A CENTURY AS A JURISDICTION

BY DON COOK
PRINCIPAL SAFETY ENGINEER
THE STATE OF CALIFORNIA
PRESSURE VESSEL UNIT

BOILER SAFETY ORDERS

EFFECTIVE JANUARY 1, 1917

INDUSTRIAL ACCIDENT COMMISSION

STATE OF CALIFORNIA

IN THE BEGINNING

- The State of California's Industrial Accident Commission issued the Boiler Safety Orders effective January 1, 2017.
- Authorized by the 1911 Workmen's Compensation Act giving the "Commission power to make and enforce safety orders, rules, regulations, to prescribe safety devices, to fix standards and to order the reporting of injuries."

CALIFORNIA'S SAFETY ORDER SYSTEM

- The Workman's Compensation Act was first voluntary and proved to be ineffective in protecting employees.
- In 1913 the CA Legislature assigned the Industrial Accident Commission with developing industrial safety standards.
- There were 20 industries that would have safety standards written.
- Included boilers, elevators, mining, & logging.

CALIFORNIA'S SAFETY ORDER SYSTEM

- How to adopt the regulations?
- Modeled the system used by Wisconsin.
- Safety standards are issued by the Commission based upon the broad statutes written by the Legislature.
- Allows for changes and exemptions.
- Could have legislation with all the details in statute but would be inflexible.

CALIFORNIA'S SAFETY ORDER SYSTEM

- Statute allowed the Commission to use "advisors" to assist in developing the regulations.
- Work began in 1914.
- Employers and employees from the affected industries formed a committee to write the regulation.
- Additional public comment was sought.
- Meetings were held in SF & LA.

NEED FOR BOILER SAFETY ORDERS

- The early 1900's annually saw ~13,000 to 14,000 serious boiler accidents with ~300 to 400 being violent explosions.
- Killed between 400 & 500 people and injured 700 to 800.
- Destroyed property worth over $500,000.

NEED FOR BOILER SAFETY ORDERS

- HSB's "The Locomotive" provided statistics in 1920 of 393,900 internal inspections resulting in 1139 being uninsurable.
- Inspectors found 212,739 defects with 23,063 described as "dangerous".
- Complete "The Locomotive" figures from 1866 to 1920 had 3,832,669 internal inspections, 29,978 condemned, 5,492,424 defects & 603,683 dangerous.

NEED FOR BOILER SAFETY ORDERS

- Professor R.H. Thurston wrote that:
  - Half, often two-thirds, of boilers are defective.
  - Ten percent in a dangerous condition.
  - Of those not inspected, he assumed that all were defective with a large percentage dangerously so.

WRITING THE SAFETY ORDERS

- The Commission formed two committees, one in Los Angeles and one in San Francisco.
- Met in 1915 & 1916.
- Made sure both employers and employees were represented.
- Wanted to get as broad based perspective as possible.
- Advisors assist, without pay, the Commission.

CALIFORNIA'S SAFETY ORDER SYSTEM

- SF committee members represented:
  - Union Iron Works, a manufacturer of boilers.
  - Hartford Steam Boiler Inspection & Insurance Co.
  - Standard Oil, a user of boilers.
  - San Francisco's Board of Public Works.
  - Boilermakers & Shipfitters Union.
  - International Union of Steam and Operating Engrs.
  - California Metal Trades Association.
  - Industrial Accident Commission

CALIFORNIA'S SAFETY ORDER SYSTEM

- LA committee members represented:
  - National Association of Steam Engineers.
  - Southern California Edison Company.
  - Hartford Steam Boiler Inspection & Insurance Co.
  - City of Los Angeles
  - Pioneer Boiler and Machine Works.
  - Fidelity & Casualty Company of New York.
  - Steam & Operating Engineers.
  - Firemen's Local #220
  - Industrial Accident Commission.

WRITING THE SAFETY ORDERS

- Public hearings were held in the fall of 1916.
- Not many changes took place once explained.

WRITING THE SAFETY ORDERS

- Still has language used in today's orders:
- Shall inspect within 14 days of notice.
- Double stop valves with open drain.
- Insurance companies inspections exempted the need for State inspection.
- Certificate of Competency issued to insurance inspectors.

WRITING THE SAFETY ORDERS

- Common language continued:
- Required reports on prescribed forms.
- Reports submitted within 21 days.
- Required to report cancelled insurance.
- Inspectors of cities, counties, & companies could be issued a Certificate of Competency.
- Exam covered boiler construction, installation, operation, maintenance, & repair.

WRITING THE SAFETY ORDERS

- Challenge incorporating existing boilers:
  - Pre-1917 boilers were non-ASME Code.
  - What safety factor to use?
- Lap seam boilers were of concern due to failures.
  - Couldn’t see the long seam where cracks were.
  - Had higher safety factors. 5.5 if age was indeterminable.

FACTORS OF SAFETY IN 1921

FACTORS OF SAFETY									
		Existing Installation							
		Longitudinal Lap Seam							
Year	State	Up to 5 Yrs	Over 5 Yrs	Over 10 Yrs	Over 15 Yrs	Over 20 Yrs	Butt Strap	2nd Hand Lap Seam	New Installation
1917	California	4.5	4.5	4.75	5	5.5	4.5	5.5	ASME 5
1916	Ohio	4.5	4.5	4.5	4.5	4.5	8	4.5	ASME 5
1919	Missouri	4.5	4.5	4.5	4.5	4.5	4.5	5.5	ASME 5
1916	Pennsylvania	4.5	4.5	4.5	4.5	50psi or 4.5	4.5	5.5	ASME 5
1920	New York	4.5	4.5	4.5	5	5.5	4	5.5	ASME 5
1918	New Jersey	4.5	4.5	4.5	5	5.5	4	5.5	ASME 5
1920	Wisconsin	4.5	4.5	4.5	4.5	4.5	4.5	5.5	ASME 5
1910	City of Detroit	5	5	5.5	5.75	6	4.5	8	ASME 5
1919	Massachusetts	5	5	5.5	5.75	6	4.5	8	Mass Rules 5
1913	British Columbia	6	6	6	6	6	a	6.3	Note: a)

Note: a) Basic FS = 4 with added penalties for conditions & bad construction practices.

WRITING THE SAFETY ORDERS

- New definitions in 1925:
  - Age: the period of time the boiler under steam, not time since construction.
  - Non-Code boiler: non-ASME.
  - Steam Heating Boiler: not more than 15psi.
  - Forging Process of Welding: heating a part to the proper “welding temperature” and hammered or rolled to form a joint.
  - Autogenous Welding Process: fusion welding with added metal.

NATIONAL BOARD INFLUENCE

- 1925 edition required a 75% score on the National Board exam.
- California was one of the original NB members.
- First chief, R.L. Hemingway was elected Vice-Chair of the National Board at original meeting in Detroit in 1921

FIRST NB MEMBERS IN 1919

- States of California, Indiana, Michigan, Minnesota, New Jersey, Ohio, Pennsylvania, & Rhode Island.
- Allegheny County, Pennsylvania.
- Cities of Detroit, MI; Erie, PA; Nashville, TN; Philadelphia, PA; St. Louis, MI; & Scranton, PA.
- More joined at the 1921 first joint meeting of NB/ASME in Detroit

1917 VS. 1925

- 1917 had exemptions for US government, railroads, agriculture, 12hp or less at 15psi max, & autos.
- 1925 exempted US government, household domestic service, and automobile boilers.
- 1917 had a Deputy Inspector who was limited to certain types of boilers. Eliminated in 1925 but allowed to remain active.
- Appears state inspectors automatically okay.

ADOPTING ASME CODE

- A strong desire for uniformity in the US.
- Massachusetts had the first state code, then Ohio and then Michigan. Other states also created their own codes.
- Boilers couldn’t be used without meeting a particular states requirements.
- Difficult and expensive for manufacturer’s to comply.

ADOPTING ASME CODE

- Controversy about using ASME Code.
- Commission received input from engineers about the use of ASME Code.
- Only negative was Western boiler manufacturers worried that the East would dominate market.
- Turned out #1 CA manufacturer built more boilers in 3 years after adoption than 10 years previously. And 30% cheaper!

ADOPTING ASME CODE

- Order 820 A.S.M.E. Boiler Code
  - (a) The Boiler Code, Edition of 1914, with Index, of the American Society of Mechanical eningeers, as copyrighted in 1915, made a part of these orders with certain changes and additions, all of which said changes and additions refer only to Exisiting Installations.
  - Actually printed in its entirety in Safety Orders.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

REPORT

OF THE COMMITTEE
TO FORMULATE STANDARD SPECIFICATIONS
FOR THE
CONSTRUCTION OF STEAM BOILERS AND OTHER
PRESSURE VESSELS AND FOR THEIR
CARE IN SERVICE

KNOWN AS

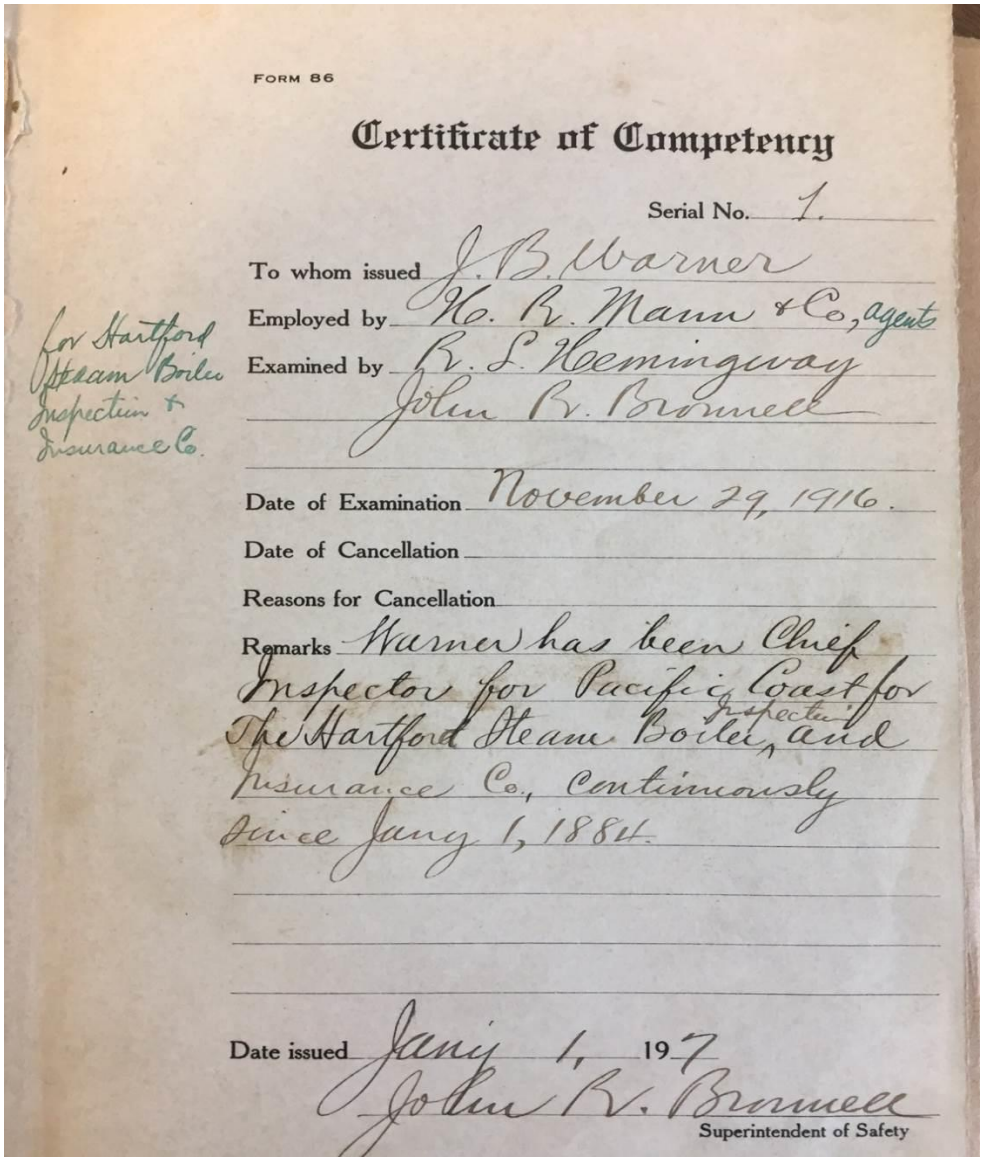
THE BOILER CODE COMMITTEE

RULES FOR THE CONSTRUCTION OF STATIONARY BOILERS AND FOR ALLOWABLE WORKING PRESSURES

Edition of 1914 with Index

ADOPTING ASME CODE

- Change in 1925 Safety Orders (first revision).
  - The CODE is hereby made a part of these Orders.
  - A special edition of the A.S.M.E. 1924 Boiler Construction Code, covering sections I, II, VI, and Appendix, for distribution in California is available for $1.30 plus postage. A separate pamphlet, covering section IV, costs $0.70 plus postage.
  - Pamphlets of Section III and V were also available.



FORM 86

Certificate of Competency

Serial No. 1.

To whom issued J. B. Warner

Employed by Ko. R. Mann & Co, agents

for Hartford Steam Boiler Inspection & Insurance Co.

Examined by R. L. Hemingway
John R. Bronnell

Date of Examination November 29, 1916.

Date of Cancellation

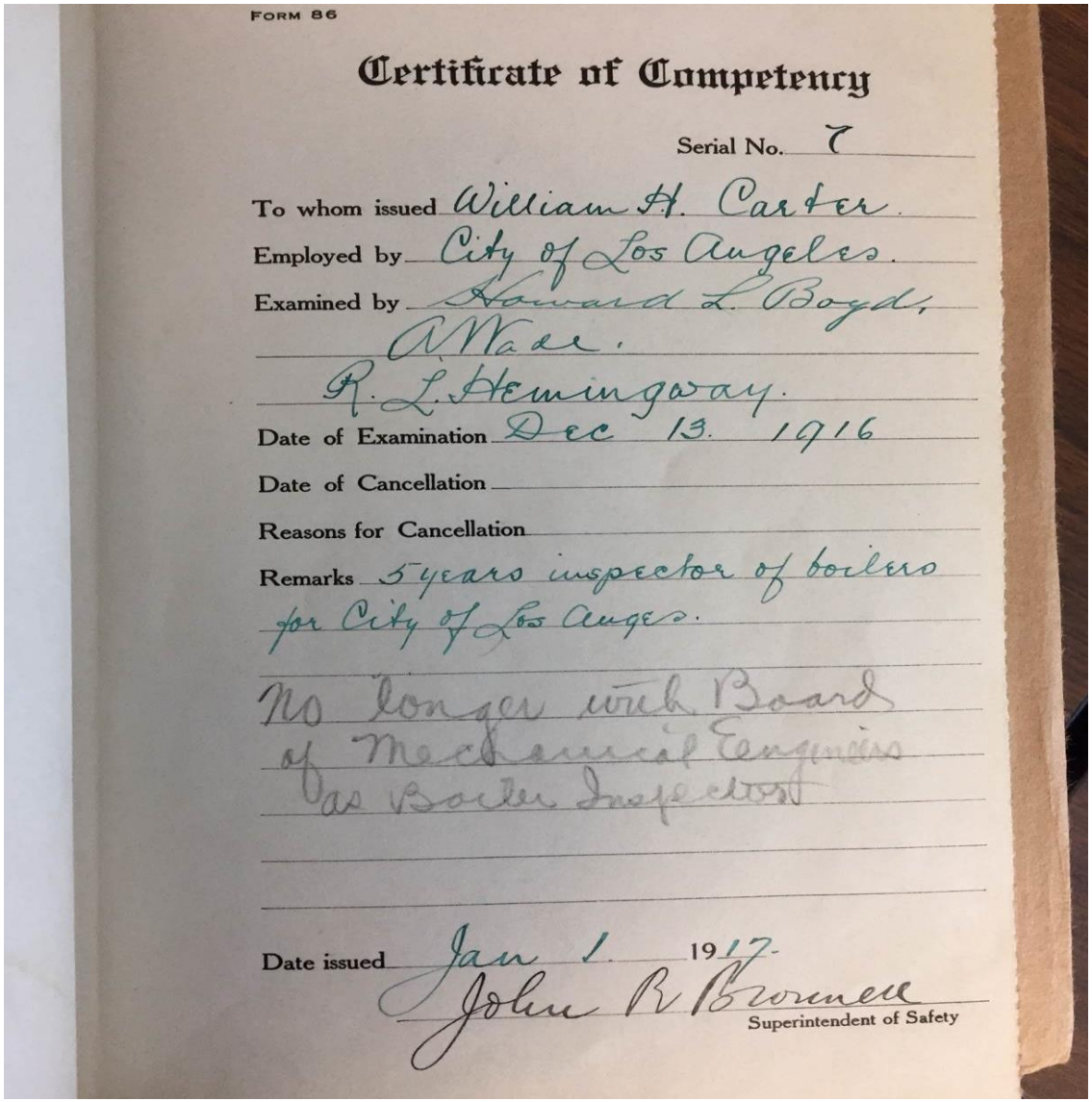
Reasons for Cancellation

Remarks Warner has been Chief Inspector for Pacific Coast for The Hartford Steam Boiler Inspection and Insurance Co, continuously since Janu 1, 1884.

Date issued Janu 1, 1917

John R. Bronnell
Superintendent of Safety

FIRST CERTIFICATE OF COMPETENCY, JANUARY 1, 1917



FORM 86

Certificate of Competency

Serial No. 7

To whom issued William H. Carter.

Employed by City of Los Angeles.

Examined by Howard L. Boyd,
A. Wade.
R. L. Hemingway.

Date of Examination Dec 13. 1916

Date of Cancellation

Reasons for Cancellation

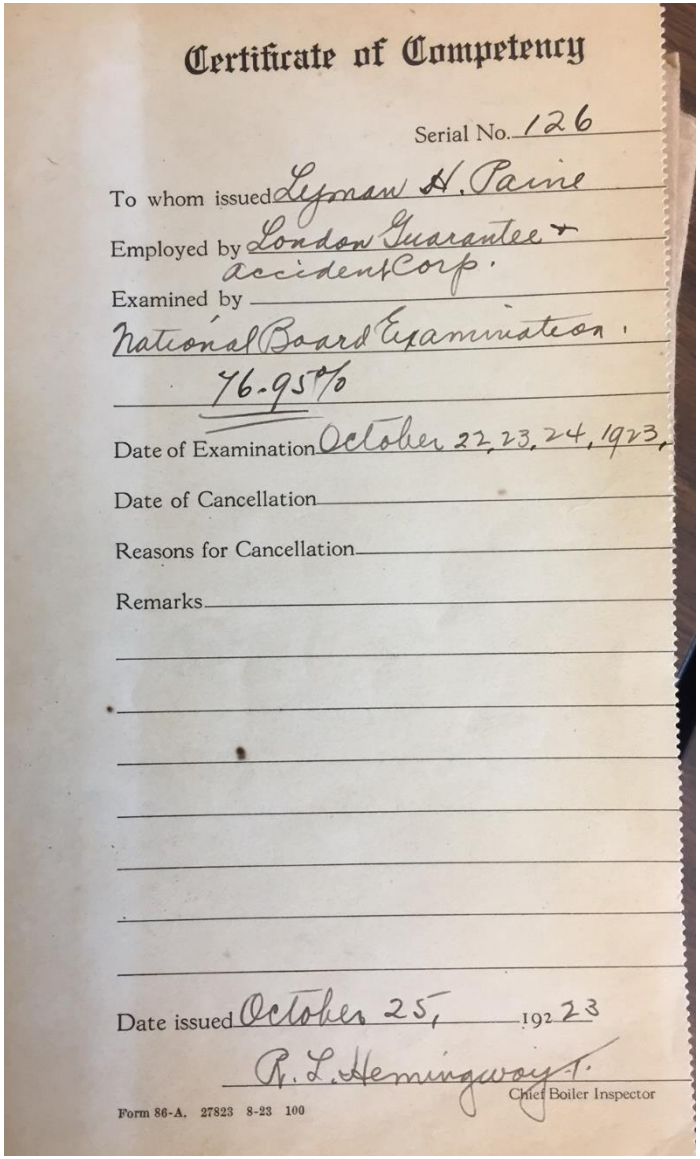
Remarks 5 years inspector of boilers for City of Los Angeles.

No longer with Board of Mechanical Engineers as Boiler Inspector

Date issued Jan 1. 1917.

John R Bronnell
Superintendent of Safety

CITY OF LOS ANGELES, WILLIAM CARTER C. OF C.



Certificate of Competency

Serial No. 126

To whom issued Lyman A. Paine

Employed by London Guarantee + accident Corp.

Examined by National Board Examination.

76.95%

Date of Examination October 22, 23, 24, 1923.

Date of Cancellation

Reasons for Cancellation

Remarks

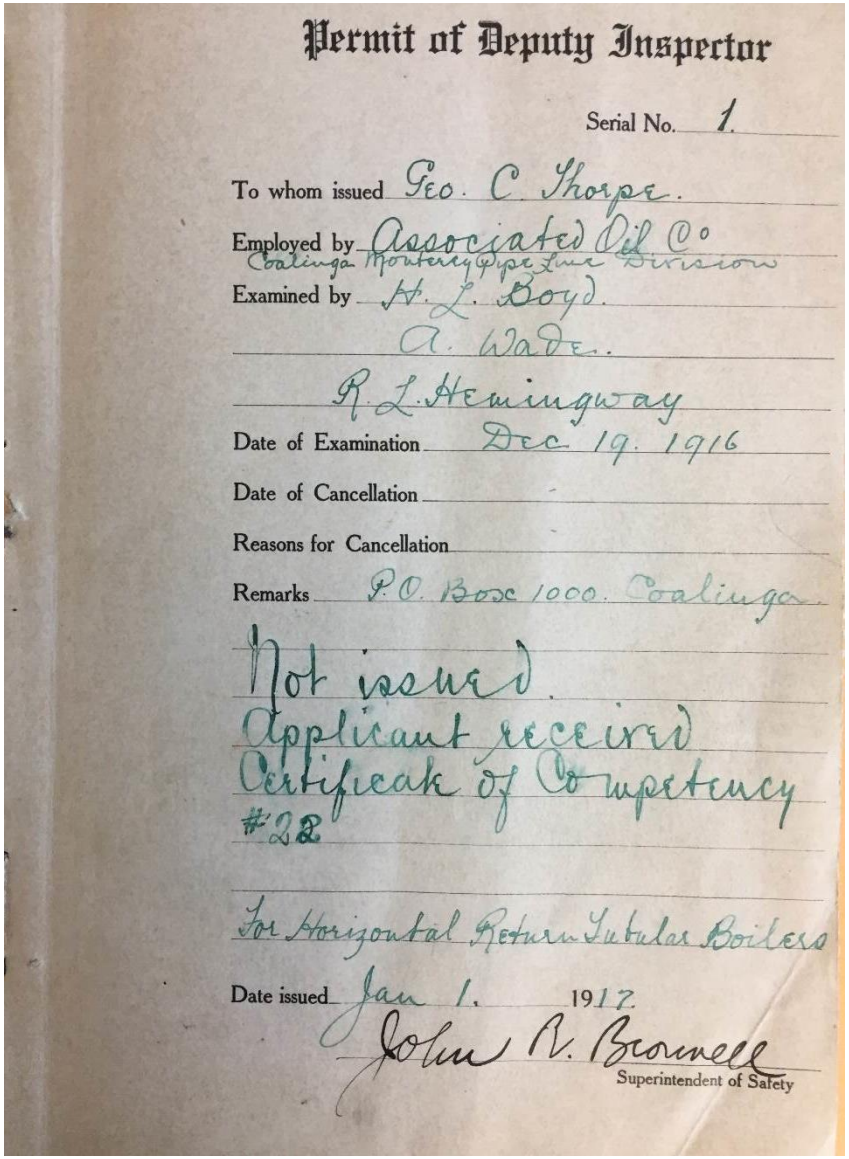
Date issued October 25, 1923

R. L. Hemingway.

Chief Boiler Inspector

Form 86-A. 27823 8-23 100

C OF C BASED ON 1923 NATIONAL BOARD EXAMINATION



Permit of Deputy Inspector

Serial No. 1.

To whom issued Geo. C. Thorpe.

Employed by Associated Oil Co
Coalinga Monterey Pipe Line Division

Examined by H. L. Boyd.
A. Wade.
R. L. Hemingway

Date of Examination Dec 19. 1916

Date of Cancellation

Reasons for Cancellation

Remarks P.O. Box 1000. Coalinga.

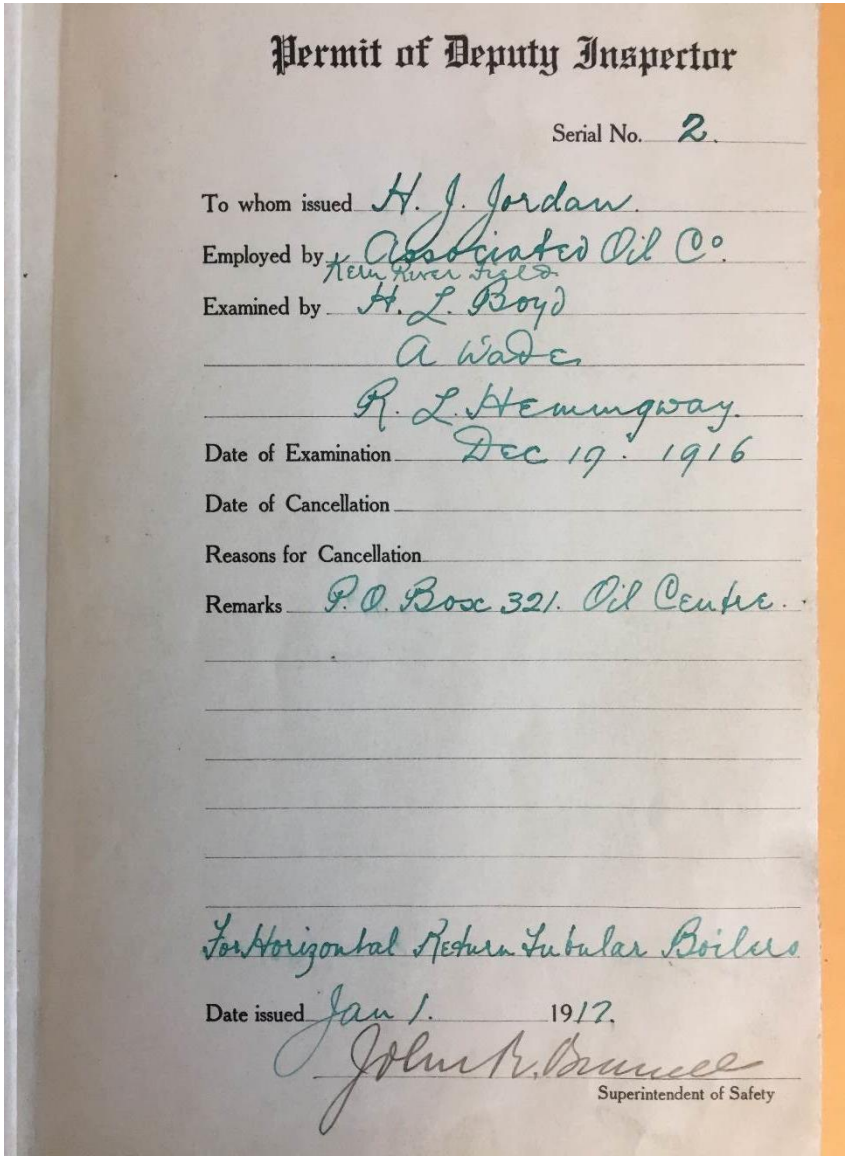
Not issued.
Applicant received
Certificate of Competency
#28

For Horizontal Return Tubular Boilers

Date issued Jan 1. 1917

John R. Bronnell
Superintendent of Safety

FIRST DEPUTY INSPECTOR, NOT ISSUED



Permit of Deputy Inspector

Serial No. 2.

To whom issued H. J. Jordan.

Employed by Associated Oil Co. New River Field.

Examined by H. L. Boyd
A Wade
R. L. Hemingway.

Date of Examination Dec 19. 1916

Date of Cancellation

Reasons for Cancellation

Remarks P. O. Box 321. Oil Center.

For Horizontal Return Tubular Boilers

Date issued Jan 1. 1917.

John R. Bruce
Superintendent of Safety

FIRST ISSUED DEPUTY INSPECTOR, H.J. JORDAN

STATE OF CALIFORNIA

INDUSTRIAL ACCIDENT COMMISSION

DEPARTMENT OF SAFETY

9063-19

First Inspection Report for Air Pressure Tanks as Required by the Air Pressure 'ank Safety Orders

1. Tank inspected 12/26/19 (Date) by the Fidelity & Casualty Co. N.Y. (State, County, City, Corporation or Company)
2. Owner or user Farmers & Merchants Bank of Stockton.
3. Party to notify Same.
4. Address Stockton Cal. Tank used for air storage (Air, elevator, sprinkler, etc.)
5. Building used for offices (Garage, factory, etc.) No. Street San Joaquin & Main St.
6. Tank No. 2 9063-19 Cal. Std. Tank No. — Age 2 years
7. Made by Unknown. Diameter 30" inches. Length 6 ft. 0" in.
8. Shell plate est. 3/16" in. Lowest T. S. 55000 Long. seam Lap. (Lap or butt)
9. Size of rivet hole est. 9/16" (Long. seam) Riveting single (Single, double, triple) Rivets steel (Iron or steel)
10. Efficiency in % 61 7/10 Pitch 1 1/2" × — × — × (Minimum pitch of each row)
11. Heads 3/8" in. Staying of heads 1 concave - 1 convex.
12. Safety valve, type lever. Size 1" Location top head.
13. Drain valve 1/2" bottom head. Pressure gage yes (top.)
14. Hydrostatic test — lbs. Pressure allowed 80 lbs.
15. Changes or repairs ordered. Provide 1/4" pipe size valved connection for attaching test gage. Means to inspect interior of shell plate or man heads as practicable. Turn tank so longitudinal seam is accessable for proper inspection
16. Has a certificate of inspection been issued for this inspection? One. No

Name of inspector C. L. Moseley

Received from (Employer) Date

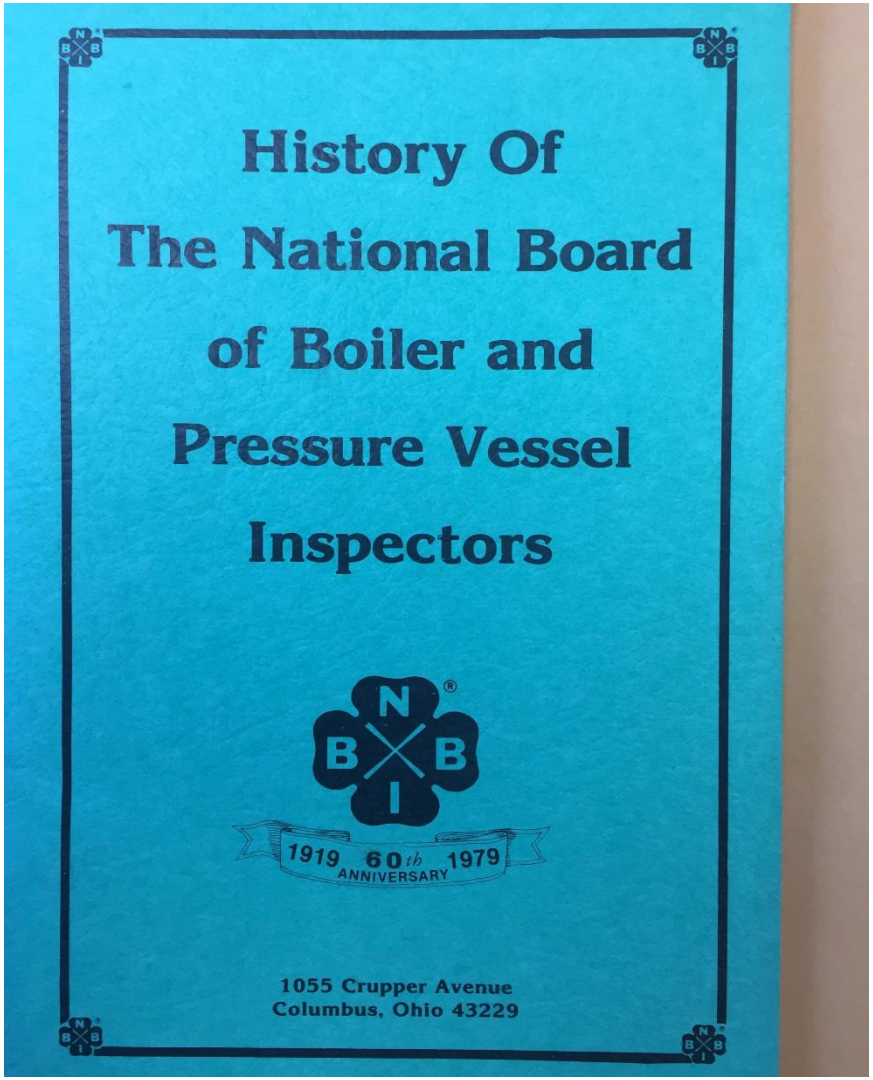
Checked by Date

B. P. 424.

No. 215.

71/80

AIR TANK INSPECTION REPORT, 12/26/1919



HISTORY OF THE NB, 60TH ANNIVESARY

CREDITS

- History of the National Board of Boiler & Pressure Vessel Inspectors "60th Anniversary"
- Boiler Safety Bulletin issued by the Industrial Accident Commission of the State of CA.
  - Articles by:
  - Will J. French
  - H.M. Wolflin
  - R.L. Hemingway (first CA chief)