FIFTH ANNUAL REPORT

—OF THE—

CHIEF INSPECTOR OF MACHINERY

—FOR THE—

YEAR ENDING DECEMBER 31ST, 1906.

THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B. C.:
Printed by RICHARD WOLFENDEN, I.S.O., V.D., Printer to the King's Most Excellent Majesty.
1907.

REPORT OF CHIEF INSPECTOR OF MACHINERY.

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NEW WESTMINSTER, B. C., January 1st, 1907.

The Hon. Chief Commissioner of Lands and Works,
Victoria. B. C.:

SIR,—I have the honour to submit to you the Fifth Annual Report of the operation of the steam boiler and machinery inspection service for the year ending December 31st, 1906.

The following is a summary in part of the work performed in this office during the year in connection with the construction and inspection of steam boilers and machinery :—

Letters inward	2,279
Telegrams inward	44
Letters outward	2,159
Telegrams outward	35
Forms acknowledging receipt of copies of Act, etc	26
Inspectors' monthly reports examined and checked	48
Machinery inspection reports examined and checked	1,046
Fees for above since May, 1906	$145
Drawings and specifications examined and reported on	123
Number of miles travelled by Chief Inspector	1,040

I am again able to report that there have been no boiler explosions during the year, nor have there been any accidents to boilers resulting in personal injury. There have, however, been five accidents to persons working around machinery, one of which was fatal. This was a case where a man was attempting to take off a belt from a pulley while it was in motion; his foot slipped, and the spokes of the pulley caught and threw him across an iron bar, breaking his back. This, and the cases resulting in injury only, are reported in District Reports A and D.

I may say in this connection that I find the steam users most willing to do everything within their power to protect their employees, but such accidents as these cannot be guarded against while persons will take chances which are not at all necessary with moving machinery.

The summary of total work done by the Inspectors shows details to be about the same as last year. The percentage of boiler plates rejected on account of inferior quality has been 11.7 per cent., which is larger than any previous year. This, I think, is accounted for by the fact that it has been very difficult for the steel makers to keep up with the demand, and the sales houses have not been as particular about their deliveries as they should have been.

The number of new boilers inspected during the year exceeds that of 1905 by 62 %. The number built under inspection in British Columbia exceeds last year's amount by 69 %.

This year, for the first time, I am able to report that no boilers were found in use without safety valves, although there were seven with safety valves inoperative, eight with safety valves overloaded, and twelve with defective safety valves, thus still leaving much to be desired in the way of care in connection with this most important part of the equipment of a steam plant. The number of defective pressure gauges has been reduced by one-half; but, as there are still 96, improvement should continue to be looked for along this line. The number of fractured plates discovered was in excess of last year. Other less important defects, as per summary, are shown to be about the same as in previous years.

The number of boilers now on our books is 2,131; the number inspected last year was 1,046, thus leaving over one-half on which no inspection was made. I trust that an increase will be made in the staff, so that the work may be kept more nearly up to date. The steam users now look forward to our annual inspection as a means of ascertaining just what repairs are needed, and if we are unable to make the inspection they are disappointed, and have to obtain their information with respect to the condition of the plant from other sources.

In conclusion, I desire to thank the staff for the able and efficient manner in which they have carried out their part of the work.

There are attached hereto, for your inspection, the reports of the various District Inspectors made to the Chief Inspector of Machinery, for the year ending December 31st, 1906, together with summary of work done and defects observed in each case. I am also appending a summary of the total work done in all the districts during the year 1906.

I have, etc.,
JOHN PECK,
Chief Engineer Examiner.

SUMMARY OF TOTAL WORK DONE BY DISTRICT INSPECTORS IN 1906.

Number of drawings and specifications calculated for new boilers	101
" boiler plates inspected	241
" boiler plates rejected	28
" boilers built under inspection in British Columbia	99
" boilers built under inspection in Eastern Canada	44
" boilers built in Eastern Canada not under inspection	12
" new boilers inspected built in United States	48
" new boilers inspected built in British Columbia	14
" new boilers inspected (total)	207
" boilers imported from Eastern Canada (second hand)	1
" boilers imported from United States (second-hand)	10
" boilers unclassified	7
" first inspections	147
" inspections, external and internal	1,032
" internal inspections only	2
" external inspections only	26
" special inspections after repairs	23
" visits in addition to inspections	869
" boilers subjected to hydrostatic test	1,009
" boilers on which pressure was reduced	50
" boilers unsafe without extensive repairs	4
" boilers repaired under Inspector's directions	89
" boilers considered unfit for further use	3
" accidents to engines and boilers	11
" accidents resulting in personal injury (not fatal)	4
" accidents resulting in personal injury (fatal)	1
" investigations	2
" inspections completed	1,046
Total horse-power of boilers inspected	49,326
Number of defects observed as per summary	1,371
Number of defects considered dangerous	100
Inspection fees earned	$ 9,347.10
Inspection fees collected	9,059.18
Miles travelled by the Inspector	22,740
Letters inward	1,824
Letters outward	1,924
Telegrams inward	51
Telegrams outward	43
Boilers taken out of service	24

SUMMARY OF DEFECTS OBSERVED.

Name of Defects.	Number.	Dangerous.
Boilers with safety valves inoperative	7	7
Boilers with safety valves overloaded	8	6
Boilers with safety valves defective in construction	12	3
Boilers without pressure gauges	3	..
Pressure gauges inoperative	8	5
Pressure gauges defective	96	..
Cases of insuffcient staying or bracing	8	..

Summary of Defects Observed.—*Concluded.*

Nature of Defects.	Number.	Dangerous.
Cases of defective stays	17	2
" broken rivets	11	..
" defective riveting	11	1
" broken stays or braces	9	2
" loose stays or braces	57	2
Boilers damaged by low water	1	1
Defective settings	65	2
Boilers with fractured plates	30	5
" laminated plates	5	1
" burned plates	14	1
Cases of sediment on fire sheets	80	4
" internal corrosion	52	..
" scale or incrustation	132	..
" external corrosion	56	6
" defective tubes	37	8
" defective feed water arrangement	63	2
" broken feed valves	5	..
Serious leakage around tube ends	51	3
Serious leakage in rivet joints	20	2
Defective blow-off pipes or cocks	44	10
Defective water gauges	27	11
Broken blow-off pipes or cocks	5	2
Water columns without blow-outs	16	1
Cases of broken test cocks	105	..
Connections to water columns without valves	41	..
Neutral sheets not stayed	5	..
Furnaces out of shape	2	..
Boilers without fusible plugs	90	..
Boilers low at front end	38	..
Cases of serious leakage of fittings	35	1
Number of hand-holes, doors having bolts and dogs burned off	7	2
Defects in engines	13	3
Boilers without stop-valves	22	1
Cases of defective steam pipes	5	..
Unclassified defects	57	6
Total	1,370	100

REPORT OF THE CHIEF ENGINEER EXAMINER.

To the Honourable Chief Commissioner of Lands and Works,
Victoria, B. C.:

SIR,—I have the honour to submit to you the following report with respect to the examination of candidates for engineers' certificates for the year ending December 31st, 1906:

During the year I have received 442 applications for engineers' certificates; on December 31st, 1905, I had on file 308 applications, making a total of 750. Of these, 443 have been examined; 66 applicants have had their fees returned, as they had not the practical qualifications required by the Act, and there are still on file 241 application forms.

RESULTS OF EXAMINATIONS.

Grade.	No. Examined.	Passed.	Failed.
Second Class	25	12	13
Third "	179	146	33
Fourth "	178	152	26
Fifth "	5	5	0
Temporary	56	56	0
Totals	443	371	72

Examination fees collected by Chief Inspector	$1,550
" " Inspector, District B	77
" " " " C	155
Total	$1,782

The work done by the candidates at their examinations was not quite as satisfactory as in 1904, and there was a lower percentage of passes.

I am pleased to be able to report that the work of the certificated engineers, in connection with the steam plants throughout the Province, has been very satisfactory. I have not had one complaint from the steam users of incapacity or negligence.

During the year two owners have been fined $100 each, and one engineer $100, for infraction of the Act, making a total of $300.

Trusting this report will meet with your approval,

I have, etc.,
JOHN PECK,
Chief Engineer Examiner.

INSPECTOR'S REPORT, DISTRICT "A."

———:o:———

New Westminster, B. C., January 1st, 1906.

John Peck, Esq.,
Chief Inspector of Machinery, New Westminster, B. C.

Sir,—I have the honour to submit my report for the work done in this district during the year 1906.

I have endeavoured to get around to all old and new plants that I know exist in my district, but I find the time much too short to accomplish this task. If every steam plant were visited during the year another Inspector would be required, as enough boilers come into the Province each year to employ an additional Inspector.

I am pleased to report that there have been no accidents of a serious nature in my district during the year.

During your absence on sick leave last summer I was appointed Acting Chief Inspector. I took charge of the office and endeavoured to perform the several duties pertaining thereto. I calculated blue prints and specifications for the boilers that were built and tested plates for new boilers in Vancouver, most of the plates passing test. Examinations were held here from time to time, many applicants availing themselves of the opportunity of obtaining certificates. Messrs. Baxter and Madigan held examinations throughout my district, when all the principal places were visited and engineers were examined. The sum of $697.50 was collected for engineers' fees and examinations of boiler designs.

On your return home I visited Vancouver, Cumberland, Nanaimo and Victoria, examining engineers, which occupied about one month's time.

Quite a number of the mills in the upper country have been enlarged, with a view to supplying the increased demand from the North-West lumber trade.

The Revelstoke Lumber Co. have re-built their saw-mill plant and are in much better shape than they were before, the mill being in a better position, besides having a larger steaming capacity.

The Bowman Lumber Co., of Comaplix, have erected a fine new mill at that place, the mill being equipped with the very latest machinery and the steam plant being of ample capacity.

The Big Bend Lumber Co. have enlarged their plant by one-third, with the intention of turning out more lumber this season.

The Columbia River Lumber Co., of Golden, have also made an addition to their plant, which would indicate that the lumber business is going ahead and that better times are coming.

Very few serious defects have been found this season, and a marked improvement is noticed.

Boiler No. 864A, locomotive type, used for shunting, was found in bad condition. The furnace was badly burned and bulged. There was no stays to support the heads, and the segments were stiffened with angle irons. The shell also was badly corroded in places.

Three new return tubular boilers, built under the supervision of the Marine Inspector in Eastern Canada, were found defective when inspected here. They were not built according to affidavit or Inspector's report. Instead of the rivet holes being drilled in place, some of them were found to be nearly $\frac{1}{16}$" out of fair. The factor used for this construction cut the boilers from 130 to 115 lbs. The Company are negotiating to have this made good, so that they can get the original pressure.

Return tubular boiler, No. 204, in use in a small mill, was found to be burned and bulged downwards about $1\frac{1}{2}$" on the bottom of shell at the back end between the blowoff and the back head. Both the owner and the man in charge testified as to their having cleaned the boiler out thoroughly before my arrival. I had them remove the back handhole door, which had not been done for some time, as the nut had to be split off. When the door was taken off I found scale and dirt about 6" deep over the burned plate. The bad part was ordered cut out and patched. The engineer had no certificate and intended starting that afternoon with this boiler, which would likely have blown up within a week. The owner and engineer were fined $100 and costs, respectively, for employing an uncertificated engineer and for operating without a certificate.

During your absence we had the Barber Asphalt and Paving Co. summoned for violating the Act. They started work in Vancouver on the public streets without either asking for inspection or employing a certificated engineer. Their case came up in Vancouver and they were fined $100 and costs.

A peculiar case of rupture during hydrostatic test occurred at a plant a short time ago. The test pressure was nearly up to the required amount and I went under the boiler to examine the joints, leaving the chief engineer to watch the gauge, when the rupture occurred. On investigation it was found that the shell plate had cracked from the edge of the manhole toward the back head to about 6″ in length. The manholes in the boiler are very large, and are cut the wrong way in the shell plate. The hole is 18″ x 15½″, with a very small reinforcing ring around same and a single row of rivets. The old ring was taken off and replaced by one large enough for a double row of rivets, with an extension at back to serve as a butt strap and a small strap inside to catch four rows of rivets. The other five boilers belonging to the steam plant were tested in a similar way the same day and stood the pressure. These are very old boilers, having been in use long before the Inspection Act was in operation.

Nothing else of an interesting character occurred during the year in this district. Appended you will find tabulated list, which I hope will meet with your approval.

I have, etc.,
THOS. H. GOLDIE,
Inspector, District "A."

INSPECTOR'S REPORT FOR THE YEAR 1906.

Number of drawings and specifications calculated for new boilers	45
" boilers plates inspected	22
" boiler plates rejected	3
" boilers built under inspection in British Columbia	12
" boilers built under inspection in Eastern Canada	10
" boilers built in Eastern Canada not under inspection	4
" new boilers inspected built in United States	10
" new boilers inspected built in British Columbia	12
" new boilers inspected (total)	39
" first inspections	47
" inspections, external and internal	219
" external inspections only	10
" special inspections after repairs	6
" visits in addition to inspections	174
" boilers subjected to hydrostatic test	216
" boilers on which pressure was reduced	5
" boilers repaired under Inspector's directions	24
" accidents to engines and boilers	2
" inspections completed	219
Total horse-power of boilers inspected	10,228
Number of defects observed as per summary	143
Number of defects considered dangerous	9
Inspection fees earned	$2,142 00
Inspection fees collected	$2,129 00
Miles travelled by the Inspector	2,740
Letters inward	256
Letters outward	216
Telegrams inward	6
Telegrams outward	4

SUMMARY OF DEFECTS OBSERVED.

Nature of Defects.	Number.	Dangerous.
Boilers with safety valves inoperative	2	2
Pressure gauges inoperative	2	..
Pressure gauges defective	6	..

Summary of Defects Observed.—*Concluded.*

Nature of Defects.	Number.	Dangerous.
Cases of defective stays	3	..
" defective riveting	4	..
" loose stays or braces	6	..
Defective settings	10	..
Boilers with fractured plates	1	1
" burned plates	3	..
Cases of sediment on fire sheets	10	2
" internal corrosion	4	..
" scale or incrustation	16	..
" external corrosion	4	..
" defective tubes	3	..
" defective feed water arrangement	7	..
" broken feed valves	2	..
Serious leakage around tube ends	7	..
" in rivet joints	3	..
Defective blow-off pipes or cocks	8	3
" water-gauges	4	..
Water columns without blow-outs	5	..
Cases of broken test cocks	8	..
Connections to water columns without valves	4	..
Boilers without fusible plugs	3	..
Cases of serious leakage of fittings	5	..
Defects in engines	3	1
Unclassified defects	10	..
Total	143	9

Thos. H. Goldie,
Inspector of Steam Boilers, District "A."

INSPECTOR'S REPORT, DISTRICT "B."

VICTORIA, B. C., JANUARY 1ST, 1907.

John Peck, Esq.,
Chief Inspector of Machinery, New Westminster, B. C.

SIR,—I have the honour, herewith, to submit my annual report for the year ending December 31st, 1906, regarding the detail of duties performed in this District.

During the year I have been enabled to cover nearly the whole of my extensive district, with the exception of Atlin and Queen Charlotte Islands.

The reason I did not go to Atlin was that, owing to my services being required elsewhere at the season I usually make inspections at that place, I was so prevented. When North, at Naas and Skeena Rivers, this spring, I could not get a steamer which was going to Queen Charlotte Islands without waiting two weeks, as there was only one boat per month, so I could not afford to wait.

During part of July and most of August I was called on to assist with engineers' examinations in Districts A and C, owing to the Chief Examiner being absent on sick leave.

With the exception of the above time, I have been constantly moving from one steam plant to another, inspecting and testing the boilers, supervising repairs to defects and making visits. I am pleased to report the continued smooth working of the Steam Boiler Inspection Act in this district. As a rule, Government officials are not too welcome visitors, especially Inspectors, causing "shut downs" of steam plants for inspection and the collecting of fees. Notwithstanding this phase, I am pleased to assert that I have received much courtesy, and in many cases hospitality, from the steam users I visit, and that the relations existing between us have been very agreeable. As you will see by the appended detail of work done, I have made over one inspection and tested one boiler per working day right through the year, and have made an average of 30 miles per day, excluding Sundays, thus totalling over 9,000 miles in the year.

I have held examinations in various parts of my district each month of the year, besides aiding with examinations in the three other districts. In District A, I was at Kamloops, Vernon, Golden and Revelstoke last July. At those examinations I was assisted by Inspector Madigan. In August I went to District C, where, with Inspector Sutherland, I held examinations at Fernie, Cranbrook and Greenwood. In October I assisted the Inspector with examinations in Vancouver.

General examinations were held by the Chief Examiner in November at Cumberland, and in December at Nanaimo and Victoria. At those places I assisted, along with Inspector Goldie. Besides the above, I have held examinations myself at the following places:—Shawnigan, Port Essington, Rivers Inlet, Duncan, Nanaimo, Mosquito Harbour, Mount Sicker, Fanny Bay, Sechart, and on many occasions in my office in Victoria. The number of candidates I have so examined were 55, of whom 52 passed in the various grades and three failed.

My principal duty, as you are aware, is the careful examination of the interior and exterior of boilers and their equipment and settings. This can only be done thoroughly by getting the boilers cool and empty, which entails the closing down of the steam plant. A careful and close examination is made of the heating surfaces to see that no defects have developed since last inspection, that the parts are free from scale, sediment or thinning of plates, that the supporting stays are sound and of sufficient strength, and, in fact, to watch for any deterioration which may endanger the boiler. If any defects are discovered, either by visual inspection or by the subsequent check of the hydrostatic test, repairs are made or the pressure is reduced to a safe limit on the steam plant. Our experience, gained by many years of service in operating machinery and boilers, together with the continually widening range gained week by week as we come across new conditions at the various plants we inspect, is at the service of both the engineers and steam users. I found the general condition of the boilers and engines to be good, but in 27 cases I had to reduce pressure because of deterioration in some way or other. In 47 cases I had repairs made and found altogether 360 defects, of which 39 were dangerous. I consider it is only by the detection of weakness in boilers by inspection, and guarding against

development of same, that there has not been one case of accident or injury to either person or steam plant during the past six years. This is a record the Board of Inspection should be proud of, when one so frequently reads in the papers of disasterous explosions, etc., elsewhere.

The general tone in manufacturing centres shows extension and increased activity. Lumber mills especially seem to be springing up everywhere, while the older established firms are enlarging their plants so as to increase their output. Other industries show a much healthier condition also and some long dormant plants are again in operation.

There has been one fatal accident reported to me during the past twelve months; this was at plant No. 662. A man was trying to take off the belt from a pulley in motion, his foot slipped and the spokes of the pulley caught and threw him down and he fell across an iron bar, breaking his back. Two other cases of injury were reported, but were not of a very serious nature. In one case the injured man allowed his hand to be caught in part of an engine and lost half of it. In the other case a man allowed himself to be caught in a shaft and had his arm badly torn. I made inquiries in these cases, and gave directions to improve conditions if possible, but in each instance it was the want of caution on the part of the injured person which caused the accident. I heard of other accidents in an informal manner, but as they were not properly reported I did not investigate.

I would also report one very narrow escape from being crushed to death on my part. During last May I inspected the interior of boiler No. 357, after which I subjected it to a hydrostatic test with the pump. In inspecting for leaks or deformation of shell I, of course, had to go along below the boiler, and just as I got to the rear end and was standing up, the suspending rods gave way and the twelve-ton boiler dropped, knocking me against the brick-work. A moment earlier and I should have been crushed. The cause of this accident was the poor thread of the nuts on the suspension rods, which, as you will readily understand, was most difficult of detection, as the thread on rods was good.

During the year Inspector Madigan inspected and tested three boilers in my district while I was absent in a distant part, which, with the assistance at examinations, was all that was reported done for this district by the other Inspectors.

I tested plates, supervised the construction, and finally tested and passed one boiler for District A and one for District D. This, with the previously mentioned assisting with examinations on the main line points and in Crow's Nest, and Boundary districts, was what I did for the other Inspectors.

I append a list of candidates, with grades, etc., whom I personally examined in my district. Also a list of defects in detail found during my inspections.

I have, etc.,

S. Baxter,

Inspector, District "B."

Inspector's Tabulated Report for the Year 1906—District "B," Victoria.

Engineers' Examinations.

Number of applications for examinations	28
Number of applications for re-examination	3
Number of applications approved	31
Examination fees	$77 50

Results of Examinations.

Class.	No. Examined.	Passed.	Failed.
Third	19	17	2
Fourth	19	18	1
Temporary	15	15	0
Fifth	2	2	0
Totals	55	52	3

Remarks.

I have held examinations each month of this year at various points of my district, including Nanaimo, Shawnigan, Port Essington, Rivers Inlet, Mosquito Harbour, Mount

Sicker, Sechart, Duncan and Fanny Bay, and on many occasions at Victoria office. I also assisted in districts A, C and D, which took in Kamloops, Vernon, Golden, Revelstoke, Vancouver, Fernie, Cranbrook and Greenwood.

SUMMARY OF WORK DONE IN DISTRICT "B" IN 1906.

Number of drawings and specifications calculated for new boilers	31
" boiler plates inspected	56
" boiler plates rejected	3
" boilers built under inspection in British Columbia	20
" boilers built under inspection in Eastern Canada	15
" boilers built in Eastern Canada not under inspection	1
" new boilers inspected built in United States	11
" new boilers inspected (total)	47
" boilers imported from the United States (second hand)	1
" boilers unclassified	4
" first inspections	52
" inspections, external and internal	374
" external inspections only	19
" special inspections after repairs	7
" visits in addition to inspections	180
" boilers subjected to hydrostatic test	314
" boilers on which pressure was reduced	27
" boilers unsafe without extensive repairs	1
" boilers repaired under Inspector's directions	47
" accidents to engines and boilers	1
" accidents resulting in personal injury (not fatal)	3
" accidents resulting in personal injury (fatal)	1
" investigations	1
" inspections completed	335
Total horse-power of boilers inspected	15,710
Number of defects observed as per summary	360
Number of defects considered dangerous	39
Inspection fees earned	$2,894.80
Inspection fees collected	2,820.60
Miles travelled by the Inspector	9,065
Letters inward	743
Letters outward	964
Telegrams inward	27
Telegrams outward	26
Boilers taken out of service	18

SUMMARY OF DEFECTS OBSERVED.

Nature of Defects.	Number.	Dangerous.
Boilers with safety valves inoperative	3	3
Boilers with safety valves overloaded	2	1
Boilers with safety valves defective in construction	7	1
Boilers without pressure gauges	3	0
Pressure gauges inoperative	4	3
Pressure gauges defective	44	0
Cases of defective stays	3	2
" broken rivets	3	0
" broken stays or braces	2	1
" loose stays or braces	5	1
Boilers damaged by low water	1	1
Defective settings	28	2
Boilers with fractured plates	14	0
" laminated plates	5	1
burned plates	1	1

Summary of Defects Observed.—*Concluded.*

Nature of Defects.	Number.	Dangerous.
Cases of sediment on fire sheets	9	0
" internal corrosion	35	0
" scale or incrustation	30	0
" external corrosion	24	2
" defective tubes	12	1
" defective feed water arrangement	5	1
Serious leakage around tube ends	10	3
Serious leakage in rivet joints	8	0
Defective blow-off pipes or cocks	8	2
Defective water-gauges	7	4
Water columns without blow-outs	2	1
Cases of broken test cocks	20	0
Connections to water columns without valves	3	0
Boilers without fusible plugs	10	0
Boilers low at front end	6	0
Cases of serious leakage of fitting	14	1
Number of hand-holes, doors having bolts and dogs burned off	6	1
Defects in engines	6	1
Boilers without stop-valves	2	1
Unclassified defects	18	5
Total	360	40

S. Baxter,
Inspector of Steam Boilers, District "B."

INSPECTOR'S REPORT, DISTRICT "C."

———:o:———

NELSON, B. C., January 1st, 1907.

John Peck, Esq.,
Chief Inspector of Machinery, New Westminster, B. C.

SIR,—I have the honour to submit the following report for the year ending December 31st, 1906 :—

The work done has varied very little from that done in previous years. Several new sawmills have been built, new boilers for the most part being installed, and a few of the mines have changed from steam to electric power. The smaller mines in this district do not, as a rule, run steadily, with the result that the boilers, which are mostly of the vertical type, are out of commission part of the time. This makes it hard to make the inspections at these plants.

Twenty-four boilers have been installed in this district during the past year. Of these, thirteen were built under inspection in Eastern Canada. They were all of the return tubular type and were of 881 total horse-power. One boiler, also of return tubular type, was built in Vancouver.

Four new and six second-hand boilers were imported from the United States. Of these, four were of the return tubular, three locomotive, two vertical and one of the economic type. It was necessary to have all the fittings on the second-hand boilers changed to comply with the requirements of this Province.

Several plants have been burned and some of the boilers considerably damaged. Boilers Nos. 256 and 666 were both slightly buckled on top, and it was necessary to have several rivets replaced and the stays adjusted. No. 295 was also damaged and has not been used since.

There is still considerable trouble with engines bought second-hand in Eastern Canada. They are generally pretty well worn, and, without exception, have been built for a much lower steam pressure than is being carried on the boilers now being installed in this district. In several cases the boiler pressure has had to be reduced on account of the engine, and the owners inconvenienced thereby. None of these engines, when they arrive, are fitted with governors having automatic stops, and this was the cause of one accident this year. The planing mill engine in plant No. 371 ran away, with the result that the flywheel burst and the engine was more or less damaged. No one was hurt.

Four boilers were damaged by sediment lodging on the fire sheet, namely, Nos. 15, 17, 372 and 373. The feed water in each case was being taken from the mine, and the silt collected in the lowest part of the boilers, which in all four cases was the front end, and in two of the boilers the plate pulled out until it burst through in a small hole. Nos. 15 and 17 were in good order internally, as far as the absence of scale or mud on other parts of the shell was concerned, but the others were very dirty inside, and, when visiting the plant in the early fall, I found the pipes on the water column choking up. At some of the mines they are rather short of power, and between the mine foreman wanting to get the ore out, and the engineer wanting to get the boilers washed, it generally ends in letting the boiler run as long as possible without washing and trust to luck. The engineer at the plant mentioned above had left, and they got a man without a certificate for a time, who let the boilers run a little too long and much time was lost in repairs.

I visited the Cariboo District this year for the first time, and found that all the boilers there were being kept in good working order. As the owners said, it costs so much to get their plants that they are much too valuable to be abused. There are several very old boilers in this district, but most are of more recent make.

Most of the defects in the appended tabulated report are of minor importance, being mostly defects in the boiler fittings.

There is still some trouble arranging for engineers' examinations in this district. I am away from the office most of the time and the district is widely scattered, so that by the time a letter reaches an engineer who wishes to try for a certificate, and he can make arrangements to get away, I may have to go to some other part of the district. The result is, that most of them wait until examinations are held in the different centres of the district.

The above will give a general idea of the work done in this district, which, I trust, will meet with your approval.

Appended please find tabulated report.

I have, etc.,
Andrew Sutherland,
Inspector, District "C."

Inspector's Tabulated Report for the Year 1906. District "C," Nelson.

Engineers' Examinations.

Number of applications for examinations	32
Number of applications for re-examination	2
Number of applications approved	34
Examination fees	$155 00

Results of Examinations.

	No. Examined.	Passed.	Failed.
Third	25	25	..
Fourth	18	16	2
Temporary	1	1	..
Totals	44	42	2

Remarks.

The examinations held in this district in August were conducted by Mr. Baxter and myself. They were held in Fernie, Cranbrook and Greenwood, and all receipts for examination fees for applications received at date of examinations, as well as for three weeks previously, were issued from receipt book in my office. There are at present in my office 29 applications accepted and 3 not accepted; 1 first class, 1 second class, 20 third class and 12 fourth class. Most of them date back to 1902.

Summary of Work Done in District "C" in 1906.

Number of boilers built under inspection in British Columbia	1
" boilers built under inspection in Eastern Canada	13
" new boilers inspected built in the United States	5
" new boilers inspected built in British Columbia	1
" new boilers inspected (total)	19
" boilers imported from United States (second-hand)	6
" first inspections	39
" inspections, external and internal	217
" external inspections only	6
" special inspections after repairs	3
" visits in addition to inspections	197
" boilers subjected to hydrostatic test	215
" boilers on which pressure was reduced	7
" boilers repaired under Inspector's directions	9
" accidents to engines and boilers	4
" inspections completed	223
Total horse-power of boilers inspected	13,922.7
Number of defects observed as per summary	582
Number of defects considered dangerous	13
Inspection fees earned	$2,347 90
Inspection fees collected	$2,286 98
Miles travelled by the Inspector	7,175
Letters inward	265
Letters outward	217
Telegrams inward	14
Telegrams outward	10

SUMMARY OF DEFECTS OBSERVED.

Nature of Defects.	Number.	Dangerous.
Boilers with safety valves overloaded	1	..
Boilers with safety valves defective in construction	2	..
Pressure gauges defective	34	..
Cases of insufficient staying or bracing	8	..
" defective stays	10	..
" broken rivets	5	..
" defective riveting	1	..
" broken stays or braces	7	1
" loose stays or braces	15	..
Defective settings	21	..
Boilers with fractured plates	9	4
" burned plates	10	..
Cases of sediment on fire sheets	53	..
" internal corrosion	6	..
" scale or incrustation	74	..
" external corrosion	12	..
" defective tubes	11	..
" defective feed water arrangement	30	..
" broken feed valves	3	..
Serious leakage around tube ends	18	..
" in rivet joints	2	..
Defective blow-off pipes or cocks	9	..
" water-gauges	13	6
Water columns without blow-outs	5	..
Cases of broken test cocks	69	..
Connections to water columns without valves	30	..
Neutral sheets not stayed	5	..
Furnaces out of shape	2	..
Boilers without fusible plugs	45	..
" low at front end	32	..
Cases of serious leakage of fittings	4	..
Defects in engines	3	..
Boilers without stop-valves	9	..
Cases of defective steam pipes	2	..
Unclassified defects	22	..
Total	582	11

ANDREW SUTHERLAND,
Inspector of Steam Boilers, District "C."

INSPECTOR'S REPORT, DISTRICT "D."

———:o:———

Vancouver, B. C., January 1st, 1907.

John Peck, Esq.,
Chief Inspector of Machinery, New Westminster, B. C.

Sir,—I have the honour to submit the following report for the year ending December 31st, 1906 (*see* tabulated report).

The reason for the number of inspections being smaller this year than last is that I was absent from my district during July holding engineers' examinations, and during November and December I was confined to the house through illness.

There has been very little out of the ordinary to report during the year. The only accident resulting in personal injury was to an employee of the Independent Asphalt Co., who ran in front of the steam roller, which passed over one of his legs, breaking it in two places. This was through no fault of the engineer.

The engineer at the Alberta Lumber Co.'s plant reported finding low water in the boiler when he went on watch, relieving the Chinese watchmen, who had shut off the connection to the water column. This was noticed in time to prevent injury to the boiler.

An accident was reported to the engine in Cooke & Tait's mill, the valve and seat wearing down $1\frac{1}{8}''$ in three days. This was investigated by yourself.

The Barber Asphalt Co., of Seattle, after securing a contract on Nelson street, brought their steam concrete mixer from Seattle, and started to work without having the boiler inspected, and with an engineer who had not a British Columbia certificate. This firm was summoned and fined $100.

I would again call your attention to the boilers used here in the large buildings for steam heat. Several new boilers were installed for this purpose during the last year which do not comply with the Inspection Act in construction and fittings, and, as the correspondence handed to you last year shows, the steam fitters installing same will not comply with the regulations unless forced to do so by the Courts, claiming that they do not come under the Inspection Act, as they do not carry high pressure.

The engineers in charge in these heating plants are, without exception, uncertificated men, and if any accident happened to their steam gauge or water service they would, on account of ignorance of the danger, be very liable to cause a serious accident.

The log-haul engineers have not taken advantage, to any extent, of the fifth class certificates provided for them at the last Session of the Legislature, their services being in such demand, owing to the number of new donkeys operating in the woods, that they can secure employment without certificates, as the owners must keep their plants in operation. An example should be made of a few of these engineers, who practically defy the Department.

As you will see by the detailed report, there has been an increase in the number of new boilers built during the year over previous years. These have been principally for the log-hauls, the demand for which class of boiler, owing to increased market for lumber, taxed the manufacturers to their limit. In many cases purchasers who would have preferred having their boilers built in British Columbia were compelled to import them from Seattle, which accounts for the large number imported from the United States in report.

I was unable to visit the logging camps last year, owing to having other pressing duties at the time suitable for making inspections at the camps.

Trusting the above will meet with your approval,

I have, &c.,

George O. Madigan,
Inspector, District "D."

SUMMARY OF WORK DONE IN DISTRICT "D" IN 1906.

Number of drawings and specifications calculated for new boilers	25
" boiler plates inspected	163
" boiler plates rejected	22
" boilers built under inspection in British Columbia	66
" boilers built under inspection in Eastern Canada	6
" boilers built in Eastern Canada not under inspection	7
" new boilers inspected built in United States	22
" new boilers inspected built in England	1
" new boilers inspected (total)	102
" boilers imported from Eastern Canada (second-hand)	1
" boilers imported from United States (second-hand)	3
" boilers unclassified	3
" first inspections	109
" inspections, external and internal	222
" internal inspections only	2
" external inspections only	1
" special inspections after repairs	7
" visits in addition to inspections	318
" boilers subjected to hydrostatic test	264
" boilers on which pressure was reduced	11
" boilers unsafe without extensive repairs	3
" boilers repaired under Inspector's directions	9
" boilers considered unfit for further use	3
" accidents to engines and boilers	4
" accidents resulting in personal injury (not fatal)	1
" investigations	1
" inspections completed	269
Total horse-power of boilers inspected	9,465.3
Number of defects observed as per summary	286
Number of defects considered dangerous	40
Inspection fees earned	$1,962.40
Inspection fees collected	1,822.60
Miles travelled by the Inspector	3,760
Letters inward	560
Letters outward	527
Telegrams inward	4
Telegrams outward	3
Boilers taken out of service	6

WORK DONE FOR OTHER DISTRICTS.

Eleven boilers were inspected for District "B."
Thirteen " " "A."

WORK DONE BY OTHER INSPECTORS FOR THIS DISTRICT.

Forty-four boilers were inspected by Mr. Goldie during my illness.

SUMMARY OF DEFECTS OBSERVED.

Nature of Defects.	Number.	Dangerous.
Boilers with safety valves inoperative	2	2
Boilers with safety valves overloaded	5	5
Boilers with safety valves defective in construction	3	2
Pressure gauges inoperative	2	2
Pressure gauges defective, over 5 lbs. error	12	..
Cases of defective stays	1	..
" broken rivets	3	..
" defective riveting	6	1
" loose stays or braces	31	1

Summary of Defects Observed.—*Concluded.*

Nature of Defects.	Number.	Dangerous.
Defective settings	6	..
Boilers with fractured plates	6	..
Cases of sediment on fire sheets	8	2
" internal corrosion	7	..
" scale or incrustation	12	..
" external corrosion	16	4
" defective tubes	11	7
" defective feed water arrangement	21	1
Serious leakage around tube ends	16	..
Serious leakage in rivet joints	7	2
Defective blow-off pipes or cocks	19	5
Defective water-gauges	3	1
Broken blow-off pipes or cocks	5	2
Water columns without blow-outs	4	..
Cases of broken test cocks	8	..
Connections to water columns without valves	4	..
Boilers without fusible plugs	32	..
Cases of serious leakage of fittings	12	..
Number of hand-holes, doors having bolts and dogs burned off	1	1
Defects in engines	1	1
Boilers without stop-valves	11	..
Cases of defective steam pipes	3	..
Unclassified defects	7	1
Total	285	40

George O. Madigan,
Inspector of Steam Boilers, District "D."

ENGINEERS WHO OBTAINED CERTIFICATES IN 1906.

—o—

SECOND CLASS.

Bennett, Ernest	1649	Harkins, R. E	1578
Butler, J. R	1930	Kelly, E. J. J	1656
Dunlop, F. K	1612	Ludgate, W. G	1800
Evans, W. H	1638	MacMillan, W. A. A	1583
Gray, J. H	1645	McDougall, Wm	1713
Gisborne, Hartley	1987	Truran, Timothy	1700

THIRD CLASS.

Allen, W. J	1580	Fletcher, Jno	1809
Armstrong, Jno	1783	Flynn, J. R	1906
Archambeault, Anatole	1826	Fraser, J. R	2002
Andrews, A. McJ	1827	Garratt, L. E	1633
Andrews, A. H	1980	Galloway, G. W	1642
Boomer, Alonzo	1581	Glover, W. J	1688
Bowyer, Job	1621	Guthrie, D. L	1886
Brown, A. T	1650	Griffith, F. E	1950
Bell, Jno	1717	George, H. J	1951
Bennett, A. S	1778	Good, D. A	2004
Bescoby, F. E	1806	Hogan, W. F	1572
Bathie, Jno	1828	Hemer, Herbert	1582
Bryant, H. T. M	1870	Hagstrand, Albin	1653
Baker, F. H	1905	Howes, A. S	1689
Booth, Chas	1998	Halhed, R. B	1719
Carter, C, H. F	1585	Hird, J. B	1722
Clugston, Isaac	1611	Houston, W. L	1811
Clouston, Thos	1669	Houston, W. L. (Jr.)	1812
Clondening, C. F	1691	Hawkins, Edward	1840
Cummins, H. C	1718	Hird, J. L	1862
Crichton, J. C	1785	Hagen, C. O	1952
Cober, Andrew	1792	Hannah, T. H	1936
Cousins, A. H	1830	Hall, F. A	2005
Carter, Albert	1832	Hodgson, Brian	2006
Carter, Albert	1901	Johnson, F. L	1635
Crowe, J. S	1903	James, Thos	1654
Craighead, F. M	1904	Johnson, W. F	1662
Cowie, Alex	1948	Johns, F. A	1802
Clark, W. M	1956	Kinney, A. E	1579
Christie, R. R	2001	Kemp, W. B	1619
Clapperton, Jas	2051	Kelsey, F. E	1643
Duguid, Geo	1640	Kelly, J. D	1655
DeGruchy, A. S	1758	Lovering, Jno	1779
Duval, L. J	1813	Lawson, C. A	1871
Dell, F. J	1833	Leicester, C. H	1992
Dick, A. W	1986	Morrison, Alex. (Jr.)	1663
Eakin, Robt	1835	Matthews, T. A	1743
Frayne, G. H	1591	Munro, Geo	1768
Ferris, W. T	1607	Mileer, C. W	1820
Ferguson, Arch	1652	Morrison, W. H	1822
Fournier, Harry	1678	Martin, Thos	1859
Fraser, A. M	1695	Miles, L. C	1874

Engineers who Obtained Certificates in 1906.—*Continued.*

Third Class.—*Concluded..*

Michelmore, A. J	1884	Selk, G. J	1698
Miller, Jno	1962	Sharp, T. M	1699
McMahon, Jno	1641	Shortreed, Jas	1709
McDonald, Jas	1667	Sullivan, T. J	1710
McCauley, Jos	1744	St. Louis, E. J	1741
McKay, W. R. B	1755	Swindell, C. L	1742
McDougall, J. A	1842	Syer, T. W	1801
McGlashan, Donald	1843	Smith, H. J	1810
McKay, R. C	1912	Smith, Chas	1846
McKnight, S. T	1964	Sheppard, Geo	1847
McGregor, J. C	1993	Stagg, Geo	1865
Newberg, Jonas	1756	Street, G. E	1873
Nelder, Wm	1911	Staples, J. I	1881
Oulton, G. B	2059	Stewart, V. W	1882
Prideaux, Wm	1584	Strain, F. H	1914
Proulx, J. P	1682	Strut, Martin	1923
Pimlott, G. E	1753	Sutherland, W. M	1996
Parkinson, R. E	1775	Wiggs, Alfred	1573
Pearson, Edwin	1895	Whitlaw, L. A	1590
Powell, R. F	1899	West, W. H	1605
Parkin, Jos	2014	Watson, R. J	1610
Robertson, Jas	1615	Wood, J. J	1628
Reid, Chas	1807	Winny, Chas	1629
Raine, J. A	1823	Wright, F. E	1697
Rogers, Edward	2018	Wilson, Jas	1794
Roberts, Jno	2020	Walden, H. T	1816
Skinner, Henry	1618	Wilson, J. H	1853
Stokes, E. A	1625	Wood, Chas	1854
Shortreed, Jno	1631	Wallace, Geo	1897
Simes, Wm	1632	Werry, S. A	1919
Stacey, H. C	1659	Walker, Harley	1971

Fourth Class.

Alexander, R. R	1606	Chaney, Chas	1805
Abbott, R. C	1648	Curnoe, T. W	1829
Adam, D. A	1786	Cliffe, S. H	1957
Allan, G. T	1803	Cook, A. R	1958
Andrews, Jno	1824	Cox, Jno	1984
Addison, S. N. S	1825	Clarke, W. H	2000
Benson, Jno	1639	Doxsee, Jos	1690
Beatty, J. R	1687	Erickson, Alex	1931
Ball, T. D	1692	Euerby, W. E	1949
Baker, F. H	1888	Faulkner, Edwin	1637
Basey, A. J	1889	Ferguson, A. J	1752
Byatt, Jos	1890	Frankforth, B. H	1784
Barnes, Jno	1929	Fisher, Chas	1836
Brown, J. L	1981	Farr, Frederick	1932
Bertram, G. S	1983	Forsyth, Judson	1934
Barraclough, G. H	1999	Foster, Jos	1935
Cameron, W. M	1576	Fowler, Arthur	2003
Clinton, O. M	1598	Grice, Thos	1608
Clarke, Robt	1716	Greene, H. E	1684
Campbell, H. E	1749	Green, U. K	1837
Cosgrove, A. S	1793	Gill, J. I	1838
Christian, J. W	1799	Gillis, W. J	1915

ENGINEERS WHO OBTAINED CERTIFICATES IN 1906.—*Continued.*

FOURTH CLASS.—*Concluded.*

Grant, C. H 1960
Greenwood, E. E 2058
Hunter, Jos 1593
Haynes, Jas 1620
Huntley, C. D 1673
Hadden, David 1675
Hilder, C. J 1705
Howard, A. F 1708
Harris, G. A 1721
Hartnell, D. M 1734
Hodgson, J. W 1748
Hamilton, J. W 1863
Harris, Thos 1896
Hovell, J. T 1916
Hartin, Jas 1917
Harrison, Oliver 1961
Hunter, Herman 1989
Hawkins, H. E 2007
Hygh, E. C 2023
Ingle, J. W 1702
Jones, T. W 1586
Johnson, A. D 1634
Jones, E. T 1819
Koenig, O. R 1953
Kirk, C. L 2008
Lomas, Geoffery 1595
Leggett, Jno 1647
Laing, G. A 1679
Longman, J. W. G 1715
Liebehenschell, E. P 1885
Lumley, Mark 1937
Langill, Rupert 2009
Marshall, Oliver 1657
Mufford, C. T. 1733
Miles, H. C 1841
Morrison, Malcolm 1877
McCann, Geo 1594
Macdonald, Jas 1613
McLeod, Malcolm 1646
McKay, R. C 1664
McIntosh, N. M 1696
McDonald, Jas 1703
McKamey, T. R 1740
McCrady, J. W. R 1745
MacDonald, Morrison 1776
McPhail, Jas 1844
McEachern, J. A 1852
McPherson, Jno 1920
McDonald, J. A 1943
McDonell, A. K 1954
McKenzie, W. A 1955
McKinnon, W. B 1977
Niven, Thos 1732
Nicoll, L. W 2012
Oliver, Robt 1674
Oxley, Arthur 1798
Papke, Herman 1589
Plumb, C. W 1596
Pierce, C. E 1601
Pearson, Edwin 1759
Place, T. W 1787
Pool, Walter 1872
Parrott, F. J 1913
Piket, L. D 1966
Potts, Jno 2013
Prior, J. R 2025
Rowland, Jacob 1602
Rooker, S. H 1603
Roberts, Wm 1609
Rudderham, Geo 1735
Ryan, T. J 1845
Richardson, Chas 1902
Reeves, W. M 1909
Ray, R. R 1967
Ridsdale, R. S 2016
Robinson, J. R 2019
Robinson, W. S 2022
Roskelley, W. P 2021
Savage, J. A 1604
Simpson, M. O 1617
St. Louis, E. J 1704
Schmidt, George 1712
Sturdevant, Edward 1739
Stickland, Harry 1894
Spear, E. J 1898
Sargent, A. T 1940
Shaw, G. N 1968
Spedding, Jos 1995
Terhune, M. G 1670
Tait, T. H 1677
Taylor, Frederick 1685
Turner, J. A 1714
Thompson, H. A 1773
Thomas, Jno 1997
Wiancko, T. A 1627
Wooster, W. G 1661
Walters, T. H 1701
Weller, A. J 1711
Whitten, Wm 1738
Whithers, W. A 1750
Welbourne, G. A 1751
Warner, G. A 1774
Woodward, Chancie 1777
Whitford, R. H 1848
Weber, Adolph 1883
Westerlund, Olof 1942
Wirtanen, G. W 1944
Whyte, Jas. (Jr.) 1972
Whyte, Harry 1974
Webster, Hedley 1978

Engineers who Obtained Certificates in 1906.—*Concluded.*

Fifth Class.

Barreau, Mat..... 1976
Neil, J. W..... 1879
Skinner, Edward..... 1676
Sanderson, E. D..... 1907
Walsh, E. W..... 1887

Temporary Certificates.

Atkinson, J. M.....1849..August 18th.
Atkin, A. C.....1878..Sept. 24th.
Andrews, F. H.....1979..Nov. 29th.
Bellis, M. A..... 1574..Jan. 30th.
Bowman, Orien.....1622..March 26th.
Barry, Michael.....1694..April 10th.
Brown, Jas. .....1770..June 6th.
Bent, J. G.....1780..July 10th.
Bonson, H. W.....1851..Sept. 9th.
Byers, J. W.....1861..Feb. 1st.
Caron, Simon.....1636..March 29th.
Colquette, S. D.....1782..Jan. 1st.
Churchill, Samuel.....1789..August 1st.
Collins, J. W.....1831..August 14th.
Dickinson, W. L.....1765..May 1st.
Dixon, Harry .....1815..July 13th.
Galloway, Alex.....1760..May 21st.
Gregory, Samuel.....1761..June 1st.
Galbraith, Wm.....1814..June 13th.
Grinnell, A. E.....1856..August 15th.
Grant, R. H.....1959..Nov. 17th.
Harris, H. B.....1592..Jan. 19th.
Harris, J. E.....1668..April 4th.
Hitchcock, C. M.....1757..May 22nd.
Harris, T. E. P.....1926..Oct. 13th.
Hofferman, J. J.....1928..Oct. 6th.
Kelly, J. W..... 1766..June 1st.
Kelly, J. A.....1771..May 15th.
Knudson, Lewis.....1850..August 15th.
King, R. D.....1864 .Sept. 8th.
Lidgate, R. J.....1587..Feb. 24th.
Lockley, W. H.....1781..July 1st.
Lewis, Emery.....1790..July 23rd.
Mathers, Jno.....1588..Feb. 23rd.
Mercer, J. B.....2024..Dec. 18th.
McFarlan, Howard....2011..Dec. 4th.
Ostrom, August.....1818..August 13th.
Peterson, H. P.....1868..Sept. 14th.
Parmer, E. S.....1880..Sept. 25th.
Potts, Jno.....1927..Oct. 17th.
Peterson, Henry..... 1947..Nov. 13th.
Robinson, W. S.....1720..April 27th.
Rolph, F. S.....1860..Sept. 9th.
Roach, Hugh.....1946..Oct. 29th.
Simpson, Ralph.....1763..May 11th.
Spear, E. J.....1769..June 1st.
Springer, J. W.....1791..June 16th.
Stanhope, P. W.....1869..Sept. 15th.
Thomas, S. J.....1762..May 1st.
Tyner, R. E.....1857..August 25th.
Tierney, M. C.....1867..Sept. 19th.
Thorkilson, J. P.....1924..Oct. 23rd.
Taylor, Jno.....1925..Oct. 15th.
Walsh, E. W.....1764..May 1st.
Whelpton, F. A. .....1788..July 17th.
White, J. J.....1866..Sept. 12th.

VICTORIA, B. C.:
Printed by Richard Wolfenden, I.S.O., V.D., Printer to the King's Most Excellent Majesty.
1907.