

# Alcohol and other drugs in the Australian construction industry: a pathway for safety focused cultural change

Herbert C Biggs<sup>1</sup> & Amy R Williamson<sup>2</sup>

Anecdotal evidence from the infrastructure and building sectors highlights issues of alcohol and other drugs (AODs) and its association with safety risk on construction sites. Currently, there is no clear evidence on the prevalence and risk of AOD use among Australian construction workers and there is limited evidential guidance regarding how to effectively address such an issue. The current research aims to scientifically evaluate the use of AODs within the Australian construction industry in order to reduce the potential resulting safety and performance impacts and engender a cultural change in the workforce. A nationally consistent and collaborative approach across the workforce will be adopted. A national assessment of the use of AODs was conducted in participating organisations across three states. The World Health Organisation's Alcohol Use Disorders Identification Test (AUDIT) was used to measure alcohol use. Illicit drug use, 'readiness to change', impediments to reducing impairment, feasibility of proposed interventions, and employee attitudes and knowledge regarding AOD was also measured through a combination of survey items and interviews. Through an educative approach and consultation with employers, employees, union groups and leaders in applied AOD research, this assessment was used to inform and support cultural change management of AOD use in the industry. Results (n=494) indicate that as in the general population, a proportion of those sampled in the construction sector may be at risk of hazardous alcohol consumption. A total of 286 respondents (58%) scored above the cut-off cumulative score for risky or hazardous alcohol use. Other drug use was also identified as a major issue. Interview responses and input from all project partners is presented within a guiding principle framework for cultural change. Results support the need for evidence-based, comprehensive and tailored responses in the workplace. This paper will discuss the final results in the context of facilitating cultural change in the construction industry.

**Keywords: alcohol, drugs, construction, safety cultural change.**

## 1. Introduction

Anecdotal evidence from the infrastructure and building sectors highlights issues of alcohol and other drugs (AOD) and its association with safety risk on construction sites. Currently, there is no clear evidence on the prevalence and risk of AOD use among Australian

---

<sup>1</sup> Principal Research Fellow; Centre for Accident Research and Road Safety – Queensland; Queensland University of Technology; 130 Victoria Park Road Kelvin Grove QLD 4059 Australia; [h.biggs@qut.edu.au](mailto:h.biggs@qut.edu.au)

<sup>2</sup> Senior Research Officer; Centre for Accident Research and Road Safety – Queensland; Queensland University of Technology; 130 Victoria Park Road Kelvin Grove QLD 4059 Australia; [ar.williamson@qut.edu.au](mailto:ar.williamson@qut.edu.au)

construction workers; despite AOD consumption being relatively prevalent within the Australian community (Holland, Pyman and Teicher 2005) and the clear link between such consumption and subsequent declines in cognitive and behavioural performance (Elliot and Shelley 2006). The collection of empirical data is needed to ascertain the level and nature of risk in order to design effective interventions and strategies that are tailored to the construction industry.

Almost universal across the Australian construction industry is the adoption of the theoretical construct of organisational safety culture (Glendon 2003; Guldenmund 2000; Reason 2000). A positive safety culture can result in improved occupational health and safety and organisational performance (Dingsdag, Biggs, Sheahan and Cipolla 2006; Biggs, Dingsdag and Roos 2008; Biggs, Dingsdag, Kirk and Cipolla 2010). When considering predominant pathways to create behavioural change in the workplace, there are two main pathways to ensure compliance: (1) the extrinsic pathway, governed by systems and rules with rewards and punishments; and (2) the intrinsic pathway, establishing voluntary compliance via individual commitment to safety (Glendon 2003). For example, in the mining industry the extrinsic pathway with a legislative framework governing mining operations and the implementation of AOD policy and programs has resulted in a heavy focus on testing. However, within the construction industry across Australia, there is generally not as extensive or explicit AOD workplace legislation and there is also wide variability between organisations, sites and practices. In general the construction industry relies heavily on an educative approach built around the intrinsic motivation of individuals to operate safely when it comes to AOD use (Guldenmund 2000; Sully 2001).

It is argued that developing a nationally consistent, contemporary and collaborative approach across the construction workforce is needed to engender a cultural change in the workforce. Such an approach may take a similar form to the on-going initiative in securing a cultural change to drink-driving in our society where peer intervention and support is encouraged and appears integral to maintaining such change (Ferguson, Schonfeld, Sheehan and Siskind 2001). The current research aims to scientifically evaluate the use of AOD within the Australian construction industry to engender a cultural change in the workforce - to render it unacceptable to arrive at a construction workplace with impaired judgement from AODs. A national approach across the Australian construction workforce - involving government representatives; employers and employees; unions; and other key industry stakeholders and experts will be adopted. An evaluation of the extent and nature of the problem, through an AOD consumption and behaviour assessment, will inform the necessary cultural change based on a non-punitive, rehabilitative and educational approach. Previous work by Biggs et al (2008) and Fleming, Lingard and Wakefield (2007) provide a significant starting point for framing cultural change in the construction industry.

## **2. Method**

This project was approved by the QUT Human Research Ethics Committee and led by an Academic Project Leader in partnership with a senior Industry Project Leader from a major Australian construction company. The project team collaborated with academic leaders and experts in applied research in the area and was guided strategically by an Industry Steering

Committee with membership comprising representatives from key government, industry and union groups. The project involved two key phases:

## **2.1 National qualitative and quantitative assessment of the use of AOD**

### **2.1.1 Participants**

In order to access a widely dispersed and geographically challenged working environment, a survey method was adopted to gain a quantitative assessment of the use of AODs in the Australian construction workforce. It was expected that the survey would be distributed to approximately 500 employees at selected construction sites across Australia from four participating companies. Operational sites were selected by the Industry Project Leader in consultation with the respective regional and safety management team. Sites were selected both on current availability and cross-representation of construction activity. Eventual site selection included high density CBD construction, major roadway development, tunnelling, railway extensions, and extensions to a current major casino complex. All employees at the selected sites were invited to participate. In addition to the survey, semi-structured interviews were conducted to gain some qualitative insights into the safety impacts of AOD in the workplace. Interview numbers were dependent on the availability of employees on the day of each site visit.

### **2.1.2 Measures**

The World Health Organisation Alcohol Use Disorders Identification Test (AUDIT) was used. The AUDIT, while originally designed for use with clinical populations, has been widely used and validated in a variety of populations and contexts, including the workplace (Davey, Obst and Sheehan 2000; Donovan, Kivlahan, Doyle, Longabaugh and Greenfield 2006; Lennings, Feeney, Sheehan, Young, McPherson and Tucker 1997; Younga and Maysona 2010). There are 10 items on the AUDIT which are classified into three domains. The first domain (Q1-3) measures the quantity and frequency of alcohol consumption and screens for possible risk of hazardous consumption. The second domain (Q4-6) examines abnormal drinking behaviour, which may indicate early or established alcohol dependence. The third domain (Q7-10) probes for negative consequences related to alcohol consumption. Each question is scored from 0 to 4, with a cumulative range of 0-40. A total AUDIT score of 8-15 indicates a risk of harmful consumption and is most appropriate for simple advice focused on the reduction of hazardous drinking. A total AUDIT score of 16 or more indicates a high risk of alcohol problems and suggests the need for brief counselling and continued monitoring. A total AUDIT score of 20 or above warrants further diagnostic evaluation for alcohol dependence. Although these thresholds were established on the basis of a study on a clinical population, they have also been widely used and validated in non-clinical populations (Babor, Higgins-Biddle, Saunders and Monteiro 2001).

Four additional exploratory questions were developed by two expert professors in the research team for the purpose of this study and were included in the survey. These relate to readiness to change (e.g. "do you think that you presently have a problem with drinking" and "in the next 3 months, how difficult would you find it to cut down or stop drinking?" and 'other

drug' consumption (e.g. "when have you most recently used marijuana/cannabis" and "when have you most recently used ecstasy or meth/amphetamine type substances". Demographic details were also included in the survey.

Semi-structured interviews were conducted across a number of roles within the participating companies to identify major issues and themes. Interview questions centred on perceptions towards AOD use in the workplace (including perceived prevalence in the industry, how it affects you, your safety, performance and productivity, as well as that of your co-workers) and attitudes and perceptions towards existing AOD workplace policies (including knowledge of, perceived effectiveness and attitudes towards them as well as what could be improved).

### **2.1.3 Procedure**

Corporate headquarters and operational sites of the industry partner organisation were visited to distribute the survey and conduct semi-structured interviews with both management and employees. The research team worked closely with the relevant operational site and safety managers in order to access employees most effectively on each site. The survey was distributed in hard copy to employees during their breaks along with an information sheet and a plain envelope to seal the completed survey in before returning it to the researcher. All surveys were confidential and anonymous. The researchers clearly communicated this to employees and that participation was entirely voluntary, that no names are recorded and that the data remains with the researchers at the end of the project. The interviews took place at both corporate headquarters and operational sites in a private room. Detailed notes were recorded by hand during the interviews and later thematically analysed.

## **2.2 Development of a cultural change management program**

Using previous work by Fleming et al (2007) and Biggs et al (2008) a set of cultural change management guidelines are presented; incorporating the information collected in the interviews. Suggestions for how to implement the guidelines are also provided using input from the interviews and all project partner organisations.

## **3. Results**

This paper firstly reports the results of the survey. Key findings from the interviews are then presented within the cultural change framework.

### **3.1 Participants**

Final survey results are based on the completion of 494 surveys. All employees who were provided with a survey, at the selected sites, completed and returned it to the researcher on-site. The majority of respondents (n=464) were male, with a mean age of 35.7 years (SD=11.4). Most respondents (398) were employees; with the remaining 85 respondents employed as a contractor. The survey was distributed across all roles within the company with the majority of respondents classifying themselves as a tradesperson (155), a labourer (117), a plant operator (68), in an administration or engineering role (53) or as a supervisor

(47). Surveys were collected across three states (Victoria, South Australia and Northern Territory). Interviews were conducted with ten employees across several roles in the company. Several less formal conversations were also had with employees on-site.

### 3.2 Survey

Of a possible maximum cumulative score of 40, the 494 respondents recorded a mean score of 9.98. Scores ranged from 0 to 40 with a median score of 9. A total of 286 respondents (58%) scored above the cut-off cumulative score for risky or hazardous alcohol use of  $\geq 8$ , with 185 respondents (65%) falling into the 8-15 scoring group, 58 respondents (20%) falling into the 16-19 scoring group and 43 respondents (15%) scoring 20 and above. Subsequent analysis focused on the three individual AUDIT domains that look specifically at consumption, dependency and alcohol-related problems (see Table 1). The maximum score for Domain 1 is 12 (scores  $\geq 6$  indicating a risk of alcohol related harm. The maximum score for Domain 2 is also 12 (scores  $\geq 4$  indicating possible alcohol dependence. Any score in Domain 3 warrants further investigation.

**Table 1: Mean AUDIT scores for each domain**

AUDIT Domain	Mean (SD)	No. of respondents (and %) who scored at or above the cut of
Domain 1: Consumption	6.17 (3.1)	300 (61%)
Domain 2: Dependency	1.38 (2.1)	79 (16%)
Domain 3: Alcohol related problems	2.48 (3.1)	291 (59%)

Four additional questions were included in the survey regarding self-rated dependency and past other drug use:

Seven per cent of respondents reported that they either possibly or definitely had a problem with drinking. A further four per cent of respondents reported that they were unsure. Fourteen per cent of respondents reported that it would be either fairly difficult or very difficult to cut down or stop drinking. Of those who scored above the cumulative score for hazardous alcohol use ( $n=286$ ), 212 respondents (74%) reported that they do not have a problem with drinking and 157 respondents (55%) reported that it would be either very easy or fairly easy to cut down or stop drinking. In terms of prevalence, a total of 292 respondents (59%) had used marijuana/cannabis in their lifetime, with 46 respondents having used it in the last year (15.8%). A total of 196 respondents (40%) had used ecstasy or meth/amphetamine type substances in their lifetime, with 62 respondents having used it in the last year (31.6%).

### 3.3 Cultural change management

Fleming et al (2007) identified the following 6 best-practise principles for creating a robust safety culture in the construction industry. They are intended to operate at an industry level as broad principles for adoption at both corporate and project levels:

1. Demonstrate safety leadership
2. Promote safety in design
3. Communicate safety information
4. Manage safety risks
5. Continuously improve safety performance
6. Entrench safety principles

These principles are presented in this section to assist with the facilitation of organisational cultural change around AOD use in the construction industry. Supporting evidence collected from the interviews is also presented in italics. The suggestions for implementation are based on findings from the interviews and also input from all project partner organisations who were invited to provide information about what they consider to be important for the effective dissemination of AOD education in the construction workplace.

### **3.3.1 Guiding principles**

#### **1. Demonstrate safety leadership**

Strong safety leadership is critical and involves communicating the importance of safety in all interactions with subordinates, subcontractors, suppliers and other project stakeholders throughout all processes within the life of the construction project (Fleming et al 2007).

*“The importance of management support, maintaining a strong supervisor relationship with a strong commitment to preventing harm caused by AOD”.*

*“Need to avoid that breakdown [between employees and management]” and go through your supervisor...get to know each other especially with a small crew”.*

*“Can be the perception that if you ask for help you might lose your job”.*

Biggs et al (2008) provide a more detailed framework that outlines the specific safety leadership behaviours that are considered essential to the development of a positive safety culture. These include: communicate company values, demonstrate leadership by motivating and inspiring others and developing a sense of ‘ownership’, clarify required and expected behaviours, personalise safety outcomes, develop positive safety attitudes, engage and own safety responsibilities and accountabilities, increase hazard/risk awareness and preventative behaviours, improve understanding and effective implementation of safety management systems and monitor, review and reflect on personal effectiveness.

#### **2. Promote design for safety**

Effective safety management at the design stage can minimise risks to the health and safety of people who subsequently construct, occupy and maintain a facility/structure (Fleming et al 2007). In terms of managing specific risk factors such as that of AOD, strong safety management and promotion from the outset of the project is critical for communicating commitment to safety at subsequent stages of the project and being consistent and transparent with all safety messages across all stakeholders and all stages of the project.

*“Consistent communication of policies and expectations right from the start of the project.”*

*“If everyone’s on the same page it makes everything easier”.*

### **3. Communicate safety information**

Communication and consultation are essential to the management of safety and it is important that this starts as early as possible in the project. Open and honest dialogue regarding safety issues should be maintained throughout the life of the project (Fleming et al 2007).

*“While current policies and employer assistance programs were generally seen as effective, there was an overall support for the development of more comprehensive and tailored educational initiatives for employees and contractors within the construction workforce. In particular, the need for preventative programs – rather than focusing on the consequences of AOD use when it could be too late. Specifically identified was the need to educate younger employees about “how to cope” with the lifestyle that can accompany a high-salary, project-to-project, transient type work and “getting in early before we have to deal with the aftermath”.*

*“Acknowledging the difference between ‘career workers’ and ‘it’s just a job workers’ was identified as an important consideration in terms of how to communicate educational messages most effectively to employees”.*

*“Consideration of the culture of specific occupational groups was also identified as being important in that the nature and pressures of a job, with specific skills and hazards, can have a major effect on employees’ lives and relationships.”*

Messages can be communicated and embedded via company health and safety policy statements, safety posters, tool box talks, ‘walk-arounds’ by management and regular reinforcement by all ‘non-safety’ managers (Biggs et al 2008).

### **4. Manage the risks**

The systematic management of safety risks through the elimination or reduction of risks is a requisite for improved safety performance within the construction industry (Fleming et al 2007). Ensuring that people possess the knowledge, skills and abilities they need to work safely is a critical aspect of good safety management (Fleming et al 2007).

*“Managers come with different levels of experience and need to know how to handle AOD issues – it’s important that they are enabled to manage properly. Also Important that everyone is treated the same and policies apply to all.”*

*“Different supervisors care about different things...some aren’t very comfortable with people who ask for help”. “They have a lot of issues to deal with and responsibilities...they’re not born with all the skills”.*

*“Links to reduced safety and productivity levels were confirmed by a number of those in safety advisory positions. Overall, there was a general lack of understanding and knowledge surrounding the physical and psychological effects of AOD use and how these effects might impair performance...No idea about types of drugs, effects and how long it stays in the system”. This was despite the overall attitude that the use of AOD is detrimental to workplace productivity and safety. In terms of prevalence, AOD use was perceived (by those in safety roles) as a major issue that is only getting worse, particularly drugs because they are harder to detect as well as the changes that are seen in drug type ‘popularity’ and the increasing use of synthetics forms of illicit drugs. Prescription medications and other legal stimulants such as energy drinks were also identified by safety staff as a major concern.”*

*“Can’t afford for people’s perceptions to be inaccurate”.*

## **5. Continuously improve safety performance**

Safety management should strive for continuous improvement by regularly reviewing safety performance, seeking feedback from project stakeholders, and using the lessons learned to improve performance and to share and promote best practices in the construction industry (Fleming et al 2007).

*“Educating the therapists and counsellors that are made available to employees, about the construction industry was identified in the research as something that could be of great value.”*

*“Can’t use direct measures such as accident rates – fortunately these are not high enough. Need to use indirect measures such as near misses and testing work culture and safety in general. i.e. knowledge of safety, support for a policy.”*

## **6. Entrench safety principles**

Throughout the application of these principles, best safety practices should be entrenched as an integral part of an industry-wide safety culture. It is important that larger construction organisations work to disseminate safety knowledge and best practice among the small to medium-sized enterprises (SME) with whom they do business (Fleming et al 2007). Construction organisations should require SME subcontractors to fully participate in project safety management programs, including safety planning, training, monitoring and reporting (Fleming et al 2007).



*“Importance of ensuring that sub-contractors are subject to the same policies and practices that company employees are subject to in their regular practices.”*

*“Negotiate safety at the start when joining with alliance partners – so that practices are consistent and to the same standard”.*

Biggs et al (2008) highlights the importance of personalising the impact of risks and why it is important to the individual and to the project that employees ensure their own safety and health and that of others – that a fatality is not just a statistic but a workmate who has a name, a partner, children, parents and siblings. Emphasising that the industry still has too many avoidable injuries and fatalities and that in some jurisdictions, individuals may be held accountable under reckless conduct (Biggs et al 2008).

### **3.3.2 Suggestions for implementation**

The interviews provided various suggestions for how to communicate AOD education to employees at work. These included the need for clear and simple visual hard copy brochures, fact sheets or posters, as well as videos about the physical and psychological effects and impacts of AOD. *“[Resources] need to be simple and short to maintain attention, easily accessed, visual, to the point, easy language”.* *“Information is only really given once they get to counselling – rather than earlier on – need more information on the front line about what effect it has”.* Training sessions (separate from the tool box talks and daily pre-starts) were also identified as an opportunity to focus on a specific safety issue in a certain level of depth – *“that would work well, put some food on”.* There was also a positive response to the proposed development of a web-based resource – which would assist those who may find it difficult to seek help or advice about AOD at work. *“The more information the better...then they can make their own decisions”.* A mentoring initiative was also suggested as a way of communicating knowledge, experience and advice to those younger workers who may benefit from a more one-on-one approach with more experienced fellow workers. *“A lot of them do listen”.*

In terms of communicating the results and outputs of this research to people in the construction industry, the following suggestions are made:

- Facilitation of a management/leadership workshop or information session to brief staff on the research, key findings and what the key safety messages or company values are. This can be an opportunity to encourage and motivate leaders to make a strong commitment to a cultural change around AOD in the industry.
- Leaders can also be encouraged to participate in the online AOD education module developed for this project (targeted at management and supervisory staff) and referred to *“A Practical Guide to Safety Leadership”* by Biggs et al (2008) for a more detailed framework for implementing a positive safety culture.

- Information about the research including the link to the online resource can be further disseminated to management and supervisory staff via company newsletters, intranet and presentations.
- Communicate the findings from this research to employees throughout the respective organisations via tool box talks, safety posters and other hard copy visual resources, emails, memos, informal conversations and any other communications process that might be available. A 'package' of practical information that is tailored to the industry would be useful.
- Advertise and promote in the workplace the use of confidential AOD help or advice contact numbers and/or service providers (both external and those provided internally by the employer) to reduce any existing stigma or fear of seeking extra information or support through the workplace. Communicate the internal assistance options such as the company EAP as well as external sources of assistance.
- Continue the use of current AOD educational resources, particularly the union supported programs such as the "Just Not at work Mate" educational policy and program.

Based on feedback provided by the project partners, the research team can provide the following training and educational resources to assist with the dissemination of key messages from this research:

- A 1-page summary document outlining key findings and 'take-home' messages
- A short set of power point presentation slides outlining key findings and messages
- A 4-page industry booklet that will outline the project's aims, methodology and findings as well as outlining the benefits to industry – available electronically at [www.sbenrc.com.au](http://www.sbenrc.com.au)
- The online educational module for managers and supervisory staff.

## **4. Conclusions**

This has been the first known study to scientifically evaluate the use of AODs in the Australian construction industry – to better understand the issue and inform the best educational solutions for improving safety.

Results from the national assessment indicate that as in the general population, a proportion of those sampled in the construction industry may be at risk of hazardous alcohol consumption. As general AOD use does not necessarily translate into workplace AOD use and impairment, these results do not tell us about when those in the 'at risk' group are drinking. A proportion of those 'at risk' will consume alcohol outside of work whereby their behaviour has no relevance to their performance at work. For others, alcohol risk will translate into workplace risk. This evidence does not allow any accurate indication of what this risk might be. Hazardous AOD use is a health issue and the health and wellbeing of the

workforce is relevant to the workplace. This research has provided us with some important evidence about the level of risk that people in this industry are putting their health at. From a safety perspective, AOD education and leadership is a proactive approach to ensuring that the risk from AOD is minimised and potential resulting accidents are prevented.

While many in the current sample appear to be at risk of hazardous alcohol consumption, a large proportion of these respondents claimed not to have a drinking problem. Many of these respondents also indicated that it would be fairly easy to cut back or stop their drinking behaviour. These results suggest that those who may be at risk are unaware that a problem may exist, further highlighting the need for educational programs to increase knowledge and awareness of the effects of AOD. Other drug use (both illicit and licit) also remains a huge concern.

Findings from this research support the need for evidence-based, comprehensive and tailored responses in the construction workplace. Previous work by Biggs et al (2008) and Fleming et al (2007) provide a useful framework for creating a robust safety culture in the construction industry to ensure that AOD risk is eliminated from the workplace. Findings from the interviews and input from project partners over the course of the project have provided insightful and invaluable information for the industry to consider in their safety management processes. Further funding is required to extend and evaluate the outputs of this study, particularly the online educational tool and the development and evaluation of other on-site resources. This research was undertaken with the benefit of a grant from the Sustainable Built Environment National Research Centre.

## References

Babor T F, Higgins-Biddle J C, Saunders J B and Monteiro M G (2001) *The Alcohol Use Disorders Identification Test. Guidelines for use in Primary Care* (2nd Ed) World Health Organisation Department of Mental Health and Substance Dependence.

Biggs H C, Dingsdag D P, and Roos C R (2008) *A Practical Guide to Safety Leadership: Implementing a construction safety competency framework*. Cooperative Research Centre for Construction Innovation, Brisbane: Icon.Net Pty Ltd, ISBN 978-0-9804262-4-3, 1- 34.

Biggs H C, Dingsdag D P, Kirk P J and Cipolla D (2010) "Safety culture research, lead indicators and the development of safety effectiveness indicators in the construction sector." *The International Journal of Technology, Knowledge and Society* 6(3): 133-140.

Davey J, Obst P and Sheehan M (2000) "Work demographics and officers' perceptions of the work environment which add to the prediction of at risk alcohol consumption within an Australian police sample." *Policing: An International Journal of Police Strategies and Management* 23(1): 69-81.

Dingsdag D P, Biggs H C, Sheahan V L and Cipolla D J (2006) *A Construction Safety Competency Framework: Improving OH&S performance by creating and maintaining a*

*safety culture*. Cooperative Research Centre for Construction Innovation, Brisbane: Icon.Net Pty Ltd, ISBN 978-0-9775282-9-5.

Donovan D M, Kivlahan D R, Doyle S R, Longabaugh R and Greenfield S F (2006) "Concurrent validity of the Alcohol Use Disorders Identification Test (AUDIT) and AUDIT zones in defining levels of severity among out-patients with alcohol dependence in the COMBINE study." *Addiction* **101**: 1696–1704.

Elliot K and Shelley K (2006) "Effects of drugs and alcohol on behaviour, job performance, and workplace safety." *Journal of Employment and Counselling* **43**: 130-134.

Ferguson M, Schonfeld C, Sheehan M and Siskind V (2001) *The impact of the "Under the Limit" drink driving rehabilitation program on the lifestyle and behaviour of offenders.*\_ATSB Monograph, CR187. Australian Transport Safety Bureau: Canberra, Australia.

Fleming T, Lingard H, Wakefield R (2007) *Guide to best practice for safer construction principles*. Cooperative Research Centre for Construction Innovation, Brisbane: Icon. Net Pty Ltd, ISBN 978-0-9803503-6-4.

Glendon A I (2003) Managing Safety Risks. In: M O'Driscoll, P Taylor and T Kalliath (Eds.), *Organisational Psychology in Australia and New Zealand* (pp. 212-238). Australia: Oxford University Press.

Guldenmund F W (2000) "The nature of safety culture: a review of theory and research." *Safety Science* **34**: 215-257.

Holland P, Pyman A, Teicher J (2005) "Negotiating the contested terrain of drug testing in the Australian workplace." *The Journal of Industrial Relations* **47**(3): 326-338.

Lennings, C J, Feeney, G F, Sheehan M, Young R, McPherson A and Tucker J (1997) "Work-place screening of mine employees using the alcohol use disorders identification test (AUDIT) and alcohol breathalyzation." *Drug and Alcohol Review* **16**: 357-363.

Reason J (2000) "Human error: models and management." *Western Journal of Medicine* **172**(6): 393-396.

Sully M (2001) "When rules are not enough: Safety regulation and safety culture in the workplace." Paper presented at the *Insurance Commission of Western Australia Road Safety Conference*, August 2001, Perth, Australia.

Younga C and Maysona T (2010) "The Alcohol Use Disorders Identification Scale (AUDIT) normative scores for a multiracial sample of Rhodes University residence students." *Journal of Child & Adolescent Mental Health* **22**(1): 15-23.