

REPORT ON THE QUALITY OF THE OIL, FURNISHED TO THE NORTHERN LIGHTHOUSES IN 1864, AND RELATIVE STATISTICS.

In conformity with the instructions of the Commissioners, we drew up directions for testing the quality of the oil at the different Lighthouses, and a list of queries to be answered by the different Lightkeepers. These were approved of by the Board, and in November last were communicated to the several Stations. On the 14th January, the Commissioners remitted to us to examine and report on the returns received from the different Stations in answer to the queries referred to. From these returns we have collected the information contained in the following Report and in the appended table.

The observations of the Lightkeepers on the oil of 1864 extended over a period of ten nights, and the following are the most striking of the results as given in the table :—

Four-wick Lamps.

<p>The average consumption of oil per hour in the Stations, nineteen in number, where, the four-wick mechanical lamp is used, was .21 gallon, which is equal to the annual consumption of 793.8 gallons. The highest consumption was at Covesea, where it was .234 gallon, and the lowest was at St Abb's Head, where it was only .182 gallon.</p>	Consumption
<p>At seventeen of the Stations the wick was never '<i>coaled</i>' during the night throughout the whole duration of the observations, but at St Abb's Head, the wick was coaled ten times, or once every night, and at, North Unst nine times during the ten nights of trial.</p>	Coaling of the Wick
<p>At St Abb's Head, North Unst, Monach, and Covesea, the flame was not <i>always</i> at the standard height shown on the diagram, which is hung up in each Lightroom for the guidance of the Keepers.</p>	Standard Height of Flame.
<p>The average time of getting up the flame to full height at all the nineteen Stations was thirty-two minutes, the longest, at Kinnairdhead, being two hours and ten minutes.</p>	Time of getting up to Full Height
<p>The average number of wicks used at the nineteen Stations was three and a half, the smallest being two and a half at Dunnet Headland the largest being five at North Unst.</p>	Number of Wicks Used.
<p>At Monach, the oil in four of the cisterns was reported as good, and in two it was reported as not so good. At Ardnamurchan it was reported as not equal to the oil of 1863, and at North Unst it was reported '<i>inferior</i>;' at all the other Stations it was '<i>good</i>,' '<i>very good</i>,' and '<i>excellent</i>.'</p>	Quality of Oil.

Three-wick Lamps

<p>The three-wick lights, three in number, consumed on an average .116 gallon per hour, consumption, equal to 438.5 gallons per annum. The highest being Rhu Vaal, which was .123, and the lowest Inchkeith, which was .110 gallon.</p>	Consumption
<p>At all the, three-wick Stations the oil is represented as of '<i>good quality</i>.' At two of them the flame was generally, and at the third it was always at standard height.</p>	Quality of Oil
<p>They were never coaled. Ten wicks were used at Macarthur's Head</p>	Coaling of Wick, &c.

Two-wick Lamps.

Large Size

<p>The average consumption at the seven Stations, where there is a two wick large-sized burner, is .0574 gallon per hour, equal to 217 gallons per annum; the highest, .0616, being at Start Point ; and the lowest, at Kyleakin, being .0521.</p>	Consumption.
<p>The only Station where the wick was coaled was at Corran, where it was coaled ten times during the ten nights of experiment.</p>	Coaling of Lamp
<p>At all the seven Stations the flame was reported as of the standard height.</p>	Standard Height of Flame.
<p>The oil was reported as of '<i>good</i>' quality at all the Stations excepting Corran, where it was reported as being '<i>inferior</i>.'</p>	Quality of Oil.

Two-wick Lamps.*Small Size.*

Consumption.	The average consumption at the four stations where a small sized burner is used, was .0279 gallon per hour, equal to 105.5 gallons per annum, the highest being at Boy High Light, viz.- .0320 gallon; and the lowest at Hoy Low, being .023 gallon per hour.
Coaling.	The wick was never coaled at any of these Stations during the trials.
Number of Wicks used.	The average number of wicks used during the observations was three, the highest (four) being at Loch Ryan, and the lowest (two) being at Chanonry.
Standard Height of Flame.	Excepting at Hoy Low, the flames were always of standard height.
Quality of Oil.	At all these Stations the quality was reported as good, excepting at Hoy, where it was reported 'inferior.'

Argand-burner Lights.

Consumption	The average consumption at twenty-one stations, where argand burners are used, was .0105 gallon per hour, equal to 39.7 gallons per annum, the highest being at Lismore, where .0135 gallon was consumed, and the lowest being at Rona, where .0082 gallon was consumed.
Coaling of Lamp.	The average number of coalings at twenty-one Stations was four. At Tarbetness, Cantickhead, Stornoway, Rhinns of Islay, Girdleness Low Light, and Point of Ayre, the wicks were coaled ten times, or once each night.
Standard Height of Flame.	At some of the argand-burner Stations it is reported that there is no diagram in the Lightroom of the standard argand flame; 14 Stations report the flame as at the standard height, and at Devaar it is reported as below the standard height.
Time of getting up the Flame.	The average time of getting up the flame is twelve minutes, the shortest, two minutes, being at Rhinns of Islay, and the longest, thirty minutes, being at Tarbetness.
Numbers of Wicks.	The average number of wicks used was two and two-thirds, the lowest being two at some stations, the highest being five at Lismore.
Quality of Oil.	At Rhinns of Islay the oil is reported as 'inferior,' at Devaar as 'medium' and at all the others it is reported as 'good'; but at Corsewall it is stated that the only times on which it was necessary to coal the wick, was on the third and fourth nights, when the oil was from a different cistern, and not of so good a quality.

GENERAL REMARKS.

The results of these trials and returns is on the whole highly satisfactory, and proves that the lights in the service generally are in charge of competent keepers. The flame is, with very few exceptions, kept to the standard size, the quantity of oil consumed is sufficient to produce such a flame, and the fact that the wicks are, with so few exceptions, never coaled, corroborates the favourable opinion which we have expressed.

The quality: of the oil may also safely be reported as very good.

While this favourable report is made of the lights generally, there are a few special circumstances stated in the returns, which we think are worthy of being enquired into, viz.:-

1st. The small consumpt of .182 gallon, and the frequent coaling, ten times, at St Abb's Head, seem to require investigation.

2d. The frequent coaling, nine times, during the ten nights trial, at North Unst and Lismore, and ten times at Corran, Tarbetness, Rhinns of Islay, Point of Ayre, Cantickhead, Stornoway, and Girdleness Low Light.

3d. The length of time, two hours ten minutes, required to get up the flame at Kinnairdhead.

4th. The large number of ten wicks, during the ten nights trial, used at Macarthur's Head

5th. The want of diagrams of the flame at some of the Stations where the single Argand burner is used.

6th. The reported inferior quality of the, oil at North Unst, Hoy, Corran, and Rhinns of Islay, and the want of uniformity in quality in all the cisterns at Monach and Corsewall.

(Signed)

D. & T. STEVENSON.

Edinburgh, 8th February, 1865.

Engineers to the Board.

TABLE OF LIGHTROOM STATISTICS, JANUARY 1865.

NAME OF STATION	Average consumption in gallons per hour of the lamp	Total Number of Coalings of Wick in the ten days	Number of Hours burned	Was Flame always at Standard?	Was Flame Generally at Standard?	Was Flame Steady or Unsteady?	Average time required to bring up Flame to Standard	Was Ventilation good?	Were Wicks much or little blackened?	Number of Wicks used.	Was Oil affected by cold?	Is there much or little dreg?	Is Oil of same quality in all the cisterns?	What is your opinion of the Oil?	REMARKS BY THE LIGHTKEEPERS
Four-wick Lamps															
Isle of May	·217	0	H:M 137:43	Yes	...	Steady	1:28	Yes	Little	3	No	Little	...	Very good	{ proportion of dreg 1 in 90
Girdleness, High	·214	0	139:13	Yes	...	Steady	0:14	Yes	Little	3	No	Little	...	Very good	
Covesea	·234	0	139:59	No	Yes	Steady	1:04	Except 1st night	Little	3	No	...	...	Excellent
Nosshead	·214	0	144:07	Yes	...	Steady	0:09	Yes	Little	8	No	Little	...	Good	
Pentland Skerries	·224	0	141:35	Yes	...	Steady	0:04	Yes	Little	3	No	A good deal	...	Good	
North Ronaldshay	·221	0	142:06	Yes	...	Steady	0:13	Yes	Little	3	No	Little	...	Good	
Whalsey	·198	0	144:56	Yes	...	Steady	0:18	Yes	A good deal	4½	No	Little	...	Good	
Dunnet Head	·223	0	141:07	Yes	...	Steady	0:16	Yes	Little	2½	No	Little	...	Good	
Butt of Lewis	·212	0	141:07	Yes	...	Steady	0:10	Yes	Little	3	No	Little	...	Good	
Island Glass	·202	0	139:49	Yes	...	Steady	0:09	Yes	Little	3	No	Little	...	Good	
Monach, High	·213	0	139:50	No	Yes	Steady	0:10	Yes	Little	3	No	Little	No	Good	{ Four of the cisterns were good, but two were not so good
Ushenish	·196	0	139:51	Yes	...	Steady	0:23	Yes	Little	3	No	Little	...	Good	
Skerryvore	·198	0	137:57	Yes	...	Steady	0:17	Yes	Little	4	No	Little	...	Good	
Ardnamurchan	·201	0	188:44	Yes	...	Steady	0:24	Yes	Little	4	No	Little	...	Good	{ but not equal to 1863 oil proportion of dreg 1 in 200
Sanda	·215	0	137:19	Yes	...	Steady	0:28	Yes	Little	3¾	No	Little	...	Good	
Kinnaird Head	·223	0	140:13	Yes	...	Steady	2:10	Yes	Little	4½	No	Little	...	Good	
St Abb's Head	·182	10	137:00	No	...	...	0:19	Yes	Little	4	No	...	...	Good
Little Ross	·203	0	135:38	Yes	...	Steady	0:55	Yes	A good deal	3	No	Little	...	Good	
North Unst	·196	9	143:55	No	Yes	Steady	0:31	Yes	Little	5	No	Little	...	Inferior	
Three-wick Lamps.															
Inchkeith	·110		135:38	No	Yes		1:38	Generally good	Little	4	No	Little	...	Good	
Rhu Vaal	·123		137:59	No	Yes	Generally steady	1:05	Good	Little	3½	No	Little	...	Good	
Macarthur's Head	·113		137:00	Yes	...	Steady	0:20		Much	10	No	...	...	Good
Two-wick Lamps. Large Size															
Corran	·0593	10	139:09	Yes	...	Steady	0:05	Yes	Good deal	5	No	Little	...	Inferior	
Phladda	·0542	0	137:38	Yes	...	Steady	0:38	Good	Little	3½	No	None	...	Good	
Sound of Mull	·0614	0	138:31	Yes	...	Steady	0:30	Yes	Little	4½	No	Little	...	Good	
Oronsay	·0608	0	143:51	Yes	...	Steady	0:20	Yes	Good deal	4½	No	Little	...	Good	
Kyleakin.	·0521	0	139:41	Yes	...	Steady	0:09	Bad	Good deal	4	No	Little	...	Good	
Holburn Head	·0523	0	141:07	Yes	...	Steady	0:31	Good	Little	4	No	Little	...	Good	
Start Point	·0616	0	141:52	Yes	...	Steady	0:08	Middling	Little	5	No	...	...	Good
Two-wick Lamps. Small size.															
Hoy, High	·0326	0	143:01	No	Yes	Unsteady	0:08	Good	Little	3	No	Little	...	Inferior	
Hoy, Low	·0230	0	143:47	No	Yes	Unsteady	0:09	Good	Little	3	No	Little	...	Inferior	
Loch Ryan	·0274	0	136:48	Yes	...	Steady	0:11	Good	Little	4	No	None	...	Good	
Cromarty	·0286	0	140:12	Yes	...	Steady	0:28	Good	Little	2½	No.	...	...	Good
Chanonry	·0280	0	139:26	Yes	...	Steady	0:29	Good	Little	2	No	Little	...	Good	

TABLE OF LIGHTROOM STATISTICS, JANUARY 1865.

NAME OF STATION	Average consumption in gallons per hour of the lamp selected for the trial	Total number of Coalings of Wick in the ten days	Number of Hours burned	Was the Flame always at Standard?	Was Flame generally at Standard?	Was Flame Steady or Unsteady?	Average time required to bring up Flame to Standard.	Was Ventilation good?	Were Wicks much or little blackened?	Number of Wicks used.	Was oil affected by cold?	Is there much or little Dreg?	Is oil of same quality in all the cisterns?	What is your opinion of the oil	REMARKS BY THE LIGHTKEEPERS.
Argand Burners.			H:M				H:M								
Bell Rock	.0109	2	137:57	...	...	Steady	0:19	Good	Little	2	No	Little	...	Good	
Tarbetness	.0116	10	139:49	Yes	...	...	0:30	Good	Little	3	No	Little	...	Good	
Devaar	.0099	4	137:18	No	...	...	0:10	Bad	Much	2	...	...	...	Medium	
Pladda	.0101	2	136:40	Yes	...	Steady	0:08	Bad	Little	2	No	Little	...	Good	
Buchanness	.0108	2	139:27	Yes	...	Steady	0:21	Good	Little	2	No	...	...	Good	Proportion of dreg 1 in 60
Mull of Kintyre	.0113	1	138:31	...	...	Steady	0:10	Good	Little	2	No	Little	...	Good	
Corsewall	.0114	2	136:17	Yes	...	Steady	0:19	Good	Little	4	No	Little	No	Good	The coalings took place on the third and fourth nights, when the oil was from a different cistern, and not so good.
Cantickhead	.0101	10	141:25	...	...	...	0:10	Good	Little	2	No	Little	...	Good	
Sumburghhead	.0104	0	142:25	Yes	...	...	0:03	Good	Little	3	Yes, at 38°	Little	...	Good	
Bressay	.0101	5	152:01	Yes	...	Steady	0:26	Good	Little	2	No	Little	...	Good	
Cape Wrath	.0106	2	141:07	Yes	...	Steady	0:15	Good	Little	2	No	Good deal	...	Good	
Stornoway	.0105	10	142:04	Yes	...	Steady	0:05	Good	Little	3	No	Little	...	Good	
Barrahead	.0104	2	138:31	Yes	...	Steady	0:15	Good	Little	2	No	Little	...	Good	
Rona	.0082	0	142:02	Yes	...	Steady	0:10	Good	Little	2	No	Little	...	Good	
Lismore	.0135	9	138:49	Yes	...	Steady	0:03	Good	Little	5	No	Little	...	Good	
Rhinns of Islay	.0105	10	137:07	Yes	...	Steady	0:02	Good	Little	3	No	Great Deal	...	Inferior	
Mull of Galloway	.0097	0	138:12	...	...	...	0:05	Good	Little	3	No	Little	...	Good	
Girdleness, Low	.0101	10	139:13	Yes	...	Steady	0:05	Good	Little	3	No	Little	...	Good	
Point of Ayre	...	10	...	Yes	...	Steady	0:05	Good	Little	3	No	Little	...	Good	
Douglas Head	...	0	...	...	...	Steady	0:15	Good	Little	2	No	Little	...	Good	
Calf of Man	.0099	0	136:07	...	...	...	0:15	Good	Little	2	No	Little	...	Good	

D. & T. STEVENSON.

Engineers to the Board.

EDINBURGH, 8TH FEBRUARY, 1865.

POSTSCRIPT.

WITH reference to the general remarks at the close of the foregoing Report, the following explanations have been received from the Officers and Lightkeepers :—

1. At St Abb's Head it has been ascertained from a Report by the Foreman of Lightroom repairs, who has visited the Station, that the small consumpt of oil, and the frequent coaling of the wicks, were due to the oil being used for, trial too soon after it had been delivered at the Lighthouse.

The Frequent coaling and alleged inferiority of the oil, referred to in the second and sixth remarks, are also satisfactorily explained by the Lightkeepers as proceeding from the same cause, they having reported that the burning of, the oil is now quite satisfactory.

3. It is explained with reference to the third remark regarding Kinnaird Head, that the Light-keeper had a good flame in 30 minutes, but that it "improved in shape and compactness" up to two hours and ten minutes, the time stated in the Report.

We beg in conclusion to recommend, in order to insure that all impurities in the new oil shall have time to settle, that the Lightkeepers should be instructed not to begin the ten nights of experiments until after they have had at least fortnight's trial of the oil.

D. & T. S

EDINBURGH 4th March 1865.