Ten Pathways To Death and Disaster: Learning from Fatal Incidents in Mines and Other High Hazard Workplaces

by Michael Quinlan

Why do mine disasters continue to occur in wealthy countries when major mine hazards have been known for over 200 years and subject to regulation for well over a century? What lessons can be drawn from these disasters and are mine operators, regulators and others drawing the correct conclusions from such events? Why is mining significantly safer in some countries than in others? Are the underlying causes of disasters substantially different from those that result in one or two fatalities?

This book seeks to answer these questions by systematically analysing mine disasters and fatal incidents in five countries (Australia, Britain, Canada, New Zealand and the USA) since 1992. It finds that there are 10 pattern causes, which repeatedly recur in these incidents namely:

• Engineering, design and maintenance flaws
• Failure to heed warning signs,
• Flaws in risk assessment
• Flaws in management systems,
• Flaws in system auditing,
• Economic/reward pressures compromising safety,
• Failures in regulatory oversight,
• Worker/supervisor concerns that were ignored,
• Poor worker/management communication and trust, and
• Flaws in emergency and rescue procedures.

The vast majority of incidents entailed at least three of these pattern causes and many exhibited five or more. The book also demonstrates these pattern deficiencies are not confined to mining but can be identified in other workplace disasters including airplane crashes, oil-rig explosions, refinery and factory fires and shipping disasters. At the same time, the examination finds no evidence to support other popular explanations of mine safety, which focus on behaviour, culture or complex technologies. It finds that there is little to differentiate the failures that lead to single death or multiple deaths and ‘disaster’ studies would benefit from also examining near misses.

The book examines why pattern causes have proved so resistant to intervention by governments while also identifying instances where lessons have been learned. How, for example, do governments strike a balance between prescriptive regulation and risk management/system-based approaches? Only by understanding and modifying the political economy of safety can these problems be addressed. It concludes by proposing an agenda for change that will address pattern causes and contribute to safe and productive work environments. The book is written for those
studying OHS, mine safety and risk management as well as those involved in the management or regulation of high hazard workplaces.


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How ignoring or missing warning signals can have catastrophic consequences. In my book Ten Pathways to Death and Disaster: Learning from Fatal Incidents in Mines and Other High Hazard Workplaces (Quinlan, 2014a), I examined single and multiple fatalities in mines in five countries (USA, UK, Canada, Australia and New Zealand) over a 20-year period, identifying a series of pattern failures or flaws. The ten pattern causes identified were those that were repeatedly found by investigators to have materially contributed to these incidents. As in other areas of risk assessment, trying to identify pa Hazards special online report, March 2015. Disasters in high hazard workplaces are â€œpredictable and preventableâ€™. In an era where we scarcely blink when a probe lands on an asteroid, why do major industries continue to kill in the same old ways? Professor Michael Quinlan warns a lack of will and not a lack of know-how is behind the â€œten pathways to death and disasterâ€™. With a litany of death and disasters to learn from, why are incidents like the fatal explosions at the Upper Big Branch mine in the US and Pike River mine in New Zealand, which both killed 29 coal miners in 2010, still occurring? Even in workplaces with shorter histories, like oil rigs, repeat disasters still occur. These repeat incidents often arose from strikingly similar causes, or â€œpattern failuresâ€™.