

Occupational Safety Charter



職業安全約章

Organizers 主辦機構：

50th Anniversary



勞工處 金禧紀念

Boilers & Pressure Vessels Division  
Occupational Safety & Health Branch  
Labour Department of Hong Kong  
香港勞工處職業安全健康部  
鍋爐及壓力容器科



Occupational Safety & Health Council  
Hong Kong  
香港職業安全健康局

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China Light and Power Co. Ltd.

中華電力有限公司

The Hongkong Electric Co. Ltd.

香港電燈有限公司

Hong Kong Boiler and Pressure

Inspectors Association

香港鍋爐及壓力容器

檢驗師協會

Hong Kong Oxygen & Acetylene Co. Ltd.

香港氧氣有限公司

Hong Kong Institution of Engineers

(Mechanical, Marine & Chemical Division)

香港工程師學會

(機械輪機及化工分部)

The American Society of

Mechanical Engineers Int'l

(Hong Kong Chapter)

美國機械工程師學會國際會

(香港分會)

12th Annual Seminar

第十二屆週年研討會

# Boilers & Pressure Vessels Safety and Technical Development

## 鍋爐壓力容器安全 及技術發展

5-6 December 1996

一九九六年十二月五日及六日

服務市民  
SERVING THE COMMUNITY

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**Opening Speech by**  
**Miss Jacqueline Willis, JP, Commissioner for Labour**  
**at the 12th Annual Seminar (1996)**  
**Boilers and Pressure Vessels Safety & Technical Development**

Director Ma, Mr. Tanner, Distinguished Guests, Ladies and Gentlemen;

Welcome to the 12th Annual Seminar on "Boilers and Pressure Vessels Safety and Technical Development". This year's seminar is again jointly organised by the Labour Department, the Occupational Safety & Health Council and supported by six other organisations from the industry. Our aim is to facilitate the exchange of safety and technical experience among boilers and pressure vessels professionals. I am glad to see a growing support from owner organisations of pressure equipment as reflected in the increase in participation rate over the years.

This year we are celebrating the 50th Anniversary of the Labour Department. We launched the Occupational Safety Charter in September and introduced a new Occupational Safety and Health Bill into the Legislative Council yesterday. All of these are milestone events. The seminar today shows our commitment, as well as your commitment, to promote a better safety culture through involvement and

participation of all those who have a duty of care.

Boilers and pressure vessels are potentially hazardous equipment. Through the concerted efforts of equipment makers, engineering contractors and professionals, competent persons, owners and the Labour Department, we will continue to aim for zero fatality and minimal accidents in our workplaces. The Labour Department on its part will play an enforcement and facilitator role in ensuring high standards of installation and maintenance consistent with the best international practice. We will organise events for the exchange of ideas to promulgate the concept of self-regulation and for the protection of workers safety and the public against any potential hazards.

This year, we are honoured to have the largest number of overseas and local speakers. Many of them are international experts or authorities in their own right from the United States, the United Kingdom, the People's Republic of China and Japan. I am sure you will all benefit from the talks and social contacts during this seminar.

Finally I would like to thank the organisers and co-organisers, particularly the staff of the Boilers and Pressure Vessels Division for all the hard work which has gone into the preparations for this seminar.

With these words, I now declare the seminar open.



12th Annual Seminar  
“Boilers & Pressure Vessels Safety and Technical Development”  
5 - 6 December 1996

# **Boiler and Pressure Vessel Safety Requirements The U.S. Experience**

by

Mr. Richard L. Allison  
Assistant Executive Director  
National Board of Boiler & Pressure Vessel Inspectors

Boilers & Pressure Vessels Division, Labour Department, Hong Kong

**About the speaker....Richard L. Allison**

**R. L. Allison has been the National Board's Assistant Executive Director, Administrative since May 1995. In this capacity, he is responsible for all nontechnical functions and staff. Mr. Allison graduated from Ohio State University with a degree in welding engineering. He began his 28-year career with Babcock & Wilcox as a welding engineer. He subsequently served in various positions including quality assurance manager, and manager of quality and technology for the construction division.**

**Mr. Allison's extensive association with the National Board Inspection Code Committee began in 1974, and he was elected the NBIC chair in 1993. He also served as a member of the National Board's Advisory Committee from 1985 through 1995, and served on the National Board Commissions & Examination Committee.**

## **Boiler and Pressure Vessel Safety Requirements**

### **The U.S. Experience**

#### **Abstract**

**This paper traces boiler and pressure vessel safety requirements from the early 1900's to present. It reviews the key elements in the success in implementing boiler and pressure vessel safety requirements in the U.S.**

**One such element is the uniform acceptance of a construction standard (the ASME BPV Code) and the uniform enforcement of its requirements.**

**The cooperative standards development process which combines the experience of owner/users, manufacturers and enforcement authorities is another key element.**

**Finally, the role of the National Board in shaping the past and the future will be presented.**



## **BOILER AND PRESSURE VESSEL SAFETY REQUIREMENTS THE U.S. EXPERIENCE**

**In the next few minutes, I want to give you an overview of the U.S. experience with boiler and pressure vessel safety requirements. Generally, requirements grow from a need for change. To understand that need for change, we need to go back to the mid-nineteenth century.**

**It was during this time that boiler explosions occurred at a rate of one every four days, killing some 50,000 Americans each year.**

**These catastrophes took place everywhere: on farms and in cities, in factories and houses, in railroad locomotives and aboard ships on the open seas.**

**The public rarely took much interest in boiler accidents back then. They were accepted much as most of us glance at a newspaper article describing an automobile accident.**

**Back then, there was no such thing as National Standards for construction. Each State and Municipality was essentially on its own. The consequences were devastating.**

**The worst steam explosion ever took place after the end of the civil war. It occurred aboard the Mississippi steamship Sultana and involved the deaths of 1200 soldiers.**

**For much of this early part of our history, boilers confounded Mechanical Engineers. Engineers looked for the more plausible mechanical explanations such as faulty workmanship, inferior construction materials, operator error, large gaps in scientific understanding, and inconsistent inspection standards and practices.**

**In 1880, a conservative, business oriented group of mechanical engineers was formed called the American Society of Mechanical Engineers, or ASME.**

**Although ASME distrusted centralized government authority, many of its members insisted that the engineer be a good citizen involved in Municipal, State and National engineering problems. However, few engineering problems rivaled boiler explosions for the danger they posed to life, property and productivity.**

**It was in 1911 when ASME appointed a committee to write a boiler construction code. The problem, however, involved getting this well-written code legally adopted for enforcement by a jurisdictions.**

**The publication of the ASME boiler code in 1915 was the beginning of a solution. Called a model voluntary standard, the code was a good reflection on the private sector and its ability to generate standards that served the public interest. But many wondered out loud what value there was to having a comprehensive code if there were no competent, well-trained inspectors to enforce it?**

**Not only was the uniform code adopted in 1915, that same year a man by the name of Carl Myers became an inspector with the Ohio Boiler Inspection Division. Ohio was progressive in this area of industrial safety. It was also one of only a handful of States that had an**

**organized Boiler Inspection program and Laws governing boiler construction, installation, and operation.**

**Mr. Myers was enthusiastic about the ASME Uniform Boiler Code as a remedy to the confusing boiler scene. This was a time of different boiler laws in different states. Sometimes it involved laws that varied from city to city.**

**Carl Myers not only appreciated a uniform approach to boiler laws, he envisioned the need for uniform qualification and commissioning of Boiler Inspectors throughout the United States.**

**On December 2, 1919, in New York City, Myers and several other inspectors had an informal meeting at which Myers suggested the idea of a national organization of inspectors. His companions liked the idea, and the National Board of Boiler and Pressure Vessel Inspectors was born.**

**Mr. Myer's insight proved to be the basis for the success of boiler and pressure vessel safety requirements in the U.S. He believed that there should be one construction code. Today, 47/50 of the states of the U.S. and all the Canadian provinces have adopted the ASME Code.**

**He believed there should be uniform qualification and commissioning of boiler inspectors. Today, there are over 3,000 National Board Commissioned Inspectors, worldwide.**

**The significance of construction to a uniform code and inspection by uniformly commissioned inspectors is that a Boiler or Pressure Vessel built in one state or province could be easily accepted by any other state or province accepting the same rules. Also, by placing controls on the design, materials and fabrication methods improvements in the quality of the final product are achieved.**

**Through the standardization and rationalization that the ASME Code and the National Board brought to all phases of the industry, boiler explosions greatly declined during the 1920's and 1930's.**

**Today, the number of accidents recorded by the National Board are modest by comparison, but nonetheless significant.**

**Since the beginning of this decade, there have been more than 13,000 accidents involving boilers and pressure vessels in the United States. The difference between accidents now, and the time of the industrial revolution is that these accidents-statistically speaking- are less likely to kill. But boiler and pressure vessel accidents continue to injure and do significant damage to property.**

**To put it all in perspective, let me give you a brief overview of last year's Incident Report covering 1995.**

**During that year, there were a total of 13 deaths, 76 injuries, and 2612 accidents. Compared to 1994, these figures represent a 63 percent increase in the number of deaths and a 69 percent increase in injuries. Total accidents inched forward a modest 5 percent. What was particularly disturbing about these statistics was the dramatic increase in the**

**injury per accident ratio: 1 injury for every 33 accidents in 1995, compared with 1 injury for every 55 accidents in 1994.**

**Granted, our data may not generate the same dramatic curiosity reserved for those industries with substantially higher accident numbers. But our numbers are perhaps more significant because boilers can potentially kill any time, any place, any one.**

**What our statistics do not show are the serious accidents that did not occur because inspectors were able to affect correction of potential problems through an early identification and inspection process.**

**We have established that the principle of uniformity was a key factor in the development of boiler and pressure vessel standards. Another principle is that of self-governance. By that I mean the reliance on the stakeholders in the standards development process. That is, those who have a vested interest in the safety of the product. The ASME Code, and for that matter, the National Board Inspection Code are developed by a consensus method which involves a leadership effort from owner/users, manufacturers and enforcement authorities. The standards are based upon the collective experience from those who operate boilers and pressure vessels, those who design and fabricate them and some extensive R&D efforts. This process is culminated with a public review period which allows any interested party to provide comments.**

**Earlier, we mentioned the role of the National Board in the standards development process. The National Board is headquartered in Columbus, Ohio. Our purpose, quite simply, is to promote greater safety through uniformity in the construction, installation, inspection and repair of boilers and pressure vessels. We are comprised of 56 Chief Boiler and Pressure Inspectors, representing U.S. and Canadian government agencies empowered to assure adherence to code construction and repair of boilers and pressure vessels.**

**As some of you may know, the National Board is the authority in developing inspection, repair, and alteration standards. Our National Board Inspection Code is an American National Standard.**

**We answer more than 15,000 inquiries per year concerning boilers and pressure vessels. Additionally, we are involved in the training and commissioning of boiler and pressure vessel inspectors all over the world.**

**The National Board registers well in excess of a million boilers and pressure vessels each year to assure access to critical information required for safe equipment operation, maintenance and repair. We also annual conduct more then 800 tests of safety relief valves at our test laboratory in Columbus.**

**There are external forces causing national board members to review some of their rules and regulations.**

**The world today somewhat mirrors the U.S. situation in the early-1900's. There are a number of boiler and pressure vessel standards. Some countries have adopted the ASME Code, others have their own code and standard. A non-ASME Code item poses a problem for many of our members to accept.**

**The Membership has directed the National Board to reconsider some of our policies and procedures in light of treaties entered into by our government. For example: we are all aware of the drive to remove trade barriers that may have been erected to restrict trade. National Board members are considering the impact of the treaties on a requirement of only one standard for construction. The current thinking is that there is a need for recognition of additional standards.**

**The primary focus will be on safety. The National Board Membership will develop the criteria a standard must address in order to produce a safe product. Once the criteria is developed, the National Board will review standards against the criteria. The International Standards Organization (ISO) has a similar initiative underway.**

**If a standard is found to comply with the criteria, authorization to register will be considered. National Board Members would then be in a position to recognize the standard and product constructed to the standard. The end result will be a decision based on protection of public safety rather than a comparison to other standards.**

**The National Board Membership is looking to their organization and - in reality - to themselves to determine the requirements they need to ensure safety. They are recognizing that they can no longer rely on other organizations to provide the assurances that individual companies are in compliance with the requirements of the jurisdictions. As standards move away from the national flavor, the jurisdictions are losing a degree of input and control they have traditionally exercised.**

**The sense is that the responsibility entrusted to our members to ensure safety will be retained, if not directly through the standard, then through the members' requirements. In short, nothing has occurred which alters the essential function of a jurisdiction: that is, the protection of public safety as it relates to pressure-retaining equipment.**

**Changes will also occur in related areas. Inspectors will need training in any additional standards recognized by the jurisdictions. This training will be in the areas of construction, in-service inspection, repairs, and alterations. The National Board recognizes that specific training will be necessary for those inspectors who will perform inspections during construction.**

**Additionally, there may be standard specifics which affect repairs and alterations. Inspectors will need training to be aware of these requirements.**

**Finally, revisions to the National Board Inspection Code will need to be considered as additional standards are recognized. The 1995 N-B-I-C recognizes that many jurisdictions are responsible for the repair and alteration requirements for pressure-retaining equipment constructed to various standards, including A-S-M-E.**

**The N-B-I-C will allow use of the "R" Stamp on repairs made to pressure-retaining equipment constructed to any code. This is a fundamental change to the repair program, and one that many National Board Members feel is long overdue.**

**In summary, I have tried to show the U.S. experience in boiler and pressure vessel safety requirements by tracing their development from the mid-19th century. Some keys to the standards development process have been discussed. The role of the National Board in this process has been presented, where we started, where we presently stand and where we are headed.**

