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TERMINAL REPORT

*Tekovic, bitumen  
plant*

BY

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UNIDO EXPERT

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This report has not been cleared by the United Nations Industrial Development Organization and does not necessarily therefore reflect their views.

Den Haag,  
January 1981

TERMINAL REPORT OF MR. SOKOLIVIC VOJIN, UNIDO EXPERT

INTRODUCTION

1. By reason of the fact that primary, provisional summary of bids on 10 lots for the Bitumen Plant has not been finished by King-Wilkinson at the time of Expert's arrival in The Hague, it was recommended by T.P.D.C. - officials that the Expert undertakes examinations relating to flexibility of projected Bitumen Plant, its capacity of production based on different crude oils and quality of Bitumen products pertinent to different types of vacuum residums. When provisional summary of bids was accomplished by King-Wilkinson's staff, Expert has started with evaluation of submitted bids.

In such a way Expert's activities included in addition to work denoted in UNIDO-Job-Description also investigations required by our T.P.D.C.-counterpart. Expert's term involved the period of two weeks beginning with 19 January 1981 and terminating till 1 February 1981.

2. WORK DONE

On the Base of Contract, King-Wilkinson was engaged to design Bitumen Plant taking into account atmospheric residium of Iranian Light, Agha Jary, crude oil. But because of well known marketing situation of this crude oil, T.P.D.C. wished to check flexibility of projected Bitumen Plant relating to other possible atmospheric residiums which would have been charged to Bitumen Plant (Atm. residiums from Arabian crude oil, Kuwait - crude oil, Murban - crude oil and Algerian crude oils).

Expert has found that projected capacity of Vacuum Distillation Unit and Blowing Unit will satisfy required production rate of bitumen at the level of 30.000 t/y through 250 working days of the plant per year if 80/100-pen-grade of bitumen would have been produced continuously from Vacuum Distillation Unit as straigh-run product.

In the case of Iranian light atm. residium as charge stock, this is possible to achieve although such product will have a softening point (R&B) at lower limit (46°C) of the necessary value for tanzanian conditions (45°C - 52°C). Unfortunately blowing of such residium to obtain a higher softening point of bitumen is very sensitive operation because penetration of the product could be sharply decreased.

Thus it would be necessary to produce 80/100 pen-grade product through straight run production evading any mis-operation of Vacuum tower, because any missing in process conditions in the Vacuum Distillation tower will give products who are not in accordance to the necessary quality of 80/100 bitumen.

If 80/100-pen-product missed in quality relating to 80/100 specification this residium can be utilized in the Blowing Unit for production of hard bitumens.

Light Arabian Atm. residium can be also charge for straight-run production of 80/100 pen-grade bitumen with remark that such bitumen will have a softening point of 45°C. But on the other side this bitumen will have a high asphaltene content (about 9%) which will put this product relating to its binding power as better product in comparison with 80/100 - bitumen from Iranian Light and Kuwait crude. The yield of Vac. residium of this crude is practically the same as in the cases of Iranian Light and Kuwait-crude. Thus, the capacity of bitumen production will be the same as in the case of Iranian crude oil.

Kuwait crude gives Atm. residium which can be also suitable utilized for production of straight-run bitumen 80/100 - pen in the quantities which correspond to projected value of 27.300 t/y (through 250 days of plant operation per year). Unfortunately we have not at disposal paraffin content neither for Iranian light, Arabian light nor for Kuwait 80/100 straight run bitumen. Algerian crude oils (Arzew-mixture, Hassi-Messaoud-mixture and Zarzaiting) give very low yield of Vacuum residium with very high content of paraffins and very low content of asphaltenes. Thus this crude oils are improper to give neither s.r. production of 80/100-pen-grade bitumen nor to assure the necessary capacity of production even in the case that such residium would has been blowed.

Murban crude gives to low yield of Vacuum residium and the quality of straight-run produced products is very bad (softening point is about 34°C, paraffin content about 15% and asphalten content only 1.2%).

Relating to the production of 60/70 pen-grade and 10/20 pen-grade bitumens, Vac. Residiums from Iranian light, Arabian light and Kuwait crude oils have to be blow. King-Wilkinson has calculated that Agha-Jary residium has to be blown 2-4 hours to achieve 60/70 pen-grade and 6 hours to produce 10/20 pen-grade bitumen. The curves relating time of blowing with the values of penetration pointed out that necessary time of of blowing to produce 60/70 pen.-grade and 10/20 pen-grade products amounts:

	<u>60/70 pen.</u>	<u>10/20 pen.</u>
Agha Jary Res.	1,5 - 2 hrs.	7 - 9 hrs.
Arabian Light Res.	1,5 - 2 hrs.	7 - 11 hrs.
Kuwait Res.	less than 1hr.	3 - 4 hrs.

with approximately values of softening points of about 50°C (for all 60/70 pen.) and about 70°C (all above mentioned Bitumen 10/20 pen-grade).

On the base of above given figures it follows that projected Blowing Unit capacity will work in average the following number of days per year:

60/70 - pen. grade Bitumen

- on the base of Agha Jary  
Vac. residium about 12 days/year
- on the base of Iranian Light  
Vac. residium about 12 days/year
- on the base of Kuwait residium about 11 days/year

10/20 pen. grade Bitumen

- on the base of Agha Jary  
Vac. residium about 15 days/year
- on the base of Arabian Light  
Vac. residium about 17 days/year
- on the base of Kuwait  
Vac. residium about 10 days/year

At first sight it seems that capacity of the Blowing Unit relating to Agha Jary - Arabian Light - and Kuwait-residiums has been projected with big overcapacity. Meanwhile, if we take into account that mis-operation in Vacuum Distillation Unit could cause a straight-run 80/100-product with bad characteristics of quality, over-capacity of Blowing Unit enables that such products can be improved by blowing. Calculating with 1 hour of blowing and 1 hour for pumping charge-stock to reactor and out of the reactor in such cases the number of working days of Blowing Units could be the following:

- in the case of Agha Jary  
Vac. residium blowing to  
80/100 pen. grade bitumen about 200 days/year
- in the case of Arabian Light  
Vac. residium blowing to  
80/100 pen. grade product about 200 days/year
- in the case of Kuwait Vac.  
residium blowing to 80/100  
pen. grade product about 190 days/year

In the above mentioned calculation we have anticipated that necessary blowing time for Agha Jary and the Arabian Light residiums will amount 1 hour and for Kuwait Vac. residium about 15 minutes.

Taking into account all necessary investigations it could be concluded that King-Wilkinson's design of the Bitumen Plant is properly projected with enough rate of flexibility.

3. Because the whole necessary equipment for the Bitumen Plant has been divided in ten lots, all Tenderers participated for lots for which they had interest. Many Tenderers participated with bids for more lots and one Tenderer sent bids for all lots. All together, in official Tender participated 32 companies.

We are giving in continuation our evaluation of submitted bids:

LOT NUMBER 1

This lot involved one Vacuum Distillation Tower, one Blowing Reactor, Feed Surge Drum, Vent Gas Scrubber, Feed-Drum, Vent Gas Drum and Level-Drum.

The following companies participated in Tender:

- |                           |                           |
|---------------------------|---------------------------|
| 1. Hans Leffer GmbH       | 5. Toyo Menka Kaisha Ltd. |
| 2. Wescon B.V.            | 6. Essen Steels Ltd.      |
| 3. Fulton Enterprise N.V. | 7. Thomassen B.V.         |
| 4. I.P.S. Corp.           |                           |

The last Tenderer (Thomassen B.V.) involved in their bid only ex works Amsterdam prices.

Because all Tenderers satisfied specifications given by King-Wilkinson, the proposal for final decision is made on the basis of the price of equipment and transportation costs i.e. on the basis of total delivery price. The most convenient Tenderers are:

1. Wescon B.V.
2. Essen Steels Ltd.

Wescon B.V. has given two bids i.e. two alternatives (cash payments and on the basis of credit). In both bid-alternatives of Wescon, the delivery price is the most competitive (in the cash payment the price is 281.650 EUA and in the alternative with credit the price amounted 288.042 EUA). Essen Steels Ltd. bid amounted (cash payments) 288.143 EUA. We remark that there are big differences in transportation costs between Wescon (21.791 EUA) and Essen Steels Ltd. (58.929 EUA). We propose that during negotiations T.P.D.C. try to level these costs. Budget estimation made by King-Wilkinson denoted delivery price of lot No. 1 in amount of 196.200 EUA.

LOT NUMBER 2

This lot includes Atm. res. Tanks (2), LVGO Tanks (2), two Vac. res. Tanks, two Bitumen 80/100 tanks, one 60/70 Bitumen Tank, one 10/20 Bitumen Tank, two Cut-Back Bitumen Tanks, one Naphta Tank, one Kerosine Tank and one Wash Oil/Slop Tank.

The following companies participated in Tender:

1. Wescon B.V.
2. Capper Neil International
3. Fulton Enterprise N.V.

All Tenderers satisfied technical specifications given by King-Wilkinson. The most convenient delivery price C.I.F. Dar-es-Salaam was contained in the bid submitted by Wescon B.V.

This company has given the bids in alternatives:

- a. with cash payments - 529.649 EUA
- b. with credit - 550.235 EUA

Capper Neil International's bid was at the level of 602.607 EUA and Fulton even 1.957.754 EUA. Budget estimation made by King-Wilkinson was 291.700 EUA. Thus we propose Wescon B.V. as equipment supplier.

#### LOT NUMBER 3

This lot includes 3 Feed/LVGO Exchangers, 3 Feed/HVGO Exchangers, 3 Feed/Residue Exchangers, one Residue Cooler, one Feed Surge Heater, one Reactor Cooler, one Cut-Back Product Cooler, one HVGO-Recycle Cooler, one LVGO Cooler, one HVGO Cooler and one Scrubber Cooler. The following companies participated in the Tender:

1. A.P.V. Spiro-Gills Ltd.
2. Fulton Enterprise N.V.
3. I.P.S. Corp.
4. Leffer GmbH
5. Graham Manufact. Ltd.
6. GEA Warmtetransport B.V.

There are very big differences in the quoted prices of the Tenderers. First of all there is a big difference between budget-estimation cost done by King-Wilkinson, but also there are vast differences between Tenderers as such. The best bid regarding to the price was given by A.P.V. Spiro-Gill Ltd (C.I.F. Dar-es-Salaam price is 568.562 EUA) but this quotation is about 120% higher than the estimation cost given by King-Wilkinson. Other Tenderers quoted even higher prices (Leffer's bid amounted 619.144 EUA; I.P.S. quotation was 795.543 EUA; GEA-Warmtetransport quoted 802.815 EUA; Fulton even 863.331 EUA). It is impossible for Expert to establish in such a short time, the cause of these differences and the expert suggests that T.P.D.C. requires a detailed re-consideration of all presented bids.

#### LOT NUMBER 4

In this lot is included a Vacuum Unit Ejector Package. The following companies participated in the Tender:

1. Graham International Ltd.
2. Hick Hardgreaves Ltd.
3. Körting Hannover A.G.
4. Fulton Enterprise N.V.
5. I.P.S. Corp.
6. Toyo Menka Kaisha Ltd.

From above mentioned Tenderers Hick Hardgreaves Ltd. gave only the cost F.O.B. British port (without transportation costs). The most favorable offer handed Graham Int. Ltd. with a total delivery price to Dar-es-Salaam of 118.744 EUA, followed by Körting Hannover A.G. with a delivery price of 152.787 EUA and I.P.S. Corp. with a delivery price of 155.200 EUA. Hick Hardgreaves Ltd. offered the best price for equipment F.O.B. European ports (130.000 EUA) but unfortunately its bid didn't contain transportation costs.

We suggest to negotiate with:

1. Graham International Ltd.
2. Körting Hannover A.G.
3. Hick Hardgreaves Ltd.

#### LOT NUMBER 5

In this lot are included a Vacuum Tower Heater. Unfortunately only two competitive Tenderers appeared:

1. Toyo Menka Kaisha Ltd.
2. Fulton Enterprise N.V.

By the reason of the fact that we have bids only from two Tenderers our proposal is to re-open the Tender for this lot.

#### LOT NUMBER 6

This lot includes a Drum Filling Plant. The following companies participated in the Tender:

1. Feige GmbH
2. H.T.E.M. Construction Co. Ltd.
3. Toyo Menka Kaisha Ltd.
4. Fulton Enterprise N.V.

Feige GmbH has given only the price of the Drum Filling Plant F.O.B. Hamburg port without transportation cost to Dar-es-Salaam. The equipment value of the bid of this company didn't consider the cost of the operating platform. The most likely bid is H.T.E.M. Construction Co. Ltd.'s bid (equipment and transportation amounts 93.214 EUA).

#### LOT NUMBER 7

This lot includes one Ferry boat. The following companies participated in this Tender:

1. Chanic S.A.
2. Quaylink International Shipping Ltd.
3. Fulton Enterprise N.V.
4. Gomba Exim Ltd.
5. Krupp GmbH

The most convenient bid is presented by Chanic S.A. (total costs C.I.F. Dar-es-Salaam amounts 215.145 EUA). On the second place is Krupp with C.I.F. Dar-es-Salaam price of 250.684 EUA.



LOT NUMBER 8

This lot includes the following equipments:

Five Fork Lift Trucks  
Three Trucks (Diesel)  
Three Station Wagons

In the Tender participated the following companies:

- |                             |                           |
|-----------------------------|---------------------------|
| 1. Achelis Söhne GmbH       | 4) Gemco Engineers        |
| 2. UNITRAC                  | 5) Fulton Enterprise N.V. |
| 3. Geveke Intern. Transport | 6) Hyster B.V.            |

From the above mentioned Tenderers, Geveke Int. Transport bid includes only 5 Fork Lift Trucks. Achelis Söhne GmbH include in its bid only three Diesel Trucks. And UNITRAC included in its bid only five Fork Lift Trucks. This practically means that only three companies have offered complete bids for lot number 8 (Gemco Engineering, Fulton Enterprise and Hyster B.V.).

The most likely bid is done by Gemco Engineers with C.I.F. Dar-es-Salaam price for all necessary equipment at the level of 258.339 EUA, followed by Hyster B.V. with C.I.F. Dar-es-Salaam quotation of 259.501 EUA. Both of the bid quotations are very close to the Budget estimation made by King-Wilkinson (255.000 EUA).

LOT NUMBER 9

This lot includes 47 different pumps with power drivers. In the Tender participated the following companies:

- |                       |                   |
|-----------------------|-------------------|
| 1. La Bour Pumps Ltd. | 4. Ingersoll-Rand |
| 2. Scanpump Ltd.      | 5. I.P.S. Corp.   |
| 3. Fulton Enterprise  |                   |

The La Bour Pumps Ltd. participate in their bid only partially offering the 19 centrifugal pumps. The most likely bid is the tender of Scanpumps Ltd. with a total C.I.F. Dar-es-Salaam price of 315.982 EUA, and I.P.S. with C.I.F. Dar-es-Salaam price of 417.282 EUA.

Meanwhile Expert considers that Ingersoll-Rand is such a well-known company that it deserves to check its bid again although its bid is not complete at present stage.

LOT NUMBER 10

This lot includes miscellaneous electrical bulk material, two 6KV-Switchgears, two 1000 KVA Transformers, one 380 V Switchgear, one 380 V Control Centre and 6000 V Underground Cable.

In the Tender participated the following companies:

- |                         |                           |
|-------------------------|---------------------------|
| 1. Sadelmi Cogepi S.p.a | 3. Fulton Enterprise N.V. |
| 2. Stibbe W. Th. H.     | 4. Philips N.V.           |

The most likely bid is offered by Stibbe W.Th.H. with a delivery price of all equipment C.I.F. Dar-es-Salaam at the level of 372.023 EUA. The Sadelmi-Cogepi S.p.a. quoted 488.715 EUA and Fulton about 494.346 EUA. Thus we propose Stibbe W.Th.H. as the equipment supplier.

The summary of the most likely bids on the ten lots for the Bitumen Plant is the following:

<u>LOT NO.</u>	<u>PROPOSED SUPPLIER</u>	<u>EUA</u>	<u>KW-ESTIMATION</u>
1	Wescon B.V.	281.650	196.200
2	Wescon B.V.	529.649	531.500
3	the lowest bid	568.562	259.200
4	Graham Int.	118.744	269.900
5	the lowest bid	634.171	178.400
6	H.T.M Ltd.	93.214	162.500
7	Chanic S.A.	215.145	197.200
8	Gemco Eng.	258.339	255.000
9	Scan Pump Ltd.	315.982	437.400
10	Stibbe W.Th.H.	<u>372.023</u>	<u>422.500</u>
SUBTOTAL		3.387.479 EUA	2.909.800 EUA
=====			

\* For lots number 3 and 5 we have put in our summary the lowest bids but we consider that tenders for above mentioned two lots ought to be re-newed.

4. In our discussions with King-Wilkinson we have suggested the necessity of designing one additional tank for blending and compounding of bitumen. The tank has to be designed to have the capacity of about 30 m<sup>3</sup>.

We have suggested also that King-Wilkinson provides the necessary specifications for laboratory Vac. distillation and blowing.

The both suggestions has been accepted by T.P.D.C. and King-Wilkinson.

Den Haag,  
31 January 1981

SOKOLOVIC VOJIN  
UNIDO EXPERT.

5. King-Wilkinson is obliged to give guarantees for
- capacity of the plant
  - qualities of all bitumen products.

