ANSI B31.3? – IT'S ONLY A TWO INCH PIPE!

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ABSTRACT

There has been a real push in certain areas of the country with respect to compliance with health and safety regulations around chemical storage and handling areas with some plants being identified with deficiencies.

The tension between what we need to do and what we can afford to do is a challenge felt by many water and wastewater providers. Often the requirements of legislation, codes of practice (COP) and standards seem to make simple systems complex with the associated increase in cost.

There is also significant variation in interpretation by the regulators as to what is acceptable and what is not in terms of compliance. This can make providing a compliant design very difficult. The variation in opinion of Drinking Water Assessors is a prime example of this.

What is perhaps more worrying is the apparent uncertainty on both sides of the client – consultant relationship. How does a client ensure that he is getting advice that at least meets the standards, COPs and legislation without necessarily being an expert himself? How does a client know that there is something missing from a project until it has been built and the dangerous goods inspector (DG) fails to provide the stationary containment certificate?

This paper will try to assist water and wastewater service providers in knowing what to ask before the Worksafe and DG inspectors fail an installation. It will use case studies to demonstrate plants that have not been designed in accordance with the relevant standards and the review process involved. It will address the cost implications of compliance versus non-compliance.

KEYWORDS

Compliance, Due Diligence, Regulations, Codes of Practice, Standards.

1.0 INTRODUCTION

The problem we all face when making any purchase is how do we know we are getting the best deal and good advice. Before we get into the details of how we do this for professional advice, let's look at a simple example that nearly all of us will have faced – buying a car.

When we buy a car, we have a specification in mind which includes what we are willing to pay. A typical specification might be,

1. 4 wheels
2. 1.8 litre engine,
3. 4 seats
4. Saloon
5. Large boot to fit food for growing family
6. ANCAP 5 star rating
7. Fuel economy around town
8. Etc.

What we assume is that the car that is sold to us meets the required design and importation standards set by New Zealand Law. How are we sure? In the above list, the only reference to a standard is item 6. The rest is just our requirements with no reference to any standard. So how do we check the compliance with the standards? We

know because it would be illegal for a manufacturer to sell a car in this country that did not comply with the legislation and we trust New Zealand law.

In design services we do not have that trust because to a large extent there is no law. Sure we have the CPEng Act and we have a code of ethics but those only apply to chartered professional engineers. What about the rest? We are basically an unregulated industry.

2.0 LEGISLATIVE REQUIREMENTS

There are a number of Acts that apply to design engineers. The problem is that they are generally applied retrospectively. By this I mean that you generally find out that the design does not comply with the Act until after the plant has been built. Let's consider a few of these Acts.

2.1 HEALTH AND SAFETY ACT

This new Act has a treasure trove of things that we must consider including section 39 Duty of a PCBU who Designs Plant, Substances or Structures. It means that we must, as designers, design without risks as far as is practicable. It is really clear on this point. This means that we must understand the risk and eliminate or mitigate those risks and be able to demonstrate we have done so. My personal interpretation of this is that the very least we must do is some kind of HAZOP or other risk identification and mitigation process such as a safety in design approach. If you are designing a chlorine store in a public place, you must at least do a HAZOP. To do anything else is, I believe, criminally negligent – more of that later.

The other part of the Act is the bringing in of the chemical compliance into the Health and Safety portfolio. Compliance with chemical standards can be a minefield as was discussed by Daniel Stevenson last year in his paper. Suffice is to say that we have Standards, codes of practice, group standards, transfer notices and regulations that all need to be navigated to ensure design meets compliance.

2.2 CPENG ACT

This is really interesting to read. It does not say what the duties of a Chartered Professional Engineer are, it just says who can be one. What's far more important to me is the code of ethics that we sign up to. This gives clear direction to the engineer about what is acceptable behaviour and what is not.

However, the number of tasks that require a Chartered Professional Engineer to undertake them in law are surprisingly few. There are only 10 Acts and 8 regulations that had to be modified as part of the Chartered Professional Engineers Act and these are pretty limited as to their scope.

What this means is that the term engineer can just about be used by anybody and there is no check on their capability.

So does this Act have any relevance to procuring design services? This is the clients call but I would suggest it is something they would want to consider – do I want an Engineer that is bound by a statutory code of ethics or not?

2.3 CODES OF PRACTICE/ BEST PRACTICE/STANDARDS

The title of this paper is ANSI B31.3? But it's only a 2 inch pipe! This refers to a standard for pipework around chemical storage areas and process plant that need stationary containment certificates. This has been a standard for a number of years but is not directly referred to and can easily be missed. I recently saw a specification, the first I have seen in New Zealand, which referred to this pipework standard specifically. The reference to this standard is in the code of practice for Hazardous Goods Storage Facilities and applies to all hazardous goods such as those used in the water and wastewater industries.

Most of the chemical installations in water treatment plants in this country are only now starting to comply with this requirement. It is clear that some of the suppliers of skids are unaware of these requirements. It is also clear that, in the main, these companies are competent and not providing un-safe installations.

Another common area of failing to meet the standards is in chlorine gas installations – this can get very expensive. Things like separation distances from public places, access space around drums, fire rating of walls (again another hidden requirement that requires digging through a number of specifications) can all be missed.

It is worrying that the stationary containment certifiers do not always pick up everything in the standards. It could therefore be a problem for you if your stationary containment certifier changes and the new person looks at slightly different things.

The other aspect of this is that, just because an existing plant was installed that way, does not mean you can install the new plant the same way.

I have talked about the standards here but they are actually at the bottom of the hierarchy tree and not actually legally binding falling under the category of Guidance and information. Above them are Codes of Practice, Safe Work Instructions, Regulations and the Act.

3.0 EXAMPLES OF PROBLEMS

The following examples demonstrate when a client did not know enough about what he was purchasing and ended up with a poor result (probably very cheaply).

The worrying thing for the clients is that, under the new health and Safety law, ignorance of their responsibilities is no defence, neither is the fact that they hired "expert" advice.

3.1 MANGANESE REMOVAL PLANT

In this example, a water supplier had bores with very high levels of manganese. The consultant was selected from an approved suppliers list and designed a plant for the removal of manganese. They included chlorine for oxidation and a greensand type media to assist in catalysing the oxidation reaction. However, a very basic but critical aspect of the design was missed, that of raising the pH to above 8 for effective oxidation of manganese. Even the sales brochure on the media indicated a pH of 8 was required for effective manganese removal. Needless to say the client has been left with a problem that was, at one point, costing $17,000 per week in alternative water supply.

3.2 CHLORINE STORE IN A PUBLIC PLACE

I was recently inspecting a chlorine store and noted that a public walking track ran right past the installation. The chlorine standard (AS/NZS 2927:2001) calls for a separation distance of a chlorine store to a public place of 15 metres. When I asked the owner about the separation distance, he did not know of the existence of the chlorine standard and had no idea about separation distances. He was currently designing another chlorine store in another public place and had no idea how to achieve the separation distance in the new plant. Furthermore it transpired that the consultant the client had employed to do the design, had no knowledge of the chlorine standard either but had a really sharp price.

3.3 HYPOCHLORITE DELIVERY

This sodium hypochlorite plant was a late add-on to an existing facility and had been constructed in a blockwork building. The biggest concern was around the delivery of hypochlorite from a road tanker to the store. To deliver, the tanker driver parked on the road about 30 metres away from the store. He ran the delivery hose along the side of a children's playground and through a picnic area. The hose was then passed through the window of the building and put into the top of the storage vessel. This is wrong in so many ways and I am not sure how this situation came about. The major problems are obvious but I list them here for completeness:

- No bunded chemical delivery pad
- No protection of the public
- The delivery driver being unable to see the tank level
- Delivery of a class 8 corrosive from a public road
- No proper delivery point
- And the list goes on…

It is a great example of somebody not understanding the requirements of a class 8 corrosive chemical and a lack of rigour in the professional services environment.

4.0 SO HOW DO YOU PROTECT YOURSELVES?

So far I have highlighted the risks and problems. So what is the solution to this minefield? The simple answer is to do your research.

4.1 TALK TO ANOTHER FACILITY OWNER

Once you have identified the problem you are trying to resolve, I would suggest you talk to someone else who owns a similar facility. Some things to ask are:

- Are they happy with the design and their designer?
- Did they have any problems with getting the appropriate certification?
- Are the chemical suppliers happy with the installation?
- Are there any things that could have been done better?
- Are they getting the performance out of the plant that they were promised?

4.2 TALK TO THE SUPPLIERS

Where chemical plants are involved, it is always worth talking to those who will supply your chemicals. In the past I have found particular chemical suppliers to be more than helpful with advice and guidance on what is required, which codes of practice apply and what makes a good installation. The thing to remember with this sort of advice is that you are likely to be made aware of what is required. If you keep asking until you find someone that is going to say what you want to hear, you might as well not have bothered. Remember, not being aware of the requirements is no defence.

One thing that is easily overlooked is the tanker access and the fact that the tanker has to drive out forward from the delivery area.

If you are using a proprietary piece of equipment, process or media – read the requirements on the data sheet yourself. The problem at the manganese removal plant could have been avoided if either the client or the consultant had read the sales literature! Whilst salesmen and sales literature are always going to paint a rosy picture, they sometimes pass over really important information. New Zealand is a really small place and snake-oil salesmen are always found out here.

4.3 TALK TO THE REGULATORS AND INSPECTORS

I have generally found the stationary containment certifiers, Worksafe and other regulatory assessors to be helpful and pragmatic. If you are thinking of installing a chemical plant, it makes sense to talk to the inspectors and Worksafe. They may be able to point you in the direction of a good installation that you could use as a template. They may be able to give you a list of the relevant codes, notices and regulations that apply.

5.0 THE TENDER PROCESS

5.1 STANDARDS

There is an opportunity to get some free consultancy advice in the tender. Ask for the standards that the consultant proposes to use. You will then be provided a list of standards in each tender which you can compare between tenders. You should be able then to get a comprehensive list of all the standards that could be used for this project. You can then use the list to evaluate the tenders and make sure your tenderer of choice is going to design appropriately. This would help eliminate designers who are less knowledgeable from leaving you with a problem.

5.2 TRACK RECORD/RELEVANT EXPERIENCE

All too often the track record of the company is asked for and the track record of the individuals on the project is ignored. What good is it if the company has done great work but the nominated designer has never done this before?

Ask for references of not only the company but also the individuals and follow up with these references.

Look at the back-up for these lead people, what is the company strength outside the nominated individual?

If you are paying for a lead engineer with 25 years' experience, make sure it is 25 years doing what you want him to do. It's no good asking me to design you a bridge but I have over 25 years' experience in engineering – just not that type of engineering.

This is at least a step into making sure your designer is competent.

5.3 KEY WORDS

In the proposal, look for key words that show the consultant has consideration for section 39 of the Health and Safety Act. For example, key words might be:

- HAZOP
- Safety in Design or SiD
- Risk reviews
- Standards
- Codes of Practice

5.4 PRICE

This is always the elephant in the room. If you get a price that is significantly lower than the other prices, this should be ringing alarm bells. It should not be seen as a potential saving. That lowest price might be the winning price but you must check that the required codes, regulations, notices and standards are going to be met – it will cost a lot more to sort out a disaster after construction than it would have cost to pay more for your consultant.

Back to the car analogy, if you are looking to buy a particular car for say about $12,000 and one comes along that appears to meet your requirements at $4,000, wouldn't you be wary?

6.0 A NOTE FOR THE CONSULTANT

Consultants must be absolutely honest with their clients in what they know and more importantly, what they don't know. Not knowing is not a defence against not being competent. They are being paid for professional advice and must provide it. Furthermore, under the Health and Safety Act they must be competent in what they do. They can now be prosecuted if they design something they are not competent to design.

7.0 CONCLUSION

As an asset manager or asset owner, there is no chance that you can know all the requirements, both best practice and legislative, for all the aspects of your assets. However, there is always someone who can help you. The trick is finding that someone.

The trick for consultants is to know who to ask and to be honest with their clients. If they don't know, they must say so – to do anything else risks prosecution under the health and safety legislation.

My recommendation to you is to talk to the leaders in the field you are looking at. If you are looking at caustic dosing plants, talk to the people who have done lots of them. If you want a chlorine dosing plant, talk to people

who have done lots of them. If you want a filter designing, don't talk to someone who has bought an off-the-shelf item once in the last 10 years, talk to someone who has really designed lots of filters.

Do a bit of research – ring chemical suppliers and Worksafe and find out which sites they think are good installations. Find out from them what standards should be applied. Ring the people provided as referees. If they are not available then ask the people providing the referees to provide others.

Remember, this is your ratepayers money, don't save a few cents that's going to cost you dollars.

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IPENZ

IXOM

Worksafe

REFERENCES

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Chartered Professional Engineers of New Zealand Act 2002

AS/NZS 2927:2001 Standard for the storage and handling of liquid chlorine gas

Code of practice for Hazardous Goods Storage Facilities

AS 3780:2008 The Storage and handling of corrosive substance

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