

RAPPORT No.

REPORT No. 7.

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Messrs Savage & Berg



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BRANDSTOF-NAVORSINGS-INSTITUUT

VAN SUID-AFRIKA.

FUEL RESEARCH INSTITUTE

OF SOUTH AFRICA.

ONDERWERP:

SUBJECT: REPORT ON VISITS TO LOURENCO MARQUES IN

CONNECTION WITH THE SPONTANEOUS HEATING OF UITKYK EXPORT COAL

IN THE S.S. AMSTELSTAD.

AFDELING:

DIVISION: CHEMISTRY.

NAAM VAN AMPTENAAR:

NAME OF OFFICER: C. C. LA GRANGE & A. J. PETRICK.

FUEL RESEARCH INSTITUTE OF SOUTH AFRICA.

REPORT NO. 7 OF 1948.

REPORT ON VISITS TO LOURENCO MARQUES IN CONNECTION WITH
THE SPONTANEOUS HEATING OF UITKYK EXPORT COAL IN THE
S.S. AMSTELSTAD.

Over a period commencing on 30/7/48 the Institute received various reports that coal loaded into the S.S. Amstelstad was showing signs of excessive heating while the ship was still in port taking coal.

An officer of the Institute was accordingly sent to Lourenco Marques to obtain first hand information on this matter.

During his first visit from the 9th to 11th August, he was mainly concerned with the heating of nut coal while on the second visit, 17th to 19th August, the position in regard to round coal was investigated.

Loading of nuts into the ship had commenced on 8/7/48. On 29/7/48 heating was first reported and discharge of nuts was commenced on 31/7/48 and completed on 9/8/48. Altogether about 2,550 long tons of nuts had been loaded.

Loading of rounds into the ship had commenced on 9/7/48 and on 12/8/48, the date on which loading was completed, heating was first reported. Altogether 6,623 long tons of rounds were loaded.

The maximum capacity of the ship was stated to be 9,500 long tons.

All loading was stated to have been carried out with Appliance No.1 except for a small amount of rounds (574 long tons) loaded into Hold 5 on 11/8/48 with appliance No.2.

THE HEATING OF NUT COAL:

When the officer arrived at Lourenco Marques practically all the nuts had already been discharged from Holds Nos. 1, 3 and 5 of the ship and round coal from Uitkyk Colliery was being loaded to replace the nuts.

It was reported that the maximum registered temperature in the nuts had been 185 °F (85 °C) before stevedores had been called in to discharge the coal.

This coal had been dumped at some distance from the quay-side. On visual examination these nuts appeared to contain a high proportion of fine coal.

Six trucks of Uitkyk nuts that had not been loaded into the ship, and were still standing in the yards, were examined. The coal generally appeared to contain an appreciable amount of fines. Nearly every truck contained a section where the amount of fines

appeared to be/.....2.

TABLE 2.

SCREEN ANALYSIS OF ROUND COAL CONTAINING
SOME $-1\frac{3}{4}$ " MATERIAL.

Size Limits.	Weight, per cent.	Calculated on $-3\frac{3}{4}$ " material.
$+1\frac{3}{4}$ "	75	
$-1\frac{3}{4}$ " + $\frac{3}{4}$ "	20	
$-\frac{3}{4}$ "	5	Wt. %.
$-\frac{3}{4}$ " + $\frac{1}{4}$ "	-	73
$-\frac{1}{4}$ " *	-	27

* A small amount of dust was blown away by the wind.

On inspecting the coal in the S.S. Amstelstad it was found that the surface coal in all the holds contained an appreciable amount of small coal and fines. In most of the holds the proportion of fines was apparently very high. On digging into the coal at a few places, the fines appeared to persist to some depth at least. At most places where the proportion of fines was high the coal was hot and damp. Steam was rising from two places in one hold. What was considered to be iron sulphate crystals were observed in places. Maximum temperatures of 176 and 194 °F, respectively, had been registered in two of the holds.

Ultimate spontaneous ignition in at least these two holds seemed very probable and a statement to this effect was issued to the parties concerned.

A ship into which export coal not originating from Uitkyk Colliery had been loaded was visited, and although containing an appreciable amount of fines much less fine coal was visible in this coal than in that in the Amstelstad.

The high percentage of fines observed in the surface coal in the Amstelstad was certainly not reflected in the trucks of Uitkyk round coal that had been inspected in the yards.

As far as could be ascertained no nuts had been loaded with the rounds into the ship.

(Sgd.) C. C. LaGrange.
SENIOR RESEARCH OFFICER.

(Sgd.) A.J. Petrick.
DIRECTOR.

PRETORIA.

25th August, 1948.

APPENDIX TO REPORT NO. 7 OF 1948:

1. On 28/6/48 samples of coal were taken at a fresh face in the workings of Uitkyk Colliery in the district from which, according to colliery officials, export coal was to be mined. The samples were sealed immediately and one was used to determine the oxygen absorption according to a technique yielding results comparable with those of T.F. Winmill (see - Transactions of the Institution of Mining Engineers, 1913 - 1916.).

The results of the oxygen absorption tests are shown in Table 3.

TABLE 3.

RESULTS OF OXYGEN ABSORPTION TESTS ON A SAMPLE OF
UITKYK COAL.

Temperature of Absorption.	Ml. Oxygen (at N.T.P.) absorbed in 96 hrs. by 100 gms. (weighed dry) of -60 mesh coal. (Absorptions carried out at a constant and known humidity in an atmosphere of air).	Increase in sulphate-sulphur content of sample during oxygen absorption test.
30 °C	178	Nil.
60 °C	515	Nil.

On the basis of the results shown in this table, and assuming Winmill's interpretation to hold for South African coal, and comparing values with those of P. N. Lategan (see - The South African Journal of Industries, December, 1925), this coal would not be classed as particularly liable to spontaneous heating.

2. On 3/8/48 a copy of a letter regarding a case of spontaneous combustion of Uitkyk coal in 1920, was received at the Institute. The text of this reads:

/.....5.

" s.s. "SPARTAN PRINCE" - BUENOS AIRES PACIFIC RLY. CO.

Referring to your letter of 2nd, we give you herewith the following details about the Uitkyk coal shipped per above steamer:

No.1 hold caught fire 7 to 8 days from Buenos Aires and No.5 hold caught fire in Buenos Aires Docks.

Practically the whole quantity in the two holds was lost and the Railway are claiming against the Underwriters. The remainder of the cargo is untouched in the Pacific Yard at Santos Lugares pending settlement of claim.

The Railway report that the coal is very much inferior to Witbank or Natal and we understand the shippers were Messrs. Robt. Hudson & Sons, Ltd.

They cannot give us any information as to the reasons of the coal catching fire. We will try and get further particulars but think we have obtained all the information the Railways are likely to give us."

3. On 19/8/48 the following statement regarding the round coal in the S.S. Amstelstad was handed to the various interested persons at Lourenco Marques:

" TO WHOM - SO - EVER IT MAY CONCERN.

Having inspected the coal in the S.S. Amstelstad, and having considered data supplied by her captain, I regard the probability of the ultimate spontaneous ignition of the coal as it exists in Nos. 2 and 4 Holds to be very great.

I have no reason to believe that the coal in the other holds will not behave similarly in due course.

(Sgd.) C.C. laGrange.

19/8/1948.
10.15 a.m.

Acting on behalf of the Director,
Fuel Research Institute
of South Africa. "

4. On 24/8/48 a copy of a telegram dated 21/8/48 and reading:

"Under instructions commencing this afternoon discharge all cargo Amstelstad owing serious heating throughout."

was received.