
Technical Paper on
Top Management's View of Point on
Confined Space Safety Works
for
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1. INTRODUCTION

“A 60 year old painter lost consciousness while undertaking painting works in an underground grease trap tank.” – Oriental Daily, August 31, 1999.

“A 41 year old (senior technical officer) lost his life when attempting to rescue his colleague during replacement works for a 2m x 2.5m manhole.” – Apple Daily, November 4, 2000.

“3 nos of workers lost consciousness due to inhalation of carbon monoxide during cleaning works in a 600mm manhole at 4 meter deep in Tuen Mun”

- 1.1 The above reported cases represent only a handful of the more serious and publicized incidents involving work in confined spaces in recent times. Cases or incidents resulting from the same kind of work which have not been reported nor made public, may very well exceed alarmingly the number of known cases. These unreported incidents may include slips or falls due to slippery surfaces inside manholes, nauseating or dizziness after spending some time underground, bites from insects or rodents, hit by falling objects, and many more.
- 1.2 No doubt, the above unreported examples may not have as fatal or serious consequences of the former, but nevertheless, they should be given equal considerations and be treated as seriously as those reported ones. Why? Because the same lack of attention or indifferent attitude which resulted in the relatively minor incidents can very well end up as tragedies, which could have been avoided by these workers when working in a confined space environment.
- 1.3 This article presents some of the key views adopted and in some areas, as practiced by the top management level of one such legally registered specialist contractor in Hong Kong, namely, BUDA Engineers & Consultants Ltd. This

article is wholly the viewpoint of the author and is presented herewith as a sharing experience only with the learned audience. This article does not intend, by any means, to disclaim or dispute any publicized findings in the areas discussed.

2. DEFINITION OF CONFINED SPACE

- 2.1 The Labour Department defines confined space as “any place in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk, and without limiting the generality of the foregoing, includes any chamber, tank, vat, pit, well, sewer, tunnel, pipe, flue, boiler, pressure receiver, hatch, caisson, shaft or silo in which such risk arises”.
- 2.2 In Hong Kong, there are numerous kilometers of stormwater & sewerage pipes, culverts and water tunnels which fall into the definition of “confined space”. At present, these confined space elements are either owned or maintained by government departments (e.g. DSD, WSD, HA, etc) and companies such as MTRC, CLP, etc. Owing to continual development, new construction projects, and periodic maintenance demands, entries into these confined spaces are inevitable. So, if man-entry into pipes, culverts and tunnels is not avoidable, what can we do to make this necessary construction activity a safer one in this industry?

3. RESPONSIBILITIES OF TOP MANAGEMENT

- 3.1 The “Owner”, in this context and under the definition of the Labour Department, shall be the person responsible for taking charge of the specific site once the site is handed over by the Client or his Engineer. The Owner will usually encompass either the supervisor, project manager or project director of the contracting or specialist firm for whom the project has been assigned to. These projects may include undertaking specific tasks such as carrying out condition survey of an existing 2100mm foul sewer culvert, undertaking topographical survey in an unused 1800mm stormwater pipe, measuring silt depth in a 4-cell box culvert of 2.4m wide and 2.2m deep each, etc, just to name a few examples.
- 3.2 Prior to the commencement of such projects, the Owner has the responsibility to ensure that the “right” working conditions are available for the confined space workers to work in. This represents foremost the most vital step any Owner of such works must undertake, because the lack of or the underestimation in providing any one component involved in this step will make a difference (a matter of life and death) in the successful completion of the works with zero safety/health incident.

3.3 Measures before Works Commencement

3.3.1 Training

3.3.1.1 Appropriate training is probably the best protection measure any Owner can equip his or her workers with for undertaking such high risk-associated tasks. However, it should be stressed herein that the term “appropriate” is the key word that any training provider should be aware of. The Owner, being in charge of the Project, should theoretically be aware of all the potential dangers and issues that may be encountered by his field teams when undertaking the works, even at the initial stage of the project, e.g., at tendering or project negotiation stage.

3.3.1.2 As suggested above, appropriate training will provide the required knowledge and expertise for the Owner’s field team to undertake and to handle potential issues or concerns arising from a confined space project. However, it must be acknowledged that no one person will become an expert in this field (or in any other field, for that matter), after undergoing one or two crash courses or classroom type lectures, right before the works.

3.3.1.3 The above paragraph suggests that continual training must be provided to the team empowered to undertake such type of project. This training must be provided on a regular basis, even when no such type project or works is on hand in the firm’s current project listing. In addition, it would be ideal that a constant team of workers who is specially designated for such works is maintained throughout the training programme, to ensure overall continuity in the process of knowledge sharing. However, in this industry whereby the occurrence of workers changing employment or company is relatively high, this continual training of the same team of workers may not be that practical, which means that an alternate method of maintaining this continuity is to create a pool of such expertise within the same company.

3.3.1.4 Citing an example from the author’s experience in BUDA, continual safety training represents probably the key agenda in the management’s mission of achieving sustainability in this field. In BUDA, a small specialist company backed by a pool of about 40 technical staff, it is the company’s on-going policy that all technical staff hold a Confined Space Worker certificate (from technician to project manager level). In addition, almost two thirds of this pool are Competent Person in Confined Space. With this kind of continual training commitment provided by the company, an acceptable level of safety consciousness is maintained amongst its technical staff.

3.3.2 Resources

3.3.2.1 Many a times, projects are won based on low bids submitted by the Owner. Low bids will usually (though not always) translate to inadequate resources such as equipment, manpower and time allocated to the successful project. This fact must be taken into consideration by the Owner during tendering stage, because to ensure that a confined space related project is able to be completed in time and safely, adequate resources must not be sacrificed in order to protect the safety of the personnel involved.

3.3.3 Understanding of Working Environment

3.3.3.1 To understand the working environment prior to commencing the works will probably equip the Owner with the required knowledge to best prepare his team for the field works. Vital information such as type of services (foul sewer or stormwater), age of services, types of surrounding environment (factories or residential areas), location of pipes (whether pipes are subject to tidal influence or flash floods), availability of emergency escape routes, potential existence of dangerous animals or insects such as snakes, centipedes, etc, will provide an initial estimation to the kind of constraints the field team may encounter, be it the duration of works or types of substance in the confined space.

3.3.3.2 As such, input into a confined space project starts as early as the tendering stage, whereby extensive information gathering is initiated for evaluating the best combination of resources and budget to be utilized for the job.

3.3.4 Preparatory Works

3.3.4.1 Sufficient time and effort to well prepare for any confined space project should never be compromised by the Owner. As mentioned above, a full understanding of the working environment prior to the works by undertaking comprehensive site visits is essential to provide input into the preparation process.

3.3.4.2 More often than not, access into confined space are usually located within inconveniently accessible areas, such as existing roadways, slope sides, or heavily vegetated areas. These types of access provide another form of hazard to the personnel involved, other than the confined space dangers, which, if not appropriately prepared for, may result in serious injuries to the outside personnel or even hampering any rescue operations to the affected workers in the confined space.

3.3.4.3 The Owner must ensure that an emergency escape route or procedure is available for all confined space works, since at times accidents cannot be avoided (even when all preparatory works are provided). A review of previous report incidents indicated that in certain cases, the lack of such emergency

procedure had actually resulted in unnecessary further dangers suffered by the confined space workers.

3.3.5 Competent Persons

3.3.5.1 Any person who is involved in confined space works must be in “top form” to participate in his role effectively. The Owner must ensure that his team of workers is well alert prior to taking up man entry works, and has the responsibility to provide a well defined programme to make his team be aware of the work schedule.

3.3.5.2 If the Owner has prior knowledge of any one from his team is under the influence of alcohol or drug/medication, the Owner is responsible to deter this person from undertaking the works. If this personnel represents a key member of the team, the Owner may even consider to postpone the schedule of works, in order to protect the well being of the rest of the team members.

3.4 **Measures during Works**

3.4.1 Safety Equipment

3.4.1.1 “*Prevention is better than prescription*” This phrase holds equal truth in the field of confined space works. Without adequate and top working condition safety equipment, no team is truly prepared to undertake such high-risk ridden works. As a minimum, the Owner must ensure that the following basic safety equipment are available to the confined space team before allowing the team to proceed with such works:

- gas detectors;
- blower;
- tripod;
- communication devices;
- safety harness;
- flow arrestor;
- safety rope;
- breathing apparatus (BA);
- resuscitator;
- personal alarm devices.

3.4.1.2 Not only should each and every one of these equipment be in good working condition, they should also be of the appropriate type, such as explosive proof, water proof, etc.

3.4.1.3 Another vital component of the above safety equipment is the personnel who will be handling the equipment. The Owner must provide adequate and

continual training to ensure that the responsible field staff has full knowledge of how these equipment work and how to operate them effectively.

3.4.2 Compliance to Regulations

3.4.2.1 Many regulations are in place today in the confined space industry to ensure that related accidents are minimized. Indifference to these regulations is foremost an offence in making, but more importantly, it increases the unnecessary chances of accident occurrence which may possibly result in fatal endings.

3.4.2.2 No matter how “inconvenient” some of these regulations may cause to certain confined space work processes, the Owner has the responsibility to implement strictly the relevant regulations for confined space works and to enforce, if necessary, his field staff to comply fully with these regulations.

3.5 **Measures after Works Completion**

3.5.1 Project Evaluation

3.5.1.1 After each completion of a confined space project, the Owner should conduct a review of the project with his field team. Areas for discussion could include:

- Review of equipment used
- Review of procedures and emergency routes provided
- Review of the adequacy of personnel and equipment used
- Review of any potential safety issues that may be encountered or may have been anticipated resulting from the works
- Review of further measures to improve work procedures or safety measures should similar projects or conditions are encountered again in the future

4. **CONCLUSION**

4.1 Works in a confined space environment has no doubt received much attention in today’s construction industry. Simply conduct a survey of most major insurance companies in Hong Kong today and ask this question: Does your company cover confined space projects? A direct response from 8 out of 10 companies will most likely be “no”. This reflects a disturbing phenomenon in this industry whereby most major contracts do request for the specialist contractor to provide such coverage during the duration of the works.

4.2 A possible measure to restore the confidence and safety record in the confined space industry is to raise the awareness and alertness of the personnel involved in the works. However, as seen in the previous discussions, the management level has numerous roles to play even prior to commencement of the operations. In fact, the

management's commitment to ensuring a safe completion of a confined space project is likely to be much more important than the roles played by the direct personnel. Without this commitment, even the smartest and ablest staff will not be able to enter and work within a confined space, with the assurance that the risks associated with his works have been adequately assessed, reviewed, prepared for, and thus, minimized to the minimum, to ensure a successful completion of the project. Together with the groundworks established by a responsible Owner, the competent staff undertaking such projects will no doubt be able to undertake and complete the tasks assigned, and more importantly, will have the good health and morale to take pride in the works that he or she has safely completed.

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