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Report on

DUST SAMPLES FROM FIRE BOXES OF OIL FIRED LOCOMOTIVES

by

R.A. Love

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DUST SAMPLES FROM FIRE BOXES OF OIL FIRED LOCOMOTIVES

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ABSTRACT

Assays of samples of dust collected from the locomotive fire boxes at Mile End showed an appreciable quantity of Vanadium in the air being breathed by workmen repairing these locomotives.

INTRODUCTION

At the request of the South Australian Railways, I visited the Mile End Roundhouse on the 2nd of October in company with Mr. S. Williams. We collected samples of dust breathed by workmen during routine maintenance operations on oil fired locomotives.

SAMPLING

Procedure

The samples were collected on a No. 41 Whatman filter paper fitted into a holder on the end of a flexible tube (vacuum cleaner hose).

The suction for collecting the sample was supplied by a modified Electrolux vacuum cleaner into the head of which an anemometer had been fitted so that the flow of air could be measured.

Filter papers were changed when the air speed dropped to about 100 ft. per minute.

The dust-charged papers were removed from the holder, folded and placed in stoppered bottles for transport to the Analyst.

The samples represent, as nearly as it was possible to obtain, the air the workmen were breathing.

Samples taken

Samples Nos. A 1918/58.1 to A 1921/58.5 were taken from loco. No. 251 and Samples A 1922/58.6 to A 1925/58.9 from loco. James McGuire.

Quantity of air inhaled

A person at rest breathes 420-580 litres per hour. A person walking or working breathes two to three times this amount depending on the effort involved.

It has been assumed for the purpose of this investigation that the workmen would be breathing at the rate of 1000 litres per hour.

Results

Mark	Location	Operation	Volume of air sampled litres	Duration of sampling and approx. employee exposure time to dust in minutes	Micrograms of Vanadium (V) per 1000 litres of air	Possible Ingestion of Vanadium during time spent on each operation assuming operator is breathing 1000 litres per hour Micrograms
A1918/58 1	Cabin of Loco.	Knocking down firebrick arch in fire box	634	10	0.85	0.14
A1919/58 2	In fire box	Completing dismantling of fire brick arch	180	3	160	8.0
A1919/58 3	In fire box	Boiler maker tightening up plugs	100	1	2	0.033
A1920/58 4	In fire box	Building firebrick arch	2480	40	73	49.0
A1921/58 5	Front of engine	Blowing boiler tubes	3072	15	2.5	0.62
A1922/58 6	In fire box	Removing bricks from arch	830	10	85	14.1
A1923/58 7	In fire box	Cleaning up	240	5	660	55.0
A1924/58 8	Front of engine	Cleaning out sand and soot. Boiler makers 1 min. tightening nuts	735	13	14	3.03
A1925/58 9	In fire box	Blowing tubes	530	8	130	9.33

SUMMARY

1. On the 2nd October, 1958, at the Mile End Roundhouse, samples of the dust breathed by workmen were taken while routine maintenance work on oil fired locomotives was carried out.

2. Samples were taken from Locomotive No. 251 and Locomotive James McGuire.

3. For the purpose of this investigation a standard of 1000 litres per hour was fixed as a man's breathing rate.

4. The assays showed that appreciable amounts of Vanadium are present in the air while men are working in the fire boxes of the locomotives - from 0.85 Micrograms per 1000 litres to 660 Micrograms per 1000 litres.

5. In the September 1957 issue of the American Medical Association Archives of Industrial Health there is a report of a meeting of the American Convention of Government Industrial Hygenists. Concentrations of the dusts of various toxic substances, in which men could work with safety, are suggested.

For Vanadium the limits were:-

Ores. 500 Micrograms per cubic meter (1000 litres)

Fumes. 100 Micrograms per cubic meter (1000 litres)

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