

This necessitates the cleaning of the "run-of-mine" product before it can be put to any industrial use. Dry cleaning of this lignite was extremely difficult due to the amount of fines produced by the thinness of the seams, and only one attempt had been made in the Lebanon to clean the lignite by "wet" means. Consequently it was usual for the mine owners to market their product with only the larger pieces of foreign matter removed. This naturally did not make for good sales, as it was mainly the sulphurous odour given off by the iron pyrites, that domestic users objected to.

Another point that the exploiters overlooked was that in view of the fact that all the lignite had to be transported down to the coast by mule and motor truck, it would be beneficial to them if they were to remove as many of the impurities as possible at the mine, and thus effect a large saving in transport costs, and also increase the sales value of their product.

The only Company that appeared to realise these facts, and attempted to do any coal washing at their mine was the Société de Briquetage des Matières Combustibles. They erected an elementary jig washer, worked by hand, at the mine at Abey. This was fairly satisfactory and removed about 35 per cent of impurities from the "run-of-mine" lignite. It could, however, only deal with small tonnages. To supplement this washer, a series of troughs were cut in the bank of the stream which ran alongside the adits. This also brought about an improvement in the quality of the product, which in this case was mainly used for manufacturing briquettes. Since then the owners have been persuaded to build a wash-box using an upward current of water, introduced by means of a small pump.

In addition to the washer at Abey, the Briquetting Company also had an elevated trough washer at their factory at Dora. This was used for washing any lignite which had been bought from sources other than their own mine.

Another difficulty associated with coal washing, even on a small scale, is the supply of water. In winter time, there is usually a good supply of water near most of the deposits, but this is liable to fall off during the summer months. No attempt has ever been made to conserve the water supply. Consequently hand picking had to be resorted to. However, if the seams are mined in a proper manner, this hand sorting can be quite satisfactory. Moreover, only two sizes of lignite were required on the market: lump lignite (plus 2 inches or 5 cms) and fines for the manufacture of briquettes.

#### MANUFACTURE OF BRIQUETTES.

##### Preliminary Investigations.

During the early part of 1940, experiments were carried out on the manufacture of briquettes. The original intention was to manufacture briquettes composed purely of the refuse left after the oil had been extracted from olives - Olive Press Refuse or Grignons - using bitumen as a binder. As olives and the oil derived therefrom was one of the stable products of the Lebanon, there was always an abundance of these grignons, which were usually of little use to the olive pressing industry.

It may be noted here that once the olive pressers realised that the refuse from their presses was of use to the briquette manufacturers, they asked as much as £3 to £4 per ton, free on site, for a commodity which hitherto had been useless to them. On top of this came the transport costs to the briquetting factories. This inherent venal greed of the merchants of this country, is another reason for the unprogressiveness of local industries. However, by holding out and refusing to buy at the olive pressers figure, the time arrived when the pressers reduced their quote by half, and in 1933 were only too willing to dispose of their grignons for less than £2 per ton.

Continental authorities were very sceptical about such a process for manufacturing Grignon Briquettes, but nevertheless, a fairly satisfactory briquette as far as analytical quality went, was produced. The disadvantage of this type of briquette was that it burned away too quickly.

Analysis of the Grignon Briquette showed:-

Moisture ... ..	1.55%
Volatiles.. ... ..	40.00%
Ash. ... ..	18.00%
Fixed Carbon ... ..	40.45%
Sulphur. ... ..	0.45%
Calorific Value. ... ..	<u>10,800</u> (6,000)
B.T.U.s and Cals/kilo.	

It was next decided to manufacture a briquette using local lignite and bitumen as a binder. The mixture eventually arrived at was 90% washed lignite, 8% bitumen and 2% fuel oil. In order to ensure even control of the drying and mixing of the ingredients, superheated steam was used in preference to open fires.

The necessary lignite was obtained from local mines, but eventually the Briquetting Company decided to run their own mines in order to ensure regular delivery and to avoid the 'middleman' costs. They accordingly leased the rights from the concession holders in the Abey and Ras-el-Harf districts.

Analysis of this Lignite Briquette gave:-

Moisture ... ..	3 - 6%
Volatiles... ..	28 - 32%
Ash. ... ..	18 - 25%
Fixed Carbon ... ..	42 - 44%
Sulphur. ... ..	3.6 - 4.2%
Calorific Value. ... ..	<u>10,200 - 10,890</u> B.T.U.s and Cals/kilo (5800 - 6050)

This briquette was sold for domestic and small industrial purposes, and gave satisfactory results.

Towards the latter part of 1942, when the coal shortage became extremely acute, and the imports of coal were limited and threatened to cease altogether, the question of using lignite briquettes as a general fuel in the Middle East received serious consideration, and the whole matter was studied very carefully.

Experiments were resumed and at the beginning of 1943, a Composite Briquette was being manufactured. This briquette consisted of 50% Lignite (washed and dried), 40% Olive Press Refuse, 8% Bitumen, and 2% Fuel Oil. (Later the Olive Press Refuse content was reduced, and in some briquettes was only 25%).

Analysis of this Composite Briquette showed:-

Moisture ... ..	5.30%
Volatiles.. ....	34.50%
Fixed Carbon ... ..	44.70%
Ash ... ..	15.50%
Calcrific Value. ...	<u>11,050</u> (6140)
B.T.U.s and Cals/kilo	

The sulphur content was not arrived at in this analysis, but it would not exceed 2%.

At this stage the Syrian Railways (D.H.F.) operating between Beirut, Damascus and Aleppe, and the Military Railway (H.B.T.) operating between Haifs, Beirut and Tripoli, were persuaded to carry out tests using local briquettes as fuel in place of imported coal.

These tests were very severe, especially those conducted by the Syrian Railways, where the grades are exceedingly steep, and part of the line is assisted by means of a rack. In both cases, however, the results did not fulfil expectations, and it appeared as though another market would have to be found for the briquettes. The results of these tests are shown below.

RAILWAY TESTS ON LOCALLY MANUFACTURED BRIQUETTES.

A. Tests conducted by the D.H.F. Section of "Communal Control of Railways".

1. The first test was made between Aleppo and Katma on the 20/3/43, with engine 871 GS. and an almost full load of 590 metric tons instead of a possible 600 metric tons.

The result was as follows:-

Consumption per 100 kilometre tons hauled ...12.320 kgs.  
Consumption per kilometre ... ..72.727 kgs.  
Vaporisation per kilogram of fuel ... .. 3 litres.

Comments.

- (a) A stop of 40 minutes was required at Tell Rifat to clean the fire, i.e. after 40 kilometres running.
- (b) 13 minutes were lost on the journey between Tell Rifat and Katma, when a small amount of the fuel, on being placed in the fire-box, only partly ignited; the remainder passed into the ash-box or smoke-box.
- (c) There was a large formation of clinker on the grill.
- (d) It was difficult to maintain pressure.

2. The second test was made with engine "Hadjaz Mikado" 260, on the 20/3/43. The tonnage was 262 between Gadem and Kiswe, in place of 325, i.e. 75% of the maximum load; 150 tons approximately from Kiswe to Deraa, i.e. scarcely 50% of the maximum load, and 25% of the maximum over various sections from Kiswe to Deraa.

The result was as follows:-

Consumption per 100 kilometre tons hauled ... 9.350 kgs  
Consumption per kilometre... ..22.000 kgs  
Vaporisation per kilogram of fuel.... .. 4.80 litres

Comments.

- (a) Smoke collected with a sulphurous odour.
- (b) Clinker collected on the grill.
- (c) There were numerous sparks and incandescent particles.

Preparation of the mined product for the Market.

The composition of the briquettes used in the above two tests was:-

85.0% Washed Abey Lignite.  
12.0% Bitumen.  
3.0% Fuel Oil.

3. The third test was made on Train 307 on 27/4/43, with Lignite Briquettes bound with Olive Residue and Bitumen.

The result was as follows:-

Consumption per 100 kilometre tons hauled .. 7.638kgs  
Consumption per kilometre ... .. 32.500kgs  
Vaporisation per kilogram of fuel ... .. 5 litres

Comments.

- (a) These briquettes leave a large quantity of ash, amounting to 20% of the weight of fuel consumed.
- (b) The residue in the smoke-box comes to 5% of the weight of fuel consumed.
- (c) There is a good deal of shooting-up of sparks through the smoke stack, which falls down to the ground in a state of ignition. This is a serious matter.

The composition of the briquettes used in the above test 3 was:-

50.0% Washed Abey and Ras-el-Harf Lignite.  
35.0% Olive Press Refuse.  
12.0% Bitumen.  
3.0% Fuel Oil.

B. Tests conducted by the Haifa-Beirut-Tripoli Railways.

1. The following is an extract from a report submitted by C.S. Finlayson, General Manager of the Haifa-Beirut-Tripoli Railways:-

- (a) "R.O.D. engine 9750 was placed on "B" Construction Train on the 23rd March, 1943, and a test of Composite Lignite Fuel was carried out.

The composition of the briquettes used was:-

- 50.0% Washed Abey and Ras-el-Harf Lignite.
- 33.5% Olive Press Refuse.
- 12.0% Bitumen.
- 3.0% Fuel Oil.

- (b) "Bearing in mind that at no time did the load exceed 340 tons, the results left much to be desired, as steam could not be maintained, and this with the injector working.

- (c) "As it was desired that a further test be made, the engine was placed on train 33 on the same date. The results again left much to be desired, as at no time was it possible to maintain a head of steam whilst the engine was working, nor could steam be obtained when the injector was on.

- (d) "At Khalde, the train was taken over by another driver, but his report was no better than the previous one .

- (e) "On the 25th March, 1943, a test was carried out with Lignite Fuel on R.O.D. 9721, on "E" Construction Train and 11 down.

The composition of the briquette used was:-

- 85.0% Washed Abey and Ras-el-Harf Lignite.
- 12.0% Bitumen.
- 3.0% Fuel Oil.

(f) "The fact that another engine had to be requisitioned to haul the train in from Tyr to Az-Zib should leave no doubt as to the unsuitability of this fuel. Any movement of importance should not be subjected to the possibility of failure through this fuel.

(g) "It must also be pointed out that when using these fuels, an excessive amount of char is thrown out of the chimney which burns for some time. This would probably cause fires and would involve the authorities in heavy amounts being claimed.

2. A third test by the Haifa-Beirut-Tripoli Railways was carried out on the 27th June, 1943, with engine 9156 hauling a train of 18 wagons, weighing 650 tons, from Az-Zib to Beirut.

The composition of the briquettes used in this test was:-

- 85.0% Washed Abey and Ras-el-Harf Lignite.
- 12.0% Bitumen.
- 3.0% Fuel Oil.

The results of this test may be tabulated as follows:-

- (a) Soon after leaving Ez-Zib the steam pressure fell to 150 lbs. and could not be regained until a stop was made.
- (b) A stop was made at the entrance to the tunnel between Naquara and Tyr to raise steam and have sufficient water in the boiler to avoid stopping in the tunnel. The fuel gave off bad fumes and the enginemen had difficulty in breathing in the tunnel.
- (c) During the journey the driver had to take advantage of all gradients to close the regulator, and allow the injector to be used.

- (d) The fire was partially cleaned three times during the trip. This fuel did not make enough fire to allow proper cleaning to be done.
- (e) Between Khalde and Beirut the steam pressure fell to 100 lbs. and a stop had to be made at the top of the gradient to regain steam and water.
- (f) On arrival at Beirut, the fire-box was completely full of ashes and clinker, above the firehole ring and up to the level of the brick arch.
- (g) Five tons of fuel were burned on the trip. None was used before the commencement of the journey to light the fire or raise steam.
- (h) During the journey, a considerable amount of small char was thrown out of the chimney.

Conclusions drawn from the preceding tests.

These tests would appear to demonstrate that the fuel as supplied is not suitable for locomotive work. The consumption is high, being nearly double that of the normal consumption in the tests carried out by the Syrian Railways. The test on full load showed that vaporisation is very poor - 3 litres in place of 7 litres as is the case of average coal.

Even on an engine engaged on shunting duties, it was difficult to maintain 80 lbs of steam. When shovelled into the fire-box the fuel burned with a flame for a few minutes, and then went dead, the result being that the fire-box became rapidly filled with dead fuel and would require cleaning at least every two hours.

Under circumstances such as these, it would not be possible to maintain a schedule service and the use of lignite and composite briquettes, such as tested above cannot be considered a practical proposition, and therefore they should only be used in the event of extreme emergency and even then on as restricted a scale as possible.

THE DORA BRIQUETTING FACTORY.

As a result of the preliminary tests on the manufacture of briquettes, the Société de Briquetage des Matières Combustibles was formed with an invested capital of over £.27,000 (240,000 Pounds Syrian).

A factory was erected at Dora, a suburb of Beirut, in 1941. Much credit is due to the engineer, M. Just Frank for the ingenuity displayed in the design and erection of the plant. All the machinery was found or made locally, a difficult task during war-time.

The lignite used came from local mines, especially Abey, the bitumen from Iraq, and the fuel oil from the Tripoli Refinery. The process involved crushing, washing, drying, mixing and compressing as shown in the accompanying flow sheet.

The Installation at the Dora Factory consisted of:-

- 19 Electric motors totalling 119 H.P.
- 1 Group of motor pumps.
- 1 Vertical boiler with heating surface of 44 sq. metres
- 1. Superheater.
- 1 Coal breaker.
- 1 Bitumen breaker
- 1 Coal washer with goblet elevator.
- 1 Coal washer
- 1 Drying apparatus with furnace.
- 1 Small drying apparatus.
- 1 Daseur with adjusting screw.
- 1 Mixing apparatus with goblet elevator.

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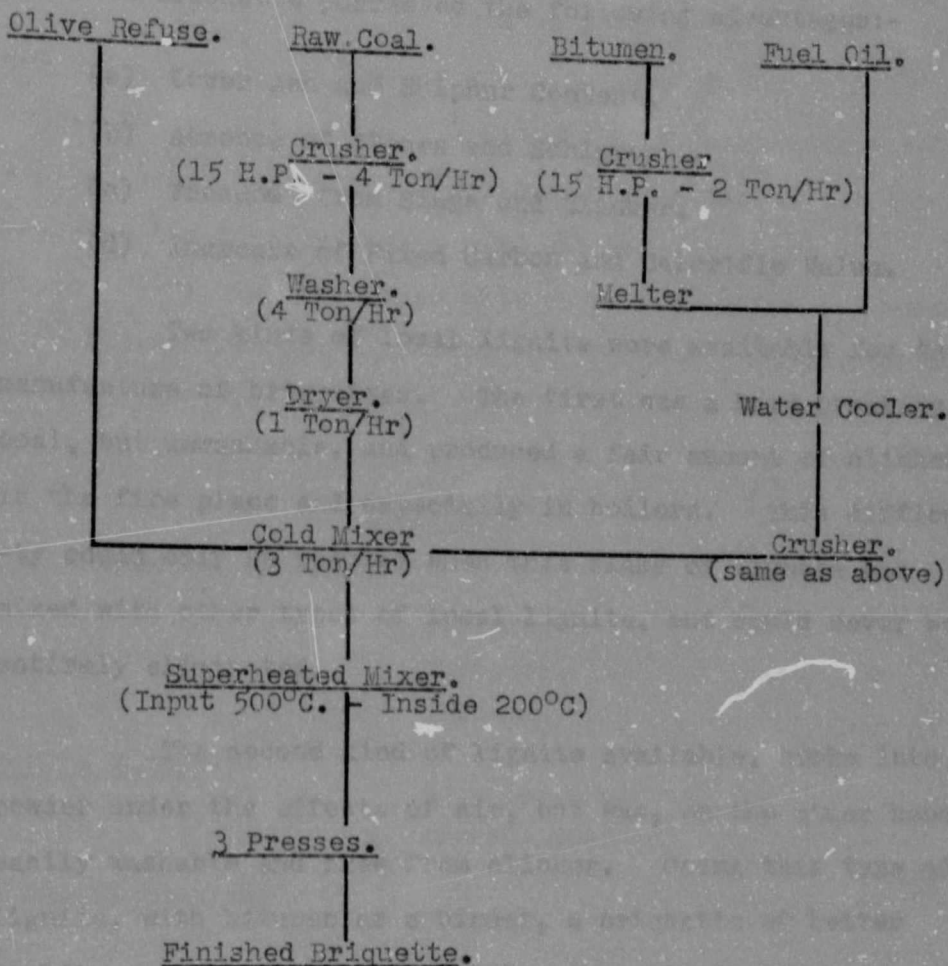
- 1 Single Press (Capacity 600 Kg/hour) Palestian make.
- 1 Double Press (Capacity 900 Kg/hour) French make.
- 1 Triple Rotary Press (Capacity 1250 Kg/hour) French make.
- 1 Triple bitumen furnace.
- 1 Electric transformer station.

The site of the factory is 15,548 square yards (13,000 sq. metres) in extent, the buildings occupying 717.6 square yards (600 sq. metres).

The narrow guage (metre) railway passes in front of the works, whilst the Haifa-Beirut-Tripoli normal guage railway, completed in 1942, passes within 75 yards of the works.

THE DORA BRIQUETTING PLANT, BEIRUT.

FLOW CHART.



QUALITY OF PRODUCTS.

Compared with local coal (i.e. lump lignite), the finished briquette possessed the following advantages:-

- (a) Lower Ash and Sulphur Content.
- (b) Absence of Stones and Schists.
- (c) Freedom from Slags and Clinker.
- (d) Increase of Fixed Carbon and Calorific Value.

Two kinds of local lignite were available for the manufacture of briquettes. The first was a hard breaking coal, but unwashable, and produced a fair amount of clinker in the fire place and especially in boilers. This difficulty could only be reduced when this class of lignite was mixed with other types of local lignite, but could never be entirely eliminated.

The second kind of lignite available, broke into powder under the effects of air, but was, on the other hand, easily washable and free from clinker. Using this type of lignite, with bitumen as a binder, a briquette of better quality and higher calorific value than the raw coal was obtained and with little clinker. Analysis of the various products have already been given.

1. With the existing installation at Dora, it was possible to briquette coal (coal dust ex bunkers of ships), lignite, charcoal, olive residue, sawdust, or any mixture of these substances.

2. Washed Lignite for the forge was also available. This had a calorific value of 9900 B.T.U.s (5500 cal/kilo), 3.5% sulphur and 18% ash. It was, however, only available in small quantities.

3. After washing and special re-washing Ferruginous Pyrites could also be obtained containing 40% sulphur and 45% Iron.

The conglomerate used as a binder - bitumen softened with fuel oil - increases the content of the volatile matter in the briquette. Replacing this conglomerate with a pitch would lower the percentage of volatile matter and increase the adhesiveness; also the melting point of pitch (75°C), is lower than that of bitumen (180°C), therefore the use of pitch lightens the process of manufacture. At this period, however, it was difficult to import pitch.

MARKETS.

The Industrial firing of:-

Boilers.

Furnaces.

Forges.

Public Works:-

Road Rollers.

Asphalt Heaters.

Domestic Heating:-

Central.

Unit.

Kitchen.

The restricted production of 1942 was distributed as follows:-

Briquettes ... ..	2050 Tons.
washed Lignite ... ..	215 "
Lump Lignite.. ... ..	125 "
Iron Pyrites.. ... ..	2 "

A surplus of 900 tons from the 1942 production immobilised a large part of the invested capital. The consumers who used the imported English and Indian Coal before the War, did not readily accept the local product, which gives off an odour characteristic of lignite, and leaves a large quantity of ash. They preferred to burn wood in their existing stoves or to install oil burners.

SOURCES OF BASIC MATERIALS.

1. Lignite.

The only quality proving satisfactory comes from Abey Mine, which is controlled by the Société de Briquetage des Matières Combustibles.

2. Olive Grignons.

The principal buying centres are at Saida, Chouafat Koufra (near Tripoli) and Tartous. The 1942 harvest was very large, and the price ranged about £3 per ton, taken at place of purchase, for material pressed twice.

3. Bitumen.

This is obtainable from the Kifri Mine in Iraq, and is bought through the Syrian Railways (D.H.P.). The cost is over £7 per ton (66 Pounds Syrian), delivered at Dora Factory. This is a high figure to pay, and the Syrian Railways are making 100 per cent profit on the transaction. Unfortunately it is the only source open, and even then the supplies are irregular as the Railways use a great deal themselves. There is a pitch in Palestine which is admirably suited to the purpose, but exports of this commodity from Palestine into Syria are prohibited.

4. Fuel Oil.

This is obtainable from the Tripoli Refinery, and sold by the Shell and Socony Societies at £11 per ton (i.e. 96 Pounds Syrian), delivered at Dora Factory.

As will be seen in the table summarising the costs in Section IX it was the extremely high cost of the basic materials as compared with the actual cost of washed lignite at the mine (approx. £3.10.0.), that was responsible for the finished briquette, especially the composite (due to the price of grignons), being so expensive.

POTENTIAL OUTPUT OF DORA BRIQUETTING FACTORY.

During the early part of 1943, the factory at DORA was working on a very small scale owing to an accumulation of stocks and insufficient market. The owners did not see their way clear to either improve or make arrangements to deal with an increased production, as they had no guarantee of a regular market.

A review of the position at Dora Factory at this period, showed the following and indicated the possibilities should an outlet occur for the requirements of the Armies, Railways or Civilian Markets.

Possible Production in Tons.

Working time of two shifts : 19 hours.  
Productive days per month : 24

	Tons - Dried.	Binder	Production.		
			Day	Month.	Year.
A. With revolving dryer.	19.0	1.9	20.9	500	6,000
B. With two dryers; old dryer restored to working order.	30.4	3.0	33.4	800	9,600
C. Construction of new dryer and full use of presses.	45.5	4.5	50.0	1200	14,400

The above tonnages are the result of theoretical calculation without taking into consideration possible technical difficulties.

The following information was obtained from the records of the Board of Directors of the company, and is being furnished to you for your information. They are given under the headings:

- (i) Sales made in the 1940-1941 period and the 1942-1943 period of production, and the prices realized during that period.
- (ii) Estimated costs made in 1943, based on an assumed production of 100,000 tons of production, with the necessary adjustments being made for the actual production.

SECTION IX.

... of the ... and have ...

COSTS.

... 1940 and 1941 ...

...  
...  
...

...  
...  
... 7

IX. COSTS.

LIGNITE AND BRIQUETTE PRODUCTION COSTS.

ABEY MINE AND DORA BRIQUETTE FACTORY.

The following figures are the mining and briquett-  
ing costs of the above concerns. They are given under  
two headings:-

- I. Costs based on the 1942 production of 3,000 tons of briquettes, and the prices ruling during that period.
- II. Estimated costs early in 1943, based on an annual production of 9,000 tons of briquettes, with assistance as indicated, being rendered by the military authorities.

Note: These costs were originally calculated by the writer in Syrian currency, and have since been transposed into British currency using the rate of exchange existing during 1942 and 1943, namely 8.83 Pounds Syrian (or 883 Piastres Syrian), equalled One Pound Sterling.

I. 1942 PRODUCTION.

LIGNITE BRIQUETTES.

Composition:

88.0%	Washed Lignite.
9.3%	Bitumen
2.7%	Fuel Oil.

The Costs come under the headings:-

A. Raw Materials.

I. Coal.

- (a) Washed Lignite.
- (b) Transport (Mine to Factory)

## (2) Conglomerate.

(a) Iraq Bitumen.

(b) Fuel Oil.

## B. Briquetting Process.

C. Fuel for Boilers and Bitumen Ovens.

D. Amertisation of Installation.

## E. General Expenses.

(1) Administration Costs.

(2) Engineers' Salaries.

(3) Royalties to Mine Owners.

(4) Government Tax.

A. Raw Materials.(1) (a) Mining Costs per ton.

	<u>£. Stg.</u>
1. Labour (productive, i.e. Miners) ...	0.947
2. Labour (unproductive, i.e. Foremen, Carpenters, Blacksmiths, etc)	1.000
3. Timber ... ..	0.100
4. Illumination.. ..	0.043
5. Topography, Mine Plans, etc....	0.018
6. Medical... ..	0.010
7. General... ..	0.003
<u>Total.</u>	<u>2.121</u>

Allowing a maximum washing loss of 40% then

Cost per Ton of Washed Lignite at Mine is ... .. 3.528(1) (b) Transport.

## 1. Mule Transport. Mine to Depot, Abey:

In cash. £.0.566 per ton ... .. 0.566

In kind. 12 kgs Barley per ton

@ 43 piastres/kg. .. .. 0.566

2. Motor Transport. Depot to Dora/ton 0.952Total Transport 2.084

	<u>£. Stg.</u>
2. <u>Conglomerate.</u>	
(a) Kifri Bitumen	
93 Kgs @ £.Sy. per metric ton	0.700
(b) Fuel Oil	
27 Kgs @ £.Sy. per metric ton	<u>0.200</u>
	<u>Total.</u> <u>0.900</u>

B. Briquetting Costs.

(a) Labour ... ..	0.969
(b) Rent on Machinery. ... ..	0.225
(c) Rent on Factory Building and Site. ...	0.034
(d) Oil, Grease and Water. ... ..	0.034
(e) Fire Insurance ... ..	0.003
(f) Electric Power ... ..	0.135
(g) Maintenance on Machinery... ..	0.273
(h) Laboratory Analysis... ..	0.006
(i) Medical Expenses for Workmen.. ...	<u>0.014</u>
	<u>Total</u> <u>1.693</u>

C. Fuel for Boilers and Bitumen Ovens ... .. 0.388D. Amortisation of Plant. ... .. 0.952E. General Expenses. ... ..

1. Administration Costs. ... ..	0.095
2. Engineers' Salaries.. ... ..	0.435
3. Royalties (to Permit Holders) ...	0.227
4. Government Tax (5% Mining Costs). <u>0.105</u>	<u>0.105</u>
	<u>Total</u> <u>0.863</u>

Summary of Costs.

	<u>£.Stg. per ton of Briquettes.</u>
A.(1) (a) Washed Lignite ... ..	3.105
(b) Transport... ..	1.884
A.(2) (a) Kifri Bitumen. ... ..	0.700
(b) Fuel Oil .... ..	0.200
B. Briquetting ... ..	1.693
C. Boiler and Bitumen Oven Fuel..	0.388
D. Amortisation of Briquetting Plant	0.952
E. General Expenses.. ... ..	<u>0.862</u>
<u>TOTAL COST OF LIGNITE BRIQUETTE</u>	<u>9.784</u>

COMPOSITE BRIQUETTES.

The cost of manufacture of a briquette composed of:-

- 50% Washed Lignite.
- 40% Olive Press Refuse.
- 8% Kifri Bitumen, and
- 2% Fuel Oil.

requires an alteration in Items A.(1).(a); A.(1).(b); A.(2).(a); and A.(2).(b) and an additional item of 470 kgs. of Olive Press Refuse (about 15% moisture is lost in the process), at £.Sy.38 per ton.

The cost then becomes:-

	<u>£.Stg. per ton.</u>
Washed Lignite ... ..	1.764
Transport ... ..	1.042
Olive Press Refuse ... ..	2.016
Bitumen ... ..	0.598
Fuel Oil ... ..	0.217
Briquetting ... ..	1.693
Boiler and Bitumen Oven Fuel..	0.383
Amortisation of Plant. ... ..	0.952
General Expenses.. ... ..	<u>0.862</u>
<u>TOTAL COST OF COMPOSITE BRIQUETTE</u>	<u>9.532</u>

II. FUTURE PRODUCTION.

Considerable reductions in the preceding figures can be effected as follows:-

- (a) Assistance in motor transport of the lignite from the Mine to the Factory by supplying vehicles from military sources, or by co-operation with the French Office Economique de Guerre.
- (b) Purchase of barley and fodder for pack animals at military controlled price.
- (c) Purchase of Olive Press Refuse at Tripoli with facilities to rail it to Beirut on the military controlled railway, as against motor transport from Saïda.
- (d) Purchase of bitumen direct from Kifri Mine, Iraq, with standard freightage on the Syrian Railways.
- (e) Purchase of fuel oil from the Tripoli Refinery at controlled prices.

1. The preceding calculations were made on a production figure of 3,000 tons of briquettes per annum. If the production is increased to 9,000 tons per annum, the non-productive mining cost item will not increase materially, and the figure of £.2.121 would come, say, to £.1.585

2. If a washing loss of 40% is allowed for, then the cost per ton of washed lignite at the mine becomes £.2.642.

3. By assisting with the supply of motor transport and the supply and purchase of barley and fodder, the transport cost should not exceed £.1.132.

4. Assistance in the matter of bitumen and fuel oil should bring this combined cost to about £.0.679 per ton.

5. Amortisation of plant may be taken as £.0.952/ton.

6. Briquetting on an output of 9,000 tons per annum will reduce the figure of £.1.693 to £.1.070 per ton.

TABULATED SUMMARY OF COSTS CALCULATED ON A PRODUCTION  
FIGURE OF 9,000 TONS OF BRIQUETTES PER ANNUM.

ITEM.	Lignite Briquette.	Composite Briquette.
	<u>£.Stg / Ton.</u>	<u>£.Stg / Ton.</u>
Washed Lignite	2.324	1.321
Transport	0.996	0.566
Olive Press Refuse	-	1.700
Bitumen and Fuel	0.679	0.566
Briquetting	1.070	1.070
Boiler & Bitumen Oven Fuel	0.388	0.388
Amortisation of Plant	0.952	0.952
General Expenses	0.862	0.862
<u>TOTAL COST PER TON.</u>	<u>7.271</u>	<u>7.425</u>

Thus on a production of 9,000 tons per annum of Composite Briquettes, with assistance as indicated and technical supervision, the cost per ton ex Dora Factory would be in the neighbourhood of £.7.10.0.

Allowing 15% for unexpected war-time contingencies this cost should not exceed £.8.15.0. per ton.

Note: Imported coal in Egypt ex India had been costing £.8.10.0. per ton for a better grade coal. No doubt, where procurable on the Black Market, the price was considerably higher than this.

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