

CHAPTER A.2 — HISTORICAL BACKGROUND

Revision 1 — August 2005

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OPERATIONAL INTEGRITY MANAGEMENT

This is the second chapter in the first volume of a series of books to do with *Operational Integrity Management*. The Table below provides a list of current books and chapters (the current chapter is highlighted).

The first volume in this series provides an overview of operational integrity management (OIM): what it is, how it works, and what it achieves. The first volume also provides an overview of the industries to which operational integrity management techniques are usually used. The second volume consists of sixteen chapters, one for each of the elements in a representative operational integrity management program. Each chapter also describes how the individual elements can be integrated with one another. The third volume describes the principles of risk management, and also provides guidance to do with the development and management of occupational integrity programs. The fourth volume discusses regulations, industrial standards and legal issues. The fifth and final volume pulls together the materials in the first four volumes. It shows how operational integrity management systems can be designed, implemented and audited, and how operational

integrity can be integrated into projects. The fifth volume concludes with a chapter that describes the roles and activities of the operational integrity management professional.

Volume A — Operational Integrity Management Basics

- Chapter 1: Overview
- Chapter 2: *Historical Background***
- Chapter 3: Standard Examples
- Chapter 4: Health, Safety and Environmental (HSE) Management
- Chapter 5: Risk Management
- Chapter 6: Creating an OIM Culture
- Chapter 7: Industries

Volume B — Elements of Operational Integrity Management

- Chapter 1: Participation, Leadership and Accountability
- Chapter 2: Information
- Chapter 3: Process Hazards Analysis
- Chapter 4: Management of Change
- Chapter 5: Procedures
- Chapter 6: Training and Education
- Chapter 7: Equipment and Instrument Integrity
- Chapter 8: Work Practices and Third Party Management
- Chapter 9: Prestartup Review
- Chapter 10: Emergency Planning and Response
- Chapter 11: Incident Investigation and Analysis
- Chapter 12: Human Factors
- Chapter 13: Reliability, Availability and Maintainability
- Chapter 14: Security
- Chapter 15: Public Outreach
- Chapter 16: Audits, Assessments and Quality Assurance

Volume C — Risk and Safety

- Chapter 1: Risk Analysis
- Chapter 2: Fault Tree, Event Tree and Block Diagram Analysis
- Chapter 3: Failure Modes & Effects Analysis (FMEA)
- Chapter 4: Stochastic Analysis
- Chapter 5: Fires and Explosions
- Chapter 6: Gas Dispersion
- Chapter 7: Siting and Layout
- Chapter 8: Occupational and Behavior-Based Safety
- Chapter 9: Operations and Maintenance

Volume D — Regulations and Standards

- Chapter 1: Regulations
- Chapter 2: Environmental Standards
- Chapter 3: Industrial Standards
- Chapter 4: Legal Issues
- Chapter 5: Litigation Support

Volume E — Implementing Operational Integrity Management Chapter 1:

- Managing an Operational Integrity Management Program Chapter 2:
- OIM On Projects

- Chapter 3: The OIM Professional

INTRODUCTION



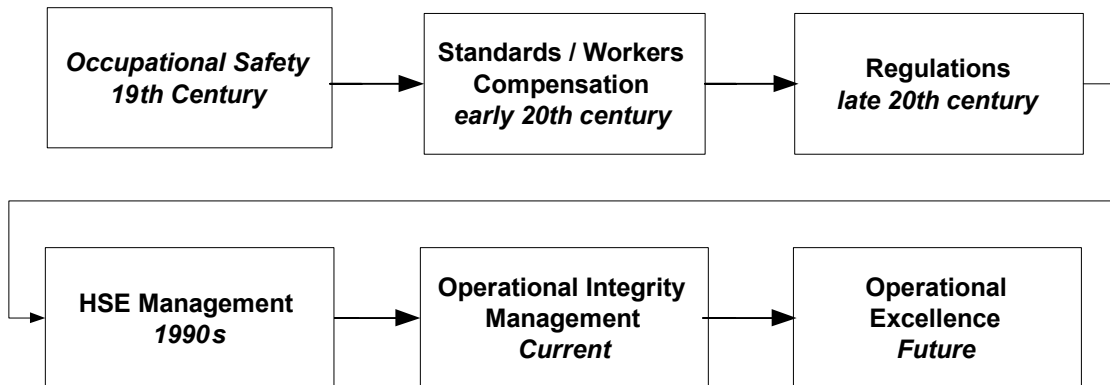
Rachel Carson Postage Stamp (1981)

Operational Integrity Management (OIM) systems have developed and grown over a period of many years — often in response to events and incidents that made companies, government agencies and the general public decide that “something must be done”. This chapter describes just a few of the key events of the last 150 years or so that have contributed toward the development of OIM principles and programs. Most of the events discussed here are dramatic accidents that had large safety, environmental and economic consequences. However some of the “events”, such as the publication of Rachel Carson’s book *Silent Spring* in the year 1962, stimulated changes in perceptions and attitudes with regard to safety and environmental issues. Other “events” included introduction of seminal regulations, such as OSHA’s Process Safety Management standard in the year 1992.

HISTORICAL PERSPECTIVE

Figure A.2.1 provides a simplified overview of the historical development of operational integrity management programs over the last 150 years or so.

Figure A.2.1 Development of Operational Integrity Management



The six steps shown in Figure A.2.1 are described below.

Occupational Safety

Figure A.2.2 Victorian Slum Housing



In the early phases of the industrial revolution (up to the middle of the 19th century), health, safety and environmental issues did not much concern industrialists, investors or governments. Consequently, industry's safety and environmental record in those days was often appalling. Toward the end of the 19th century public reaction to this state of affairs led to the introduction of the basic occupational safety and environmental regulations and standards. It was during the same time period that other basic reforms, such as child labor laws, were enacted.

One “advantage” of the very poor safety and environmental performance of industries in the nineteenth century was that simple inventions could and did lead to sudden and dramatic improvements. For example, until the latter half of that century rail cars were coupled and decoupled by men standing between those cars and inside the buffers. Unexpected movements of the cars led to a high rate of fatalities and injuries because the workers were either crushed between the cars or they were hit as the train started to move. The invention and rapid subsequent adoption of the automatic rail car coupler in the late nineteenth century in the United States, as illustrated in Figure A.2.3, led to an enormous and almost instantaneous reduction in railroad accidents because railroad workers were no longer obliged to step between the cars to do their work.

Figure A.2.3
Uncoupling Railcars



Not only were industrial safety standards up until the end of the nineteenth century very low, equally little attention was paid to environmental issues, as illustrated by the following quotation from Charles Dickens' novel *Hard Times* (written in the year 1854):

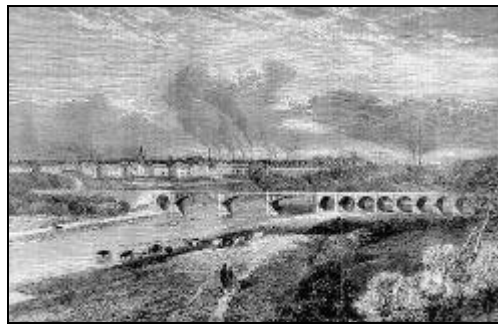
It [the town of Coketown] was a town of red brick, or of brick that would have been red if the smoke and ashes had allowed it; but, as matters stood it was a town of unnatural red and black like the painted face of a savage. It was a town of machinery and tall chimneys, out of which interminable serpents of smoke trailed themselves for ever and ever, and never got uncoiled. It had a black canal in it, and a river that ran purple with ill-smelling dye . . .

The town of Coketown is fictional. However, it is drawn from the real town of Preston in Lancashire, whose location is shown in Figure A.2.4. Shown in Figure A.2.5 is a Victorian industrial town such as Preston.

Figure A.2.4 Preston, Lancashire



Figure A.2.5
Victorian Industrial Town



Industrial Standards and Workers' Compensation

The second phase in the development of operational integrity programs as shown in Figure A.2.1 came about at the end of the nineteenth and start of the twentieth centuries. At that time professional engineering and technical societies introduced standards and codes to do with topics such as boiler safety. Also, the introduction of workers' compensation helped regulate the financial relationship between companies and those workers who were injured while at work.