takes the legal burden for rescue off of facility management and places it on a third party. For these reasons and many more, most local companies will find outsourcing technical rescue to be the optimal solution for their facilities.**