1194/2.

1.2.1963

GERMAN GEOLOGICAL MISSION
IN AFGHANISTAN
Wi/61/533/63

as appendix to
DGMA Report on Coal Investigations
in Afghanistan

Additional Report
on Coal Properties of Dahan-i-Tor
(Darra-i-Suf, Lower Seam)

In the spring of 1962 a channel-sample of coal was taken by the German Geological Mission in the Lower Seam at Dahan-i-Tor Coal Mine. The place of sampling was one of the adits (at that time Adit No. 5, 23 m flat dipping distance from mouth, 15 m crosscut to West).

The macropetrographical section of the seam showed as follows (from the roof to the floor).

S II/1	50 cm	"Glanzstreifenkohle"
S II/2	20 cm	Shale
S II/3	30 cm	"Glanzstreifenkohle"
S II/4	60 cm	- " -
S II/5	25 cm	- " -
total thickness of raw coal	165 cm	

1194/2

The samples were packed airtight in the mine and airfreighted to Hannover, Germany. Coalpetrographical analyses were not needed again since there was no difference from earlier samples of that place. Four samples (S II/1, 3, 4, 5) were analysed chemically both separately and in a mixed sample, the results of which are representative for the whole channel.

The mixed sample of "Glanzstreifen- und Glanzkohle" showed only very little carbonaceous shale, a few yellowish oxydization films and carbonate films on joints. Granulation is middle to small lumpy. The sample had kept the moisture of the mine.

The mixed sample had the following physical and chemical properties:

H_2O of the raw coal	5,1	
Hygroskopical H_2O (airdried)	2,5	
Capacity of H_2O absorption (ashfree)	4,7	
Sulphur (total) waterfree	0,75	
Ash (waterfree)	14,9	colour: pink wit white grains.
Volatiles (referred to reduced ash - content 12,9%, w-a.free)	34,0	
Crucible coke properties	slightly caking	
Swelling index	- 2 -	
Heat of combustion (Ho) kcal/kg ref. to 4,7% H_2O, ashfree	1667	
ref to 2,7 % H_2O, airdried	6838	

Dilatometer - Test

Softening temperature °C	424
Contraction %	- 13 -
Dilatation	- non -

Distilling-Analysis referred to waterfree sample containing 14,9 % ash :

Tar - content	7,98 %
Solid residuum	82,95 %
H_2O of distillation	3,75 %
Gas + loss	5,32 %
	100,00

pH of the H_2O of distillation = 7

The sample has 34 % volatiles (without H_2O) i.e. more than 33 %; accordingly classification is due to heat of combustion. Thus, class 7 results. Swelling index 2 gives group 1. Since there is no dilatation, but softening and contraction, sub-group 1 is present. The Code-Number is therefore 711 / statistical group VII With regard to previous investigations of Dahan-i-Tor samples there is no considerable difference, also with regard to baking and coking properties.

Some hints are given by the degree of weathering of the coal. Some weathering must be present since new minerals occur as films on joints but the capacity of water reception is normal and excludes strong weathering. Swelling index 2 indicates little to moderate alteration. No dilatation with 34 % of volatiles again excludes very little weathering.
Result: weathering is little to moderate.

Coalification of the fresh coal.

Experience has shown that in cases of little to moderate weathering the content of volatiles has not been changed more than ± 3 % of its absolutes value. Thus, the coal in fresh condition (which has not yet been reached by the mining work) is presumably a "Gas - Gasflammkohle" which corresponds to the term "high volatile bituminous B to C" USA standard.

With regard to the coking properties the fresh coal is supposed to have a swelling index of 3 - 6 and a dilatation of 10 - 70 %.

Refractrometric constitution analysis of the Vitrinites by the

Berek - microphotometer was performed in Hannover, in order to determine the reflectance of the macerals. This is important because it has been found generally that by increasing rank (Reife der Kohle) i.e. coalification and accordingly decrease in volatile matter content the reflectance of vitrinites increases. By measuring in oil/greenfilter it has been found furthermore, that reflectance is less sensitive against weathering than most other parameters. The reason is, that in the course of coalification (= higher rank), when the limit of 85 % C is exceeded, polished as well as bedding planes showanisotropy of reflectance In the case of the channel - sample of Dahan-i-Tor mentioned below, a reflectance value of 0,79 % (average) was measured. This value is near to the 85 % C limit and the stochastic relations to the inferred content of volatiles have been corroborated as to the fresh coal.

Considering the hopeful prospects for coking coal further inside the mine it is suggested to sample from 100 m dipping depth onwards and to remove the coal touched by the ventilation-air in the adit before sampling is started. From 100 m depth sampling ought to be made each 25 m within the same seam along the dip. Packing in Polyaethylene bottles and airfreighting is inavoidable

This report is based on investigations performed by the Coal Laboratory of the Bundesanstalt für Bodenforschung, Hannover, by Dr. H. Jacob.

Chief Geologist