

Using MIL-STD-882C as a WHS Compliance Tool for Acquisition

Matthew J. Squair

Jacobs Australia
PO Box 237, Civic Square, ACT 2608,
Email: matthew.squair@jacobs.com.au

Abstract

The Model Australian Workplace Health and Safety (WHS) Act places new and onerous requirements upon manufacturer, suppliers and end users organisations. These new requirements include the requirement to demonstrate due diligence in the discharge of individual and corporate responsibilities. Traditionally contract terms have steered clear of invoking specific Workplace Health and Safety (WHS) legislation in anything other than at the most abstract level. Unfortunately such traditional approaches provide little evidence with which one can demonstrate compliance with the WHS act.

This paper describes an approach to establishing compliance with the WHS Act (2011) using the combination of a contracted MIL-STD-882C system safety program and a compliance finding methodology. The advantages and effectiveness of this approach in terms of establishing compliance with the act and the effective discharge the responsibilities of both supplier and acquirer are illustrated using a case study of a major aircraft modification program. Limitations of the approach are then discussed given the significant difference between the decision making criteria of classic systems safety and the so far as is reasonably practicable principle currently enshrined in Australian legislation.

Keywords: Due diligence, acquisition, supply chain, compliance finding, reasonably practicable, MIL-STD-882C

1 Introduction

The Model WHS Act is now in force in seven Australian legislations¹. The act requires that the Person Conducting a Business or Undertaking (PCBU) be able to *positively* demonstrate their due diligence in complying with it's provisions. These responsibilities cannot be delegated, and failure to meet them by responsible officers can result in criminal penalties².

Given the impossibility of contracting away over-all responsibilities for the safety of plant³ customer's

A draft of this paper was presented at the Seventeenth Australian Safety Critical Systems Conference (ASCS2016), Brisbane, Australia. This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License © BY-NC-SA V4.0.

¹Only Victoria has declined to implement the model act

²For a reckless breach (that is the accused knew of a hazard but allowed it to occur) penalties go up to \$600,000 and/or five years jail, without recklessness penalties go up to \$300,000

³Any machinery, equipment, appliance, container, implement

wishing to take a traditional laissez faire approach are relying upon suppliers to have been duly diligent and may find themselves suddenly being held accountable for the failures of others, regardless of either the customer's awareness or ability to manage. The imposition of what is effectively a command responsibility⁴ conflicts with normal contracting practices which generally attempts to minimise risk exposure to the principal by placing contractual risk, and responsibility, with the contracting party most able to deal with them.

To defend against the strict liability⁵ so imposed by the act recognises a form of due diligence. Of course in order to effectively discharge the responsibilities for due diligence when acquiring plant you do need to establish exactly *what* constitutes due diligence when acquiring complex plant. This paper discusses a standards based method that may be used to assure a customer that the obligations of the act are being complied with in contractually enforceable terms and that appropriate evidence of compliance is generated sufficient for the defensible demonstration of the customers obligations in a timely fashion.

2 So what is due diligence?

The concept of due diligence arises as a defence against negligence, the term seems to have come into common usage with the US securities act of 1933 where as long as a broker's investigation of a company was 'duly diligent', they could not be held liable for failing to disclose information that was undiscovered by their investigation of the security they were selling. Two definitions provide slightly different but pertinent perspectives on the concept:

The diligence reasonably expected from, and ordinarily exercised by, a person who seeks to satisfy a legal requirement or obligation *Black's Law Dictionary* (2014).

and

A minimum standard of behaviour which provides against contravention of relevant regulatory provisions and adequate supervision ensuring that the system is properly carried out *Lexis Nexis Concise Australian Legal Dictionary* (2011)

or tool. Components of any of those things and anything fitted or connected to any of those things (Safe Work Australia 2011b).

⁴Command responsibility is a recognised omission form of individual liability, where the leader is responsible for the actions of the subordinate, regardless of whether they were aware of these actions or not

⁵Where 'mens rea' or state of mind does not come into the question of guilt

2.1 Meaning under the act

A party under the WHS act is liable both for matters about which they do know or should have known had they diligently investigated (Safe Work Australia 2011b). The demonstration of due diligence, originally a common law defence against the tort of common law negligence (Shipping Corporation of India Ltd v Gamlen Chemical Co. AAsia Pty Ltd 1980), is, under the act, a statutory defence against a charge of breaching that legislation. The statute's non-exhaustive definition (Safe Work Australia 2011b, Pt 2, Div. 4 (27)) is that it includes, but is not limited to:

1. acquiring and keep up-to-date knowledge of work health and safety matters;
2. to gain an understanding of the nature of the operations of the business or undertaking of the person conducting the business or undertaking and generally of the hazards and risks associated with those operations;
3. ensuring that the person conducting the business or undertaking has available for use, and uses, appropriate resources and processes to eliminate or minimise risks to health and safety from work carried out as part of the conduct of the business or undertaking;
4. ensuring that the person conducting the business or undertaking has appropriate processes for receiving and considering information regarding incidents, hazards and risks and responding in a timely way to that information;
5. ensuring that the person conducting the business or undertaking has, and implements, processes for complying with any duty or obligation of the person conducting the business or undertaking under this Act; and
6. verifying the provision and use of the resources and processes referred to in paragraphs (3) to (5)

The last two points ensure that an appropriate level of corporate governance is exercised to ensure both legal compliance and practical effect. As these general responsibilities cannot be contracted away under the act the implication is that any customer in the supply chain needs to be able to demonstrate that the supplying parties, be they designers, manufacturer's or importers have complied with the above elements of due diligence. The act in effect overlays a statutory responsibility between contractual parties that requires the customer to ensure that he or she receives appropriate advice from the supplier such that compliance may be demonstrated.

2.2 Due diligence and the principle of reasonable practicability

The requirement for exercising of due diligence under the act forms part of a larger complex of decision making criteria⁶ about safety and risk which must be adhered to by the decision maker and which may be summarised, simply, as the principle of 'reasonably practicability'. These criteria are not absolutes in and of themselves but reflect a set of normative choices about *how* society should manage

⁶In practice a mix of rights (bounded risk and due process), and utility (probabilistic cost/benefit) based decision criteria (Millet et al. 1992)

workplace risk. Without the principles of reasonable practicability, and due diligence, the act would impose an absolute liability upon the decision maker, which society recognises to be an unfair one.

Reasonable practicability is simply a way of testing that all that could feasibly be done to eliminate or reduce risk has been done. In essence it is a test we apply to *all* possible precautions to determine their reasonableness⁷, that is on the balance of the significance of the risk, the effort that would be required to implement that precaution⁸. Note that this principle says nothing about what might be considered an acceptable risk, instead it concerns itself in a precautionary fashion with the question of whether we have done all that we reasonably and practicably can do to eliminate risks or if elimination is not possible to reduce the risk.

3 Supply chain responsibilities

Under the model act designers, manufacturers, importers, suppliers and installers of plant must all ensure, so far as is reasonably practicable, the plant they design, manufacture, import or supply is without risks to health and safety (Safe Work Australia 2012). Division 3 of the Act imposes specific duties upon designer, manufacturer and installer to ensure that the plant is without risks to the health and safety of personnel. General responsibilities (Safe Work Australia 2011b) across the supply chain consist of:

1. Acquit the general responsibility to ensure that the plant is without risks to the health and safety of personnel as applicable to their role;
2. Carry out necessary tests, calculations and analysis to acquit the 'without risk' obligation; and
3. Give adequate information regarding purpose, results of necessary tests, calculations and necessary conditions

But at the end of the day the PCBU for the end user still retains the primary duty of care, including the responsibility for safe plant.

...the provision and maintenance of safe plant and structures.(Div 2 section 2.19(3)(a))

To acquit this responsibility the PCBU can rely upon other parties to discharge their responsibilities under the act, although ultimately such responsibility continues to reside with the relevant officer. In these circumstances due diligence is discharged through being able to demonstrate the receipt of *credible information* and advise from *appropriate* people (Safe Work Australia 2011a).

Officers may meet the due diligence requirements in some respects by proper reliance on information from and the activities of others, while having more direct involvement in health and safety management and governance in other aspects.

⁷The general principle of reasonableness having been established via the *reasonable man* principle(?)

⁸The cost versus benefit of each precaution is in turn evaluated using the stopping rule of gross disproportion introduced by Lord Asquith (Edwards v. National Coal Board 1949)

To the extent to which an officer will seek to rely on others, the officer must be able to demonstrate the reasonableness of that reliance, which may be demonstrated through the receipt of credible information (evidence) and advice from appropriate people.

The question faced by any customer⁹ in the supply chain is not just how to demonstrate the exercise of their own due diligence, but as part of this to be able to demonstrate that it was reasonable to rely upon the advice of other's e.g the supplying organisation. Even within the Australia this can be challenging, but when complex plant may be procured from overseas, where designers and manufacturer's may be unaware of Australian legislative requirements, it can become even more so. To be effective of course any such reliance must be based on a well founded understanding of the act by all parties, which in a scenario as just discussed can be problematic. This is the fundamental challenge faced by the Australian Defence Organisation (ADO) as a customer and end user in discharging their WHS obligations. How then can the ADO acquit it's responsibilities for due diligence under the WHS Act?

3.1 Evidence and due diligence

Objective evidence is critical to the demonstration of due diligence. The problem of both ensuring that acquisition *has* been carried out in accordance with the WHS act, and subsequently demonstrating that this *was* done turns on the ability to gather evidence in the form of advice from the supplier, and ensuring that such evidence is adequate to demonstrate the diligent discharge of one's responsibilities. But how much evidence is required, and how do we judge it's probative value? What is the standard of persuasion that we set? Is proof required or may we rely on presumption? What if any, is the degree of corroboration required? How do we ensure that those evaluating the evidence are competent to do so?

4 A major aircraft upgrade project

The questions and challenges identified in the preceding section came to the fore on a recent Defence Materiel Organisation (DMO) project to provide a major capability upgrade for a military aircraft. As part of the aircraft type certification process the project was required to establish what is termed a compliance finding as to the modified aircraft's compliance with the 2011 WHS Act, as a necessary prerequisite for the granting of a Special Flight Permit (SFP) by the airworthiness authority.

As background, the technical airworthiness regime of the ADO evolved out of organisational concerns in the early 90s over the practice of aviation safety (RAAF 2001, trans. 596). As part of the technical airworthiness regime projects such as this are required to establish a set of appropriate standards upon which the design will be based and to ensure that object evidence is generated by the OEM or others to demonstrate compliance. Finally this evidence is gathered and assessed to make what is termed a compliance finding by an authorised and competent person.

⁹Customer and supplier is used here in the general sense to denote the relationship between adjacent agents in the supply chain, e.g. designer to manufacturer or supplier to end user

The purpose of this activity is to ensure that decision makers are appropriately informed before making airworthiness decisions, in other words to ensure due diligence. There are thus close parallels between the due diligence requirements of the WHS act and those of the airworthiness regulations, perhaps unsurprising when you consider that both were intended to improve corporate safety culture.

Given the breadth of the WHS, such a task seemed quite daunting given that, at first glance, the task of making such a compliance finding was unsupported by anything other than the general clauses in the contract requiring the supplier to comply with the WHS act. The project had in effect arrived at the general customer's dilemma alluded to earlier, how to obtain adequate advice from others and how to determine the reasonableness of relying on such advice.

4.1 Compliance finding and the WHS

The obvious methodology to apply the problem was to apply the compliance finding process that the project was using to the problem. However the compliance finding process is very much oriented towards design standards which, by their nature, generate an evidential trail of design artefacts that can be used to judge the designed product compliance with the standard. This approach becomes more difficult when process compliance needs to be demonstrated and the end effect upon the product is not easily discernible. Further while the Act lays out a set of legal principles and a high level set of decision criteria there is a significant gap between these and methods and practices amenable to proceduralisation. This posed two challenges, the first was how to bridge the gap between the high level principles of the WHS act and execution and, having done so, finding the required evidence.

4.2 MIL-STD-882C

The answer to both these challenges came in the shape of the US DOD's system safety standard MIL-STD-882C. The great advantage of applying a standard is that, at least in principle, it provides an objective set of criteria and allows us to avoid such subjective and potentially slippery terms as, 'acceptably safe' or 'minimal risk'. In this instance one of the standing regulatory requirements of the ADO's Director General of Technical Airworthiness (DGTA), is that a formal system safety program be conducted (DGTA 2014, TAREG 3.7.1). As the original acquisition program for the aircraft had been conducted using the MIL-STD-882C (US DOD 1996) so the project had decided to continue the use of MIL-STD-882C to maintain consistency with past safety analyses and documentation.

Traditionally system safety has been viewed by the ADO as focusing upon operational safety, for example DGTA's regulatory guidance states that "The system safety plan (SSP) focuses on the identification and mitigation of aircraft system hazards ... that impact airworthiness.." (DGTA 2014, Sec. 3 Ch. 22). So the concept of treating a fighter aircraft as a workplace under the Act was something of a paradigm shift. Fortunately MIL-STD-882C is not only about operational safety, and in it's fullest application can be applied to:

"...every activity of the system lifecycle; e.g., research, technology development, design,

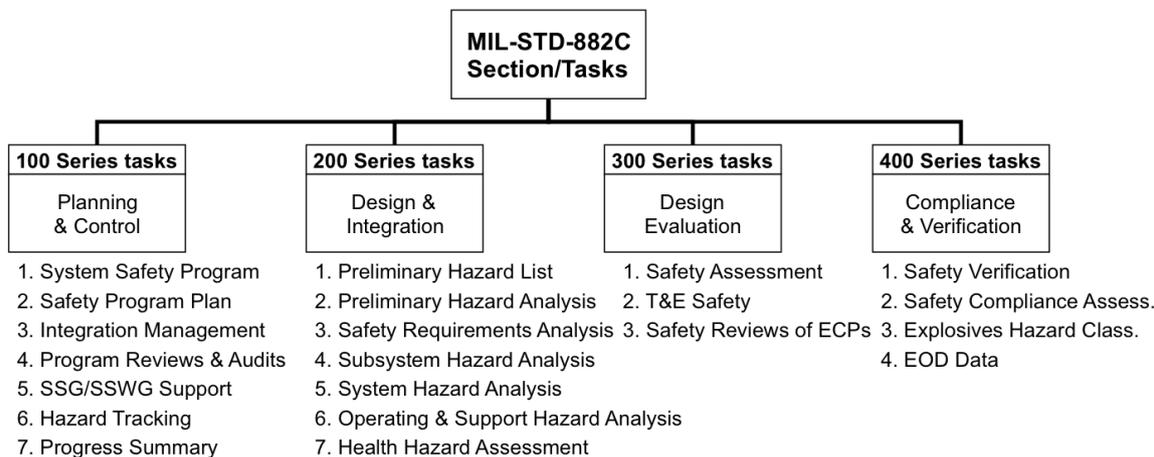


Figure 1: MIL-STD-882C task taxonomy

test and evaluation, production, construction, checkout and calibration, operation, maintenance and support, modification and disposal” (US DOD 1996, cl. 1.1).

The standard itself is constructed as a task based one where data artefacts generated by each task and are then submitted to the managing authority for contractual disposition¹⁰.

4.3 The act versus the standard

From the perspective of a yardstick against which to measure compliance, and the generation of evidence with which to measure it MIL-STD-882C appeared to be ideal. But the question remained as to how well MIL-STD-882C’s provided coverage of the WHS act? To ensure that the standard did indeed provide adequate coverage a comparison of standard with the act’s associated regulations was performed. MIL-STD-882C’s sections and tasks are shown in Figure 1 and discussed in subsequent sections.

4.4 Precautionary or risk acceptance based?

One of the key aspects of the current WHS act is the adoption of the reasonably practicable or precautionary approach to safety. In essence the act requires that all that can reasonably be done, should be done in order to firstly eliminate and if that is not possible reduce the risk via a hierarchy of controls. This approach differs significantly from risk acceptance approaches, such as those espoused by AS/ISO 31000 or AS/IEC61508, which utilise a calculus of probability to determine whether a risk need be mitigated. The question is whether MIL-STD-882C cut from the same ‘risk acceptance’ cloth and therefore incompatible with the WHS act at fundamental level?

At first glance MIL-STD-882C’s use of risk criteria and might seem to indicate that it falls into the risk acceptance family of standards, however upon closer examination it becomes clear that in fact MIL-STD-882C is a precautionary based standard that requires that from the first hazards be eliminated or if that is not possible mitigated in accordance with a specified

¹⁰The contractual response can range from review through to formal approval based on the role that the managing authority wishes to take

hierarchy of controls(US DOD 1996, Sec. 4.4). Further, MIL-STD-882C firmly situates the use of probabilistic risk assessment as a late development phase activity, intended to evaluate the success of initial hazard mitigation activities.

4.5 Risk assessment. Since the priority for system safety is eliminating hazards by design, a risk assessment procedure considering only hazard severity will generally suffice during the early design phase to minimise risk (US DOD 1996, Cl. 4.5).

While this does not automatically ensure that a supplier will apply the standard in a precautionary manner, given that standards are inherently open to interpretation, it does mean that the WHS act and MIL-STD-882C share a congruent set of objectives and criteria for making decisions about safety and risk.

4.5 The question of evidence revisited

The other advantage that MIL-STD-882C possesses is that was developed for use in acquisition environment where the customer maintained a close oversight of what the supplier was doing. Therefore the standard is set up to support this oversight through the association of contract data deliverables (CDRLs) as accomplishment criteria for specific program tasks. This useful attribute of the standard means that when invoked on contract with the associated CDRL items evidence in the form of contemporaneous documentation is produced.

Applying legal principles of evidence we find that the CDRL items can satisfy all but one of the criteria. The one area that 882C’s CDRL items fall short is in the area of parsimony. While the standard provides guidance on how to tailor CDRLs to the program’s scope and risk it is all too common for the customer to invoke a large number of data items without consideration of the real need.

The degree to which we require such evidence is driven by the specifics of program complexity, size, product history and contractor competency. This sets the standard of proof in terms of whether direct or presumptive evidence is acceptable, as well as the degree to which we require corroborating evidence. For

| Probative value | CDRL items value |
|-----------------|--|
| Relevance | Evidence of contracted safety tasks |
| Clarity | Evidence quality is defined using data item descriptions |
| Unambiguous | Evidence relates to specified tasks and their outcomes |
| Parsimonious | The standard as a whole is intended to be tailored, guidance is provided |
| Authenticity | Evidence is also formal contract data deliverables |

Table 1: Probative values of CDRL items

example if the system we are procuring has been developed and certified for use by a national regulator, acting as a ‘trusted witness’ then we may set a lower standard of proof as far as direct evidence goes. The other advantage of using a CDRL-task based standard is that the evidence is contracted for and must be delivered under the terms of the contract to a defined quality standard. This eliminates the potential for debate between the customer and supplier as to what is an appropriate level of due diligence. The role of a subsequent compliance finding activity is then to validate that the delivered data item does meet the required standard for probative value and is fit to base a finding upon.

4.6 882C tasks, compliance and evidence

4.6.1 Compliance and competence

Part of the due diligence requirements of the WHS is being able to demonstrate both competence and compliance with the act. The degree of competence of the organisation performing upstream tasks can be assessed by the customer by requiring the supplier to prepare and deliver a System Safety Program Plan (SSPP) (US DOD 1996, Task 102). The SSPP provides the basis of understanding between the supplier and customer as to how the program will be accomplished and thereby a compliance mechanism that can be used for monitoring of the supplier’s performance.

4.6.2 Reasonable foreseeability of hazards

The act requires that reasonably foreseeable hazards that could pose a risk be identified by the duty holder (Safe Work Australia 2014, s3.). This requirement is satisfied by the various hazard analysis of the standard. At the earliest point in a MIL-STD-882 safety program hazards are identified by the preparation of a Preliminary Hazards Lists (PHL) (US DOD 1996, Task 102). The PHL is of value in identifying major sources of risk, they being of particular concern under the WHS Act, and is focused on the conceptual design. During this lifecycle phase the conduct of a PHL provides a practical method to ensure that major risks are identified early when there is most opportunity in the design to subsequently eliminate in a cost effective fashion.

4.6.3 Hazard characterisation

Having been identified hazards are then characterised through the follow on conduct of Task 202 preliminary

| M882C clause | WHS regulation |
|---|---|
| Cl. 4.4.1 Design for minimum risk | Eliminate or minimise via s36.(3)(a) substitution or s36.(3)(b) isolation |
| Cl. 4.4.2 Incorporate safety devices | s36.(3)(c) Implement engineering controls |
| Cl. 4.4.3 Provide warning devices | s36.(3)(c) Implement engineering controls |
| Cl. 4.4.4 Develop procedures and training | s36.(4) Administrative controls, and s36.(5) Protective equipment |

Table 2: Hierarchy of control comparison

Hazard Analysis (PHA)¹¹. The PHA’s purpose is as an initial assessment of identified hazards, to identify hazard controls and subsequent actions. Again the approach is that having identified the hazard, to apply a hierarchy of controls (US DOD 1996, Cl. 4.4) and only after having implemented all practicable controls characterise the residual risk. MIL-STD-882C follows the PHA with a number of other safety analyses that focus on specific safety aspects. Two are of particular note, Task 206 Operating & Support Hazard Analysis (O&SHA) and Task 207 Health Hazard Analysis. These as the names imply look at hazards arising from operational and support tasks performed by the operating organisation and hazards to personnel health introduced by the system design. The standard also includes specific tasks, Task 205 Subsystem Hazard Analysis (SSHA) and Task 205 System Hazard Analysis (SHA), that can be used to tier the safety program and allow the extension of due diligence to critical subcontractors and subsequently integrate their efforts into the overall safety program.

4.6.4 Hierarchical elimination or control of hazards

Having identified the hazards, MIL-STD-882C requires that a hierarchy of controls is used to identify hazard controls that can be applied in order to eliminate the hazard or reduce the hazard’s risk if that is not possible. The WHS Act also requires that to satisfy the SFAIRP hazard elimination or control be applied in a hierarchical fashion. As Table 2 demonstrates there is strong correlation between the WHS Act’s hierarchy and that of MIL-STD-882C.

4.6.5 Application of design standards

Guidance provided by the Code of Practice for the Safe Design, Manufacture, Importation and Supply of Plant (Safe Work Australia 2014) indicates that for many well understood hazards the conduct of a full risk based hazard assessment, along with the application of a hierarchy of controls approach is unnecessary. For these precedent hazards application of a standard or legislative requirement or code of practice may be sufficient to satisfy the reasonably practicable criteria. This ‘standards’ driven approach for precedent hazards maps to the MIL-STD-882C task of identifying both general and specific safety requirements for inclusion into the design. In MIL-STD-882C terms this approach to risk treatment is captured in Task 203 the Safety Requirements & Criteria Analysis (SRCA).The SRCA (in part) identifies

¹¹As noted previously the standard neither requires or desires that the probabilistic risk associated with a hazard be fully characterised upon initial identification

both those standards that are appropriate to control identified hazards, as well as more generic non-specific safety standards, and ensures that they have been translated into specific design requirements for safety. This task takes on added importance when the breadth of the current WHS regulations, codes of practice and guidance material is considered. If we had started this task at the beginning of the program rather than retrospectively we would have undoubtedly identified that the SRCA needed to consider the legislation, regulations and codes of practice in generating safety requirements.

4.6.6 So far as is reasonably practicable?

As noted previously the standard is generally congruent with that of the WHS Act. However the standard does not explicitly incorporate the concept of reasonable practicability, nor any test of what might be considered such, i.e. use of the the grossly disproportionate test to determine when to stop. Instead residual risk acceptance is established in terms of the level of organisation authorised to make the decision for a specific level risk threshold. As the residual risk increases the acceptance authority moves upwards in the customer organisation. The standard does provide guidance as to the role of risk assessment in the context of cost versus benefit decisions about further hazard risk reduction (US DOD 1996, Annex C. 30.5).

4.6.7 Due diligence in design

Section 22 of the Act requires that a designer must ensure, so far as is reasonably practicable, that plant, substance or structure is designed to be without risks to the health and safety of persons who carry out reasonably foreseeable activities at the workplace, such as the inspection, operation or repair of plant (Safe Work Australia 2011b, s22.(2)(e)). WHS regulations further define the detailed procedural requirements that apply, for example a regulatory requirement to apply a hierarchy of control measures to hazards which cannot be eliminated (Safe Work Australia 2014, s36.).

In this instance both the general requirement of the act and the specific requirement of the regulations can be traced to the conduct of MIL-STD-882C tasks. These tasks generated objective evidence in the form of contract data deliverables, i.e. analysis reports¹². However it should also be recognised that due diligence in design extends beyond the design activities and into the operational phase as some analyses can only be validated in an operational environment. This puts in place a joint responsibility under the WHS Act on the designer and end user to establish how such analyses can be validated (safely) and on the end user to support the designer in carrying them out. In this instance that resulted in some compliance findings being partial in nature until an operational evaluation could be carried out.

4.7 Practical implementation

4.7.1 Assessing compliance

Having confirmed adequate coverage the compliance finding team moved into assessing the evidence provided by the OEM in satisfaction of the contracts data deliverables list. Where appropriate a

¹²In practice the situation was slightly more complicated as the contemporary analyses were used to revalidate the original safety analyses against the modified design

brief analysis of the quality of the deliverables was conducted and their main findings summarised in support of the compliance finding. In the majority of cases though the compliance finding simply sought to confirm the completion of the tasks mandated by MIL-STD-882C, in order to substantiate confidence in the OEM's advice to the project.

However a demonstration of procedural compliance does not automatically translate to the conclusion that all hazards having been acceptably treated. The evaluation of the adequacy of the activities undertaken by the supplier on the basis of evidence provided requires a competent person to make such a decision. This requirement for competence in evaluating the evidence mirrors the legislative guidance that when conducting hazard identification that such activities must be undertaken by people competent to do so. Thus a defensible compliance argument must consider not just the evidence but also the competence of those undertaking the original activity and the competence of those undertaking the compliance finding. On the supplier's side backing evidence to substantiate the competence of the supplier was provided in the form of an OEM Independent Safety Assessors Judgement Report which confirmed that the identified hazards had been evaluated and the risks reduced to an acceptable level. On the customer's side the compliance finding plan established minimum levels of competency for the compliance finding team members.

4.7.2 Dealing with noncompliance

Subsequent consideration of areas of noncompliance were treated as objectively as possible using the compliance finding process. This follows the legal practice of separating the determining the compliance 'verdict', compliance or non-compliance, from the subsequent sentencing function of dispositioning the non-compliance. This 'separation of concerns' approach reduces the potential for ambiguity that is introduced when value judgements are mixed in with assessments of compliance.

5 Discussion

While exercising due diligence through a process such as this paper describes ensures that information is available to the decision maker, it does not of itself automatically entail that either the advice provided will be correct. Compliance finding of necessity also requires expertise to in evaluating the quality of the evidence provided, both in evaluating the eight that may be given to such evidence as well as it's technical quality. Such expertise may be limited in the customer organisation. Where such expertise is lacking then there is arguably a legitimate role for seeking professional advice from competent persons, recognising that there is a lack in the first instance is of course the problem. In the case of the project the great advantage that it had was that significant management attention and resources had been applied to the compliance finding process, as an integral part of the airworthiness type certification process.

Another area where caution needs to be applied is the attempt to argue that a risk based safety strategy is compliant with the precautionary principles of the the Act. If a supplier applies MIL-STD-882C rigorously then in turn we may be able to demonstrate that

the WHS Act's 'reasonable and practicable' criteria are also satisfied. If on the other hand the supplier simply applies the risk acceptance criteria of the standard without in the first instance trying to eliminate or minimise then the duty holder may find themselves both noncompliant with the WHS Act, and provided with the evidence of their noncompliance.

6 Conclusions

MIL-STD-882C and the WHS Act share many common approaches to safety. Both focus upon outcomes, the application of effective measures in the first instance, rather than upon the acceptability of risk. Both require the application of a hierarchy of controls to the treatment of safety risks and both link the assessment of residual risk to the consideration of cost versus benefit in any risk acceptance decision. Given this common DNA it is no surprise that the use of a MIL-STD-882C task/deliverable defined safety program provides a viable standard with which to make a compliance finding on the WHS act. As MIL-STD-882C is a well understood and accepted international standard its use does not require a protracted educational process with potential suppliers, at least in the Defence industry.

While the approach is a workable one we do seem to have come full circle from detailed process based standards of the 1970s through performance based safety standards of the 90s and back to a process based compliance approach all to provide the duty holder assurance that their duty of care has been met. One might also speculate that the authors of the WHS legislation had derived a number of the key principles from the original standard.

7 Future work

The compliance mapping from act and legislation to the tasks of 882C was carried in essentially a serial clause by clause approach. However the act and its supporting regulations and guides are actually interdependent. For example some concepts within the act are implicit within the act but rely upon supporting guides for formal definitions. Similarly detailed parts of the act rely upon more general parts for context. In order to provide a greater degree of transparency and a more formal coverage analysis the next step will be to express the WHS act/MIL-STD-882C compliance argument utilising a formal notation such as Goal Structured Notation (GSN).

A perusal of MIL-STD-882C's task descriptions shows that there are specific 400 series verification deliverables that can be directly tailored under contract to ensure that the contractor provides objective evidence of compliance to the act. This approach rather than relying on the project office interpolating compliance from evidence developed for other purposes would further reduce the compliance finding work load for a project office's compliance finding team.

As this approach was developed for an Australian Defence Organisation (ADO) acquisition project there is an obvious application of this technique to other ADO acquisition programs where a formal MIL-STD-882C safety program has been levied. In order

to embed the lessons of the specific project into corporate memory the intent is to develop 'advice to contractors' model text explaining the requirement to use a MIL-STD-882C safety program and how its deliverables to demonstrate their compliance with the WHS Act. This model text will be proposed for inclusion into the DMO's ASDEFCON contracting template suite.

References

- Blythe v. Birmingham Waterworks Co., Exchequer, 156 Eng. Rep., (1856).
- Commonwealth of Australia, Director General Technical Airworthiness (2014), AAP 7001.053, Technical Airworthiness Manual, accessed 10 December 2014, <<http://www.defence.gov.au/dgta>>.
- Edwards v. National Coal Board, Court of Appeal CA, Tucker, Asquith and Singleton L.JJ., (1949), Mar. 8, 9, 10, 21.
- Commonwealth of Australia, Royal Australian Air Force (2001), Report of the Board of Inquiry into F-111 (Fuel Tank) Deseal/Reseal and Spray Seal Programs, accessed 10 December 2014, <<http://www.airforce.gov.au/docs/Volume1.htm>>.
- Commonwealth of Australia, Safe Work Australia (2011), Interpretive Guideline - Model Work Health and Safety Act - The Health and Safety Duty of an Officer Under Section 27, accessed 10 December 2014, <<http://www.safeworkaustralia.gov.au>>.
- Commonwealth of Australia, Safe Work Australia (2011), Model Work Health and Safety Bill, Model Bill, accessed 10 December 2014, <<http://www.safeworkaustralia.gov.au>>.
- Commonwealth of Australia, Safe Work Australia (2014), Draft Safe Design, Manufacture, Import and Supply of Plant, Model Code of Practice, accessed 10 December 2014, <<http://www.safeworkaustralia.gov.au>>.
- Commonwealth of Australia, Safe Work Australia (2014), Model Work Health and Safety Regulations, Model Regulations, revised as at 9 January 2014, accessed 10 December 2014, <<http://www.safeworkaustralia.gov.au>>.
- Shipping Corporation of India Ltd v Gamlen Chemical Co. A/Asia Pty Ltd, HCA 51; (1980), 147 CLR.
- Morgan, M.G., Henrion, M., Small, Mitchell, (1992), *Uncertainty: A guide to Dealing with Uncertainty in Quantitative Risk and Policy Analysis*, Cambridge University Press.
- United States, Department of Defence (1996), MIL-STD-882C(CN1), System Safety (Change Notice 1), accessed 10 December 2014, <<https://assist.dla.mil/online/start/>>.