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DYEING, TANNING AND COLOURING MATERIALS AND THEIR FUTURE PROSPECTS IN THE NORTH AFRICAN SUB-REGION

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INDUSTRIES SECTOR STUDY ON SITC DIVISION 53 DYEING, TANNING AND COLOURING MATERIALS

I. SCOPE OF THE SECTOR STUDY AND LIMITATIONS

In the present study, which is an analysis of the situation now prevailing in the dyeing, tanning and colouring materials industry in the North African sub-region, an attempt has been made to outline the main characteristics of this industry and to put forward solutions aimed at accelerating the development of this industry and at reducing the expenditure of foreign exchange on imports.

The following countries were considered:

- | | |
|------------|------------|
| 1. Morocco | 2. Algeria |
| 3. Tunisia | 4. Libya |
| 5. Sudan | 6. UAR |

Unfortunately, the information available is meagre and not always reliable. Statistics were very inadequate (both in scope and quality), insufficiently detailed, and analysis based on them involves risks of which we are fully aware.

This study deals with the industrial sectors as described by the Standard International Trade Classification (SITC) Division 53.

This Division has been sub-divided into 3 main groups:

- group 531 Synthetic organic dyestuffs, natural indigo and colour lakes
- group 532 Dyeing and tanning extracts, synthetic tanning materials.
- group 533 Pigments, paints, varnishes and related materials.

An effort has been made to follow this classification as much as possible in this report. But as the name indicates, the SITC has been set up for trade purposes. Although helpful for industries attempting import substitution, the groupings of the SITC are slightly antiquated and do not always make sense for industrial programming.

Although not strictly falling within the subject SITC Division 53, chapters on "Raw materials for paint", "Mineral tanning agents" and "Other mineral pigment materials" have been included as it was felt that these organically belong in the report.

II. SIGNIFICANCE OF THE DYEING, TANNING AND COLOURING MATERIALS TO THE NORTH AFRICAN SUB-REGION

The significance of dyeing, tanning and colouring materials to the North African sub-region may be shown by comparing this group to chemicals in general. Such comparisons are provided in Table 1. On the average, the above group accounts for about 9 per cent of the 1960-1965 import-export balances. It appears that there is a tendency towards a smaller share for the group. This is evidenced by the fall from 10.9 per cent in 1960 to 8.8 per cent in 1965. Part of the explanation is to be found in Table 2.

Table 2 presents apparent consumption and indices (1960 = 100) of the group for the 1960-1965 period. As regards the beginning and the end of the period, the sub-region as a whole shows positive increase in apparent consumption, domestic production and import. Import shows the least increase and domestic production the highest. This is not, however, the case regarding the years in between the period. In general, declines in index numbers are obvious. It, therefore, appears that 1965 is the beginning of upward momentum in the 1960's. In view of the political situation in certain countries in the early 1960's, this is quite understandable.

Table 1

(\$1,000)

| | 1960 | | | 1961 | | | 1962 | | | 1963 | | | 1964 | | | 1965 | | |
|------------|----------|----------|--------|----------|----------|---------|----------|----------|--------|----------|----------|---------|----------|----------|----|----------|----------|----|
| | Chemical | Division | 53 | Chemical | Division | 53 | Chemical | Division | 53 | Chemical | Division | 53 | Chemical | Division | 53 | Chemical | Division | 53 |
| Morocco | A | 31,814 | 2,154 | 34,778 | 2,387 | 37,149 | 2,423 | 41,496 | 2,971 | 40,310 | 2,898 | 40,903 | 3,108 | | | | | |
| | B | 3,952 | 239 | 7,509 | 239 | 2,964 | 172 | 3,162 | 183 | 2,964 | 127 | 2,569 | 211 | | | | | |
| | C | 27,862 | 1,915 | 27,269 | 2,148 | 34,185 | 2,251 | 38,334 | 2,788 | 37,346 | 2,771 | 38,334 | 2,897 | | | | | |
| Algeria | A | 52,798 | 4,000 | 71,356 | 4,159 | 28,078 | 1,230 | 42,085 | 2,303 | 55,905 | 2,981 | 63,000 | 3,500 | | | | | |
| | B | 6,300 | 35 | 8,870 | 144 | 5,155 | 44 | 3,649 | 15 | 1,970 | 11 | 2,500 | 15 | | | | | |
| | C | 46,498 | 3,965 | 62,486 | 4,015 | 22,923 | 1,186 | 38,436 | 2,288 | 53,935 | 2,970 | 60,500 | 3,485 | | | | | |
| Tunisia | A | 12,993 | 921 | 12,441 | 911 | 14,331 | 1,035 | 17,421 | 1,114 | 16,379 | 1,297 | 19,155 | 1,541 | | | | | |
| | B | 1,471 | 4 | 9,212 | 5 | 6,350 | 1 | 8,067 | 1 | 7,014 | 6 | 20,219 | 4 | | | | | |
| | C | 11,522 | 917 | 3,229 | 906 | 7,981 | 1,034 | 9,354 | 1,113 | 9,365 | 1,291 | -1,064 | 1,537 | | | | | |
| Libya | A | 13,157 | 537 | 11,127 | 769 | 14,216 | 930 | 15,453 | 1,060 | 18,421 | 1,599 | 17,962 | 1,453 | | | | | |
| | B | - | - | - | - | - | - | - | - | - | - | - | - | | | | | |
| | C | 13,157 | 537 | 11,127 | 769 | 14,216 | 930 | 15,453 | 1,060 | 18,421 | 1,599 | 17,962 | 1,453 | | | | | |
| Total | A | 110,762 | 7,612 | 129,702 | 8,226 | 93,774 | 5,618 | 116,455 | 7,448 | 131,015 | 8,775 | 141,020 | 9,602 | | | | | |
| Maghreb | B | 11,723 | 278 | 25,591 | 388 | 14,469 | 217 | 14,878 | 199 | 11,948 | 144 | 25,288 | 230 | | | | | |
| | C | 99,039 | 7,334 | 104,111 | 7,838 | 79,305 | 5,401 | 101,577 | 7,249 | 119,067 | 8,631 | 115,732 | 9,372 | | | | | |
| Sudan | A | 11,883 | 1,488 | 15,642 | 1,085 | 17,069 | 1,139 | 17,069 | 1,541 | 16,225 | 1,438 | 20,147 | 1,316 | | | | | |
| | B | 32 | - | 17 | - | 14 | - | 75 | - | 78 | - | 66 | - | | | | | |
| | C | 11,851 | 1,488 | 15,625 | 1,085 | 17,055 | 1,139 | 16,994 | 1,541 | 16,147 | 1,438 | 20,081 | 1,316 | | | | | |
| UAR | A | 74,171 | 1,351 | 56,415 | 7,630 | 71,609 | 9,214 | 108,647 | 8,418 | 98,516 | 6,470 | 137,991 | 10,467 | | | | | |
| | B | 1,769 | 129 | 1,683 | 195 | 1,977 | 84 | 3,172 | 9 | 4,492 | 14 | 3,825 | 39 | | | | | |
| | C | 72,402 | 11,222 | 54,732 | 7,435 | 69,632 | 9,130 | 105,475 | 8,409 | 94,024 | 6,456 | 134,166 | 10,428 | | | | | |
| Total | A | 196,816 | 20,451 | 201,759 | 16,941 | 182,452 | 15,971 | 242,171 | 17,407 | 245,756 | 16,683 | 299,158 | 21,358 | | | | | |
| Sub-region | B | 13,524 | 407 | 27,291 | 583 | 16,460 | 301 | 18,125 | 208 | 16,518 | 158 | 29,179 | 269 | | | | | |
| | C | 183,292 | 20,044 | 174,468 | 16,358 | 165,992 | 15,670 | 224,046 | 17,199 | 229,238 | 16,525 | 269,979 | 21,116 | | | | | |

A = Imports.

B = Exports.

C = Imports - Exports.

(\$1,000)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 |
|---------------|--------|--------|--------|--------|--------|--------|
| | % | % | % | % | % | % |
| Morocco | | | | | | |
| A | 2,370 | 2,777 | 2,583 | 3,295 | 3,525 | 3,625 |
| B | 2,154 | 2,387 | 2,423 | 2,971 | 2,898 | 3,108 |
| C | 239 | 239 | 172 | 183 | 127 | 211 |
| D | - | - | - | - | - | - |
| E | 4,285 | 4,925 | 4,834 | 6,083 | 6,296 | 6,522 |
| Algeria | | | | | | |
| A | 12,310 | 11,210 | 5,140 | 6,385 | 6,235 | 8,250 |
| B | 4,000 | 4,159 | 1,230 | 2,303 | 2,981 | 3,500 |
| C | 35 | 144 | 44 | 15 | 11 | 15 |
| D | - | - | - | - | - | - |
| E | 16,275 | 15,225 | 6,326 | 8,673 | 9,205 | 11,735 |
| Tunisia | | | | | | |
| A | 940 | 1,285 | 1,525 | 2,335 | 2,798 | 3,078 |
| B | 921 | 911 | 1,035 | 1,114 | 1,297 | 1,541 |
| C | 4 | 5 | 1 | 1 | 6 | 4 |
| D | - | - | - | - | - | - |
| E | 1,857 | 2,191 | 2,559 | 3,448 | 4,089 | 4,615 |
| Libya | | | | | | |
| A | - | - | - | 200 | 400 | 600 |
| B | 537 | 769 | 930 | 1,060 | 1,599 | 1,453 |
| C | - | - | - | - | - | - |
| D | - | - | - | 1 | - | 32 |
| E | 537 | 769 | 930 | 1,259 | 1,999 | 2,021 |
| Total Maghreb | | | | | | |
| A | 15,620 | 15,272 | 9,248 | 12,215 | 12,958 | 15,553 |
| B | 7,612 | 8,226 | 5,618 | 7,448 | 8,775 | 9,602 |
| C | 278 | 388 | 217 | 199 | 144 | 230 |
| D | - | - | - | - | - | - |
| E | 22,954 | 23,110 | 14,649 | 19,463 | 21,589 | 24,893 |
| Sudan | | | | | | |
| A | 200 | 260 | 300 | 400 | 500 | 600 |
| B | 1,488 | 1,085 | 1,139 | 1,541 | 1,438 | 1,316 |
| C | - | - | - | - | - | - |
| D | 1 | - | - | - | 1 | - |
| E | 1,687 | 1,284 | 1,439 | 1,941 | 1,937 | 1,916 |

Table 2 (Cont'd)

| | 1960 | | 1961 | | 1962 | | 1963 | | 1964 | | 1965 | | |
|------------------|------|--------|------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| | | % | | % | | % | | % | | % | | % | |
| UAR | A | 2,150 | 100 | 2,650 | 123.3 | 3,500 | 162.7 | 4,400 | 204.6 | 4,650 | 216.3 | 5,050 | 234.9 |
| | B | 11,351 | 100 | 7,630 | 67.2 | 9,214 | 81.2 | 8,418 | 74.2 | 6,470 | 57.0 | 10,467 | 92.2 |
| | C | 129 | 100 | 195 | 151.2 | 84 | 65.1 | 9 | 7.0 | 14 | 10.9 | 39 | 30.2 |
| | D | 15 | - | 2 | - | 7 | - | 3 | - | - | - | - | - |
| Total sub-region | E | 13,357 | 100 | 10,083 | 75.5 | 12,623 | 94.5 | 12,806 | 95.9 | 11,106 | 83.1 | 15,478 | 115.9 |
| | A | 17,970 | 100 | 18,122 | 100.8 | 13,048 | 72.6 | 17,015 | 94.7 | 18,108 | 100.8 | 21,203 | 118.0 |
| | B | 20,451 | 100 | 16,941 | 82.8 | 15,971 | 78.1 | 17,407 | 85.1 | 16,683 | 81.6 | 21,385 | 104.6 |
| | C | 407 | 100 | 583 | 143.2 | 301 | 74.0 | 208 | 51.1 | 158 | 38.8 | 269 | 66.1 |
| Total sub-region | D | 16 | 100 | 3 | 18.8 | 7 | 43.8 | 4 | 25.0 | 1 | 6.3 | 32 | 200.0 |
| | E | 37,998 | 100 | 34,477 | 90.7 | 28,711 | 75.6 | 34,210 | 90.0 | 34,632 | 91.1 | 42,287 | 111.3 |

A = Local production.

D = Re-exports.

B = Imports.

E = Consumption.

C = Exports.

III. GROUP 531. SYNTHETIC ORGANIC DYE STUFFS, NATURAL INDIGO AND COLOUR LAKES

Group 531 has been sub-divided into:

- Sub-group 531.0 Synthetic organic dyestuffs, natural indigo and colour lakes
- Item 531.0 (1) Synthetic organic dyestuffs and natural indigo
- Item 531.0 (2) Colour lakes.

III.1. Synthetic organic dyestuffs

III.1.1. Market aspects

Synthetic organic dyestuffs find their application in:

| | |
|---|---------------------------------|
| Textile dyeing and printing | - 70 per cent of total sales |
| Dyeing of paper and paper products | - 15 per cent of total sales |
| Dyeing of synthetic fibres and other synthetics | } 15 per cent of total sales |
| Leather dyeing | |
| Raw materials for paints, inks and related products | |

Dyestuff consumption in textile industry is between 2 per cent by weight of cloth (to produce light coloured cotton cloth) and 8 per cent by weight (to produce dark sheets).

World production of synthetic organic dyestuffs in 1961 was around \$1,000 million. In 1966 US production increased to \$330 million (90,000 tons).

The average world price of synthetic organic dyestuffs in 1965 was estimated at about \$3/kg, with individual prices of, \$9/kg for acid yellow 3 and \$2.50/kg for phenamine green C.

III.1.2 Demand projections

Organic dyestuff consumption in the Sudan and Libya is still very limited but in the other countries of the sub-region demand is increasing at a high rate. This is due to the expansion of industries for textile dyeing and printing, the principal current and near term outlet for dyestuffs.

Present and future demands for synthetic organic dyestuffs in the sub-region are approximated in Tables 3 and 4.

Table 3

(Tons)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Morocco | 365 | 317 | 385 | 493 | 592 | 675 | 1,100 | 1,700 | 2,500 |
| Algeria | 162 | 179 | 150 | 160 | 180 | 190 | 300 | 600 | 1,200 |
| Tunisia | 118 | 97 | 122 | 129 | 203 | 171 | 280 | 400 | 550 |
| Libya | - | - | - | 63 | 85 | 61 | 100 | 150 | 220 |
| Total Maghreb | 645 | 593 | 657 | 845 | 1,060 | 1,097 | 1,780 | 2,850 | 4,470 |
| Sudan | 93 | 26 | 64 | 152 | 79 | 89 | 170 | 350 | 600 |
| UAR | 1,746 | 1,209 | 1,764 | 1,683 | 1,499 | 1,724 | 3,000 | 4,500 | 6,500 |
| Total sub-region | 2,484 | 1,828 | 2,485 | 2,680 | 2,638 | 2,910 | 4,950 | 7,700 | 11,570 |

Table 4

(\$1,000)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Morocco | 612 | 593 | 696 | 1,003 | 1,076 | 1,316 | 2,200 | 3,400 | 5,000 |
| Algeria | 348 | 386 | 315 | 336 | 378 | 400 | 630 | 1,260 | 2,520 |
| Tunisia | 197 | 184 | 233 | 278 | 436 | 478 | 620 | 880 | 1,220 |
| Libya | - | - | - | 31 | 41 | 29 | 100 | 200 | 330 |
| Total Maghreb | 1,157 | 1,163 | 1,244 | 1,648 | 1,931 | 2,223 | 3,550 | 5,740 | 9,070 |
| Sudan | 140 | 44 | 78 | 167 | 139 | 127 | 260 | 550 | 1,000 |
| UAR | 5,213 | 3,140 | 6,451 | 4,790 | 3,954 | 5,023 | 8,400 | 12,600 | 18,200 |
| Total sub-region | 6,510 | 4,347 | 7,773 | 6,605 | 6,024 | 7,373 | 12,210 | 18,890 | 28,270 |

III.1.3. Present situation of local production

Of the six countries of the North African sub-region, only the UAR has chosen to implement a project. This is due to begin commercial production in 1968.

It is clear that this very courageous project would benefit considerably from the greater consumer markets provided by regional economic co-operation. Production of the following types of dyestuffs and intermediates is envisaged:

| Type | Tons per year |
|--|---------------|
| 1. Direct and fast to light dyes | 715 |
| 2. Acid dyes | 117 |
| 3. Wool mordant dyes | 50 |
| 4. Sulphur dyes | 30 |
| 5. Naphtols | 100 |
| 6. Naphtol bases | 32 |
| 7. Aniline salts | 500 |
| 8. Intermediates | |
| - Beta naphtol | } |
| - H-acid | |
| - Betahydroxy naphthoic acid | |
| - O-benzensulphonylo-H-acid | |
| | 300 |
| 9. Vat dyes | 675 |
| 10. Intermediates for vat dyes | 400 |
| 11. Reducing agents for dyestuff manufacture | |
| - Bisulfite | 200 |
| - Hydrosulfite | 200 |
| - Rongalite | 300 |

Total production capacity of dyestuffs would therefore be around 2,200 tons/year.

The know-how and equipment for the production of vat dyes and their intermediates have been supplied by an Italian firm, and those for the other dyestuffs were furnished by a Polish organization.

The estimated capital investment for this plant is 14 million Egyptian pounds, including the cost of housing for plant employees.

An estimated 1,400 employees will be required for full production at the factory, which includes 180 technicians, 120 administrative persons, 400 skilled and 700 semi-skilled workers.

The Ismailia plant was designed with large spare capacity in utilities (e.g., electric supply, steam, water, etc.). Later expansion and production increases in the existing product lines will be low in cost.

Considering all cost reducing influences derived from greater output (e.g., on raw materials and intermediates cost, on production and on sales cost), it seems advisable to limit production of organic dyes and pigments in the North African sub-region for quite some time, other than in the Ismailia factory in the UAR.

Present UAR demand of dyestuffs is estimated to be 2,000 tons/year, including a number of dyes uneconomic to produce in small quantities during the first phase of the UAR project.

As some dyes, however, could be manufactured in excess of local demand, the idea is to exchange those in surplus with those required.

It is planned that 60 per cent of the UAR dyestuffs requirements will be met by part of the factory's production. The remainder of the factory's output will be exported.

III.1.4. Future of the local organic dyestuffs manufacture

We visualize the future of the organic dyestuffs manufacture in the North African sub-region as follows:

1969 Starting year of Ismailia factory, at 50 per cent of rated capacity.

1970 Needed to accumulate production experience. By the end of this year, 100 per cent of rated capacity should be reached.

1971-75 Efficiency will increase, training of local staff will be completed, sales organization and sales outlets will be built up, including exports.

Project studies for expansion of the Ismailia plant finalized and construction carried out.

Some of the dyes in great demand will already be produced in higher quantities than the original rated capacity.

Total output will reach 4,000 tons/year of dyestuffs. The increased demand for dyestuffs might justify a second factory in the sub-region, (e.g., in Morocco and possibly as a subsidiary from or a joint venture with the Ismailia plant). By that time the Ismailia plant should be in a position to supply raw materials and intermediates to a Maghreb factory.

Ideally the two factories should aim at specialization in complementary product ranges.

The first production phase in 1975 will reach 2,000 tons/year of dyestuffs.

1976-80 There will be increased production of existing product lines in two factories and expansions into other more diversified final products (e.g. a range of organic pigments for which the projected polyester fibre plant in the UAR will be a customer) and reactive dyes.

Production of more intermediates and basic raw materials will start.

Output of dyestuffs should have reached 6,000 tons/year in Ismailia plant and 4,000 tons/year in Morocco.

The order of magnitude of financial and labour requirements are presented in Table 11.

III.2. Organic pigments, natural indigo and colour lakes

III.2.1. Market aspects

This group comprises the dyestuffs which are insoluble in water or the other liquids in which they are used.

Natural organic pigments such as carmine, alizarin and purpurine have become very costly and have been almost completely replaced by synthetic products.

Natural indigo still holds a certain place in a country like the Sudan.

Synthetic organic pigments are used as pure pigments or in the precipitated form as a lake.

To this group belong beta-hydroxynaphthol pigments, tenzidine yellows, the triphenylmethane group, metal organic pigment using calcium, strontium, magnesium and manganese lakes with beta-naphthol, permanent violet.

III.2.2. Demand projections

A rough estimate of present and future demand for natural indigo and colour lakes is shown in Tables 5 and 6.

Table 5

(Tons)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------|---|------|------|------|------|------|------|------|------|------|
| Morocco | A | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - |
| Algeria | A | - | - | - | - | - | - | - | - | - |
| | B | 191 | 152 | 100 | 140 | 150 | 170 | 200 | 300 | 400 |
| Tunisia | A | - | - | - | - | - | - | - | - | - |
| | B | 85 | 74 | 91 | 60 | 73 | 71 | 90 | 120 | 150 |
| Libya | A | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - |
| Total | A | - | - | - | - | - | - | - | - | - |
| | B | 276 | 226 | 191 | 200 | 223 | 241 | 290 | 420 | 550 |

Table 5 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|------|------|------|------|------|------|------|------|-------|
| Sudan | A | 126 | 137 | 91 | 115 | 117 | 63 | 80 | 100 | 150 |
| | B | - | - | - | - | - | - | - | - | - |
| UAR | A | - | - | - | - | - | - | - | - | - |
| | B | - | - | 23 | - | 5 | - | 50 | 250 | 500 |
| Total sub-region | A | 126 | 137 | 91 | 115 | 117 | 63 | 80 | 100 | 150 |
| | B | 276 | 226 | 214 | 200 | 228 | 241 | 340 | 670 | 1,050 |

A = Demand of natural indigo.

B = Demand of colour lakes.

Table 6

(\$1,000)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|------|------|------|------|------|------|------|------|------|
| Morocco | A | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - |
| Algeria | A | - | - | - | - | - | - | - | - | - |
| | B | 40 | 30 | 24 | 35 | 37 | 43 | 50 | 75 | 100 |
| Tunisia | A | - | - | - | - | - | - | - | - | - |
| | B | 14 | 14 | 20 | 15 | 16 | 18 | 25 | 30 | 40 |
| Libya | A | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - |
| Total Maghreb | A | - | - | - | - | - | - | - | - | - |
| | B | 54 | 44 | 44 | 50 | 53 | 61 | 75 | 105 | 140 |
| Sudan | A | 190 | 197 | 130 | 155 | 173 | 97 | 120 | 150 | 230 |
| | B | - | - | - | - | - | - | - | - | - |
| UAR | A | - | - | - | - | - | - | - | - | - |
| | B | - | - | 9 | - | 2 | - | 15 | 75 | 150 |
| Total sub-region | A | 190 | 197 | 130 | 155 | 173 | 97 | 120 | 150 | 230 |
| | B | 54 | 44 | 53 | 50 | 55 | 61 | 90 | 180 | 290 |

A = Demand of natural indigo.

B = Demand of colour lakes.

III.2.3. Present and future situation of local production

The Ismailia factory manufactures a small amount of organic pigments, notably, 10 tons of the phthalocyanine type.

A broader range of these pigments is projected for the second phase of the Ismailia project. A figure of 400 tons/year of organic pigments was mentioned in Cairo as being required to supply textile, plastics and paints industries of the UAR. These include the projected polyester fibre plant and the polymer plants at Alexandria for polyethylene, PVC, caprolactam and polybutadiene.

It is suggested that in the Ismailia and Morocco plants the following organic pigments capacity be established:

(Tons)

| | 1970 | 1975 | 1980 |
|---------|------|------|-------|
| UAR | 10 | 300 | 600 |
| Morocco | - | 400 | 500 |
| Total | 10 | 700 | 1,100 |

The financial and labour requirements for these projects are given in Table 11.

III.3. Raw materials for dyestuffs manufacture

For the production of organic dyestuffs a large number of different chemicals is required. They can be divided into two types:

- the group of the real basic chemical raw materials; and
- the group of the intermediates.

The UAR is strengthening its present position in the first group. Included are the heavy inorganic chemicals like sulphuric acid, nitric acid, chlorine, hydrochloric acid, caustic soda, sodium carbonate, ammonia, sodium sulfide (1,800 tons/year projected in the second five-year plan). Special reducing agents for dyestuffs manufacture are also projected in the Ismailia venture:

Sodium bisulfite (NaHSO_3) = 200 tons/year

Sodium hydrosulfite ($\text{Na}_2\text{S}_2\text{H}_4$) = 200 tons/year

Rongalite (sodiumsulfoxylate formaldehyde) = 300 tons/year

Production of these chemicals could easily and with great economic advantage be expanded to serve the region.

The second category includes: the organic chemicals group of coal tar chemicals. The most important aromatic raw materials are: benzene, toluene, o, m, p-xylene, naphthalene, acenaphthene, anthracene, carbazole.

From these nine basic chemicals literally thousands of intermediates can be made.

The new coke batteries near the Helwan steel factory started in 1964 to produce basic coal tar. Distillation of this coal tar is included in the second industrialization programme concurrently with the expansion of the coke production at Helwan to 1.3 - 1.5 million tons/year.

Naphtalene, phenol, cresol and anthracene will be produced. In addition, present production of 2,400 tons/year of benzene, 520 tons of toluene, 110 tons of xylene and 95 tons of raw phenol will be about tripled. A further 15,000 tons/year of benzene and toluene can be expected from the delayed coking plant projected at the new Suez refinery.

Another important organic chemical intermediate for the plant which will be available locally is aniline. Nitrobenzene and aniline plants are under construction as sections of a military factory with capacity of 750 tons of nitrobenzene and from which 570 tons of aniline will be produced annually.

About 60 per cent, by weight (40 per cent by value) of the raw materials for local dyes production will be of local origin.

III.4. Present and future development of group 531

The estimates of present and future demand for synthetic organic dyestuffs, natural indigo and colour lakes (group 531) are shown in Tables 7 and 8.

Table 7

(Tons)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------------|---|------|------|------|-------|-------|-------|-------|-------|-------|
| Morocco | A | 395 | 317 | 385 | 493 | 592 | 675 | 1,100 | 1,700 | 2,500 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | - | - | - | - | - | - | - | - | - |
| | D | 365 | 317 | 385 | 493 | 592 | 675 | 1,100 | 1,700 | 2,500 |
| Algeria | A | 162 | 179 | 150 | 169 | 180 | 190 | 300 | 600 | 1,200 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | 191 | 152 | 100 | 140 | 150 | 170 | 200 | 300 | 400 |
| | D | 353 | 331 | 250 | 300 | 330 | 360 | 500 | 900 | 1,600 |
| Tunisia | A | 118 | 97 | 122 | 129 | 203 | 171 | 280 | 400 | 550 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | 85 | 71 | 91 | 60 | 73 | 71 | 90 | 120 | 150 |
| | D | 203 | 171 | 213 | 189 | 276 | 242 | 370 | 520 | 700 |
| Libya | A | - | - | - | 63 | 85 | 61 | 100 | 150 | 220 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | - | - | - | - | - | - | - | - | - |
| | D | - | - | - | 63 | 85 | 61 | 100 | 150 | 220 |
| Total Maghreb | A | 645 | 593 | 657 | 845 | 1,060 | 1,097 | 1,780 | 2,850 | 4,470 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | 276 | 226 | 191 | 200 | 223 | 241 | 290 | 420 | 550 |
| | D | 921 | 819 | 848 | 1,045 | 1,283 | 1,338 | 2,070 | 3,270 | 5,020 |

Table 7 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Sudan | A | 93 | 26 | 64 | 152 | 79 | 89 | 170 | 350 | 600 |
| | B | 126 | 137 | 91 | 115 | 117 | 63 | 80 | 100 | 150 |
| | C | - | - | - | - | - | - | - | - | - |
| | D | 219 | 163 | 155 | 267 | 196 | 152 | 250 | 450 | 750 |
| UAR | A | 1,746 | 1,209 | 1,764 | 1,683 | 1,499 | 1,724 | 3,000 | 4,500 | 6,500 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | - | - | 23 | - | 5 | - | 50 | 250 | 500 |
| | D | 1,746 | 1,209 | 1,787 | 1,683 | 1,504 | 1,724 | 3,050 | 4,750 | 7,000 |
| Total sub-region | A | 2,484 | 1,828 | 2,485 | 2,680 | 2,638 | 2,910 | 4,950 | 7,700 | 11,570 |
| | B | 126 | 137 | 91 | 115 | 117 | 63 | 80 | 100 | 150 |
| | C | 276 | 226 | 214 | 200 | 228 | 241 | 340 | 670 | 1,050 |
| | D | 2,886 | 2,191 | 2,790 | 2,995 | 2,983 | 3,214 | 5,370 | 8,470 | 12,770 |

Table 8

(\$1,000)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Morocco | A | 612 | 593 | 696 | 1,003 | 1,076 | 1,316 | 2,200 | 3,400 | 5,000 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | - | - | - | - | - | - | - | - | - |
| | D | 612 | 593 | 696 | 1,003 | 1,076 | 1,316 | 2,200 | 3,400 | 5,000 |
| Algeria | A | 348 | 386 | 315 | 336 | 378 | 400 | 630 | 1,260 | 2,520 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | 40 | 30 | 24 | 35 | 37 | 43 | 50 | 75 | 100 |
| | D | 388 | 416 | 339 | 371 | 415 | 443 | 680 | 1,335 | 2,620 |
| Tunisia | A | 197 | 184 | 233 | 278 | 436 | 478 | 620 | 880 | 1,220 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | 14 | 14 | 20 | 15 | 16 | 18 | 25 | 30 | 40 |
| | D | 211 | 198 | 253 | 293 | 452 | 496 | 645 | 910 | 1,260 |
| Libya | A | - | - | - | 31 | 41 | 29 | 100 | 200 | 330 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | - | - | - | - | - | - | - | - | - |
| | D | - | - | - | 31 | 41 | 29 | 100 | 200 | 330 |
| Total Maghreb | A | 1,157 | 1,163 | 1,244 | 1,648 | 1,931 | 2,223 | 3,550 | 5,740 | 9,070 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | 54 | 44 | 44 | 50 | 53 | 61 | 75 | 105 | 140 |
| | D | 1,211 | 1,207 | 1,288 | 1,698 | 1,984 | 2,284 | 3,625 | 5,845 | 9,210 |

Table 8 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Sudan | A | 140 | 44 | 78 | 167 | 139 | 127 | 260 | 550 | 1,000 |
| | B | 190 | 197 | 130 | 155 | 173 | 97 | 120 | 150 | 230 |
| | C | - | - | - | - | - | - | - | - | - |
| | D | 330 | 241 | 208 | 322 | 312 | 224 | 380 | 700 | 1,230 |
| UAR | A | 5,213 | 3,140 | 6,451 | 4,790 | 3,954 | 5,023 | 8,400 | 12,600 | 18,200 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | - | - | 9 | - | 2 | - | 15 | 75 | 150 |
| | D | 5,213 | 3,140 | 6,460 | 4,790 | 3,956 | 5,023 | 8,415 | 12,675 | 18,350 |
| Total sub-region | A | 6,510 | 4,347 | 7,773 | 6,605 | 6,024 | 7,373 | 12,210 | 18,890 | 28,270 |
| | B | 190 | 197 | 130 | 155 | 173 | 97 | 120 | 150 | 230 |
| | C | 54 | 44 | 53 | 50 | 55 | 61 | 90 | 180 | 290 |
| | D | 6,754 | 4,588 | 7,956 | 6,810 | 6,252 | 7,531 | 12,420 | 19,220 | 28,790 |

A = Demand of synthetic organic dyestuffs C = Demand of colour lakes

B = Demand of natural indigo

D = Total demand of group 531

The domestic demand per capita of synthetic organic dyestuffs, natural indigo and colour lakes (group 531) is shown in Tables 9 and 10.

Table 9

(Kg)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|------|------|------|------|------|------|------|------|------|
| Morocco | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.07 | 0.10 | 0.13 |
| Algeria | 0.03 | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.06 | 0.09 |
| Tunisia | 0.05 | 0.04 | 0.05 | 0.04 | 0.06 | 0.06 | 0.07 | 0.09 | 0.10 |
| Libya | - | - | - | 0.04 | 0.05 | 0.04 | 0.05 | 0.07 | 0.09 |
| Total Maghreb | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.06 | 0.08 | 0.10 |
| Sudan | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 | 0.03 | 0.04 |
| UAR | 0.07 | 0.05 | 0.07 | 0.06 | 0.05 | 0.06 | 0.09 | 0.12 | 0.16 |
| Total sub-region | 0.05 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.06 | 0.09 | 0.11 |

Table 10

(\$)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|------|------|------|------|------|------|------|------|------|
| Morocco | 0.05 | 0.05 | 0.06 | 0.08 | 0.09 | 0.10 | 0.15 | 0.20 | 0.25 |
| Algeria | 0.04 | 0.04 | 0.03 | 0.03 | 0.04 | 0.04 | 0.05 | 0.08 | 0.14 |
| Tunisia | 0.05 | 0.05 | 0.06 | 0.07 | 0.11 | 0.11 | 0.13 | 0.15 | 0.19 |
| Libya | - | - | - | 0.02 | 0.03 | 0.02 | 0.05 | 0.09 | 0.13 |
| Total Maghreb | 0.04 | 0.04 | 0.05 | 0.06 | 0.07 | 0.07 | 0.10 | 0.14 | 0.19 |
| Sudan | 0.03 | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 | 0.03 | 0.04 | 0.06 |
| UAR | 0.20 | 0.12 | 0.24 | 0.17 | 0.14 | 0.17 | 0.25 | 0.33 | 0.42 |
| Total sub-region | 0.10 | 0.07 | 0.12 | 0.10 | 0.09 | 0.10 | 0.15 | 0.20 | 0.26 |

Tables 9 and 10 make it possible to compare the levels of consumption. It will be seen that consumption per head is still very low. It may be assumed that the influence of the local production will be considerable and that the level of per capita consumption will increase during the years to come.

Table 11 includes approximate quantification of desired future outlook for local industry in synthetic organic dyestuffs, natural indigo and colour lakes (group 531).

Table 11

| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-----------------|------|------|------|-------|-------------------|------|------|------|-------|
| | | Capacity (tons) | | | | | Production (tons) | | | | |
| Morocco | A | - | - | - | 2200 | 5000 | - | - | - | 2000 | 4000 |
| | B | - | - | - | 400 | 500 | - | - | - | 300 | 400 |
| | C | - | - | - | 2600 | 5500 | - | - | - | 2300 | 4400 |
| UAR | A | - | - | 2200 | 5000 | 7000 | - | - | 2200 | 4000 | 6000 |
| | B | - | - | 10 | 300 | 600 | - | - | 10 | 250 | 500 |
| | C | - | - | 2210 | 5300 | 7600 | - | - | 2210 | 4250 | 6500 |
| Total sub-region | A | - | - | 2200 | 7200 | 12000 | - | - | 2200 | 6000 | 10000 |
| | B | - | - | 10 | 700 | 1100 | - | - | 10 | 550 | 900 |
| | C | - | - | 2210 | 7900 | 13100 | - | - | 2210 | 6550 | 10900 |

Table 11 (Cont'd)

| | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------|---------------------------------------|------|-------|-------|--------|--------------------------------------|------|------|------|-------|
| | Gross business output (\$1,000) | | | | | Value added (\$1,000) | | | | |
| Morocco | - | - | - | 4500 | 10500 | - | - | - | 1800 | 4200 |
| UAR | - | - | 6000 | 11200 | 16500 | - | - | 2400 | 4480 | 6600 |
| Total | - | - | 6000 | 15700 | 27000 | - | - | 2400 | 6280 | 10800 |
| sub-region | - | - | 6000 | 15700 | 27000 | - | - | 2400 | 6280 | 10800 |
| | Fixed investment (\$1,000) | | | | | Working capital (\$1,000) | | | | |
| Morocco | - | - | - | 24000 | 42000 | - | - | - | 900 | 2100 |
| UAR | 4000 | 8000 | 24000 | 42000 | 60000 | - | - | 1200 | 2200 | 3300 |
| Total | 4000 | 8000 | 24000 | 66000 | 102000 | - | - | 1200 | 3100 | 5400 |
| sub-region | 4000 | 8000 | 24000 | 66000 | 102000 | - | - | 1200 | 3100 | 5400 |
| | Number of workers | | | | | Additional capacity (tons) | | | | |
| Morocco | - | - | - | 1400 | 1800 | - | - | - | 2600 | 2900 |
| UAR | - | - | 1400 | 1800 | 2200 | - | - | 2210 | 3090 | 2300 |
| Total | - | - | 1400 | 3200 | 4000 | - | - | 2210 | 5690 | 5200 |
| sub-region | - | - | 1400 | 3200 | 4000 | - | - | 2210 | 5690 | 5200 |
| | Additional fixed investment (\$1,000) | | | | | Additional working capital (\$1,000) | | | | |
| Morocco | - | - | - | 24000 | 18000 | - | - | - | 900 | 1200 |
| UAR | 4000 | 4000 | 16000 | 18000 | 18000 | - | - | 1200 | 1000 | 1100 |
| Total | 4000 | 4000 | 16000 | 42000 | 36000 | - | - | 1200 | 1900 | 2300 |
| sub-region | 4000 | 4000 | 16000 | 42000 | 36000 | - | - | 1200 | 1900 | 2300 |
| | Additional workers | | | | | | | | | |
| Morocco | - | - | - | 1400 | 400 | | | | | |
| UAR | - | - | 1400 | 400 | 400 | | | | | |
| Total | - | - | 1400 | 1800 | 800 | | | | | |
| sub-region | - | - | 1400 | 1800 | 800 | | | | | |

A = Synthetic organic dyestuffs

B = Colour lakes

C = Total of group 531

The suggested programme for development of local industry in the 1965-1980 period will require US\$102 million of fixed investment and 4,000 workers. Gross output is expected to increase by about \$27 million and value added by \$10.8 million by 1980. Local production will cover 41.1, 77.3 and 85.3 per cent in quantity and 48.3, 81.6 and 93.8 per cent in value of domestic demand in 1970, 1975 and 1980 respectively.

IV. GROUP 532. DYEING AND TANNING EXTRACTS, SYNTHETIC TANNING MATERIALS

Group 532 has been sub-divided into:

- sub-group 532.1 Dyeing extracts (vegetable and animal)
- 532.3 Synthetic tanning materials
- 532.4 Tanning extracts of vegetable origin
- 532.5 Tannins (tannic acids) and derivatives.

IV.1. Market situation, tanning agents

Tanning may be defined as the process of converting raw hides and skins into leather. During this process tanning agents are used. These may be of vegetable origin, of inorganic chemicals, or of synthetic organic chemical substances.

Market development for tanning agents, of course, is closely related to development of the leather tanning industry. Another factor is the possibility of developing new commercial outlets for tanning agents outside the leather industry.

Local processing of hides and skins is developing quickly in all countries of the sub-region. Previously hides and skins were exported mainly in a raw or salted state. Only small quantities were tanned, often under adverse conditions by artisans for local consumption and for handicrafts.

Today, a number of demonstration and training tanneries can be found in the region and, wherever necessary, there are modern government tanneries in operation or in an advanced stage of construction.

The number of expansion projects for existing tanneries and projects for new tanneries in the sub-region are an indication of continued fast growth of this industry sector. Increased local consumption of leather can be expected to take up part of the production increase. Manufacture of pre-tanned hides and skins for export will account for another part of increased output. The difficulty in finding workers for the wet-house tanning operations in Europe and North America will have a positive influence on growth of the tanning industry in the North African sub-region.

It is expected that substitution of leather by synthetics, before 1980, will not have a notable effect on growth of domestic leather markets in the sub-region, as in industrially advanced countries. It will be more than offset by the many factors positively influencing the growth of leather demand (e.g., increased use of footwear through education and urbanization and increased national army consumption).

Although synthetics for the replacement of leather are about half its price, it should be realized that leather can be made in the sub-region

with very little foreign exchange content. In contrast, synthetic leather substitutes for the time being at least will have a very high foreign exchange content.

Regarding the export markets for leather, it is felt that the period of rapid substitution of synthetics for sole leather, the main consumer of vegetable tanning extracts has already taken place. Future rates of substitution are, therefore, likely to be slower than in the late fifties.

It is expected therefore that total demand for all types of tanning materials in the North African sub-region will increase substantially.

IV.2. Sub-group 532.3. Synthetic tanning materials

IV.2.1. Market aspects

Synthetic tanning agents, also called syntans are condensation products of sulfonated phenols (or higher homologs) and formaldehyde which are capable of converting animal skin into leather. Comparatively few syntans exist which do not include a sulfonic acid group.

Syntans may be classified according to use as auxiliary, complementary or replacement tannins.

It is estimated that world production of syntans is 60,000 tons/year, and consumption is increasing, mainly for retanning of chrome leather and for light-fast requirements.

IV.2.2. Demand projections

Present and future demand for synthetic tanning materials in the sub-region is estimated as follows:

Table 12

(Tons)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|------|------|-------|-------|------|-------|-------|-------|-------|
| Morocco | 239 | 224 | 341 | 385 | 383 | 384 | 530 | 700 | 900 |
| Algeria | 2 | 8 | 10 | 11 | 13 | 20 | 40 | 60 | 80 |
| Tunisia | 45 | 134 | 23 | 61 | 56 | 74 | 120 | 170 | 250 |
| Libya | 10 | 58 | 111 | 68 | 17 | 92 | 50 | 75 | 100 |
| Total Maghreb | 296 | 424 | 485 | 525 | 469 | 570 | 740 | 1,005 | 1,330 |
| Sudan | 123 | 107 | 92 | 29 | 57 | 158 | 200 | 270 | 350 |
| UAR | 500 | 330 | 494 | 880 | 268 | 600 | 800 | 1,100 | 1,500 |
| Total sub-region | 919 | 861 | 1,061 | 1,434 | 794 | 1,328 | 1,740 | 2,375 | 3,180 |

Table 13

(\$1,000)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|------|------|------|------|------|------|------|------|-------|
| Morocco | 101 | 91 | 137 | 167 | 136 | 156 | 212 | 280 | 360 |
| Algeria | 1 | 6 | 6 | 6 | 6 | 10 | 20 | 30 | 40 |
| Tunisia | 17 | 36 | 11 | 26 | 27 | 45 | 60 | 85 | 120 |
| Libya | 2 | 10 | 32 | 31 | 10 | 27 | 25 | 40 | 50 |
| Total Maghreb | 121 | 143 | 186 | 230 | 179 | 238 | 317 | 435 | 570 |
| Sudan | 23 | 16 | 28 | 17 | 31 | 57 | 80 | 110 | 140 |
| UAR | 105 | 69 | 104 | 197 | 69 | 150 | 240 | 330 | 450 |
| Total sub-region | 249 | 228 | 318 | 444 | 279 | 445 | 637 | 875 | 1,160 |

It is doubted whether manufacture in the sub-region before 1980 has any priority. It is expected that domestic demand will still be met by imports.

IV.3. Sub-group 532.4. Tanning extracts of vegetable origin

IV.3.1. Market aspects

Vegetable tannins are basically polyphenolic compounds extracted and concentrated from a great number of woody and herbaceous plants. The process consists of an extraction of the disintegrated material with hot soft water in a counter-current system of vats, concrete basins or autoclaves. The extraction liquors are concentrated in film vacuum evaporators to 50 per cent extracts or even spray dried to powders. Vegetable tanning agents are important raw materials in the hide and leather industries, especially for the manufacture of sole and other heavy leathers. They perform well for pre- or rough tannage processes before export to consumer countries to finish for fashion leathers whereas previously only salted hides and skins were exported.

Worldwide, the most important sources for vegetable tannins are the wood of the quebracho common in Argentina and Paraguay, the wood of the chestnut in France, Italy and Yugoslavia, oaks and hemlocks which were important materials in North America and Europe, mangrove bark found on many tropical coasts, especially South East Asia and East Africa and the bark of the wattle (mimosa) which has become an important plantation tree for this purpose in South and East Africa.

Although a wide variety of raw materials, suitable for tanning extract production, are found in developing countries, the North African sub-region is poorly endowed with such materials.

It is felt that the Sudan is the only country in the region where the availability of raw materials and other conditions provide a basis for economic production. In the Sudan it has been found that a granular substance containing over 50 per cent tannins is recoverable from mechanically disintegrated and separated pods of the *Acacia Nilotica*. This powder, called "garad tan" locally, is the only recorded, naturally occurring, substance which contains a mixture of condensed and hydrolysable tannins. It is, therefore, not essential to blend it with other vegetable tannin materials to obtain a tannage with good penetration, while still producing a light-coloured mellow leather. The sugar content of the liquor is very low; it does not ferment readily, and will not darken the finished leather by oxidation to the extent found with other vegetable tanning materials. "Garad tan" has the advantage over some of the competing products which need pressure autoclaves that it can be extracted below 100°C and therefore in low-cost open cement pits.

World trade in vegetable tanning agents showed a peak in 1950/51 of 500,000 tons/year of which about 50 per cent consisted of quebracho, 35 per cent of wattle extract, 15 per cent of chestnut extract. It is estimated to have shrunk to around 200,000 tons during 1965.

There is a considerable world surplus of capacity in vegetable tanning extract factories.

The world situation, in terms of production and trade, has deteriorated since 1956. It is felt, however, that this should not deter countries or regions from establishing national tanning extract industries. These can be based on indigenous materials to supply the rapidly expanding local tanneries and to export to countries in the region not having a raw material base to make these extracts themselves.

It should be realized that in this crowded field, only efficient, low-cost production units will be viable. Serviceable second-hand equipment should be available to make a good start.

IV.3.2. Demand projections

The countries of the sub-region import large quantities of vegetable tanning agents and extracts from outside the region. The main consumer of vegetable tanning agents in the region is the UAR.

The estimate of future requirements of vegetable tanning agents in the sub-region was taken into account: about 0.8 kg extract are required per kg of raw hide.

Present and future demands for vegetable tanning agents in the sub-region are given in Tables 14 and 15.

Table 14

(Tons)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| Morocco | 373 | 529 | 737 | 630 | 645 | 254 | 800 | 1,200 | 1,800 |
| Algeria | 134 | 172 | 190 | 195 | 205 | 220 | 600 | 1,000 | 1,600 |
| Tunisia | 153 | 178 | 148 | 207 | 187 | 210 | 300 | 420 | 600 |
| Libya | - | - | - | - | - | - | 110 | 150 | 200 |
| Total Maghreb | 660 | 879 | 1,075 | 1,032 | 1,037 | 684 | 1,810 | 2,770 | 4,200 |
| Sudan | - | - | - | 207 | 142 | 136 | 500 | 1,000 | 2,000 |
| UAR | 4,527 | 2,952 | 5,026 | 3,571 | 2,388 | 3,940 | 5,000 | 8,000 | 12,000 |
| Total sub-region | 5,187 | 3,831 | 6,101 | 4,810 | 3,567 | 4,760 | 7,310 | 11,770 | 18,200 |

Table 15

(\$1,000)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|------|------|------|------|------|------|-------|-------|-------|
| Morocco | 74 | 94 | 86 | 123 | 131 | 53 | 170 | 250 | 380 |
| Algeria | 30 | 38 | 40 | 45 | 55 | 63 | 150 | 250 | 400 |
| Tunisia | 43 | 42 | 34 | 54 | 49 | 60 | 75 | 105 | 150 |
| Libya | - | - | - | - | - | - | 25 | 35 | 50 |
| Total Maghreb | 147 | 174 | 160 | 222 | 235 | 176 | 420 | 640 | 980 |
| Sudan | - | - | - | 58 | 44 | 52 | 125 | 250 | 500 |
| UAR | 789 | 450 | 804 | 647 | 385 | 715 | 1,000 | 1,600 | 2,400 |
| Total sub-region | 936 | 624 | 964 | 927 | 664 | 943 | 1,545 | 2,490 | 3,880 |

IV.3.3. Present and future situation of local production

"Garad tan" and tanning extracts are already produced in the FAO pilot plant of the Leather Institute at Omdurman near Khartoum and are used successfully in the adjacent Government tannery. A project for a commercial garad tan and tanning extract factory at Sennar, a town in the centre of the acacia nilotica forest, based on experience in this pilot plant, is supported.

Investments for a 1,000 tons/shift/year garad powder plant are \$125,000 and for the second phase of 1,000 tons/shift/year spray dried tanning extract, \$200,000.

Demand projections indicate the need to operate this factory at full 3 shift capacity in the period 1970-1975.

A projected Sudanese factory for vegetable tanning extracts would benefit by an increased production level, whereas the project is marginal when working only for the national market. Raw material for this industry is plentiful in the Sudan. *Acacia nilotica* is used for reforestation and there is co-operation with the Forestry Department for the replanting of trees with high tannin content pods.

IV.4. Sub-group 532.1. Dyeing extracts (vegetable and animal)

Sub-group 532.5. Tannins (tannic acids) and derivatives

Sub-group 532.3. Artificial bates

Table 16

[illegible]

Table 16 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|------|------|------|------|------|------|------|------|------|
| UAR | A | 7 | 7 | 5 | 2 | 2 | - | 5 | 10 | 20 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | 3 | 2 | 8 | 1 | 8 | 7 | 10 | 15 | 25 |
| Total sub-region | A | 71 | 84 | 23 | 40 | 26 | 49 | 73 | 111 | 167 |
| | B | 61 | 56 | 43 | 56 | 46 | 53 | 70 | 90 | 120 |
| | C | 18 | 22 | 85 | 40 | 18 | 39 | 58 | 91 | 137 |

Table 17

(\$1,000)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|------|------|------|------|------|------|------|------|------|
| Morocco | A | 16 | 37 | 10 | 11 | 15 | 23 | 30 | 45 | 65 |
| | B | 13 | 12 | 10 | 14 | 12 | 11 | 17 | 22 | 30 |
| | C | 4 | 2 | 4 | 2 | 3 | 15 | 22 | 32 | 44 |
| Algeria | A | 20 | 3 | 8 | 10 | 4 | 6 | 10 | 20 | 30 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | 2 | 6 | 7 | 8 | 5 | 7 | 10 | 20 | 30 |
| Tunisia | A | 4 | 6 | 5 | 6 | 2 | 2 | 6 | 10 | 20 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | 3 | 4 | 20 | 1 | 2 | 2 | 4 | 8 | 16 |
| Libya | A | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - |
| | C | - | - | - | - | - | - | - | - | - |
| Total Maghreb | A | 40 | 46 | 23 | 27 | 21 | 31 | 46 | 75 | 115 |
| | B | 13 | 12 | 10 | 14 | 12 | 11 | 17 | 22 | 30 |
| | C | 15 | 12 | 31 | 11 | 10 | 24 | 36 | 60 | 90 |
| Sudan | A | 1 | - | - | 9 | 2 | 27 | 30 | 38 | 50 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | - | - | - | - | - | - | - | - | - |
| UAR | A | 8 | 9 | 6 | 7 | 5 | - | 7 | 15 | 30 |
| | B | - | - | - | - | - | - | - | - | - |
| | C | 7 | 5 | 16 | 3 | 10 | 9 | 15 | 22 | 37 |
| Total sub-region | A | 49 | 55 | 29 | 43 | 28 | 58 | 83 | 128 | 195 |
| | B | 13 | 12 | 10 | 14 | 12 | 11 | 17 | 22 | 30 |
| | C | 22 | 17 | 47 | 14 | 20 | 33 | 51 | 82 | 127 |

A = Dyeing extracts (vegetable and animal). B = Artificial bates for pre-tanning.
 C = Tannins (tannic acids) and derivatives.

Sub-group 532.1 of colouring matter of vegetable and animal origin (also comprising dyewood extract and other vegetable dyeing extracts but excluding indigo) is of small and decreasing importance in the sub-region. It, therefore, is not separately considered in this study.

The SITC heading 532.3 comprises the synthetic tanning materials and artificial bates for pre-tanning (e.g., enzymatic, pancreatic or bacterial origin). Bating is a term given to the whole process of treating delimed pelts with enzymes to give the required flexibility and appearance to finished leather. Dog and pigeon dung was once used for this purpose and the unconfirmed story is that they are still used in the North African

sub-region by artisan leather tanners. These traditional products have been replaced nowadays by standardized products consisting of deliming salts and enzymes extracted from the pancreatic glands of pigs.

We see no regional production before 1980.

IV.5. Present and future development of group 532

Tables 18 and 19 include estimates of present and future demand for dyeing and tanning extracts and for synthetic tanning materials (group 532).

Table 18

(Tons)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Morocco | A | 239 | 224 | 341 | 385 | 383 | 384 | 530 | 700 | 900 |
| | B | 373 | 529 | 737 | 630 | 645 | 254 | 800 | 1,200 | 1,800 |
| | C | 38 | 69 | 11 | 14 | 20 | 20 | 30 | 45 | 65 |
| | D | 61 | 56 | 43 | 56 | 46 | 53 | 70 | 90 | 120 |
| | E | 5 | - | 2 | 32 | 5 | 25 | 35 | 50 | 70 |
| | F | 716 | 878 | 1,134 | 1,117 | 1,099 | 736 | 1,465 | 2,085 | 2,955 |
| Algeria | A | 2 | 8 | 10 | 11 | 13 | 20 | 40 | 60 | 80 |
| | B | 134 | 172 | 190 | 195 | 205 | 220 | 600 | 1,000 | 1,600 |
| | C | 19 | 3 | 6 | 10 | 3 | 5 | 10 | 20 | 30 |
| | D | - | - | - | - | - | - | - | - | - |
| | E | 7 | 14 | 5 | 7 | 4 | 6 | 10 | 20 | 30 |
| | F | 162 | 187 | 211 | 223 | 225 | 251 | 660 | 1,100 | 1,740 |
| Tunisia | A | 45 | 134 | 23 | 61 | 56 | 74 | 120 | 170 | 250 |
| | B | 153 | 178 | 148 | 207 | 187 | 210 | 300 | 420 | 600 |
| | C | 2 | 2 | 1 | 2 | - | 1 | 3 | 6 | 12 |
| | D | - | - | - | - | - | - | - | - | - |
| | E | 3 | 16 | 70 | - | 1 | 1 | 3 | 6 | 12 |
| | F | 203 | 330 | 242 | 270 | 244 | 286 | 426 | 602 | 874 |
| Libya | A | 10 | 58 | 111 | 68 | 17 | 92 | 50 | 75 | 100 |
| | B | - | - | - | - | - | - | 110 | 150 | 200 |
| | C | - | - | - | - | - | - | - | - | - |
| | D | - | - | - | - | - | - | - | - | - |
| | E | - | - | - | - | - | - | - | - | - |
| | F | 10 | 58 | 111 | 68 | 17 | 92 | 160 | 225 | 300 |
| Total Maghreb | A | 296 | 424 | 485 | 525 | 469 | 570 | 740 | 1,005 | 1,330 |
| | B | 660 | 879 | 1,075 | 1,032 | 1,037 | 684 | 1,810 | 2,770 | 4,200 |
| | C | 59 | 74 | 18 | 26 | 23 | 26 | 43 | 71 | 107 |
| | D | 61 | 56 | 43 | 56 | 46 | 53 | 70 | 90 | 120 |
| | E | 15 | 20 | 77 | 39 | 10 | 32 | 48 | 76 | 112 |
| | F | 1,091 | 1,453 | 1,698 | 1,678 | 1,585 | 1,365 | 2,711 | 4,012 | 5,869 |
| Sudan | A | 123 | 107 | 92 | 29 | 57 | 158 | 200 | 270 | 350 |
| | B | - | - | - | 207 | 142 | 136 | 500 | 1,000 | 2,000 |
| | C | 5 | - | - | 12 | 1 | 23 | 25 | 30 | 40 |
| | D | - | - | - | - | - | - | - | - | - |
| | E | - | - | - | - | - | - | - | - | - |
| | F | 128 | 107 | 92 | 248 | 200 | 317 | 725 | 1,300 | 2,390 |

Table 18 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| UAR | A | 500 | 330 | 494 | 880 | 268 | 600 | 800 | 1,100 | 1,500 |
| | B | 4,527 | 2,952 | 5,026 | 3,571 | 2,388 | 3,940 | 5,000 | 8,000 | 12,000 |
| | C | 7 | 7 | 5 | 2 | 3 | - | 5 | 10 | 20 |
| | D | - | - | - | - | - | - | - | - | - |
| | E | 3 | 2 | 8 | 1 | 8 | 7 | 10 | 15 | 25 |
| | F | 5,037 | 3,291 | 5,533 | 4,454 | 2,666 | 4,547 | 5,815 | 9,125 | 13,545 |
| Total sub-region | A | 919 | 861 | 1,071 | 1,434 | 794 | 1,328 | 1,740 | 2,375 | 3,180 |
| | B | 5,187 | 3,831 | 6,101 | 4,810 | 3,567 | 4,760 | 7,310 | 11,770 | 18,200 |
| | C | 71 | 81 | 23 | 40 | 26 | 49 | 73 | 111 | 167 |
| | D | 61 | 56 | 43 | 56 | 46 | 53 | 70 | 90 | 120 |
| | E | 18 | 22 | 85 | 40 | 18 | 39 | 58 | 91 | 137 |
| | F | 6,256 | 4,851 | 7,323 | 6,380 | 4,451 | 6,229 | 9,251 | 14,437 | 21,804 |

Table 19
(\$1,000)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------------|---|------|------|------|------|------|------|------|-------|-------|
| Morocco | A | 101 | 91 | 137 | 167 | 136 | 156 | 212 | 280 | 360 |
| | B | 74 | 94 | 86 | 123 | 131 | 53 | 170 | 250 | 380 |
| | C | 16 | 37 | 10 | 11 | 15 | 23 | 30 | 45 | 65 |
| | D | 13 | 12 | 10 | 14 | 12 | 11 | 17 | 22 | 30 |
| | E | 4 | 2 | 4 | 2 | 3 | 15 | 22 | 32 | 44 |
| | F | 208 | 236 | 247 | 317 | 297 | 258 | 451 | 629 | 879 |
| Algeria | A | 1 | 6 | 6 | 6 | 6 | 10 | 20 | 30 | 40 |
| | B | 30 | 38 | 40 | 45 | 55 | 63 | 150 | 250 | 400 |
| | C | 20 | 3 | 8 | 10 | 4 | 6 | 10 | 20 | 30 |
| | D | - | - | - | - | - | - | - | - | - |
| | E | 8 | 6 | 7 | 8 | 5 | 7 | 10 | 20 | 30 |
| | F | 59 | 53 | 61 | 69 | 70 | 86 | 190 | 320 | 500 |
| Tunisia | A | 17 | 36 | 11 | 26 | 27 | 45 | 60 | 85 | 120 |
| | B | 43 | 42 | 34 | 54 | 49 | 60 | 75 | 105 | 150 |
| | C | 4 | 6 | 5 | 6 | 2 | 2 | 6 | 10 | 20 |
| | D | - | - | - | - | - | - | - | - | - |
| | E | 3 | 4 | 20 | 1 | 2 | 2 | 4 | 8 | 16 |
| | F | 67 | 88 | 70 | 87 | 80 | 109 | 145 | 208 | 306 |
| Libya | A | 2 | 10 | 32 | 31 | 10 | 27 | 25 | 40 | 50 |
| | B | - | - | - | - | - | - | 25 | 35 | 50 |
| | C | - | - | - | - | - | - | - | - | - |
| | D | - | - | - | - | - | - | - | - | - |
| | E | - | - | - | - | - | - | - | - | - |
| | F | 2 | 10 | 32 | 31 | 10 | 27 | 50 | 75 | 100 |
| Total Maghreb | A | 121 | 143 | 186 | 230 | 179 | 238 | 317 | 435 | 570 |
| | B | 147 | 174 | 160 | 222 | 235 | 176 | 420 | 640 | 980 |
| | C | 40 | 46 | 23 | 27 | 21 | 31 | 46 | 75 | 115 |
| | D | 13 | 12 | 10 | 14 | 12 | 11 | 17 | 22 | 30 |
| | E | 15 | 12 | 31 | 11 | 10 | 24 | 36 | 60 | 90 |
| | F | 336 | 387 | 410 | 504 | 457 | 480 | 836 | 1,232 | 1,785 |

Table 19 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-------|------|-------|-------|-------|-------|-------|-------|-------|
| Sudan | A | 23 | 16 | 28 | 17 | 31 | 57 | 80 | 110 | 140 |
| | B | - | - | - | 58 | 44 | 52 | 125 | 250 | 500 |
| | C | 1 | - | - | 9 | 2 | 27 | 30 | 38 | 50 |
| | D | - | - | - | - | - | - | - | - | - |
| | E | - | - | - | - | - | - | - | - | - |
| | F | 24 | 16 | 28 | 84 | 77 | 136 | 235 | 398 | 690 |
| UAR | A | 105 | 69 | 104 | 197 | 69 | 150 | 240 | 330 | 450 |
| | B | 789 | 450 | 804 | 647 | 385 | 715 | 1,000 | 1,600 | 2,400 |
| | C | 8 | 9 | 6 | 7 | 5 | - | 7 | 15 | 30 |
| | D | - | - | - | - | - | - | - | - | - |
| | E | 7 | 5 | 16 | 3 | 10 | 9 | 15 | 22 | 37 |
| | F | 909 | 533 | 930 | 854 | 469 | 874 | 1,262 | 1,967 | 2,917 |
| Total sub-region | A | 249 | 228 | 318 | 444 | 279 | 445 | 637 | 875 | 1,160 |
| | B | 936 | 624 | 964 | 927 | 664 | 943 | 1,545 | 2,490 | 3,880 |
| | C | 49 | 55 | 29 | 43 | 28 | 58 | 83 | 128 | 195 |
| | D | 13 | 12 | 10 | 14 | 12 | 11 | 17 | 22 | 30 |
| | E | 22 | 17 | 47 | 14 | 20 | 33 | 51 | 82 | 127 |
| | F | 1,269 | 936 | 1,368 | 1,442 | 1,003 | 1,490 | 2,333 | 3,597 | 5,392 |

A = Synthetic tanning materials.

B = Tanning extracts of vegetable origin.

C = Dyeing extracts (vegetable and animal).

D = Artificial bates for pre-tanning.

E = Tannins (tannic acids) and derivatives.

F = Total demand of group 532.

Per capita domestic demand for dyeing and tanning extracts and synthetic tanning materials (group 532) is shown in Tables 20 and 21.

Table 20

(Kg)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|------|------|------|------|------|------|------|------|------|
| Morocco | 0.06 | 0.08 | 0.09 | 0.09 | 0.09 | 0.06 | 0.10 | 0.12 | 0.15 |
| Algeria | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.05 | 0.07 | 0.10 |
| Tunisia | 0.05 | 0.08 | 0.06 | 0.06 | 0.06 | 0.07 | 0.08 | 0.10 | 0.13 |
| Libya | 0.0 | 0.04 | 0.08 | 0.05 | 0.01 | 0.06 | 0.08 | 0.10 | 0.12 |
| Total Maghreb | 0.04 | 0.05 | 0.06 | 0.06 | 0.05 | 0.04 | 0.08 | 0.10 | 0.12 |
| Sudan | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 | 0.05 | 0.07 | 0.12 |
| UAR | 0.19 | 0.12 | 0.20 | 0.16 | 0.09 | 0.16 | 0.18 | 0.24 | 0.31 |
| Total sub-region | 0.10 | 0.07 | 0.11 | 0.09 | 0.06 | 0.09 | 0.11 | 0.15 | 0.20 |

Table 21

(%)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|------|------|------|------|------|------|------|------|------|
| Morocco | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.03 | 0.04 | 0.05 |
| Algeria | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 |
| Tunisia | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.04 | 0.05 |
| Libya | - | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 | 0.03 | 0.03 | 0.04 |
| Total Maghreb | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.04 |
| Sudan | - | - | - | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 |
| UAR | 0.04 | 0.02 | 0.03 | 0.03 | 0.02 | 0.03 | 0.04 | 0.05 | 0.07 |
| Total sub-region | 0.02 | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 |

Growth of domestic demand is explained by the continued fast growth of leather tanning industry, increased local consumption of leather and by the manufacture of pre-tanned hides and skins for export (replacing the salted hides and skins formerly exported).

Table 22 shows the desired future structure of local industry for dyeing and tanning extracts and for synthetic tanning materials (group 532).

Table 22

| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
|-------|---|---------------------------------------|------|-------|-------|--------|--------------------------------------|------|-------|-------|--------|
| | | Capacity (tons) | | | | | Production (tons) | | | | |
| Sudan | A | - | - | 2,000 | 3,000 | 6,000 | - | - | 2,000 | 2,700 | 5,400 |
| | B | - | - | 1,000 | 3,000 | 6,000 | - | - | 1,000 | 2,700 | 5,400 |
| | C | - | - | 3,000 | 6,000 | 12,000 | - | - | 3,000 | 5,400 | 10,800 |
| Sudan | | Gross business output (\$1,000) | | | | | Value added (\$1,000) | | | | |
| Sudan | | - | - | 420 | 750 | 1,500 | - | - | 210 | 400 | 830 |
| Sudan | | Fixed investment (\$1,000) | | | | | Working capital (\$1,000) | | | | |
| Sudan | | - | - | 250 | 350 | 600 | - | - | 65 | 115 | 230 |
| Sudan | | Number of workers | | | | | Additional capacity (tons) | | | | |
| Sudan | | - | - | 100 | 150 | 250 | - | - | 3,000 | 3,000 | 6,000 |
| Sudan | | Additional fixed investment (\$1,000) | | | | | Additional working capital (\$1,000) | | | | |
| Sudan | | - | - | 250 | 100 | 250 | - | - | 65 | 50 | 115 |
| Sudan | | Additional workers | | | | | | | | | |
| Sudan | | - | - | 100 | 50 | 100 | | | | | |

A = Garad tan.

B = Vegetable tanning extract.

C = Total.

The proposed programme for establishment of local manufacture of commercial garad tan and tanning extract in the Sudan, based on the experience of the pilot plant, requires \$600,000 in fixed investment and 250 workers. The gross output will rise to \$1,500 thousand and value added to \$830,000 by 1980.

V. MINERAL TANNING AGENTS

Although, strictly speaking, mineral tanning agents do not belong to the subject SITC group, it seems appropriate to add some remarks on these chemicals because they belong to the group of tanning agents and are, from a production and project point of view, closely related to the inorganic pigments industry.

V.1. Market aspects

In the last 20 years, tanning processes have been improved considerably. There has been a change from vegetable tanning agents to minerals tans, especially for the upper leathers. It is estimated that today about 80 per cent of total light leather output is produced by the chrome tanning process.

World production, excluding the USSR, of chromium chemicals in 1965 is estimated at 200,000 tons of $\text{Na}_2\text{Cr}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$. Of this, 17 per cent or about 15,000 tons, was Cr_2O_3 and was used for tanning and textiles. The US production of sodium-dichromate and chromate in 1963 was 130,000 tons.

V.2. Demand projections

The anticipated increase in output of national tanning industries in the sub-region will result in a similar increase in demand for chrome tanning agents.

The following estimates should be checked with the production for chrome leather in the sub-region, because the content of chromoxide in this type of finished leather is between 4 and 7 per cent. About 100 grammes of chromsulfate (25 per cent Cr_2O_3) are required for one average-sized skin.

A very rough estimate of present and future demand for chromium salts and chrome tanning agents is shown in Tables 23 and 24.

(Tons)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Morocco | A | 570 | 750 | 633 | 798 | 670 | 563 | 730 | 960 | 1,210 |
| | B | 350 | 380 | 300 | 380 | 310 | 400 | 520 | 700 | 900 |
| Algeria | A | 653 | 345 | 355 | 370 | 385 | 400 | 510 | 650 | 800 |
| | B | 130 | 145 | 160 | 175 | 190 | 200 | 260 | 350 | 450 |
| Tunisia | A | 280 | 300 | 310 | 320 | 330 | 350 | 440 | 560 | 690 |
| | B | 125 | 140 | 155 | 170 | 185 | 200 | 260 | 350 | 450 |
| Libya | A | 50 | 60 | 70 | 80 | 90 | 100 | 140 | 190 | 250 |
| | B | 28 | 30 | 35 | 40 | 45 | 50 | 70 | 100 | 140 |
| Total | A | 1,553 | 1,455 | 1,368 | 1,568 | 1,475 | 1,413 | 1,820 | 2,360 | 2,950 |
| Maghreb | B | 633 | 695 | 650 | 765 | 730 | 850 | 1,110 | 1,500 | 1,940 |
| Sudan | A | 100 | 120 | 140 | 160 | 180 | 200 | 280 | 370 | 470 |
| | B | 65 | 75 | 80 | 90 | 95 | 100 | 130 | 170 | 220 |
| UAR | A | 894 | 676 | 1,034 | 1,048 | 1,100 | 1,141 | 1,450 | 1,820 | 2,300 |
| | B | 500 | 580 | 650 | 700 | 700 | 750 | 1,000 | 1,300 | 1,700 |
| Total | A | 2,547 | 2,251 | 2,542 | 2,776 | 2,755 | 2,754 | 3,550 | 4,550 | 5,720 |
| sub-region | B | 1,198 | 1,350 | 1,380 | 1,555 | 1,525 | 1,700 | 2,240 | 2,970 | 3,860 |

A = Total demand of chromium salts. B = Demand of chrome tanning agents.

(\$1,000)

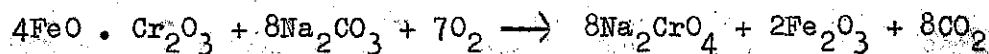
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|------|------|------|------|------|------|------|-------|-------|
| Morocco | 146 | 185 | 154 | 193 | 160 | 137 | 178 | 240 | 300 |
| Algeria | 149 | 79 | 82 | 85 | 89 | 92 | 120 | 160 | 200 |
| Tunisia | 67 | 72 | 74 | 77 | 79 | 84 | 106 | 135 | 170 |
| Libya | 12 | 14 | 17 | 19 | 22 | 24 | 34 | 46 | 60 |
| Total Maghreb | 374 | 350 | 327 | 374 | 350 | 337 | 438 | 581 | 730 |
| Sudan | 24 | 29 | 34 | 38 | 43 | 48 | 67 | 89 | 113 |
| UAR | 223 | 175 | 242 | 279 | 255 | 265 | 340 | 426 | 550 |
| Total sub-region | 621 | 554 | 603 | 691 | 648 | 650 | 845 | 1,096 | 1,393 |

V.3. Present and future local production

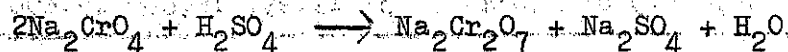
Manufacture of chrome tanning compounds would only be worth studying in combination with a chrome pigments industry on a regional basis. Although there is no raw materials base for such an industry in the sub-region (neither chromite mineral nor sodium carbonate required to produce chromates), it should be conceded that this easily made remark is valid for almost all countries which at present have these industries without having their own chromite ore. Chromite mineral would have to be imported into the region from the USA, South Africa, Rhodesia, Cuba, the USSR, or Turkey, but sodium carbonate production is projected in the UAR and sulphuric acid for oxidation to bichromate is already produced in the sub-region.

The process is simple and has remained almost unchanged since the end of the nineteenth century.

As a first, principal step, chromite is mixed with sodium carbonate and lime and roasted in the presence of air at about 1100°C to give sodium chromate:



The lime is added only to prevent caking and to increase the rate of oxidation. Sodium chromate is extracted from the reaction mixture with water and the liquor is purified to remove impurities such as aluminium salts. Sodium dichromate is prepared from the sodium chromate solution by adding sulphuric acid:



The orange-red crystals of $\text{Na}_2\text{Cr}_2\text{O}_7$ are the commercial end-product from which the tanning agents are produced after a reduction step by means of an inexpensive reducing agent and addition of ammonium salts.

The remarks on a regional chrome derivatives industry made in this chapter should be read in conjunction with the remarks on chrome pigments (Chapter VI.3.3.3.B.b.).

VI. GROUP 533. PIGMENTS, PAINTS, VARNISHES AND RELATED MATERIALS

Group 533 has been sub-divided into:

- Sub-group 533.1 Colouring materials n.e.s.
- 533.2 Printing inks
- 533.3 Prepared paints, enamels, lacquers, varnishes, artists colours, siccatives (paint driers) and mastics.

VI.1. Sub-group 533.1. Colouring materials n.e.s.

Tables 25 and 26 show the present and future demand for colouring materials n.e.s.

Table 25

(Tons)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|--------|--------|-------|-------|-------|--------|--------|--------|--------|
| Morocco | - | - | - | - | - | - | - | - | - |
| Algeria | 260 | 60 | - | - | - | - | - | - | - |
| Tunisia | 751 | 653 | 853 | 846 | 949 | 1,086 | 1,300 | 1,600 | 1,900 |
| Libya | - | - | 42 | 28 | 40 | 39 | 55 | 90 | 130 |
| Total Maghreb | 1,011 | 713 | 895 | 874 | 989 | 1,125 | 1,355 | 1,690 | 2,030 |
| Sudan | 1,140 | 736 | 898 | 466 | 606 | 572 | 800 | 1,100 | 1,450 |
| UAR | 11,214 | 8,650 | 5,185 | 4,694 | 3,642 | 10,300 | 12,645 | 15,610 | 19,020 |
| Total sub-region | 13,365 | 10,099 | 6,978 | 6,034 | 5,237 | 11,997 | 14,800 | 18,400 | 22,500 |

Table 26

(\$1,000)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Morocco | - | - | - | - | - | - | - | - | - |
| Algeria | 80 | 26 | - | - | - | - | - | - | - |
| Tunisia | 108 | 94 | 122 | 118 | 141 | 201 | 234 | 288 | 342 |
| Libya | - | - | 67 | 19 | 39 | 33 | 44 | 72 | 104 |
| Total Maghreb | 188 | 120 | 189 | 137 | 180 | 234 | 278 | 360 | 446 |
| Sudan | 251 | 191 | 214 | 129 | 184 | 193 | 270 | 370 | 490 |
| UAR | 2,648 | 2,267 | 1,084 | 907 | 802 | 1,865 | 2,500 | 3,100 | 3,800 |
| Total sub-region | 3,087 | 2,578 | 1,487 | 1,173 | 1,166 | 2,292 | 3,048 | 3,830 | 4,736 |

The multitudinous variety of colouring materials n.e.s. makes it impossible at any rate as far as this survey is concerned, to embark upon an analysis per product of the market, which really represents an infinite number of micro-markets. The statistics are given, under one heading, of all these products together.

On the basis of information gathered during the short time at our disposal, it may be concluded that until 1980 the conditions for the manufacture of a variety of colouring materials will not be favourable at the sub-regional level. It is expected that until 1980 the domestic demand will still be covered by imports. Some prospects are foreseen after 1980 in the UAR.

VI.2. Sub-group 533.2. Printing inks

VI.2.1. Demand projections

The present and future demand of inks is shown in Tables 27 and 28.

Table 27

(Tons)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Morocco | A | 80 | 80 | 80 | 80 | 100 | 100 | | | |
| | B | 290 | 285 | 245 | 282 | 221 | 273 | | | |
| | C | 370 | 365 | 325 | 362 | 321 | 373 | 500 | 700 | 1,000 |
| Algeria | A | 80 | 100 | 100 | 100 | 100 | 109 | | | |
| | B | 500 | 398 | 213 | 209 | 262 | 300 | | | |
| | C | 580 | 498 | 313 | 309 | 362 | 409 | 550 | 800 | 1,000 |
| Tunisia | A | - | 50 | 35 | 245 | 108 | 108 | | | |
| | B | 116 | 124 | 101 | 121 | 149 | 160 | | | |
| | C | 116 | 174 | 136 | 366 | 257 | 268 | 350 | 450 | 600 |
| Libya | A | - | - | - | - | - | - | | | |
| | B | 4 | 7 | 31 | 25 | 44 | 18 | | | |
| | C | 4 | 7 | 31 | 25 | 44 | 18 | 40 | 60 | 90 |
| Total Maghreb | A | 160 | 230 | 215 | 425 | 308 | 317 | | | |
| | B | 910 | 814 | 590 | 637 | 676 | 751 | | | |
| | C | 1,070 | 1,044 | 805 | 1,062 | 984 | 1,068 | 1,440 | 2,010 | 2,790 |
| Sudan | A | - | - | - | - | - | - | | | |
| | B | 13 | 20 | 13 | 32 | 44 | 34 | | | |
| | C | 13 | 20 | 13 | 32 | 44 | 34 | 60 | 90 | 130 |
| UAR | A | 400 | 400 | 450 | 450 | 500 | 500 | | | |
| | B | 573 | 627 | 689 | 704 | 466 | 1,162 | | | |
| | C | 973 | 1,027 | 1,139 | 1,154 | 966 | 1,662 | 2,300 | 3,000 | 3,900 |
| Total sub-region | A | 560 | 630 | 665 | 875 | 808 | 817 | | | |
| | B | 1,496 | 1,461 | 1,292 | 1,373 | 1,186 | 1,947 | | | |
| | C | 2,056 | 2,091 | 1,957 | 2,248 | 1,994 | 2,764 | 3,800 | 5,100 | 6,820 |

The tables show that the influence of the local production is already considerable. It may be assumed that local production will gradually follow the increase in demand determined by inevitable development of the market. It may be assumed, also, that the variety and quality of the local products will improve, and if prices remain good, local products will present an increasingly serious challenge to imported goods.

Table 28

(\$1,000)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Morocco | A | 120 | 120 | 120 | 120 | 150 | 150 | | | |
| | B | 331 | 382 | 384 | 394 | 325 | 419 | | | |
| | C | 451 | 502 | 504 | 514 | 475 | 569 | 750 | 1,050 | 1,500 |
| Algeria | A | 110 | 140 | 140 | 140 | 140 | 170 | | | |
| | B | 320 | 254 | 126 | 199 | 295 | 320 | | | |
| | C | 430 | 394 | 266 | 339 | 435 | 490 | 660 | 960 | 1,320 |
| Tunisia | A | - | 50 | 35 | 245 | 108 | 108 | | | |
| | B | 104 | 108 | 103 | 128 | 140 | 170 | | | |
| | C | 104 | 158 | 138 | 373 | 248 | 278 | 350 | 450 | 600 |
| Libya | A | - | - | - | - | - | - | | | |
| | B | 11 | 16 | 27 | 24 | 28 | 23 | | | |
| | C | 11 | 16 | 27 | 24 | 28 | 23 | 40 | 60 | 90 |
| Total Maghreb | A | 230 | 310 | 295 | 505 | 398 | 428 | | | |
| | B | 766 | 760 | 640 | 745 | 788 | 932 | | | |
| | C | 996 | 1,070 | 935 | 1,250 | 1,186 | 1,360 | 1,800 | 2,520 | 3,510 |
| Sudan | A | - | - | - | - | - | - | | | |
| | B | 11 | 20 | 16 | 36 | 42 | 36 | | | |
| | C | 11 | 20 | 16 | 36 | 42 | 36 | 65 | 100 | 140 |
| UAR | A | 350 | 350 | 400 | 400 | 450 | 450 | | | |
| | B | 470 | 506 | 490 | 568 | 286 | 869 | | | |
| | C | 820 | 856 | 890 | 968 | 736 | 1,319 | 2,300 | 3,000 | 3,900 |
| Total sub-region | A | 580 | 660 | 695 | 905 | 848 | 878 | | | |
| | B | 1,247 | 1,286 | 1,146 | 1,349 | 1,116 | 1,837 | | | |
| | C | 1,827 | 1,946 | 1,841 | 2,254 | 1,964 | 2,715 | 4,165 | 5,620 | 7,550 |

A = Local production.

B = Imports.

C = Demand.

VI.2.2. Present and future local production

Development of local ink manufacture has had a good start in most countries of the region. There now are, or for certain planners soon will be, sufficient manufacturing capacity in the sub-region to satisfy local demand in a wide variety of writing, fountain pen, and ball point inks, newspaper ink and inks for other types of more sophisticated printing jobs. Production is carried out either as a section of a paint factory, or in factories making stationery.

Morocco: Although no information was available on ink factories, it would seem that the well-equipped paint industry supplies the market with certain qualities.

Algeria: Lorilleux-Algiers production in 1966 was 150 tons. New factory being erected with a capacity of 1,000 tons/year; complete line of inks.

Tunisia: Société africaine des encre - Sidi Fathaila - produces, with 5 employees, about 20 tons/year of printing ink. Products la Cigogne-Tunis, with 3 employees, produces a few tons/year of writing and ball point inks. The existing modern paint factories are equipped to supply the demand in other ink qualities.

Libya: This country at present has no ink factory. It can be expected that the existing paint factories will start production of inks as soon as import substitution of paints is achieved.

Sudan: Sudanese Stationery Plant, Khartoum North. As from January 1968 the production programme includes:

- 200 tons/year of writing inks
- 100 tons/year of printing inks
- 5 tons/year of ball point inks
- 12 tons/year of india inks
- 6 tons/year of stamp inks
- 10 tons/year of stamp ink (metallic)

Rainbow Paint Co. will start production in November 1967 with existing equipment of inks for letter press, offset press and newspaper print. Capacity: 100-120 tons/year.

UAR: An annex to the PACHIN paint factory, the first big printing ink factory in the UAR, is being erected. Coates Brothers, United Kingdom, will supply the know-how. The production programme comprises:

- 300 tons/year of rotary inks
- 525 tons/year of rotogravure inks
- 200 tons/year of letter press and offset inks
- 25 tons/year of aniline inks
- 50 tons/year of varnishes
- 50 tons/year metal coating
- 1,150 tons/year (shift year)

Starting in 1958 with 25 per cent, in 1969 to reach 75 per cent and in 1970 100 per cent of production capacity the factory, at that point, is expected to reach 1,850 tons/year of high quality products. Investment in fixed and liquid assets total \$1,486,000, with \$1,150,000 for equipment and buildings. Sales volume of \$2,070,000 a year is expected, and for this local raw materials will be \$414,000 and imported raw materials \$506,000. Staffing will consist of 7 technicians, 3 administrative staff, 30 skilled and 34 semi-skilled employees.

There are a number of private factories producing, in combination, 500 tons/year, mostly writing inks.

The nationalized pencil factory has 10 tons/year capacity for making ink.

A hectagraphing ink factory produces 26,000 tubes of 300 grammes each year but has a capacity of 75,000 tubes/shift year.

The substantial progress made during the past few years by the local industry, and the results obtained in various countries in terms of the quality of the products, are particularly encouraging and warrant a confident outlook for the future.

Based on the present trends of the market, the current position regarding supply of raw material, and the rapid increase in local production to fully satisfy local needs, a programme for the development of the local industry has been drawn up.

This last is quantified and shown in Tables 41-46.

VI.3. Sub-group 533.3. Prepared paints, enamels, lacquers, varnishes, artists colours, siccatives (paint driers) and mastics

Sub-group 533.3 has been sub-divided into:

- 533.3.1 Prepared pigments, opacifiers, enamels, glasses, lustres, etc.
- 533.3.2 Varnishes, lacquers, distempers, water pigments, stamping foils and dyes put up for retail sale.
- 533.3.3 Artists' colours.
- 533.3.4 Prepared driers.
- 533.3.5 Putty, painters' fillings, etc.

VI.3.1. Item 533.3 (2,3,4,5). Paints, varnishes and related materials

VI.3.1.1. Market aspects

World production of paints in 1966 is estimated at 6 million tons, with a value of \$6,000 million.

Annual world consumption of paints is, therefore, about 2 kg per capita at an average price of \$1/kg.

The United States accounts for 40 per cent of world production, with 12 kg per capita consumption, and Europe for 30 per cent. Sweden has a per capita consumption of 14 kg/year. On the other side of the scale, agricultural countries such as Burma consume only 0.2 per capita.

In 1966 the United States led in paint exports, with \$50 million. Next was Germany and Holland was third in paint exports with \$28 million in 1967. It is interesting to note that Holland has doubled its paint exports since 1962 and, presumably, a large part of it went to developing countries.

VI.3.1.2. Demand projections

The consumption of paints will increase, of course, with growth of population, with the increase in standard of living, and with people becoming more conscious of the decorative and protective advantages of paints. To a large extent, development of the paint industry will parallel the development of the housing and building industry. Paint is about 1 per cent of total building costs in many countries. Another relationship used to check projected figures is that in many countries for each ton of cement 20-25 kg of paint is consumed. The 1965 consumption of cement in the sub-region was 4,850,000 tons. Comparing this to consumption of 39,000 tons of paint indicates only 8 kg of paint per ton of cement and could mean that the sub-region is lagging behind in paint consumption. Maintenance in housing and building, such as re-painting of existing buildings, is still low in the sub-region, an estimated 25 per cent of total output. About 70-80 per cent of paint consumption goes into new buildings and construction. This is a higher figure than in industrialized countries.

There already exists demand for marine paints. With the national merchant marine and fishing fleet being built up, this consumption seems to be the following:

| Country | Consumers | Estimated demand |
|------------------|--|------------------|
| Morocco | 8 vessels, 60,000 tons, total fishing fleet | 500 tons/year |
| Tunisia | 7 vessels, 16,000 tons total | 300 tons/year |
| Algeria | 1 vessel, 3,700 tons total | 300 tons/year |
| Libya | | 100 tons/year |
| Sudan | negligible | |
| UAR | navy, merchant marine, fishing fleet, 3 dry docks, Suez Canal business, Alexandria harbour | 1,000 tons/year |
| Total sub-region | | 2,200 tons/year |

Regional economic co-operation should increase coastal shipping between countries of the sub-region.

Car and other metal paints consumption can also be expected to increase due to increased national car assembling, body manufacturing plants and other metal industries.

The projected demand has been approximated by taking the actual figures for 1960-1965, 1966 and, as far as possible, 1967 during field interviews, as well as projections to 1970, from local paint manufacturers, importers and government planning agencies, taking into account the annual rate of growth percentage.

The present and projected paint demand data are given in Tables 29 and 30.

Table 29

(Tons)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| Morocco | A | 5,031 | 5,660 | 5,784 | 6,237 | 7,200 | 7,300 | | | |
| | B | 801 | 932 | 857 | 862 | 922 | 743 | | | |
| | C | 179 | 244 | 193 | 158 | 58 | 21 | | | |
| | D | 5,653 | 6,348 | 6,448 | 6,941 | 8,064 | 8,022 | 10,700 | 16,000 | 24,000 |
| Algeria | A | 16,498 | 15,877 | 7,386 | 8,358 | 8,041 | 10,999 | | | |
| | B | 7,858 | 7,205 | 2,370 | 3,350 | 4,170 | 3,600 | | | |
| | C | | 159 | 54 | 27 | 8 | | | | |
| | D | 24,356 | 22,923 | 9,702 | 11,691 | 12,203 | 14,599 | 18,000 | 27,000 | 40,000 |
| Tunisia | A | 1,197 | 1,670 | 1,791 | 2,708 | 3,354 | 4,000 | | | |
| | B | 582 | 579 | 596 | 677 | 718 | 385 | | | |
| | C | 8 | 7 | 1 | 3 | 5 | 6 | | | |
| | D | 1,771 | 2,242 | 2,386 | 3,382 | 4,067 | 4,379 | 6,000 | 8,000 | 11,000 |
| Libya | A | | | | 588 | 1,000 | 1,400 | | | |
| | B | 1,345 | 2,035 | 1,966 | 2,409 | 3,308 | 2,813 | | | |
| | C | | | | | | | | | |
| | D | 1,345 | 2,035 | 1,966 | 2,997 | 4,308 | 4,213 | 5,000 | 6,500 | 8,500 |
| Total Maghreb | A | 22,726 | 23,207 | 14,961 | 17,891 | 19,595 | 23,699 | | | |
| | B | 10,586 | 10,751 | 5,789 | 7,298 | 9,118 | 7,541 | | | |
| | C | 187 | 410 | 248 | 173 | 71 | 27 | | | |
| | D | 33,125 | 33,548 | 20,502 | 25,011 | 28,642 | 31,213 | 39,700 | 57,500 | 83,500 |
| Sudan | A | 300 | 400 | 500 | 700 | 900 | 1,100 | | | |
| | B | 2,104 | 1,486 | 1,644 | 2,196 | 1,651 | 2,059 | | | |
| | C | | | | | | | | | |
| | D | 2,404 | 1,886 | 2,144 | 2,896 | 2,551 | 3,159 | 4,000 | 5,000 | 6,000 |
| UAR | A | 2,100 | 2,700 | 3,600 | 4,500 | 4,800 | 5,200 | | | |
| | B | 800 | 700 | 822 | 786 | 509 | 554 | | | |
| | C | 628 | 1,120 | 51 | 2 | 2 | | | | |
| | D | 2,272 | 2,280 | 4,371 | 5,284 | 5,307 | 5,754 | 8,000 | 12,000 | 18,000 |
| Total sub-region | A | 25,126 | 26,307 | 19,061 | 23,091 | 25,295 | 29,999 | | | |
| | B | 13,490 | 12,937 | 8,255 | 10,280 | 11,278 | 10,154 | | | |
| | C | 815 | 1,530 | 299 | 180 | 73 | 27 | | | |
| | D | 37,801 | 37,714 | 27,017 | 33,191 | 36,500 | 40,126 | 51,700 | 74,500 | 108,000 |

Table 30

(\$1,000)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------|---|--------|--------|-------|-------|-------|-------|--------|--------|--------|
| Morocco | A | 2,200 | 2,600 | 2,400 | 3,100 | 3,300 | 3,400 | | | |
| | B | 665 | 810 | 694 | 802 | 797 | 688 | | | |
| | C | 233 | 237 | 168 | 174 | 122 | 204 | | | |
| | D | 2,632 | 3,173 | 2,926 | 3,728 | 3,975 | 3,884 | 5,100 | 8,000 | 12,000 |
| Algeria | A | 12,000 | 11,000 | 5,000 | 6,200 | 6,000 | 8,000 | | | |
| | B | 3,300 | 3,099 | 698 | 1,609 | 2,075 | 1,750 | | | |
| | C | | 143 | 44 | 15 | 11 | | | | |
| | D | 15,300 | 13,956 | 5,654 | 7,794 | 8,064 | 9,750 | 12,000 | 16,600 | 24,400 |

Table 30 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Tunisia | A | 600 | 700 | 1,000 | 1,350 | 1,600 | 1,800 | | | |
| | B | 386 | 363 | 395 | 404 | 451 | 477 | | | |
| | C | 4 | 4 | 1 | 2 | 3 | 3 | | | |
| | D | 982 | 1,059 | 1,394 | 1,752 | 2,048 | 2,274 | 2,700 | 3,800 | 5,500 |
| Libya | A | | | | 200 | 400 | 600 | | | |
| | B | 523 | 743 | 804 | 955 | 1,468 | 1,316 | | | |
| | C | - | - | - | - | - | - | | | |
| | D | 523 | 743 | 804 | 1,155 | 1,868 | 1,916 | 2,300 | 3,000 | 4,000 |
| Total Maghreb | A | 14,800 | 14,300 | 8,400 | 10,850 | 11,300 | 13,800 | | | |
| | B | 4,874 | 5,015 | 2,591 | 3,770 | 4,791 | 4,231 | | | |
| | C | 237 | 384 | 213 | 191 | 136 | 207 | | | |
| | D | 19,437 | 18,931 | 10,778 | 14,429 | 15,955 | 17,824 | 22,100 | 31,400 | 45,900 |
| Sudan | A | 200 | 200 | 300 | 400 | 500 | 600 | | | |
| | B | 827 | 547 | 558 | 689 | 510 | 481 | | | |
| | C | - | - | - | - | - | - | | | |
| | D | 1,027 | 747 | 858 | 1,089 | 1,010 | 1,081 | 2,200 | 2,800 | 3,800 |
| UAR | A | 1,800 | 2,300 | 3,100 | 4,000 | 4,200 | 4,600 | | | |
| | B | 630 | 560 | 644 | 738 | 500 | 695 | | | |
| | C | 89 | 123 | 10 | 1 | - | - | | | |
| | D | 2,341 | 2,737 | 3,734 | 4,737 | 4,700 | 5,295 | 7,000 | 9,600 | 14,000 |
| Total sub-region | A | 16,800 | 16,800 | 11,800 | 15,250 | 16,000 | 19,000 | | | |
| | B | 6,331 | 6,122 | 3,793 | 5,197 | 5,801 | 5,407 | | | |
| | C | 326 | 507 | 223 | 192 | 136 | 207 | | | |
| | D | 22,805 | 22,415 | 15,370 | 20,255 | 21,665 | 24,200 | 31,300 | 43,800 | 63,700 |

A = Local production. B = Imports. C = Exports. D = Demand.

VI.3.1.3. Present local production

Paints and related products manufacturing industries are typical examples of small- to medium-size light industries. They are well suited as local industries supplying national markets, ideally in geographically decentralized establishments.

There are advantages in producing paints as near as possible to the consumers to guarantee freshness of the product, avoiding extensive transport and storage which may spoil paint, and to assure having quality adjusted exactly to the specific needs of the consumer.

Paint factories develop, therefore, quite appropriately in early stages of economic development. As they are at no great disadvantage in relation to imports from developed countries, not much protection is required.

Manufacture of paints in North Africa is, generally, still centralized in the capitals (e.g., in Tunis, in Cairo and Alexandria, in Khartoum, in Casablanca). Libya's two factories are in Tripoli, but the province of Cyrenaica could easily support one more factory. An exception is Algeria, where some geographical distribution of paint factories can be observed (30 per cent in Oran, 60 per cent in Algiers and 10 per cent in Constantine).

The paint industry is already well established in each of the six countries of the North African sub-region. Although the factories are in different stages of development, there is similarity in that almost all have been started, wholly or in part, with foreign capital, as joint ventures with imported know-how and often under licence agreement using technology and goodwill on the sales side of the parent companies.

Often the main raw materials and packing materials such as lithographed tins are supplied by the licensor's purchasing department because it can obtain better prices by wholesale buying. Data on the individual paint factories in existence in September 1967 are included in the next section.

Whereas the initial stages of manufacturing consist mainly of mixing the required ingredients and adjusting to the desired colour prior to packing, efforts should now start in the sub-region to also produce part of the ingredients for paint. Then, as experience is accumulated, more functions should be carried out by the local factories.

In general, the paint industry is not yet sufficiently integrated into the national economies of the various countries. Most raw materials are imported and due to the close collaboration with parent concerns no real effort is made to change this situation. The fact that the number of ingredients for paint making is so great (a few hundred) and that they are comparatively easy to transport has further deterred the use of local raw materials.

Another, probably more serious defect, is that with the exception of the UAR almost no national staff has been observed taking part in this branch of industry. National or regional applied paint research institutes, however small and limited they might be, would go a long way towards improving this situation by publishing standards for locally made paints, by stimulating and giving guidance on use of local raw materials and by building up a group of nationals with experience in paint technology.

In the UAR the point has been reached where initial technical licence agreements are coming to an end and, supported by a National Applied Paints Research Institute, local production is becoming fully independent. National minimum quality standards can be set for paints and allied products, private formulations can be made incorporating a maximum of national paint-making materials.

The economies of scale of paint industries are not great, and the latest manufacturing techniques have even reduced required investments for equipment and buildings. An average North African paint factory has a production of 1,000 tons per year, with 50 employees; the annual turnover is around \$750,000 on a capital investment of \$200,000. Raw material imports from outside the sub-region for paint manufacture approximate 50-60 per cent of turnover.

It is well known, however, that production of 2,000 tons per year can today be made with \$150,000 in paint-making equipment, consisting of a high-speed dissolver, a pearl mill, pump, product tanks with railmixer and filling station. This resultant figure of capital investment for equipment of not more than \$75 per annual ton of paint has to be reached in the sub-region for it to become competitive with foreign imports.

Increasing the efficiency in the North African paint factories is of utmost importance if this sector is to become competitive with imports from foreign countries. The process of mergers of the numerous small European and American paint factories into integrated paint concerns is in full swing. Units of 30,000 tons per year in one fully automated production line, from raw materials to finished product storage, are being built. Labour efficiency in the paint factories in the sub-region for example should be improved in the first instance to a realistic figure of 50 tons per man year.

VI.3.1.4. Data on existing paint factories in the North African sub-region

Morocco

Local paint industry has developed quickly since 1958. There are about 13 enterprises, 4 of which account together for 70 per cent of total output. Given planned expansion, the industry is equipped to supply demand up to 1980. Three more paint factories are projected, each having 1,800 tons per year capacity. An average of \$100,000 is invested annually in this sector for modernization and replacements. Total employment is 400 and is growing 2 per cent per year.

| | | | |
|-----|---|------------|-----------------------------|
| (1) | Prodec | Casablanca | 640 tons production in 1963 |
| (2) | Astral Celluco | Casablanca | |
| (3) | Chimicolor | Casablanca | |
| (4) | Veuve Côte | Casablanca | |
| (5) | Sadvel | Casablanca | 890 tons production in 1966 |
| (6) | Somel Peintures | Casablanca | |
| (7) | Soc. Franco-Cherifienne de Peintures | Casablanca | |
| (8) | Soc. Le Soleil | Casablanca | |

Algeria

There are about 17 paint factories registered in Algeria. These have 600 employees and total capacity of 20,000 tons per year.

- (1) Duco, 2 factories, 85 per cent Duco-France, ICI licence
- (2) Astral-Celluco, Oued Smar; daughter of French company
- (3) Ripolin et Lefranc, 2 factories, at Algiers and Oran
- (4) Veuve Côte, since 1961. Factories at Algiers, Oran, Annaba, Constantine; total 400 employees, 6,000 tons production in 1966
- (5) Ex. CAP, Algiers

- (6) Comité de Gestion les Nouvelles Peintures, Algiers
- (7) Ex Ferriol et Biron, Constantine
- (8) Freitag Algerie, Rouiba
- (9) Labes et Martin, Oran
- (10) Norcolor, Cheragas
- (11) Villemar et Fils, Oued Smar
- (12) Complexe des Peintures Oranaïses, Oran
- (13) Soc. Francs Africaine des Peintures et Emaux
- (14) Soc. Alg. des résines et produits synthétiques, Oued Smar.

Tunisia

- (1) Astral Celluco, Tunis; 100 per cent affiliate of French concern; 1965 production: 1,100 tons, 75 employees. Production capacity: 2,000 tons per year. Turnover D450,000
- (2) Chimique de Tunisie, Tunis; 1965 production: 1,100 tons, turnover D300,000
- (3) Chimie Couleur, Tunis; 1965 production: 500 tons; turnover D180,000; 30 employees.

Libya

- (1) The Libyan-Norwegian Company for Industry and Commerce (Linoco), Bob-Ben Gashir, Tripoli, since 1962/63; partnership with Jotun Paint Works, Norway; 2,000 tons per year capacity; 40 employees. Production: 1963 - 500 tons; 1964 - 1,000 tons; 1965 - 1,300 tons; 1966 - 1,600 tons. Forecast for 1967: 2,000 tons; turnover 1966: £L 225,000
- (2) P. Catsiapis and Son, Tripoli, since 1965, Greek ownership; Licence of Sadolin Co., Denmark; 30 employees; capacity 5,000 tons per year. Production: 1965 - 100 tons; 1966 - 800 tons. Forecast for 1967: 1,800 tons
- (3) Chemicals and Tiles Plant, Tripoli. This listed factory could not be traced and existence was negated.

Sudan

- (1) Rainbow Co., Khartoum North, since 1960, licensed by Berger Jensen Nicholson, United Kingdom; agreement for Duco range with ICI, financial tie with Mitchell Cotts. Capacity 3,000 tons per shift year. Full range of points except nitro-cellulose types. Employment 50. Production since 1960 annually increased from 300 to 1,300 tons in 1966. Forecasts for 1967 - 1,700 tons; 1968 - 1,900 tons; 1969 - 2,300 tons; 1970 - 2,800 tons
- (2) Nile Paint Works, Omdurman. Advanced project stage; 50/50 joint venture of local capital with Van Wijk, Holland. Equipment ready for shipment. Capacity 800-3,000 tons per shift year. Production forecasts 1968 - 100 tons; 1969 - 300 tons; 1970 - 800 tons
- (3) Cronos Co., Khartoum, about 75-tons per year rated capacity
- (4) Stella Paints Products, half ton of paint per day.

UAR

- (1) Pachin (Paints and Chemicals Industries), Cairo, since 1960. Government factory producing 75 per cent of Egyptian production. Licence agreement until 1970 with S. Dyrup, Denmark. Capacity in 1966: 3,000 tons per shift year being expanded to 5,000 tons per year; 200 employees. Turnover LE 1.2 million in 1966
- (2) Alexandria branch of Pachin - 1966 capacity 1,000 tons per year, valued at LE 400,000; 100 employees.
- (3) Nine - ten small privately owned factories; total output: 1,000 - 1,500 tons in 1966, valued at LE 400,000
- (4) Stella Paints Products with a rated production of 0.5 ton/paints/day since 1962. Could not be traced and is omitted
- (5) Stars Paints Industries. Construction of which was mentioned to have started in 1962.

VI.3.1.5. The future of local production

After rapid development during the first phase of local paint production, based on import substitution, the second phase will be marked by a consolidation of this industry sector and rationalization of production and marketing. It is hoped that some of the small and the inefficient enterprises will disappear through mergers into fewer stronger companies. Some of the companies in the private sector in Algeria and the UAR will disappear and be integrated into the government enterprises. A shift towards higher quality paints can be expected. Utilization of raw materials produced in the region will grow (e.g., drying oils, alkyd resins, locally made pigments and dyes, thinners and solvents, locally made labelled or lithographed metal cans and other packing materials). Last but not least, national technical and commercial staff will be found to take over from expatriates, and local capital will play a greater role in the paint industry.

There will be room for the creation of a few new manufacturing units during the period studied, especially in the Sudan, in Libya and in Tunisia, to satisfy the increased demand over and above the production increase at existing paint factories. These new companies will create competition, resulting in decreased sales prices of the final products.

When estimating future production in the sub-region, the increased output for new uses should be accounted for. Marine paints, for instance, could be made in the sub-region with existing equipment by any of the existing paint factories. Know-how could come from their European partners or might be better developed in the region to reflect local conditions.

It seems fair to assume that within a few years all countries of the sub-region will have local paint and allied products industries supplying 90-95 per cent of consumption. Only a small amount of special paints and artists' paints will be supplied by imports.

Tables 41-46 define a programme for development of the local paint industry for each country. They also give orders of magnitude for financial and labour requirements during the period 1965-1980.

It is clear that there is ample room here for discussion of quantity, size, production programme, degree of specialization and co-operation, and the location of factories in each country.

VI.3.2. Raw materials for paints, etc.

It was stated earlier in this report that integration of the paint industry in the national economies is still limited and that in some cases over 90 per cent of the raw materials are imported from outside the sub-region. With the growing volume of national paints and allied products production, projects for supporting industries producing raw materials for paint production become feasible.

One of the reasons that almost no locally available ingredients for paint production are used in the sub-region, or that no start has been made for the production of such materials, is the non-existence of independent paint-formulation technology in the region. The paint companies work with formulations from their parent concerns and are not sufficiently interested or not equipped to do the necessary development work. The system of import duties in force does not encourage such an approach. A sub-regional paint technology institute, as earlier suggested in this report, could remedy this situation and act as the centre for such development.

There are many factors working against the use of local raw materials. These include loss of business by importers, the traditional short-sighted enemy of local industrialization, the absence of cost advantage, improperly organized business, undependable prices, quality or delivery, etc. Many of these could be overcome by soliciting the advice of industrial extension officers working in the country.

Paints consist of four main constituents: the binder or film-builder, the pigment, the dryer or siccative and the solvents or thinners. Further, a number of additives may bring the total of ingredients required for a modern paint up to 25 or more. Of principal groups, only the pigments and the driers come under the heading of this sector study.

We will cover pigments in detail and give shorter descriptions of the other groups to establish the link with the sector reports on chemicals.

VI.3.2.1. Binders or film-builders

(a) Drying and modified oils

The sub-region is not rich in drying oils, the classic film-builder for paints and varnishes. There are, however, possibilities for drying oils such as linseed and rice bran, semi-drying oils such as sunflower, cotton-seed, fish, and for castor oil.

It is felt that agriculture in the sub-region could provide more of these raw materials (e.g., by introducing solvent extraction in addition to expelling). Also the local oil pressing industry could make more of an effort to process these in greater quantities (if necessary, supplemented by imports of oil seeds) into the following products: bleached, boiled, blown linseed oils, stand oils, dehydrated castor oil, refined fish oils and glycerol, sunflower oil and cotton-seed oil for alkyd resin manufacture. There are already facilities for the production of these technical vegetable oils (e.g., in Alexandria (UAR), in Algeria, Tunisia and in Morocco) to satisfy demand of the sub-region.

(b) Alkyd resins and other polyester resins

With the trend towards higher quality paints, consumption of alkyd resins is increasing. The UAR and Algeria are already well-equipped to produce alkyd resins; the Sudan intends to install equipment by 1968; and in other countries of the sub-region projects to install alkyd resin manufacturing equipment in paint factories are being studied.

Most alkyd resins are imported into the region, but those manufactured in the UAR could be supplied for the period until each country has its own alkyd resin plant. At any rate, it would seem that the region could be self-sufficient in this important group of raw materials. Polyester resin manufacture is not a simple process and it is, therefore, recommended that production be concentrated in only a few specialized factories in the sub-region.

Work started by a Sudanese paint company on the manufacture of gumesters from locally available arabic gums and their incorporation into paints is a good example of the potentialities of this type of development effort.

Regional or national production of polyester resins, for which locally available glycerine and technical oils and fats can be used, would build up regional consumption of phthalic and maleic acid anhydride and thus might make feasible at an early date production of these intermediates. Phthalic acid anhydride manufacture could be based on by-product naphthalene from the metallurgical coke plant at Helwan, (UAR), in Algeria, Tunisia and in Morocco.

(c) Polyvinylacetate

An estimated 50-75 per cent of non-industrial paint production in the sub-region consists of emulsion type paints. The preferred film-forming ingredient in North Africa for these paints is polyvinylacetate. This type, used particularly as interior and exterior house paint, is expected to grow strongly.

Polyvinylacetate emulsion, containing about 60 per cent polyvinylacetate, enters into formulation for buff paints (15-20 per cent), indoor paints (25 per cent) and outdoor paints (50-75 per cent). A low estimate for polyvinylacetate demand in the sub-region seems to be 10 per cent of paint demand, or could be self-sufficient in this important group of raw materials. Polyester resin manufacture is not a simple process and it is, therefore, recommended that production be concentrated in only a few specialized factories in the sub-region.

about 5,300 tons per year for 1970, 7,700 tons per year for 1975 and 11,300 tons per year in the 1980's.

Additional demand of polyvinylacetate can be expected in adhesives, in paper coating and sizing, in textile warp sizing and finishing, and as raw material for polyvinyl alcohol production.

A vinyl acetate polymerization plant based on imported monomer seems feasible as a department of the main paint factory in almost any of the countries of the region. Polymerization know-how is available from suppliers of the monomer. Polyvinylacetate, for instance, is made in Turkey by three factories with a total capacity of 3,500 tons per year.

Production capacity as low as 250 tons per year polyvinylacetate and using a reactor of 1 ton batch capacity is feasible, but a regional project would be much better from a technological and commercial point of view. In Libya, management of a local paint factory showed interest in such an undertaking.

In those countries of the region such as the UAR, where a calcium carbide project will materialize, a complete project including monomer production could be incorporated in the manufacturing chain of calcium carbide, acetaldehyde, acetic acid, vinyl acetate. The polyvinylacetate and copolymers produced would serve the paint and ink industry. Too, there are also a variety of other applications, such as an ingredient in adhesives, in textile coating and finishing, in the paper industry and as a chewing gum base. The UAR seems a possible country for such a regional project, in view of the existing plans to make calcium carbide, but Algeria would offer the advantage of cheap electricity for calcium carbide production. Manufacture of calcium carbide, by the way, seems a good prospect for a regional project considering that there is at present no production of this chemical in the region and regional imports are building up to around 20,000-30,000 tons per year. Used calcium carbide-acetylene equipment should be available at low prices from industrialized countries, which are changing over to ethylene-based processes for higher volume production.

(d) Nitrocellulose

Nitrocellulose chips, in different clear qualities and as raw material for cellulose paints, are manufactured in a UAR explosives factory near Cairo. It is projected to increase the production capacity of this existing factory from 150 tons to 500 tons per year, mainly to be used for paints. At present most countries of the sub-region satisfy their demand for this chemical from outside the sub-region.

(e) Acrylic resins

Acrylic resins are used for finishing and as a binder in textiles, in thermoplastic and thermosetting protective coatings (especially for car paints), in floor finishes and as coating and impregnant for leather and

paper. An acrylic resin polymerization plant is under consideration by a large paint factory, in combination with a textile group, in Tunisia. It is felt that this project requiring high investment would benefit considerably from a larger regional market.

VI.3.2.2. Paint driers

Paint driers, or siccatives, constitute a small branch of industry connected with paint manufacture. Driers are chemical additives used to accelerate the drying period of paints, varnishes, printing inks, etc. by catalysing the oxidation of drying oils or synthetic resin varnishes. They are mainly cobalt, manganese, cerium, lead and zinc salts of unsaturated organic acids such as fatty acids of linseed oil and naphthenic acid.

There are adequate production facilities for paint driers, for instance, in the UAR, Algeria, Tunisia and Morocco to satisfy demand in the sub-region until 1980. The production process is relatively simple.

About 0.5 per cent by weight of different types of driers are used in paint production. Consumption is, therefore, only a few hundred tons per year for the whole sub-region.

Statistical data are included in the figures for paints, varnishes and related materials.

VI.3.2.3. Solvents and thinners

Mineral spirits, as used for solvents and thinners, can be produced locally without too much effort by any one of the oil refineries of the sub-region. Regional requirements of thinners for paint mixing and for retail trade by 1970 are estimated at 2,500 tons per year, 3,500 tons in 1975 and 5,500 tons in 1980 (about 5 per cent of paint production).

VI.3.2.4. Packaging materials for paints

About 12 per cent of raw materials' cost, or 7 per cent of turnover of paint factories, is made up of the cost of packaging materials, viz., tin plate cans. Size distribution and appearance of the tins influence this figure.

In Morocco, Algeria and the UAR, first-quality lithographed or otherwise decorated tins for paints were observed being manufactured by local specialize can-making companies from imported tin sheet. In Libya and the Sudan, tins were made locally from imported tin sheet, were labelled or reformed from imported lithographed flats and used locally made tops and bottoms. This was in a paint factory itself.

Each country should be encouraged to have one integrated factory which is specialized in tin-can making. This will prevent the creation of can-making facilities as departments in a variety of factories, none of which would be able to produce high-class, low-priced cans.

VI.3.3. Item 533.3 (1) Prepared pigments, opacifiers, enamels, glasses, lustres, etc.

VI.3.3.1. Market aspects

Under the term pigments fall various inorganic, organic, natural and synthetic substances used to impart colour to products of the following branches:

Paints, inks and allied industries
Building materials, ceramics
Floor coverings, oil cloth and artificial leather
Plastics, artificial fibres, rubber goods
Paper.

The distinction between pigments and dyes is not so sharp, but basically pigments are finely divided solid powders, insoluble under the circumstances used, while dyes are almost always organic substances for use in colouring fibres and plastics.

The task of the pigments is to contribute to the protective value and to impart a decorative effect.

World production of inorganic pigments is large. By value, production of inorganic pigments is slightly higher and, by weight, 10 times higher than production of organic dyes and pigments.

VI.3.3.2. Demand projections

With increasing demand for paints, printing inks, etc., demand for pigments is also increasing.

The present and projected demand for prepared pigments is given in Tables 31 and 32.

Table 31

(Tons)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Morocco | A | 200 | 230 | 250 | 300 | 300 | 300 | | | |
| | B | 1,601 | 1,662 | 1,439 | 1,906 | 1,716 | 1,665 | | | |
| | D | 1,801 | 1,892 | 1,689 | 2,206 | 2,016 | 1,965 | 2,500 | 3,200 | 4,000 |
| Algeria | A | 440 | 148 | - | 104 | 201 | 176 | | | |
| | B | 1,790 | 1,537 | 700 | 700 | 800 | 1,100 | | | |
| | D | 2,230 | 1,685 | 700 | 804 | 1,001 | 1,276 | 1,700 | 2,300 | 3,200 |
| Tunisia | A | 283 | 270 | 570 | 442 | 778 | 548 | | | |
| | B | 56 | 84 | 88 | 60 | 68 | 71 | | | |
| | D | 339 | 354 | 658 | 502 | 846 | 619 | 900 | 1,200 | 1,600 |
| Libya | A | - | - | - | - | - | - | | | |
| | B | - | - | - | - | 51 | 64 | | | |
| | D | - | - | - | - | 51 | 64 | 100 | 150 | 250 |

Table 31 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------------------|---|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| Total Maghreb | A | 923 | 648 | 820 | 846 | 1,279 | 1,024 | | | |
| | B | 3,447 | 3,283 | 2,227 | 2,666 | 2,635 | 2,900 | | | |
| | D | 4,370 | 3,931 | 3,047 | 3,512 | 3,914 | 3,924 | 5,200 | 6,850 | 9,050 |
| | A | - | - | - | - | - | - | | | |
| Sudan | B | - | - | - | 701 | 936 | 744 | | | |
| | D | - | - | - | 701 | 936 | 744 | 1,000 | 1,200 | 1,400 |
| | A | - | - | - | - | - | - | | | |
| | B | 2,029 | 869 | 719 | 1,392 | 1,139 | 2,125 | | | |
| UAR | C | 117 | 220 | 98 | 25 | 48 | - | | | |
| | D | 1,912 | 649 | 621 | 1,367 | 1,091 | 2,125 | 2,500 | 3,200 | 4,200 |
| | A | 923 | 648 | 820 | 846 | 1,279 | 1,024 | | | |
| | B | 5,476 | 4,152 | 2,946 | 4,759 | 4,710 | 5,769 | | | |
| Total sub-region | C | 117 | 220 | 98 | 25 | 48 | - | | | |
| | D | 6,282 | 4,580 | 3,668 | 5,580 | 5,941 | 6,793 | 8,700 | 11,250 | 14,650 |

A = Local production. B = Imports. C = Exports. D = Demand

Table 32

(\$1,000)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Morocco | A | 50 | 57 | 63 | 75 | 75 | 75 | | | |
| | B | 329 | 320 | 272 | 376 | 381 | 434 | | | |
| | D | 379 | 377 | 335 | 451 | 456 | 509 | 620 | 800 | 1,000 |
| | A | 200 | 70 | - | 45 | 95 | 80 | | | |
| Algeria | B | 700 | 580 | 240 | 270 | 370 | 500 | | | |
| | D | 900 | 650 | 240 | 315 | 465 | 580 | 700 | 900 | 1,200 |
| | A | 140 | 135 | 290 | 240 | 390 | 270 | | | |
| | B | 28 | 39 | 77 | 40 | 37 | 90 | | | |
| Tunisia | D | 168 | 174 | 367 | 280 | 427 | 360 | 500 | 600 | 800 |
| | A | - | - | - | - | - | - | | | |
| | B | - | - | - | - | 14 | 25 | | | |
| | D | - | - | - | - | 14 | 25 | 40 | 60 | 100 |
| Total Maghreb | A | 390 | 262 | 353 | 360 | 560 | 425 | | | |
| | B | 1,057 | 939 | 589 | 686 | 802 | 1,049 | | | |
| | D | 1,447 | 1,201 | 942 | 1,046 | 1,362 | 1,474 | 1,860 | 2,360 | 3,100 |
| | A | - | - | - | - | - | - | | | |
| Sudan | B | - | - | - | 243 | 275 | 229 | | | |
| | D | - | - | - | 243 | 275 | 229 | 300 | 360 | 420 |
| | A | - | - | - | - | - | - | | | |
| | B | 850 | 400 | 370 | 561 | 446 | 777 | | | |
| UAR | C | 39 | 71 | 33 | 9 | 14 | - | | | |
| | D | 811 | 329 | 337 | 552 | 432 | 777 | 1,000 | 1,300 | 1,700 |
| | A | 390 | 262 | 353 | 360 | 560 | 425 | | | |
| | B | 1,907 | 1,339 | 959 | 1,490 | 1,523 | 2,055 | | | |
| Total sub-region | C | 39 | 71 | 33 | 9 | 14 | - | | | |
| | D | 2,258 | 1,530 | 1,279 | 1,841 | 2,069 | 2,480 | 3,160 | 4,020 | 5,220 |

A = Local production. B = Imports. C = Exports. D = Demand.

The estimate of present and future demand of other inorganic pigments is shown in Tables 33 and 34.

Table 33

(Tons)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Morocco | A | 24 | 48 | 40 | 74 | 128 | 87 | | | |
| | B | 456 | 412 | 571 | 569 | 575 | 504 | | | |
| | C | 180 | 240 | 291 | 398 | 337 | 367 | | | |
| | D | 88 | 75 | 52 | 52 | 41 | 27 | | | |
| | E | 93 | 113 | 169 | 253 | 293 | 253 | | | |
| | F | 119 | 154 | 162 | 107 | 105 | 170 | | | |
| | G | 570 | 750 | 633 | 798 | 670 | 563 | | | |
| | H | 128 | 343 | 573 | 770 | 1,211 | 977 | | | |
| | I | 20 | 20 | 70 | 70 | 50 | 70 | | | |
| | K | 1,678 | 2,155 | 2,561 | 3,091 | 3,410 | 3,018 | 4,000 | 5,000 | 6,000 |
| Algeria | A | 40 | 23 | 15 | 14 | 13 | 20 | | | |
| | B | 564 | 388 | 300 | 370 | 350 | 370 | | | |
| | C | 360 | 285 | 130 | 140 | 125 | 190 | | | |
| | D | 43 | 20 | 25 | 40 | 46 | 50 | | | |
| | E | 206 | 269 | 150 | 170 | 160 | 190 | | | |
| | F | 200 | 154 | 60 | 65 | 58 | 80 | | | |
| | G | 653 | 345 | 355 | 370 | 385 | 400 | | | |
| | H | 76 | 25 | 500 | 900 | 1,000 | 1,100 | | | |
| | I | 45 | 50 | 40 | 40 | 50 | 60 | | | |
| | K | 2,187 | 1,559 | 1,575 | 2,109 | 2,187 | 2,460 | 3,200 | 4,000 | 5,000 |
| Tunisia | A | - | - | - | - | - | - | | | |
| | B | 136 | 92 | 159 | 146 | 204 | 208 | | | |
| | C | 51 | 84 | 89 | 151 | 185 | 255 | | | |
| | D | - | - | - | - | - | - | | | |
| | E | 222 | 397 | 326 | 313 | 305 | 204 | | | |
| | F | 131 | 156 | 163 | 178 | 61 | 48 | | | |
| | G | 280 | 300 | 310 | 320 | 330 | 350 | | | |
| | H | 156 | 208 | 206 | 258 | 305 | 307 | | | |
| | I | 25 | 35 | 30 | 30 | 40 | 50 | | | |
| | K | 1,001 | 1,272 | 1,283 | 1,396 | 1,430 | 1,422 | 2,000 | 2,700 | 3,500 |
| Libya | A | - | - | - | - | - | - | | | |
| | B | 55 | 70 | 80 | 100 | 150 | 200 | | | |
| | C | 20 | 25 | 30 | 50 | 80 | 120 | | | |
| | D | - | - | - | - | - | - | | | |
| | E | 30 | 35 | 40 | 60 | 120 | 180 | | | |
| | F | 10 | 15 | 15 | 20 | 30 | 40 | | | |
| | G | 50 | 60 | 70 | 80 | 90 | 100 | | | |
| | H | 30 | 40 | 50 | 70 | 100 | 130 | | | |
| | I | 5 | 5 | 15 | 20 | 30 | 30 | | | |
| | K | 200 | 250 | 300 | 400 | 600 | 800 | 1,300 | 1,800 | 2,500 |

Table 33 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------------------|---|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| Total Maghreb | A | 64 | 71 | 55 | 88 | 141 | 107 | | | |
| | B | 1,211 | 962 | 1,110 | 1,185 | 1,279 | 1,282 | | | |
| | C | 611 | 634 | 540 | 739 | 727 | 932 | | | |
| | D | 131 | 95 | 77 | 92 | 87 | 77 | | | |
| | E | 551 | 814 | 685 | 796 | 878 | 827 | | | |
| | F | 460 | 479 | 400 | 370 | 254 | 338 | | | |
| | G | 1,553 | 1,455 | 1,368 | 1,568 | 1,475 | 1,413 | | | |
| | H | 390 | 616 | 1,329 | 1,998 | 2,616 | 2,514 | | | |
| | I | 95 | 110 | 155 | 160 | 170 | 210 | | | |
| | K | 5,066 | 5,236 | 5,719 | 6,996 | 7,627 | 7,700 | 10,500 | 13,500 | 17,000 |
| Sudan | A | - | - | - | - | - | - | | | |
| | B | 40 | 50 | 60 | 80 | 100 | 120 | | | |
| | C | 10 | 15 | 20 | 30 | 40 | 50 | | | |
| | D | - | - | - | - | - | - | | | |
| | E | 20 | 30 | 40 | 60 | 80 | 100 | | | |
| | F | 5 | 5 | 5 | 10 | 15 | 20 | | | |
| | G | 100 | 120 | 140 | 160 | 180 | 200 | | | |
| | H | 15 | 20 | 25 | 40 | 50 | 70 | | | |
| | I | 10 | 10 | 10 | 20 | 35 | 40 | | | |
| | K | 200 | 250 | 300 | 400 | 500 | 600 | 1,000 | 1,500 | 2,000 |
| UAR | A | - | - | - | - | - | - | | | |
| | B | 21 | 25 | 75 | 26 | 24 | 30 | | | |
| | C | 230 | 250 | 293 | 955 | 271 | 300 | | | |
| | D | - | - | - | - | - | - | | | |
| | E | 550 | 700 | 935 | 1,134 | 1,342 | 1,400 | | | |
| | F | 1,000 | 1,200 | 1,785 | 1,333 | 1,122 | 1,300 | | | |
| | G | 894 | 676 | 1,034 | 1,048 | 1,100 | 1,141 | | | |
| | H | 1,100 | 1,300 | 1,842 | 2,186 | 1,390 | 1,500 | | | |
| | I | 100 | 100 | 105 | 110 | 130 | 150 | | | |
| | K | 3,895 | 4,251 | 6,069 | 6,792 | 5,379 | 5,821 | 8,000 | 10,500 | 13,000 |
| Total sub-region | A | 64 | 71 | 55 | 88 | 141 | 107 | | | |
| | B | 1,272 | 1,037 | 1,245 | 1,291 | 1,403 | 1,432 | | | |
| | C | 851 | 899 | 853 | 1,724 | 1,038 | 1,282 | | | |
| | D | 131 | 95 | 77 | 92 | 87 | 77 | | | |
| | E | 1,121 | 1,544 | 1,660 | 1,990 | 2,300 | 2,327 | | | |
| | F | 1,465 | 1,684 | 2,190 | 1,713 | 1,391 | 1,658 | | | |
| | G | 2,547 | 2,251 | 2,542 | 2,776 | 2,755 | 2,754 | | | |
| | H | 1,505 | 1,936 | 3,196 | 4,224 | 4,056 | 4,084 | | | |
| | I | 205 | 220 | 270 | 290 | 335 | 400 | | | |
| | K | 9,161 | 9,737 | 12,088 | 14,188 | 13,506 | 14,121 | 19,500 | 25,500 | 32,000 |

A = Zinc chloride, zinc and barium
sulphates.

B = Zinc oxides.

C = Titanium oxides.

D = Calcium, barium and magnesium
carbonates.

E = Iron oxides.

F = Lead oxides.

G = Chromium salts.

H = Carbon black.

I = Other inorganic pigments.

K = Total demands of other inorganic
pigments.

Table 34

(\$1,000)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------|---|------|------|------|------|------|------|-------|-------|-------|
| Morocco | A | 4 | 11 | 9 | 19 | 25 | 20 | | | |
| | B | 115 | 95 | 126 | 124 | 158 | 148 | | | |
| | C | 81 | 109 | 130 | 178 | 150 | 160 | | | |
| | D | 8 | 9 | 6 | 8 | 5 | 5 | | | |
| | E | 16 | 20 | 26 | 38 | 40 | 43 | | | |
| | F | 30 | 38 | 38 | 27 | 34 | 66 | | | |
| | G | 146 | 185 | 154 | 193 | 160 | 137 | | | |
| | H | 32 | 77 | 130 | 170 | 292 | 241 | | | |
| | I | 10 | 10 | 35 | 35 | 25 | 35 | | | |
| | K | 442 | 554 | 654 | 792 | 889 | 855 | 1,120 | 1,400 | 1,680 |
| Algeria | A | 9 | 5 | 3 | 3 | 3 | 4 | | | |
| | B | 138 | 95 | 80 | 105 | 103 | 105 | | | |
| | C | 180 | 140 | 67 | 75 | 70 | 100 | | | |
| | D | 4 | 2 | 3 | 4 | 5 | 6 | | | |
| | E | 27 | 36 | 20 | 22 | 20 | 25 | | | |
| | F | 54 | 42 | 18 | 20 | 18 | 24 | | | |
| | G | 149 | 79 | 82 | 85 | 89 | 92 | | | |
| | H | 23 | 8 | 140 | 240 | 243 | 265 | | | |
| | I | 22 | 25 | 20 | 20 | 25 | 30 | | | |
| | K | 606 | 432 | 433 | 574 | 576 | 651 | 850 | 1,050 | 1,300 |
| Tunisia | A | - | - | - | - | - | - | | | |
| | B | 36 | 24 | 42 | 39 | 68 | 87 | | | |
| | C | 27 | 42 | 44 | 74 | 88 | 106 | | | |
| | D | - | - | - | - | - | - | | | |
| | E | 19 | 27 | 27 | 27 | 32 | 29 | | | |
| | F | 37 | 43 | 43 | 46 | 22 | 24 | | | |
| | G | 67 | 72 | 74 | 77 | 79 | 84 | | | |
| | H | 60 | 55 | 53 | 66 | 80 | 80 | | | |
| | I | 12 | 17 | 15 | 15 | 20 | 25 | | | |
| | K | 258 | 280 | 298 | 344 | 389 | 435 | 600 | 800 | 1,050 |
| Libya | A | - | - | - | - | - | - | | | |
| | B | 14 | 18 | 22 | 28 | 45 | 60 | | | |
| | C | 10 | 12 | 15 | 25 | 40 | 60 | | | |
| | D | - | - | - | - | - | - | | | |
| | E | 5 | 6 | 6 | 9 | 18 | 27 | | | |
| | F | 3 | 4 | 4 | 7 | 10 | 15 | | | |
| | G | 12 | 14 | 17 | 19 | 22 | 24 | | | |
| | H | 9 | 12 | 15 | 21 | 30 | 39 | | | |
| | I | 2 | 2 | 7 | 10 | 15 | 15 | | | |
| | K | 55 | 68 | 86 | 119 | 180 | 240 | 390 | 540 | 750 |

Table 34 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Total Maghreb | A | 13 | 16 | 12 | 22 | 28 | 24 | | | |
| | B | 303 | 232 | 270 | 296 | 374 | 400 | | | |
| | C | 298 | 303 | 256 | 352 | 348 | 426 | | | |
| | D | 12 | 11 | 9 | 12 | 10 | 11 | | | |
| | E | 67 | 89 | 79 | 96 | 110 | 124 | | | |
| | F | 124 | 127 | 103 | 100 | 84 | 129 | | | |
| | G | 374 | 350 | 327 | 374 | 350 | 337 | | | |
| | H | 124 | 152 | 338 | 497 | 645 | 625 | | | |
| | I | 46 | 54 | 77 | 80 | 85 | 105 | | | |
| | K | 1,361 | 1,334 | 1,471 | 1,829 | 2,034 | 2,181 | 2,960 | 3,790 | 4,780 |
| Sudan | A | - | - | - | - | - | - | | | |
| | B | 10 | 15 | 18 | 24 | 30 | 36 | | | |
| | C | 5 | 7 | 10 | 15 | 20 | 25 | | | |
| | D | - | - | - | - | - | - | | | |
| | E | 3 | 5 | 6 | 9 | 12 | 15 | | | |
| | F | 2 | 2 | 2 | 4 | 6 | 8 | | | |
| | G | 24 | 29 | 34 | 38 | 43 | 48 | | | |
| | H | 4 | 6 | 8 | 12 | 15 | 21 | | | |
| | I | 5 | 5 | 5 | 10 | 17 | 20 | | | |
| | K | 53 | 69 | 83 | 112 | 143 | 173 | 300 | 450 | 600 |
| UAR | A | - | - | - | - | - | - | | | |
| | B | 5 | 6 | 17 | 11 | 9 | 11 | | | |
| | C | 115 | 125 | 151 | 444 | 140 | 145 | | | |
| | D | - | - | - | - | - | - | | | |
| | E | 83 | 110 | 132 | 200 | 233 | 244 | | | |
| | F | 270 | 324 | 482 | 345 | 389 | 400 | | | |
| | G | 223 | 175 | 242 | 279 | 255 | 265 | | | |
| | H | 242 | 286 | 402 | 496 | 360 | 385 | | | |
| | I | 50 | 50 | 52 | 55 | 65 | 75 | | | |
| | K | 988 | 1,076 | 1,478 | 1,830 | 1,451 | 1,525 | 2,160 | 2,830 | 3,500 |
| | A | 13 | 16 | 12 | 22 | 28 | 24 | | | |
| | B | 318 | 253 | 305 | 331 | 413 | 447 | | | |
| | C | 418 | 435 | 417 | 811 | 508 | 596 | | | |
| | D | 12 | 11 | 9 | 12 | 10 | 11 | | | |
| | E | 153 | 204 | 217 | 305 | 355 | 383 | | | |
| | F | 396 | 453 | 587 | 449 | 479 | 537 | | | |
| | G | 621 | 554 | 603 | 691 | 648 | 650 | | | |
| | H | 370 | 444 | 748 | 1,005 | 1,020 | 1,031 | | | |
| | I | 101 | 109 | 134 | 145 | 167 | 200 | | | |
| | K | 2,402 | 2,479 | 3,032 | 3,771 | 3,628 | 3,879 | 5,420 | 7,070 | 8,880 |

A = Zinc chloride, zinc and barium sulphates.

B = Zinc oxides.

C = Titanium oxides.

D = Calcium, barium and magnesium carbonates.

E = Iron oxides.

F = Lead oxides.

G = Chromium salts.

H = Carbon black.

I = Other inorganic pigments.

K = Total demands of other inorganic pigments.

The total demand of pigments is given in Tables 35 and 36

Table 35

(Tons)

| Country | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Morocco | A | 1,801 | 1,892 | 1,689 | 2,206 | 2,016 | 1,965 | 2,500 | 3,200 | 4,000 |
| | B | 1,678 | 2,155 | 2,561 | 3,091 | 3,410 | 3,018 | 4,000 | 5,000 | 6,000 |
| | C | 3,479 | 4,047 | 4,250 | 5,297 | 5,426 | 4,983 | 6,500 | 8,200 | 10,000 |
| Algeria | A | 2,230 | 1,685 | 700 | 804 | 1,001 | 1,276 | 1,700 | 2,300 | 3,200 |
| | B | 2,187 | 1,559 | 1,575 | 2,109 | 2,187 | 2,460 | 3,200 | 4,000 | 5,000 |
| | C | 4,417 | 3,244 | 2,275 | 2,913 | 3,188 | 3,736 | 4,900 | 6,300 | 8,200 |
| Tunisia | A | 339 | 354 | 658 | 502 | 846 | 619 | 900 | 1,200 | 1,600 |
| | B | 1,001 | 1,272 | 1,283 | 1,396 | 1,430 | 1,422 | 2,000 | 2,700 | 3,500 |
| | C | 1,340 | 1,626 | 1,941 | 1,898 | 2,276 | 2,041 | 2,900 | 3,900 | 5,100 |
| Libya | A | - | - | - | - | 51 | 64 | 100 | 150 | 250 |
| | B | 200 | 250 | 300 | 400 | 600 | 800 | 1,300 | 1,800 | 2,500 |
| | C | 200 | 250 | 300 | 400 | 651 | 864 | 1,400 | 1,950 | 2,750 |
| Total Maghreb | A | 4,370 | 3,931 | 3,047 | 3,512 | 3,914 | 3,924 | 5,200 | 6,850 | 9,050 |
| | B | 5,066 | 5,236 | 5,719 | 6,996 | 7,627 | 7,700 | 10,500 | 13,500 | 17,000 |
| | C | 9,436 | 9,167 | 8,766 | 10,508 | 11,541 | 11,624 | 15,700 | 20,350 | 26,050 |
| Sudan | A | - | - | - | 701 | 936 | 744 | 1,000 | 1,200 | 1,400 |
| | B | 200 | 250 | 300 | 400 | 500 | 600 | 1,000 | 1,500 | 2,000 |
| | C | 200 | 250 | 300 | 1,101 | 1,436 | 1,344 | 2,000 | 2,700 | 3,400 |
| UAR | A | 1,912 | 649 | 621 | 1,367 | 1,091 | 2,125 | 2,500 | 3,200 | 4,200 |
| | B | 3,895 | 4,251 | 6,069 | 6,792 | 5,379 | 5,821 | 8,000 | 10,500 | 13,000 |
| | C | 5,807 | 4,900 | 6,690 | 8,159 | 6,470 | 7,946 | 10,500 | 13,700 | 17,200 |
| Total sub-region | A | 6,282 | 4,580 | 3,668 | 5,580 | 5,941 | 6,793 | 8,700 | 11,250 | 14,650 |
| | B | 9,161 | 9,737 | 12,088 | 14,188 | 13,506 | 14,121 | 19,500 | 25,500 | 32,000 |
| | C | 15,443 | 14,317 | 15,756 | 19,768 | 19,447 | 20,914 | 28,200 | 36,750 | 46,650 |

A = Demand of prepared pigments.

B = Demand of other inorganic pigments.

C = Total demand of pigments.

Table 36

(\$1,000)

| Country | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------|---|-------|-------|------|-------|-------|-------|-------|-------|-------|
| Morocco | A | 379 | 377 | 335 | 451 | 456 | 509 | 620 | 800 | 1,000 |
| | B | 442 | 554 | 654 | 792 | 889 | 855 | 1,120 | 1,400 | 1,680 |
| | C | 821 | 931 | 989 | 1,243 | 1,345 | 1,364 | 1,740 | 2,200 | 2,680 |
| Algeria | A | 900 | 650 | 240 | 315 | 465 | 580 | 700 | 900 | 1,200 |
| | B | 606 | 432 | 433 | 574 | 576 | 651 | 850 | 1,050 | 1,300 |
| | C | 1,506 | 1,082 | 673 | 889 | 1,041 | 1,231 | 1,550 | 1,950 | 2,500 |
| Tunisia | A | 168 | 174 | 367 | 280 | 427 | 360 | 500 | 600 | 800 |
| | B | 258 | 280 | 298 | 344 | 389 | 435 | 600 | 800 | 1,050 |
| | C | 426 | 454 | 665 | 624 | 816 | 795 | 1,100 | 1,400 | 1,850 |

Table 36 (Cont'd)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| Libya | A | - | - | - | - | 14 | 25 | 40 | 60 | 100 |
| | B | 55 | 68 | 86 | 119 | 180 | 240 | 390 | 540 | 750 |
| | C | 55 | 68 | 86 | 119 | 194 | 265 | 430 | 600 | 850 |
| Total Maghreb | A | 1,447 | 1,201 | 942 | 1,046 | 1,362 | 1,474 | 1,860 | 2,360 | 3,100 |
| | B | 1,361 | 1,334 | 1,471 | 1,829 | 2,034 | 2,181 | 2,960 | 3,790 | 4,780 |
| | C | 2,808 | 2,535 | 2,413 | 2,875 | 3,396 | 3,655 | 4,820 | 6,150 | 7,880 |
| Sudan | A | - | - | - | 243 | 275 | 229 | 300 | 360 | 420 |
| | B | 53 | 69 | 83 | 112 | 143 | 173 | 300 | 450 | 600 |
| | C | 53 | 69 | 83 | 355 | 418 | 402 | 600 | 810 | 1,020 |
| UAR | A | 811 | 329 | 337 | 552 | 432 | 777 | 1,000 | 1,300 | 1,700 |
| | B | 988 | 1,076 | 1,478 | 1,830 | 1,451 | 1,525 | 2,160 | 2,830 | 3,500 |
| | C | 1,799 | 1,405 | 1,815 | 2,382 | 1,883 | 2,302 | 3,160 | 4,130 | 5,200 |
| Total sub-region | A | 2,258 | 1,530 | 1,279 | 1,841 | 2,069 | 2,480 | 3,160 | 4,020 | 5,220 |
| | B | 2,402 | 2,479 | 3,032 | 3,771 | 3,628 | 3,879 | 5,420 | 7,070 | 8,880 |
| | C | 4,660 | 4,009 | 4,311 | 5,612 | 5,697 | 6,359 | 8,580 | 11,090 | 14,100 |

A = Demand of prepared pigments.

C = Total demand of pigments.

B = Demand of other inorganic pigments.

VI.3.3.3. Present and future situation of local production

Most of the industries using pigments as raw material have either only recently started in the sub-region or are as yet not present. It is, therefore, not strange that the pigments industry as a supporting industry for other industries is lagging behind and is today almost non-existent in the sub-region. Some exceptions are:

- Small production of natural yellow and red oxides of iron in some of the countries (Morocco - Kettara) which, however, have mostly lost their importance due to competition from synthetic pigments of higher quality and uniformity;
- A milling factory in Tunis of natural pigments and paint extenders like barywhite (barium sulphate) which has operated since 1963. Although at present only a very limited product range is made, this factory seems to have good development potential by improving the quality of the products made and by extending its range of products.

Although the total volume of pigments consumption appears large it should be realized that the quantity of each individual pigment consumed, often requiring a separate manufacturing process, is comparatively small. Projects for manufacturing these products will, therefore, become feasible propositions many years sooner when based on the demand of the whole sub-region than when based only on national demand.

The proposed development programme for principal pigments in the North African sub-region is given below.

The suggested structure of the local pigments manufacturing industry and the financial and labour requirements during the period 1965-1980 are presented in Tables 41 and 46.

A. White pigments and extenders

(a) Lithopone

Lithopone has many good qualities. It is brilliantly white, extremely fine and its hiding power is better than zinc oxide. In humid countries, it has certain disadvantages (chalking) which do not play a role in the dry North African sub-region. It is made by precipitation of a mixture of two insoluble compounds. When zinc sulphate solution is added to barium sulphide solution, the two solutions, with heat, react and a heavy mixed precipitate results which is 28 to 30 per cent zinc sulphide and 72 to 70 per cent barium sulphate.



This precipitate is filtered, dried, crushed, heated to a high temperature, and quenched in cold water. This second heating in a muffle furnace at 725°C produces crystals of the right optical size. Subsequent treatments, as indicated, give the finished product.

Some of the variations of the original lithopone are calcium lithopone in which calcium sulphide replaces the barium sulphide in the precipitation; high-strength lithopone which contains from 50 to 60 per cent zinc sulphide, due to the addition of zinc chloride to the sulphate solution; and the titanated lithopone which has about 15 per cent titanium dioxide added.

World production of lithopone is over 500,000 tons/year, but it is not manufactured in the sub-region. Present consumption in the sub-region is estimated around 3,300 tons/year.

A very rough estimate of present and future demand of lithopone is shown in the following table:

| | 1965 | 1970 | 1975 | 1980 |
|------|-------|-------|-------|-------|
| Tons | 3,300 | 4,500 | 5,700 | 7,000 |

Project studies have been made in some of the countries of the region. Notable is a project in Morocco for a factory with capacity of 2,000 tons per year lithopone and 800 tons per year zinc oxide. It would create employment for 40 persons, at a capital cost of \$220,000 for equipment, \$80,000 for buildings and \$100,000 working capital.

We were informed that in Algeria, a project for a 20,000 tons per year lithopone factory has been included in the Algerian development plan. It would produce white pigments in quantities sufficient for the whole sub-region and be based on abundantly available barytes and zinc concentrates.

To make such project a success, it might be necessary to limit imports of the competing product, titanium dioxide, into the region for some time to come.

The industrialized countries have used lithopone as white pigment for many years, and there is no reason why the sub-region should use titanium dioxide. It is placed unfavourably for its production, with no known deposits of rutile or ilmenite in the sub-region.

However, many factories of lithopone in industrialized countries have closed down during the last few years and more are planning to stop production on account of the competition of titanium dioxide. Large capital investments in lithopone manufacture seem dubious considering the decreasing importance of this product. It would seem, however, worth while to study the possibilities of transferring equipment from one of the factories in Europe or USA now being closed for this marginal project having a life span of 20-30 years in the North African sub-region.

It is suggested here that a plant of 7,000 tons capacity in 1970, 9,000 tons in 1975 and 10,000 tons in 1980 be established in Algeria. It would produce lithopone for the whole sub-region.

(b) Zinc white (zinc oxide)

Another important white pigment is zinc oxide, ZnO , often manufactured in conjunction with lithopone. It is the truest white that can be obtained and its colour is unaffected by gases in the atmosphere. It has a covering effect which is less than of TiO_2 , but due to formation of zinc soaps with the oils it has good protective effect. Moreover, zinc soaps have a stabilizing and equalizing effect on the paint. Zinc oxide is also used as an extender in the rubber and the enamel-ware industries.

Zinc white is manufactured from metallurgically manufactured zinc, zinc scrap (e.g., from the galvanizing industry, making galvanized pipes and sheets) or directly from zinc ores by reduction with coal or coke and evaporation of the zinc in the same furnace. Oxidation is done in the gas-phase and zinc oxide is settled in cyclones.

A rough estimate demand of zinc oxide pigment is the following:

| | 1965 | 1970 | 1975 | 1980 |
|------|-------|-------|-------|-------|
| Tons | 1,500 | 2,300 | 3,100 | 4,000 |

The Maghreb countries have a basic raw material position in zinc with about 8,000 tons of zinc concentrate per year in Tunisia and 50-100, thousand tons per year of zinc concentrates from the Algerian/Moroccan border. The larger reserves are on the Algerian side of the border.

The Waelz furnace at Zellidja (Morocco) produces zinc oxide. It could be refined by the Weatherill process to supply the whole regional demand.

A plant of 4,000 tons capacity in 1970 is proposed here, with 6,000 tons in 1975 and 8,000 tons in 1980. It would be located in Morocco and produce zinc oxide for the whole sub-region.

(c) Titanium dioxide

The most recently introduced and largest selling white pigment is titanium dioxide. TiO_2 can replace about 5 times the weight of other white pigments. It is mostly used together with zinc oxide or with lithopone because TiO_2 has a good covering power and a wonderful white effect. Its protective power is not so excellent, however.

Originally, TiO_2 was used mainly in the production of paints and printing ink, but today 40 per cent of total production finds application in paper, plastics, rubber, linoleum, cement, bitumen and man-made fibres. To meet these diverse requirements 30 important world producers offer an estimated 360 grades of the material.

TiO_2 , which appeared later on the market than lithopone, has since had an enormous world-wide acceptance.

World demand of titanium dioxide is about 1,500,000 tons and is increasing 7 per cent per year.

Total TiO_2 demand of the sub-region is estimated in the following table:

| | 1965 | 1970 | 1975 | 1980 |
|------|-------|-------|-------|-------|
| Tons | 2,500 | 3,500 | 4,700 | 6,000 |

In the sub-region, only UAR has made an attempt at TiO_2 production. It was unsuccessful, according to information in Cairo. A satisfactory white product was never obtained because of incomplete removal of the iron from the ilmenite.

The sub-region is not well placed for TiO_2 production. It has neither a basic raw material position in rutile or ilmenite nor in sulphuric acid needed to wash out the iron. It takes close to a ton of sulphur to produce a ton of TiO_2 or 3 tons H_2SO_4 /ton TiO_2 .

Present capacities of TiO_2 plants are between 3,000 - 30,000 tons per year. Investment is about \$15² million for a 20,000 tons per year plant.

It is felt that TiO_2 production in Africa should only be studied for the whole continent based on Sierra Leone rutil. The 100,000 tons per year rutil plant in Sierra Leone of Sherbro Minerals made its first shipments in September 1967.

(d) Pigment extenders

There are a number of natural white pigments which are used in cheaper paints, with the double purpose of pigmenting where grey white colours are acceptable and for extending the paint to bring cost of products down to a desired level. For instance:

Sulphates:

- Barium sulphate (baryte, blanc fixe, BaSO_4 also used in oil well drilling as ingredient for drilling mud);⁴
- Calcium sulphate (gypsum, plaster of Paris, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$).

Carbonates:

- Calcium carbonate (whiting, chalk);
- Magnesium carbonate (also used as filler for rubber and plastics).

Silicates:

- Silica, quartz (also required for frit production for ceramics and for abrasives);
- Talcum (soapstone steatite, magnesium silicate $\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$);
- Kaolin ($\text{Al}_2\text{O}_3 \cdot \text{SiO}_2 \cdot 2\text{H}_2\text{O}$).

Blanc fixe is a precipitated barium sulphate made by precipitation of soluble barium compounds with sulphuric acid or soluble sulphates. It is very stable but has poor covering power. It is widely used as filler for rubber and as such could find outlets in the rubber and tyre factories in the region. There already exists local production of ground barite in some of the countries of the sub-region (e.g. Morocco and Tunisia). In Algeria there are 2 factories operating, S.A. des Barytes algériennes.

Talcum, also called soapstone or steatite, belongs to the group of silicates, $\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$, and is used as pigment extender for cheap paints. It is produced in the region in a high capacity modern factory near Cairo, which could easily satisfy demand of the region till 1980. Production in 1965 reached a level of 40,000 tons.

It is felt that the factories already present in the region for milling and grinding of natural products like local yellow and red ochres, barytes, calcite (limestone) kaolin and talcum for putty and as pigment extenders for light coloured paints and slate powder for dark paints, should be retained and expanded. Improvements in equipment and processes should be made, however, which will result in products of higher quality, especially as regards purity, fineness of particle, and colour. To this end, jet milling and wet grinding should be introduced. It should be realized that present day high quality paints require some raw materials of 5 microns particle size. More experience on the commercial side will increase volume of sales and justify investments.

There should be at least one unit (of say 5 tons a day initial capacity - investment \$50,000) in each country of the sub-region. It would include crushing, grinding, washing, settling separation and drying equipment.

B. Coloured pigments

(a) Iron pigments

Iron pigments with the colours yellow, red, brown and black constitute the greatest volume in the group of coloured pigments. Natural iron oxides, in the form of limonite and hematite, occur in most countries of the sub-region. Pigments can be made of them provided the concentration is sufficiently high and the minerals are properly micronized to suit modern paint-making requirements. The trade names for such pigments are yellow and red ochre.

A rough estimate demand of iron oxides is the following:

| | 1965 | 1970 | 1975 | 1980 |
|------|-------|-------|-------|-------|
| Tons | 2,500 | 3,500 | 4,700 | 6,000 |

In Morocco, the Kettara mine produced yellow ochre, but production was discontinued a few years ago. In the other countries of the sub-region, the same situation was found, although some local paint manufacturers maintain that natural iron pigments (locally produced at about \$0,08/kg) are economic propositions provided jet milling is introduced.

High purity synthetic iron oxides of greater uniformity and fineness are often preferred by the paint industry, especially for formulating into the higher quality paints.

The best quality iron oxides are produced by air oxidation of iron scrap under diluted iron chloride solution. Iron oxide pigments can also be manufactured as a by-product in anilin manufacture. This possibility is being explored in Egypt. Synthetic iron oxides can be tailored to the specific end use

(e.g., Bayer (Uerdingen) makes more than 20 different standard types, not counting the mixtures and special types, in a factory with a capacity of 187,000 tons per year). This fact has to be considered when proposing projects.

It is suggested here that two plants for iron pigment be established in the sub-region. One plant would be in Morocco, with capacity of 1,500 tons in 1970, 2,000 tons in 1975 and 2,500 tons in 1980. The other would be in UAR, with capacity of 3,000 tons in 1970, 4,000 tons in 1975 and 5,000 tons in 1980.

(b) Chrome pigments

The second important group of coloured mineral pigments includes the chrome pigments. They combine brilliance of colour and great staining power with considerable hiding power and they impart decided corrosion inhibiting properties to paints. Main examples of this group are chrome yellow and orange, zinc chromate and chrome oxide itself. Although the market for some of the chrome pigments has decreased, new applications for others such as chromate yellow for road paint has increased.

The sub-regional demand for chrome pigments is included in the chapter on mineral tanning agents and is reproduced below:

(Tons)

| | 1965 | 1970 | 1975 | 1980 |
|-----------------------|-------|-------|-------|-------|
| Chrome pigments | 1,054 | 1,310 | 1,580 | 1,860 |
| Chrome tanning agents | 1,700 | 2,240 | 2,970 | 3,860 |
| Chromium salts total | 2,754 | 3,550 | 4,550 | 5,720 |

The production of chrome pigments does not require intricate equipment. Most of it can even be manufactured locally, tiled tanks or vats with stirring equipment for precipitation, filter presses, drying ovens and grinding mills with sieves, being the main items.

In the first phase of a chrome pigments factory, basic chromate which forms the raw material for the manufacture of pigmented chromates should be imported. Initial production of 300-500 tons chromates per year in one factory seems feasible. An initial investment of 350-150, thousand would be needed.

The project for coloured pigment production could be implemented by enlarging the product range of one of the earlier mentioned ~~filling~~ factories. The new line would be inorganic coloured pigments (say 10-15 tons a day) producing lead and zinc chromate yellows and Berlin blues, and green tones to be made by mixing of the first two types. Co-operation with a well established overseas pigment factory would accelerate this development. The European inorganic pigments industry has over-capacity at present and is in the process of rationalization. A number of smaller plants are being merged into bigger

companies or being taken over by concerns with captive use for pigments. Excess production capacity can be used for dumping practices overseas, against which practice local sub-regional production will have to be given protection.

From an interview with a Sudanese paint manufacturer, it appeared that in UAR there exists or has existed inorganic pigment production because chrome-orange samples have been received for evaluation. This information could not be confirmed in UAR by the Chemical Organization. It seems worthwhile to trace it and probably revive the factory, as it may turn out to have better potential when a greater regional market can be served.

The remarks on a regional chrome derivatives industry made in the chapter on mineral tanning agents should be read in conjunction with the remarks on chrome pigments.

Project data for bichromate production from chromite ore (2,000 tons sodium bichromate and 400 tons potassium bichromate per year) are the following:

Investments:

| | |
|---|------------------|
| Equipment | \$400,000 |
| Site, buildings erection starting up | \$200,000 |
| Working capital | <u>\$200,000</u> |
| | \$800,000 |

Manufacturing cost:

| | |
|---------------------|------------------|
| Raw materials | \$160,000 |
| Utilities | \$ 90,000 |
| Labour | \$ 50,000 |
| Factory overheads | \$ 50,000 |
| Packaging | \$ 10,000 |
| Depreciation | \$ 60,000 |
| Capital cost, taxes | <u>\$ 20,000</u> |
| | \$440,000 |

Sales value:

| | |
|--|--------------------|
| 2,000 tons sodium bichromate at \$250 | = \$500,000 |
| 400 tons potassium bichromate at \$350 | = <u>\$140,000</u> |
| | \$640,000 |

Gross profit

The estimated gross profit is \$200,000, or 1/3 of the total fixed capital of \$600,000.

It is proposed here to establish two plants for chrome derivatives in the sub-region. One plant would be in Morocco with capacity of 2,400 tons in 1970 and 3,600 tons in 1980. The other would be in UAR, with capacity of 2,400 tons in 1970 and 3,600 tons in 1975.

Detailed on-the-spot investigation would determine the most effective production programmes for each country.

(c) Lead oxides

Red lead, Pb_3O_4 , has a brilliant red-orange colour, and is quite resistant to light. It finds extensive use as a priming coat for structural steel because it possesses corrosion inhibiting properties. The red lead, or minium, is manufactured by oxidizing lead to litharge, PbO , in air and further oxidizing the litharge to the red lead by heating it to around 700°F.

The basic lead chromate, $PbCrO_4$, $Pb(OH)_2$, may also be used as an orange-red pigment and is also an excellent corrosion inhibitor. It is manufactured by boiling white lead with a solution of sodium dichromate.

Litharge, PbO , is used as lead pigment, to some extent in anti-corrosion paints, in the lead salts of naphthenic and oleic acid paint driers, importantly in lead acid storage batteries and as an activator in rubber compounding.

Demand projections of lead oxides for the sub-region are the following:

| | 1965 | 1970 | 1975 | 1980 |
|------|-------|-------|-------|-------|
| Tons | 2,000 | 3,000 | 4,000 | 5,000 |

We are not sure whether lead oxides are at present produced in the region (e.g., the lead smelter in Tunisia). Present national consumption alone is too small for profitable enterprise. The raw material base is ample. On a regional basis, and in conjunction with a lead acid storage battery factory in the sub-region, production of red lead Pb_3O_4 (minium) together with grey oxide and yellow lead oxide litharge PbO seems worth further study.

Although competing products are constantly developed, simple red lead-based linseed oil paints with about 80 per cent red lead and 15-18 per cent linseed oil will hold their place as simple but effective primer coating agents for iron and mild steel surfaces because of their rust inhibiting properties.

A production unit for 2,000 tons red lead per year would require an estimated \$100,000. For the ready-made paints of today the non-settling type should be manufactured.

Project data for a red lead and litharge plant of 8 tons/24 hour daily capacity, as a department of a lead battery factory, are the following:

Investments

| | |
|----------------------------------|------------------|
| Equipment | \$100,000 |
| Erection, buildings, starting up | \$100,000 |
| Working capital | \$100,000 |
| | <u>\$300,000</u> |

Manufacturing costs per ton products

| | |
|---------------------------|--------------|
| Raw material | \$170 |
| Wages (15 men salaries) | \$ 10 |
| Power | \$ 5 |
| Packaging | \$ 15 |
| Overheads | \$ 5 |
| Depreciation and interest | \$ 10 |
| | <u>\$215</u> |

With a CIF sales price of lead oxides around \$260/ton, gross profits would be about \$100,000/year.

It is suggested here that a plant of 4,000 tons capacity in 1970, 5,000 tons in 1975 and 6,000 tons in 1980 be established in Tunisia to produce lead oxides for the whole sub-region.

C. Black pigments

All black pigments except aniline black (iron oxide black), manganese dioxide and cobalt black are carbonaceous in nature, lamp black, impingement carbon black, furnace black, thermal decomposition black, animal or bone black, vegetable or wine black, carbon pigments like graphite and mineral blacks.

The black pigments retard the oxidation of linseed oil and cause a slow drying film which under many conditions prolongs the life of paint. Carbon and graphite pigments should not be used in direct contact with iron and steel in primer coatings because they stimulate metal corrosion.

Carbon black

Chemically, carbon black is an elementary carbon, with a small amount of chemisorbed hydrogen and oxygen and less than 1 per cent of ash.

Physically, it is composed of roughly spherical particles of colloidal dimensions, ranging in diameter from 50 to 5,000 Å. The industrial properties for which carbon black is valued are associated with its fine state of division.

Carbon black is mainly used in:

Rubber industry, which consumes more than 90 per cent of the carbon black produced. Carbon black improves the physical properties of rubber, for instance: abrasion resistance, toughness, tensile properties;

Inks and paints as black pigment.

Carbon black capacity in 1963 is given in the following table:

Unit: 10^3 tons/year.

| Process | Oil furnace | Gas furnace | Channel | Total |
|--------------|-------------|-------------|---------|-------|
| Europe a/ | 380 | 9 | 20 | 409 |
| Asia, Africa | 148 | 9 | 19 | 176 |
| Australia | | | | |
| America | 908 | 283 | 121 | 1312 |

a/ Eastern countries not included

There are now 16 main types of carbon black on the market, the uses for which are variable, produced by three groups of processes. From these main types, ten are furnace blacks, four channel blacks and two thermal blacks. They differ in origin, colour and particle size.

The principal manufacturing processes are: channel, thermal furnace, furnace.

In the channel process the carbon black is collected by impingement of small natural gas flames on a relatively cool metal surface. The apparent density of this black is about 0.05 gr/cm^3 . Impurities are eliminated by cyclones and density is increased in agitation tanks where occluded air is removed; the apparent density increases to 0.2 gr/cm^3 and handling becomes easier.

In the thermal furnace process, carbon black production is carried out in two phases: natural gas mixed with air is burned in an insulated furnace, filled with refractory. When the refractory temperature reaches about 1000°C , combustion is stopped and gas alone is charged into the furnace. The heated refractory decomposes the natural gas into carbon and hydrogen. Cracked gases, with the entrained carbon, are cooled by a water spray. The carbon black is then separated from the gases in bag filters. When the refractory is cooled, the cycle is repeated. The manufacture of thermal blacks amounts to about 6.5 per cent of the total production.

In the furnace process, two raw materials are used: gas and oil. In the gas furnace process, the natural gas and air are introduced simultaneously into a firebrick-lined chamber, in a predetermined ratio, through burners which distribute the air and gas in alternate parallel layers.

Combustion occurs at the air gas interface and supplies the heat necessary to crack the remaining natural gas to carbon and hydrogen.

The gaseous effluent, containing entrained carbon, is sent to a cooling tower, where water is sprayed, and it is then passed into an electric precipitator. A part of the carbon black is removed and the remainder is flocculated into loose aggregates which are recovered by cyclones.

In the oil furnace process, the operation is essentially the same as for gas. Liquid is introduced into the furnace by atomization or vaporization. Yields in the oil furnace process usually run between 50 and 60 per cent of the carbon content of the feed; the yield can be correlated with the feed aromaticity (very aromatic oils are the best feed-stocks).

The elements of operating cost for a 25,000 tons per year plant, based on the furnace gas process, are given below:

| | |
|--|----------------|
| <u>Investment (process units only)</u> | US\$ 5,000,000 |
| <u>Raw material and utilities requirements per ton of carbon black</u> | |
| Natural gas (m ³) | US\$ 5,710 |
| Electricity (kWh) | US\$ 500 |
| Cooling water (m ³) | US\$ 68 |
| Labour (men/shift) | US\$ 15 |

The demand in the sub-region for carbon black is as yet small:

| | 1965 | 1970 | 1975 | 1980 |
|------|-------|-------|-------|--------|
| Tons | 5,000 | 7,000 | 9,000 | 12,000 |

With the abundance of natural gas in the sub-region, carbon black manufacture would appear to offer profitable opportunities, provided suitable export markets can be found.

Domestic use, in any individual country of the sub-region, is as yet small in comparison to the unit size of carbon factories. It is felt that production of less than 7,000 t/year channel black should not be considered.

It is proposed here that a plant of 10,000 tons capacity in 1970, 12,000 tons in 1975 and 15,000 tons in 1980 be established in Libya to produce carbon black for the whole sub-region and, in the future, for export outside the sub-region.

D. Frits, glasses, vitreous enamels

Glasses, frits and vitreous enamel production mainly serving the enamelware and ceramics industry, can be added as a department to an existing industry. Some of the raw materials used in preparing frits are locally available, e.g., quartz, feldspar, limestone, clay. Only a few items such as sodium carbonate, borax, metal oxides would be required for the time being from outside the region. A project for such a factory in co-operation with Bayer was studied in UAR but is at present postponed.

With the increasing local production of ceramics and enamelware in the sub-region, a regional project seems worth further study.

The project could be carried out in conjunction with sodium silicate and ultramarine production, as the processes are almost the same.

Examples of the components of these materials are:

| <u>Glazing base</u> | | <u>Enamel</u> |
|---------------------|---------------------------------|---------------|
| 20% | Quartz | 13.5% |
| 25 | Feldspar | 47.2 |
| 45 | Borax | 23.0 |
| 4 | Fluorospath | - |
| - | Kryolith | 15.4 |
| 5 | NaNO ₃ | - |
| - | Na ₂ CO ₃ | 0.9 |
| 0.3 | Nickel oxide | - |
| 0.2 | Cobalt oxide | - |

VI.4 Present and future development of group 533

Tables 37 and 38 show the estimates of present and future demand for pigments, paints, varnishes and related materials. (group 533).

Table 37

(Tons)

| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------|------|--------|--------|--------|--------|--------|--------|--------|--------|
| Morocco | A | - | - | - | - | - | - | - | - |
| | B | 370 | 365 | 325 | 362 | 321 | 373 | 500 | 700 |
| | C | 5,653 | 6,348 | 6,448 | 6,941 | 8,064 | 8,022 | 10,700 | 16,000 |
| | D | 3,479 | 4,047 | 4,250 | 5,297 | 5,426 | 4,983 | 6,500 | 8,200 |
| | E | 9,502 | 10,760 | 11,023 | 12,600 | 13,811 | 13,378 | 17,700 | 24,900 |
| Algeria | A | 260 | 60 | - | - | - | - | - | - |
| | B | 580 | 498 | 313 | 309 | 362 | 409 | 550 | 800 |
| | C | 24,356 | 22,923 | 9,702 | 11,691 | 12,203 | 14,599 | 18,000 | 27,000 |
| | D | 4,417 | 3,244 | 2,275 | 2,913 | 3,188 | 3,736 | 4,900 | 6,300 |
| | E | 29,613 | 26,725 | 12,290 | 14,913 | 15,753 | 18,744 | 23,450 | 34,100 |

Table 37 (cont'd)

(Tons)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|--------|--------|--------|--------|--------|--------|--------|---------|---------|
| Tunisia | A | 751 | 653 | 853 | 846 | 949 | 1,086 | 1,300 | 1,600 | 1,900 |
| | B | 116 | 174 | 136 | 366 | 257 | 268 | 350 | 450 | 600 |
| | C | 1,771 | 2,242 | 2,386 | 3,382 | 4,067 | 4,379 | 6,000 | 8,000 | 11,000 |
| | D | 1,340 | 1,626 | 1,941 | 1,898 | 2,276 | 2,041 | 2,900 | 3,900 | 5,100 |
| | E | 3,978 | 4,695 | 5,316 | 6,492 | 7,549 | 7,774 | 10,550 | 13,950 | 18,600 |
| Libya | A | - | - | 42 | 28 | 40 | 39 | 55 | 90 | 130 |
| | B | 4 | 7 | 31 | 25 | 44 | 18 | 40 | 60 | 90 |
| | C | 1,345 | 2,035 | 1,966 | 2,997 | 4,308 | 4,213 | 5,000 | 6,500 | 8,500 |
| | D | 200 | 250 | 300 | 400 | 651 | 864 | 1,400 | 1,950 | 2,750 |
| | E | 1,549 | 2,292 | 2,339 | 3,450 | 5,043 | 5,134 | 6,495 | 8,600 | 11,470 |
| Total Maghreb | A | 1,011 | 713 | 895 | 874 | 989 | 1,125 | 1,355 | 1,690 | 2,030 |
| | B | 1,070 | 1,044 | 805 | 1,062 | 984 | 1,068 | 1,440 | 2,010 | 2,790 |
| | C | 33,125 | 33,548 | 20,502 | 25,011 | 28,642 | 31,213 | 39,700 | 57,500 | 83,500 |
| | D | 9,436 | 9,167 | 8,766 | 10,508 | 11,541 | 11,624 | 15,700 | 20,350 | 26,050 |
| | E | 44,642 | 44,472 | 30,968 | 37,455 | 42,156 | 45,030 | 58,195 | 81,550 | 114,370 |
| Sudan | A | 1,140 | 736 | 898 | 466 | 606 | 572 | 800 | 1,100 | 1,450 |
| | B | 13 | 20 | 13 | 32 | 44 | 34 | 60 | 90 | 130 |
| | C | 2,404 | 1,886 | 2,144 | 2,896 | 2,551 | 3,159 | 4,000 | 5,000 | 6,500 |
| | D | 200 | 250 | 300 | 1,101 | 1,436 | 1,344 | 2,000 | 2,700 | 3,400 |
| | E | 3,757 | 2,892 | 3,355 | 4,495 | 4,637 | 5,109 | 6,860 | 8,890 | 11,480 |
| UAR | A | 11,214 | 8,650 | 5,185 | 4,694 | 3,642 | 10,300 | 12,645 | 15,610 | 19,020 |
| | B | 973 | 1,027 | 1,139 | 1,154 | 966 | 1,662 | 2,300 | 3,000 | 3,900 |
| | C | 2,272 | 2,280 | 4,371 | 5,284 | 5,307 | 5,754 | 8,000 | 12,000 | 18,000 |
| | D | 5,807 | 4,900 | 6,690 | 8,159 | 6,470 | 7,946 | 10,500 | 13,700 | 17,200 |
| | E | 20,266 | 16,857 | 17,385 | 19,291 | 16,385 | 25,662 | 33,445 | 44,310 | 58,120 |
| Total sub-region | A | 13,365 | 10,099 | 6,978 | 6,034 | 5,237 | 11,997 | 14,800 | 18,400 | 22,500 |
| | B | 2,056 | 2,091 | 1,957 | 2,248 | 1,994 | 2,764 | 3,800 | 5,100 | 6,820 |
| | C | 37,801 | 37,714 | 27,017 | 33,191 | 36,500 | 40,126 | 51,700 | 74,500 | 108,000 |
| | D | 15,443 | 14,317 | 15,756 | 19,768 | 19,447 | 20,914 | 28,200 | 36,750 | 46,650 |
| | E | 68,665 | 64,221 | 51,708 | 61,241 | 63,178 | 75,801 | 98,500 | 134,750 | 183,970 |

Table 38

(\$1,000)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------|---|--------|--------|-------|-------|-------|--------|--------|--------|--------|
| Morocco | A | - | - | - | - | - | - | - | - | - |
| | B | 451 | 502 | 504 | 514 | 475 | 569 | 750 | 1,050 | 1,500 |
| | C | 2,632 | 3,173 | 2,926 | 3,728 | 3,975 | 3,884 | 5,100 | 8,000 | 12,000 |
| | D | 821 | 931 | 989 | 1,243 | 1,345 | 1,364 | 1,740 | 2,200 | 2,680 |
| | E | 3,904 | 4,606 | 4,419 | 5,485 | 5,795 | 5,817 | 7,590 | 11,250 | 16,180 |
| Algeria | A | 80 | 26 | - | - | - | - | - | - | - |
| | B | 430 | 394 | 266 | 339 | 435 | 490 | 660 | 960 | 1,320 |
| | C | 15,300 | 13,956 | 5,654 | 7,794 | 8,064 | 9,750 | 12,000 | 16,600 | 24,400 |
| | D | 1,506 | 1,082 | 673 | 889 | 1,041 | 1,231 | 1,550 | 1,950 | 2,500 |
| | E | 17,316 | 15,458 | 6,593 | 9,022 | 9,540 | 11,471 | 14,210 | 19,510 | 28,220 |

Table 38 (cont'd)

(1000\$)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Tunisia | A | 108 | 94 | 122 | 118 | 141 | 201 | 234 | 288 | 342 |
| | B | 104 | 158 | 138 | 373 | 248 | 278 | 350 | 450 | 600 |
| | C | 982 | 1,059 | 1,394 | 1,752 | 2,048 | 2,274 | 2,700 | 3,800 | 5,500 |
| | D | 426 | 454 | 665 | 624 | 816 | 795 | 1,100 | 1,400 | 1,850 |
| | E | 1,620 | 1,765 | 2,319 | 2,867 | 3,253 | 3,548 | 4,384 | 5,938 | 8,292 |
| Libya | A | - | - | 67 | 19 | 39 | 33 | 44 | 72 | 104 |
| | B | 11 | 16 | 27 | 24 | 28 | 23 | 40 | 60 | 90 |
| | C | 523 | 743 | 804 | 1,155 | 1,868 | 1,916 | 2,300 | 3,000 | 4,000 |
| | D | 55 | 68 | 86 | 119 | 194 | 265 | 430 | 600 | 850 |
| | E | 589 | 827 | 984 | 1,317 | 2,129 | 2,237 | 2,814 | 3,732 | 5,044 |
| Total Maghreb | A | 188 | 120 | 189 | 137 | 180 | 234 | 278 | 360 | 446 |
| | B | 996 | 1,070 | 935 | 1,250 | 1,186 | 1,360 | 1,800 | 2,520 | 3,510 |
| | C | 19,437 | 18,931 | 10,778 | 14,429 | 15,955 | 17,824 | 22,100 | 31,400 | 45,900 |
| | D | 2,808 | 2,535 | 2,413 | 2,875 | 3,396 | 3,655 | 4,820 | 6,150 | 7,880 |
| | E | 23,429 | 22,656 | 14,315 | 18,691 | 20,717 | 23,073 | 28,998 | 40,430 | 57,736 |
| Sudan | A | 251 | 191 | 214 | 129 | 184 | 193 | 270 | 370 | 490 |
| | B | 11 | 20 | 16 | 36 | 42 | 36 | 65 | 100 | 140 |
| | C | 1,027 | 747 | 858 | 1,089 | 1,010 | 1,081 | 2,200 | 2,800 | 3,800 |
| | D | 53 | 69 | 83 | 355 | 418 | 402 | 600 | 810 | 1,020 |
| | E | 1,342 | 1,027 | 1,171 | 1,609 | 1,654 | 1,712 | 3,135 | 4,080 | 5,450 |
| UAR | A | 2,648 | 2,267 | 1,084 | 907 | 802 | 1,865 | 2,500 | 3,100 | 3,800 |
| | B | 820 | 856 | 890 | 968 | 736 | 1,319 | 2,300 | 3,000 | 3,900 |
| | C | 2,341 | 2,737 | 3,734 | 4,737 | 4,700 | 5,295 | 7,000 | 9,600 | 14,000 |
| | D | 1,799 | 1,405 | 1,815 | 2,382 | 1,883 | 2,302 | 3,160 | 4,130 | 5,200 |
| | E | 7,608 | 7,265 | 7,523 | 8,994 | 8,121 | 10,781 | 14,960 | 19,830 | 26,900 |
| Total sub-region | A | 3,087 | 2,578 | 1,487 | 1,173 | 1,166 | 2,292 | 3,048 | 3,830 | 4,736 |
| | B | 1,827 | 1,946 | 1,841 | 2,254 | 1,964 | 2,715 | 4,165 | 5,620 | 7,550 |
| | C | 22,805 | 22,415 | 15,370 | 20,255 | 21,665 | 24,200 | 31,300 | 43,800 | 63,700 |
| | D | 4,660 | 4,009 | 4,311 | 5,612 | 5,697 | 6,359 | 8,580 | 11,090 | 14,100 |
| | E | 32,379 | 30,948 | 23,009 | 29,294 | 30,492 | 35,566 | 47,093 | 64,340 | 90,086 |

A = Colouring materials n.e.s (533.1).

D = Prepared pigments and related materials (533.3 - 1).

B = Printing inks (533.2).

C = Paints, varnishes and related materials

E = Total demand of group 533.

(533.3 - 2,3,4,5).

The domestic per capita demand for pigments, paints, varnishes and related materials (group 533) is shown in Tables 39 and 40.

Table 39

(kgs)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|------|------|------|------|------|------|------|------|------|
| Morocco | A | - | - | - | - | - | - | - | - | - |
| | B | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 |
| | C | 0.50 | 0.54 | 0.54 | 0.56 | 0.64 | 0.62 | 0.71 | 0.92 | 1.20 |
| | D | 0.31 | 0.35 | 0.35 | 0.43 | 0.43 | 0.38 | 0.43 | 0.47 | 0.50 |
| | E | 0.84 | 0.92 | 0.92 | 1.02 | 1.10 | 1.03 | 1.17 | 1.43 | 1.75 |
| Algeria | A | 0.03 | 0.01 | - | - | - | - | - | - | - |
| | B | 0.05 | 0.05 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.05 | 0.06 |
| | C | 2.32 | 2.14 | 0.89 | 1.05 | 1.08 | 1.26 | 1.31 | 1.70 | 2.19 |
| | D | 0.42 | 0.30 | 0.21 | 0.26 | 0.28 | 0.32 | 0.36 | 0.40 | 0.45 |
| | E | 2.82 | 2.50 | 1.13 | 1.34 | 1.39 | 1.62 | 1.71 | 2.15 | 2.70 |
| Tunisia | A | 0.18 | 0.16 | 0.20 | 0.20 | 0.22 | 0.25 | 0.26 | 0.27 | 0.28 |
| | B | 0.03 | 0.04 | 0.03 | 0.09 | 0.06 | 0.06 | 0.07 | 0.08 | 0.09 |
| | C | 0.43 | 0.54 | 0.57 | 0.80 | 0.95 | 1.00 | 1.18 | 1.36 | 1.62 |
| | D | 0.33 | 0.39 | 0.46 | 0.45 | 0.53 | 0.46 | 0.57 | 0.66 | 0.75 |
| | E | 0.97 | 1.13 | 1.26 | 1.54 | 1.76 | 1.77 | 2.08 | 2.37 | 2.74 |
| Libya | A | - | - | 0.03 | 0.02 | 0.03 | 0.02 | 0.03 | 0.04 | 0.05 |
| | B | - | - | 0.02 | 0.02 | 0.03 | 0.01 | 0.02 | 0.03 | 0.04 |
| | C | 1.00 | 1.45 | 1.36 | 2.00 | 2.69 | 2.55 | 2.63 | 2.95 | 3.40 |
| | D | 0.15 | 0.18 | 0.21 | 0.27 | 0.41 | 0.52 | 0.74 | 0.89 | 1.10 |
| | E | 1.15 | 1.63 | 1.62 | 2.31 | 3.16 | 3.10 | 3.42 | 3.91 | 4.59 |
| Total Maghreb | A | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 |
| | B | 0.04 | 0.04 | 0.03 | 0.04 | 0.03 | 0.04 | 0.04 | 0.05 | 0.06 |
| | C | 1.21 | 1.20 | 0.72 | 0.86 | 0.96 | 1.02 | 1.11 | 1.39 | 1.75 |
| | D | 0.35 | 0.33 | 0.31 | 0.36 | 0.39 | 0.38 | 0.44 | 0.49 | 0.55 |
| | E | 1.64 | 1.60 | 1.09 | 1.29 | 1.41 | 1.48 | 1.63 | 1.97 | 2.40 |
| Sudan | A | 0.10 | 0.06 | 0.08 | 0.04 | 0.05 | 0.04 | 0.05 | 0.06 | 0.07 |
| | B | - | - | - | - | - | - | - | 0.01 | 0.01 |
| | C | 0.21 | 0.16 | 0.18 | 0.24 | 0.20 | 0.24 | 0.26 | 0.28 | 0.31 |
| | D | 0.02 | 0.02 | 0.03 | 0.09 | 0.11 | 0.10 | 0.13 | 0.15 | 0.16 |
| | E | 0.33 | 0.24 | 0.29 | 0.37 | 0.36 | 0.38 | 0.44 | 0.50 | 0.55 |
| UAR | A | 0.43 | 0.33 | 0.19 | 0.17 | 0.13 | 0.35 | 0.38 | 0.41 | 0.44 |
| | B | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.06 | 0.07 | 0.08 | 0.09 |
| | C | 0.09 | 0.09 | 0.16 | 0.19 | 0.19 | 0.20 | 0.24 | 0.32 | 0.42 |
| | D | 0.22 | 0.18 | 0.25 | 0.29 | 0.23 | 0.27 | 0.32 | 0.36 | 0.40 |
| | E | 0.78 | 0.64 | 0.64 | 0.69 | 0.58 | 0.88 | 1.01 | 1.17 | 1.35 |
| Total sub-region | A | 0.21 | 0.15 | 0.10 | 0.09 | 0.07 | 0.16 | 0.18 | 0.19 | 0.20 |
| | B | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.06 |
| | C | 0.59 | 0.57 | 0.40 | 0.48 | 0.52 | 0.55 | 0.61 | 0.77 | 0.97 |
| | D | 0.24 | 0.22 | 0.23 | 0.29 | 0.28 | 0.29 | 0.33 | 0.38 | 0.42 |
| | E | 1.07 | 0.97 | 0.76 | 0.89 | 0.90 | 1.04 | 1.17 | 1.39 | 1.65 |

Key to table on opposite page.

Table 40

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|------|------|------|------|------|------|------|------|------|
| Morocco | A | - | - | - | - | - | - | - | - | - |
| | B | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.06 | 0.08 |
| | C | 0.23 | 0.27 | 0.24 | 0.30 | 0.32 | 0.30 | 0.34 | 0.46 | 0.60 |
| | D | 0.07 | 0.08 | 0.08 | 0.10 | 0.11 | 0.10 | 0.12 | 0.13 | 0.14 |
| | E | 0.34 | 0.39 | 0.36 | 0.44 | 0.47 | 0.44 | 0.51 | 0.65 | 0.82 |
| Algeria | A | 0.01 | - | - | - | - | - | - | - | - |
| | B | 0.04 | 0.04 | 0.02 | 0.03 | 0.04 | 0.04 | 0.05 | 0.06 | 0.07 |
| | C | 1.46 | 1.30 | 0.52 | 0.70 | 0.71 | 0.84 | 0.88 | 1.04 | 1.33 |
| | D | 0.14 | 0.09 | 0.06 | 0.08 | 0.09 | 0.11 | 0.11 | 0.12 | 0.14 |
| | E | 1.65 | 1.43 | 0.60 | 0.81 | 0.84 | 0.99 | 1.04 | 1.22 | 1.54 |
| Tunisia | A | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.05 | 0.05 | 0.05 | 0.05 |
| | B | 0.03 | 0.04 | 0.03 | 0.09 | 0.06 | 0.06 | 0.07 | 0.08 | 0.09 |
| | C | 0.24 | 0.26 | 0.33 | 0.41 | 0.48 | 0.52 | 0.53 | 0.64 | 0.81 |
| | D | 0.10 | 0.11 | 0.16 | 0.15 | 0.19 | 0.18 | 0.22 | 0.24 | 0.27 |
| | E | 0.40 | 0.43 | 0.55 | 0.68 | 0.76 | 0.81 | 0.87 | 1.01 | 1.22 |
| Libya | A | - | - | 0.05 | 0.01 | 0.03 | 0.02 | 0.02 | 0.03 | 0.04 |
| | B | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.03 | 0.04 |
| | C | 0.39 | 0.53 | 0.55 | 0.77 | 1.17 | 1.16 | 1.21 | 1.36 | 1.60 |
| | D | 0.04 | 0.05 | 0.06 | 0.08 | 0.12 | 0.16 | 0.23 | 0.27 | 0.34 |
| | E | 0.44 | 0.59 | 0.68 | 0.88 | 1.34 | 1.35 | 1.48 | 1.69 | 2.02 |
| Total Maghreb | A | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| | B | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.04 | 0.05 | 0.06 | 0.07 |
| | C | 0.71 | 0.68 | 0.38 | 0.49 | 0.54 | 0.58 | 0.62 | 0.76 | 0.96 |
| | D | 0.10 | 0.09 | 0.08 | 0.10 | 0.11 | 0.12 | 0.14 | 0.15 | 0.17 |
| | E | 0.86 | 0.82 | 0.50 | 0.64 | 0.70 | 0.75 | 0.82 | 0.98 | 1.21 |
| Sudan | A | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| | B | - | - | - | - | - | - | - | 0.01 | 0.01 |
| | C | 0.09 | 0.06 | 0.07 | 0.09 | 0.08 | 0.08 | 0.14 | 0.16 | 0.18 |
| | D | 0.01 | 0.01 | 0.01 | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 |
| | E | 0.12 | 0.09 | 0.10 | 0.13 | 0.13 | 0.13 | 0.20 | 0.24 | 0.26 |
| UAR | A | 0.10 | 0.09 | 0.04 | 0.03 | 0.03 | 0.06 | 0.08 | 0.08 | 0.09 |
| | B | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.05 | 0.07 | 0.08 | 0.09 |
| | C | 0.09 | 0.10 | 0.14 | 0.17 | 0.17 | 0.13 | 0.21 | 0.25 | 0.32 |
| | D | 0.07 | 0.05 | 0.07 | 0.09 | 0.07 | 0.08 | 0.09 | 0.11 | 0.12 |
| | E | 0.29 | 0.27 | 0.28 | 0.32 | 0.30 | 0.37 | 0.45 | 0.52 | 0.62 |
| Total sub-region | A | 0.05 | 0.04 | 0.02 | 0.02 | 0.02 | 0.03 | 0.04 | 0.04 | 0.04 |
| | B | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 |
| | C | 0.35 | 0.34 | 0.23 | 0.29 | 0.31 | 0.33 | 0.37 | 0.45 | 0.57 |
| | D | 0.07 | 0.06 | 0.06 | 0.08 | 0.08 | 0.09 | 0.10 | 0.11 | 0.13 |
| | E | 0.50 | 0.47 | 0.34 | 0.42 | 0.44 | 0.49 | 0.56 | 0.66 | 0.81 |

A = Colouring materials n.e.s. (533.1).

B = Printing inks (533.2).

C = Paints, varnishes, and related materials (533.3 - 2,3,4,5).

D = Prepared pigments and related materials (533.3 - 1)

E = Total demand of group 533.

Regarding development of the market for pigments, paints, varnishes and related materials in the North African sub-region during the years to come, the forecasts are optimistic. Consumption will rise from 42,156 tons (US\$20.7 million) in Maghreb countries and from 63,178 tons (US\$30.5 million) in the whole sub-region in 1964 to 114,370 tons (US\$57.7 million) and 183,970 tons (US\$90.1 million) respectively in 1980. This is almost 300 per cent growth.

Consumption per capita should increase in the same period from 1.41kg (US\$0.70) in Maghreb countries and from 0.90 kg (US\$0.44) in the whole sub-region in 1964, to 2.40 kg (US\$1.21) and 1.65 kg (US\$0.81) in 1980, respectively.

In spite of good prospects and the relatively high annual average rate of increase in the period to come, the level of consumption per capita is relatively low. Only Libya, Algeria and Tunisia will reach a level of per capita consumption higher than the present world average (2kg/year).

The present situation and future outlook of local industry for pigments, paints, varnishes and related materials (group 533) is shown in the following tables.

Table 41

| | | Capacity tons | | | | | Production tons | | | | |
|---------|---|---------------|--------|--------|--------|--------|-----------------|--------|--------|--------|--------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Morocco | A | - | - | - | - | - | - | - | - | - | - |
| | B | 120 | 120 | 400 | 800 | 1,000 | 100 | 100 | 300 | 600 | 800 |
| | C | 10,000 | 10,000 | 12,000 | 18,000 | 27,000 | 7,200 | 7,300 | 10,000 | 15,200 | 23,000 |
| | D | 500 | 500 | 7,900 | 10,400 | 14,100 | 300 | 300 | 6,300 | 8,300 | 11,300 |
| | E | 10,620 | 10,620 | 20,300 | 29,200 | 42,100 | 7,600 | 7,700 | 16,600 | 24,100 | 35,100 |
| Algeria | A | - | - | - | - | - | - | - | - | - | - |
| | B | 150 | 200 | 500 | 800 | 1,200 | 100 | 109 | 400 | 600 | 1,000 |
| | C | 20,000 | 20,000 | 20,000 | 30,000 | 45,000 | 8,041 | 10,999 | 16,500 | 25,000 | 38,000 |
| | D | 2,300 | 2,300 | 7,000 | 9,000 | 10,000 | 201 | 176 | 5,600 | 7,200 | 8,000 |
| | E | 22,450 | 22,500 | 27,500 | 39,800 | 56,200 | 8,342 | 11,284 | 22,500 | 32,800 | 47,000 |
| Tunisia | A | - | - | - | - | - | - | - | - | - | - |
| | B | 160 | 160 | 300 | 400 | 600 | 108 | 108 | 250 | 300 | 500 |
| | C | 7,000 | 7,000 | 7,000 | 9,000 | 12,000 | 3,354 | 4,000 | 5,400 | 7,200 | 10,000 |
| | D | 1,000 | 1,000 | 4,000 | 5,000 | 6,000 | 778 | 548 | 3,200 | 4,000 | 4,800 |
| | E | 8,160 | 8,160 | 11,300 | 14,400 | 18,600 | 4,240 | 4,656 | 8,850 | 11,500 | 15,300 |
| Libya | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 5,500 | 7,000 | 7,000 | 7,000 | 10,000 | 1,000 | 1,400 | 4,000 | 6,000 | 8,000 |
| | D | - | - | 10,000 | 12,000 | 15,000 | - | - | 8,000 | 9,600 | 12,000 |
| | E | 5,500 | 7,000 | 17,000 | 19,000 | 25,000 | 1,000 | 1,400 | 12,000 | 15,600 | 20,000 |

Table 41 (cont'd)

| | | Capacity tons | | | | | Production tons | | | | |
|------------------|---|---------------|--------|--------|---------|---------|-----------------|--------|--------|---------|---------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Total | A | - | - | - | - | - | - | - | - | - | - |
| | B | 430 | 480 | 1,200 | 2,000 | 2,800 | 308 | 317 | 950 | 1,500 | 2,300 |
| | C | 42,500 | 44,000 | 46,000 | 64,000 | 94,000 | 19,595 | 23,699 | 35,900 | 53,400 | 79,000 |
| | D | 3,800 | 3,800 | 28,900 | 36,400 | 45,100 | 1,279 | 1,024 | 23,100 | 29,100 | 36,100 |
| | E | 46,730 | 48,280 | 76,100 | 102,400 | 141,900 | 21,182 | 25,040 | 59,950 | 84,000 | 117,400 |
| Sudan | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | 200 | - | - | - | - | 100 |
| | C | 1,400 | 2,000 | 5,000 | 6,000 | 7,000 | 900 | 1,100 | 3,600 | 4,500 | 6,000 |
| | D | - | - | - | 1,500 | 3,000 | - | - | - | 1,200 | 2,400 |
| | E | 1,400 | 2,000 | 5,000 | 7,500 | 10,200 | 900 | 1,100 | 3,600 | 5,700 | 8,500 |
| UAR | A | - | - | - | - | - | - | - | - | - | - |
| | B | 600 | 600 | 2,400 | 3,000 | 4,000 | 500 | 500 | 2,000 | 2,500 | 3,500 |
| | C | 6,000 | 6,000 | 9,000 | 13,000 | 20,000 | 4,800 | 5,200 | 7,500 | 11,000 | 17,000 |
| | D | - | - | 5,400 | 7,600 | 8,600 | - | - | 4,300 | 6,100 | 6,900 |
| | E | 6,600 | 6,600 | 16,800 | 23,600 | 32,600 | 5,300 | 5,700 | 13,800 | 19,600 | 27,400 |
| Total sub-region | A | - | - | - | - | - | - | - | - | - | - |
| | B | 1,030 | 1,080 | 3,600 | 5,000 | 7,000 | 808 | 817 | 2,950 | 4,000 | 5,900 |
| | C | 49,900 | 52,000 | 60,000 | 83,000 | 121,000 | 25,295 | 29,999 | 47,000 | 68,900 | 102,000 |
| | D | 3,800 | 3,800 | 34,300 | 45,500 | 56,700 | 1,279 | 1,024 | 27,400 | 36,400 | 45,400 |
| | E | 54,730 | 56,880 | 97,900 | 133,500 | 184,700 | 27,382 | 31,840 | 77,350 | 109,300 | 153,500 |

Key to Tables 41, 42, 43, 44, 45 and 46 on page 78.

Table 42

| | | Gross business output (1000\$) | | | | | Value added (1000\$) | | | | |
|---------|---|--------------------------------|-------|--------|--------|--------|----------------------|-------|-------|-------|-------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Morocco | A | - | - | - | - | - | - | - | - | - | - |
| | B | 150 | 150 | 450 | 900 | 1,200 | 80 | 80 | 250 | 500 | 660 |
| | C | 3,300 | 3,400 | 4,700 | 7,200 | 11,000 | 1,100 | 1,120 | 1,550 | 2,380 | 3,700 |
| | D | 75 | 75 | 1,730 | 2,280 | 3,130 | 40 | 40 | 920 | 1,200 | 1,650 |
| | E | 3,525 | 3,625 | 6,880 | 10,380 | 15,330 | 1,220 | 1,240 | 2,720 | 4,080 | 6,010 |
| Algeria | A | - | - | - | - | - | - | - | - | - | - |
| | B | 140 | 170 | 480 | 720 | 1,080 | 70 | 90 | 260 | 400 | 590 |
| | C | 6,000 | 8,000 | 10,800 | 15,000 | 22,800 | 2,000 | 2,600 | 3,550 | 4,950 | 7,500 |
| | D | 95 | 80 | 1,680 | 2,160 | 2,400 | 45 | 40 | 840 | 1,080 | 1,200 |
| | E | 6,235 | 8,250 | 12,960 | 17,880 | 26,280 | 2,115 | 2,730 | 4,650 | 6,430 | 9,290 |
| Tunisia | A | - | - | - | - | - | - | - | - | - | - |
| | B | 108 | 108 | 250 | 300 | 500 | 50 | 50 | 140 | 160 | 270 |
| | C | 1,600 | 1,800 | 2,430 | 3,420 | 4,900 | 530 | 590 | 800 | 1,130 | 1,620 |
| | D | 390 | 270 | 830 | 1,040 | 1,250 | 160 | 110 | 330 | 420 | 500 |
| | E | 2,098 | 2,178 | 3,510 | 4,760 | 6,650 | 740 | 750 | 1,270 | 1,710 | 2,390 |

Table 42 (cont'd)

| | | Gross business output (1000\$) | | | | | Value added (1000\$) | | | | |
|------------------|---|--------------------------------|--------|--------|--------|--------|----------------------|-------|--------|--------|--------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Libya | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 400 | 600 | 1,800 | 2,700 | 3,600 | 130 | 200 | 600 | 900 | 1,190 |
| | D | - | - | 2,000 | 2,400 | 3,000 | - | - | 1,000 | 1,200 | 1,500 |
| | E | 400 | 600 | 3,800 | 5,100 | 6,600 | 130 | 200 | 1,600 | 2,100 | 2,690 |
| Total Maghreb | A | - | - | - | - | - | - | - | - | - | - |
| | B | 398 | 428 | 1,180 | 1,920 | 2,780 | 200 | 220 | 650 | 1,060 | 1,520 |
| | C | 11,300 | 13,800 | 19,730 | 28,320 | 42,300 | 3,760 | 4,510 | 6,500 | 9,360 | 14,010 |
| | D | 560 | 425 | 6,240 | 7,880 | 9,780 | 245 | 190 | 3,090 | 3,900 | 4,850 |
| | E | 12,258 | 14,653 | 27,150 | 38,120 | 54,860 | 4,205 | 4,920 | 10,240 | 14,320 | 20,380 |
| Sudan | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | 90 | - | - | - | - | 50 |
| | C | 500 | 600 | 2,000 | 2,500 | 3,500 | 160 | 200 | 660 | 820 | 1,150 |
| | D | - | - | - | 360 | 720 | - | - | - | 180 | 360 |
| | E | 500 | 600 | 2,000 | 2,860 | 4,310 | 160 | 200 | 660 | 1,000 | 1,560 |
| UAR | A | - | - | - | - | - | - | - | - | - | - |
| | B | 450 | 450 | 1,800 | 2,250 | 3,150 | 240 | 240 | 1,000 | 1,240 | 1,730 |
| | C | 4,200 | 4,600 | 6,200 | 8,300 | 12,800 | 1,380 | 1,520 | 2,040 | 2,740 | 4,220 |
| | D | - | - | 980 | 1,410 | 1,550 | - | - | 550 | 790 | 860 |
| | E | 4,650 | 5,050 | 8,980 | 11,960 | 17,500 | 1,620 | 1,760 | 3,590 | 4,770 | 6,810 |
| Total sub-region | A | - | - | - | - | - | - | - | - | - | - |
| | B | 848 | 878 | 2,980 | 4,170 | 6,020 | 440 | 460 | 1,650 | 2,300 | 3,300 |
| | C | 16,000 | 19,000 | 27,930 | 39,120 | 58,600 | 5,300 | 6,230 | 9,200 | 12,920 | 19,380 |
| | D | 560 | 425 | 7,220 | 9,650 | 12,050 | 245 | 190 | 3,640 | 4,870 | 6,070 |
| | E | 17,408 | 20,303 | 38,130 | 52,940 | 76,670 | 5,985 | 6,880 | 14,490 | 20,090 | 28,750 |

Table 43

| | | Fixed investment (1000\$) | | | | | Working capital (1000\$) | | | | |
|------------------|---|---------------------------|-------|--------|--------|--------|--------------------------|-------|-------|--------|--------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Morocco | A | - | - | - | - | - | - | - | - | - | - |
| | B | 150 | 150 | 380 | 630 | 730 | 23 | 23 | 65 | 140 | 180 |
| | C | 1,250 | 1,250 | 1,480 | 1,910 | 2,510 | 660 | 680 | 940 | 1,440 | 2,200 |
| | D | 100 | 100 | 1,010 | 1,140 | 1,450 | 15 | 15 | 360 | 440 | 620 |
| | E | 1,500 | 1,500 | 2,870 | 3,680 | 4,690 | 698 | 718 | 1,365 | 2,020 | 3,000 |
| Algeria | A | - | - | - | - | - | - | - | - | - | - |
| | B | 180 | 220 | 450 | 630 | 820 | 21 | 26 | 72 | 108 | 160 |
| | C | 2,000 | 2,000 | 2,000 | 2,730 | 3,600 | 1,200 | 1,600 | 2,160 | 3,000 | 4,560 |
| | D | 200 | 200 | 530 | 630 | 670 | 15 | 10 | 250 | 320 | 360 |
| | E | 2,380 | 2,420 | 2,980 | 3,990 | 5,090 | 1,236 | 1,636 | 2,482 | 3,428 | 5,080 |
| Tunisia | A | - | - | - | - | - | - | - | - | - | - |
| | B | 180 | 180 | 300 | 380 | 520 | 16 | 16 | 38 | 45 | 75 |
| | C | 1,020 | 1,020 | 1,020 | 1,190 | 1,480 | 320 | 360 | 480 | 680 | 980 |
| | D | 120 | 120 | 270 | 320 | 360 | 60 | 41 | 125 | 157 | 185 |
| | E | 1,320 | 1,320 | 1,590 | 1,890 | 2,360 | 396 | 417 | 643 | 882 | 1,240 |
| Libya | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 860 | 1,020 | 1,020 | 1,020 | 1,250 | 80 | 120 | 360 | 540 | 720 |
| | D | - | - | 2,600 | 3,000 | 3,600 | - | - | 400 | 480 | 600 |
| | E | 860 | 1,020 | 3,620 | 4,020 | 4,850 | 80 | 120 | 760 | 1,020 | 1,320 |
| Total Maghreb | A | - | - | - | - | - | - | - | - | - | - |
| | B | 510 | 550 | 1,130 | 1,640 | 2,070 | 60 | 65 | 175 | 293 | 415 |
| | C | 5,130 | 5,290 | 5,520 | 6,850 | 8,840 | 2,260 | 2,760 | 3,940 | 5,660 | 8,460 |
| | D | 420 | 420 | 4,410 | 5,090 | 6,080 | 90 | 66 | 1,135 | 1,397 | 1,765 |
| | E | 6,060 | 6,260 | 11,060 | 13,580 | 16,990 | 2,410 | 2,891 | 5,250 | 7,350 | 10,640 |
| Sudan | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | 220 | - | - | - | - | 20 |
| | C | 300 | 400 | 800 | 920 | 1,020 | 100 | 120 | 400 | 500 | 700 |
| | D | - | - | - | 50 | 80 | - | - | - | 50 | 100 |
| | E | 300 | 400 | 800 | 970 | 1,320 | 100 | 120 | 400 | 550 | 820 |
| UAR | A | - | - | - | - | - | - | - | - | - | - |
| | B | 520 | 520 | 1,400 | 1,650 | 1,950 | 68 | 68 | 270 | 340 | 470 |
| | C | 920 | 920 | 1,190 | 1,560 | 2,000 | 840 | 920 | 1,240 | 1,660 | 2,560 |
| | D | - | - | 680 | 900 | 920 | - | - | 250 | 370 | 400 |
| | E | 1,440 | 1,440 | 3,270 | 4,110 | 4,870 | 908 | 988 | 1,760 | 2,370 | 3,430 |
| Total sub-region | A | - | - | - | - | - | - | - | - | - | - |
| | B | 1,030 | 1,070 | 2,530 | 3,290 | 4,240 | 128 | 133 | 445 | 633 | 905 |
| | C | 6,350 | 6,610 | 7,510 | 9,330 | 11,860 | 3,200 | 3,800 | 5,580 | 7,820 | 11,720 |
| | D | 420 | 420 | 5,090 | 6,040 | 7,080 | 90 | 66 | 1,385 | 1,817 | 2,265 |
| | E | 7,800 | 8,100 | 15,130 | 18,660 | 23,180 | 3,418 | 3,999 | 7,410 | 10,270 | 14,890 |

Table 44

| | | Number of workers | | | | | Additional capacity (tons) | | | | |
|------------------|---|-------------------|-------|-------|-------|-------|----------------------------|-------|--------|--------|--------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Morocco | A | - | - | - | - | - | - | - | - | - | - |
| | B | 15 | 15 | 30 | 45 | 50 | - | - | 280 | 400 | 200 |
| | C | 390 | 400 | 450 | 500 | 600 | - | - | 2,000 | 6,000 | 9,000 |
| | D | 15 | 15 | 98 | 115 | 142 | - | - | 7,400 | 2,500 | 3,700 |
| | E | 420 | 430 | 578 | 660 | 792 | - | - | 9,680 | 8,900 | 12,900 |
| Algeria | A | - | - | - | - | - | - | - | - | - | - |
| | B | 17 | 20 | 35 | 45 | 55 | - | 50 | 300 | 300 | 400 |
| | C | 600 | 600 | 700 | 830 | 1,000 | - | - | - | 10,000 | 15,000 |
| | D | 12 | 12 | 70 | 90 | 100 | - | - | 4,700 | 2,000 | 1,000 |
| | E | 629 | 632 | 805 | 965 | 1,155 | - | 50 | 5,000 | 12,300 | 16,400 |
| Tunisia | A | - | - | - | - | - | - | - | - | - | - |
| | B | 17 | 17 | 25 | 30 | 40 | - | - | 140 | 100 | 200 |
| | C | 153 | 139 | 150 | 180 | 220 | - | - | - | 2,000 | 3,000 |
| | D | 15 | 15 | 20 | 25 | 30 | - | - | 3,000 | 1,000 | 1,000 |
| | E | 185 | 171 | 195 | 235 | 290 | - | - | 3,140 | 3,100 | 4,200 |
| Libya | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 63 | 63 | 100 | 150 | 200 | - | 1,500 | - | - | 3,000 |
| | D | - | - | 27 | 30 | 34 | - | - | 10,000 | 2,000 | 3,000 |
| | E | 63 | 63 | 127 | 180 | 234 | - | 1,500 | 10,000 | 2,000 | 6,000 |
| Total Maghreb | A | - | - | - | - | - | - | - | - | - | - |
| | B | 49 | 52 | 90 | 120 | 145 | - | 50 | 720 | 800 | 800 |
| | C | 1,206 | 1,202 | 1,400 | 1,660 | 2,020 | - | 1,500 | 2,000 | 18,000 | 30,000 |
| | D | 42 | 42 | 215 | 260 | 306 | - | - | 25,100 | 7,500 | 8,700 |
| | E | 1,297 | 1,296 | 1,705 | 2,040 | 2,471 | - | 1,550 | 27,820 | 26,300 | 39,500 |
| Sudan | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | 20 | - | - | - | - | 200 |
| | C | 81 | 50 | 120 | 130 | 150 | - | 600 | 3,000 | 1,000 | 1,000 |
| | D | - | - | - | 10 | 15 | - | - | - | 1,500 | 1,500 |
| | E | 81 | 50 | 120 | 140 | 185 | - | 600 | 3,000 | 2,500 | 2,700 |
| UAR | A | - | - | - | - | - | - | - | - | - | - |
| | B | 40 | 40 | 95 | 110 | 130 | - | - | 1,800 | 600 | 1,000 |
| | C | 400 | 400 | 450 | 475 | 500 | - | - | 3,000 | 4,000 | 7,000 |
| | D | - | - | 54 | 67 | 70 | - | - | 5,400 | 2,200 | 1,000 |
| | E | 440 | 440 | 599 | 652 | 700 | - | - | 10,200 | 6,800 | 9,000 |
| Total sub-region | A | - | - | - | - | - | - | - | - | - | - |
| | B | 89 | 92 | 185 | 230 | 295 | - | 50 | 2,520 | 1,400 | 2,000 |
| | C | 1,687 | 1,652 | 1,970 | 2,265 | 2,670 | - | 2,100 | 8,000 | 23,000 | 38,000 |
| | D | 42 | 42 | 269 | 337 | 391 | - | - | 30,500 | 11,200 | 11,200 |
| | E | 1,818 | 1,786 | 2,424 | 2,832 | 3,356 | - | 2,150 | 41,020 | 35,600 | 51,200 |

Table 45

| | | Additional fixed investment (1000\$) | | | | | Additional working capital (1000\$) | | | | |
|------------------|---|--------------------------------------|------|-------|-------|-------|-------------------------------------|------|-------|-------|-------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Morocco | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | 230 | 250 | 100 | - | - | 42 | 75 | 40 |
| | C | - | - | 230 | 430 | 600 | - | 20 | 260 | 500 | 760 |
| | D | - | - | 910 | 130 | 310 | - | - | 345 | 80 | 180 |
| | E | - | - | 1,370 | 810 | 1,010 | - | 20 | 647 | 655 | 980 |
| Algeria | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | 40 | 230 | 180 | 190 | - | 5 | 46 | 36 | 52 |
| | C | - | - | - | 730 | 870 | - | 400 | 560 | 840 | 1,560 |
| | D | - | - | 330 | 100 | 40 | - | - | 235 | 70 | 40 |
| | E | - | 40 | 560 | 1,010 | 1,100 | - | 405 | 841 | 946 | 1,652 |
| Tunisia | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | 120 | 80 | 140 | - | - | 22 | 7 | 30 |
| | C | - | - | - | 170 | 290 | - | 40 | 120 | 200 | 300 |
| | D | - | - | 150 | 50 | 40 | - | - | 65 | 32 | 28 |
| | E | - | - | 270 | 300 | 470 | - | 40 | 207 | 239 | 358 |
| Libya | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | - | 160 | - | - | 230 | - | 40 | 240 | 180 | 180 |
| | D | - | - | 2,600 | 400 | 600 | - | - | 400 | 80 | 120 |
| | E | - | 160 | 2,600 | 400 | 830 | - | 40 | 640 | 260 | 300 |
| Total Maghreb | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | 40 | 580 | 510 | 430 | - | 5 | 110 | 118 | 122 |
| | C | - | 160 | 230 | 1,330 | 1,990 | - | 500 | 1,180 | 1,720 | 2,800 |
| | D | - | - | 3,990 | 680 | 990 | - | - | 1,045 | 262 | 368 |
| | E | - | 200 | 4,800 | 2,520 | 3,410 | - | 505 | 2,335 | 2,100 | 3,290 |
| Sudan | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | 220 | - | - | - | - | 20 |
| | C | - | 100 | 400 | 120 | 100 | - | 20 | 280 | 100 | 200 |
| | D | - | - | - | 50 | 30 | - | - | - | 50 | 50 |
| | E | - | 100 | 400 | 170 | 350 | - | 20 | 280 | 150 | 270 |
| UAR | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | 880 | 250 | 300 | - | - | 202 | 70 | 130 |
| | C | - | - | 270 | 370 | 440 | - | 80 | 320 | 420 | 900 |
| | D | - | - | 680 | 220 | 20 | - | - | 250 | 120 | 30 |
| | E | - | - | 1,830 | 840 | 760 | - | 80 | 772 | 610 | 1,060 |
| Total sub-region | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | 40 | 1,460 | 760 | 950 | - | 5 | 312 | 188 | 272 |
| | C | - | 260 | 900 | 1,820 | 2,530 | - | 600 | 1,780 | 2,240 | 3,900 |
| | D | - | - | 4,670 | 950 | 1,040 | - | - | 1,295 | 432 | 448 |
| | E | - | 300 | 7,030 | 3,530 | 4,520 | - | 605 | 3,387 | 2,860 | 4,620 |

Table 46

| | | Additional workers | | | | |
|------------------|---|--------------------|------|------|------|------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 |
| Morocco | A | - | - | - | - | - |
| | B | ... | - | 15 | 15 | 5 |
| | C | - | 10 | 50 | 50 | 100 |
| | D | - | - | 83 | 17 | 27 |
| | E | - | 10 | 148 | 82 | 132 |
| Algeria | A | - | - | - | - | - |
| | B | - | 3 | 15 | 10 | 10 |
| | C | - | - | 100 | 130 | 170 |
| | D | - | - | 58 | 20 | 10 |
| | E | - | 3 | 173 | 160 | 190 |
| Tunisia | A | - | - | - | - | - |
| | B | - | - | 8 | 5 | 10 |
| | C | - | - | - | 27 | 40 |
| | D | - | - | 5 | 5 | 5 |
| | E | - | - | 13 | 37 | 55 |
| Libya | A | - | - | - | - | - |
| | B | - | - | - | - | - |
| | C | - | - | 37 | 50 | 50 |
| | D | - | - | 27 | 3 | 4 |
| | E | - | - | 64 | 53 | 54 |
| Total Maghreb | A | - | - | - | - | - |
| | B | - | 3 | 38 | 30 | 25 |
| | C | - | 10 | 187 | 257 | 360 |
| | D | - | - | 173 | 45 | 46 |
| | E | - | 13 | 398 | 332 | 431 |
| Sudan | A | - | - | - | - | - |
| | B | - | - | - | - | 20 |
| | C | - | - | 39 | 10 | 20 |
| | D | - | - | - | 10 | 5 |
| | E | - | - | 39 | 20 | 45 |
| UAR | A | - | - | - | - | - |
| | B | - | - | 55 | 15 | 20 |
| | C | - | - | 50 | 25 | 25 |
| | D | - | - | 54 | 13 | 3 |
| | E | - | - | 159 | 53 | 48 |
| Total sub-region | A | - | - | - | - | - |
| | B | - | 3 | 93 | 45 | 65 |
| | C | - | 10 | 276 | 292 | 405 |
| | D | - | - | 227 | 68 | 54 |
| | E | - | 13 | 596 | 405 | 524 |

A = Colouring materials n.e.s (533.1) B = Printing inks (533.2)
C = Paints, varnishes and, related materials (533.3 - 2,3,4,5)
D = Prepared pigments and related materials (533.3 - 1)
E = Total of group 533.

During the period 1965-1980, ink, paint and pigment production is estimated to increase to about 117,400 tons (US\$54.9 million) in Maghreb countries and to 153,500 tons (US\$76.7 million) in the whole sub-region, or respectively about 96,200 tons (US\$42.6 million) and 125,900 tons (US\$59.3 million) above 1964.

Local production will cover the following percentages of domestic demand in the whole sub-region in 1970, 1975 and 1980 respectively, 78.5, 81.1 and 83.3 per cent in quantity terms and 80.9, 82.3 and 85.1 per cent in value terms.

Increased local production may be expected to be met by utilization of existing excess capacity in the sub-region, by added capacity to plants in existence in 1964 or by new plants. These last will have additional capacity of 95,200 tons (2,400 tons for inks, 51,500 for paints and 41,300 tons for pigments) in the Maghreb countries and 130,000 tons (6,000 tons for inks, 71,000 tons for paints and 52,900 tons for pigments) in the whole sub-region.

The fixed investment cost will be about US\$10.9 million (1.5 for inks, 3.7 for paints and 5.7 million for pigments) in the Maghreb countries and US\$15.4 million (3.2 for inks, 5.5 for paints and 6.7 million for pigments) in the whole sub-region.

The additional working capital by 1980 will reach a level of US\$8.2 million (0.4 for inks, 6.2 for paints and 1.6 million for pigments) in the Maghreb countries and US\$11.5 million (0.8 for inks, 8.5 for paints and 2.2 million for pigments) in the whole sub-region.

The additional labour needs would total some 1,174 persons (96 for inks, 814 for paints, and 264 for pigments) in the Maghreb countries and 1,538 persons (206 for inks, 983 for paints and 349 for pigments) in the whole sub-region.

Again US\$16.2 million of the additional value added (1.3 for inks, 10.3 for paints and 4.6 million for pigments) can be considered as an addition to GDP for the Maghreb countries and US\$22.8 million (2.9 for inks, 14.1 for paints and 5.8 million for pigments) for the whole sub-region in 1980.

The suggested programme for the development of the local ink, paint and pigment industry includes proposals concerning the specialization and new plant location for main pigments in the North African sub-region. It also outlines the general prospects for development of inks and paints for each country.

The very thorough investigations made would suggest that a statement should be drawn up of the quantity, number of units, size, production programme, degree of specialization, co-operation and siting of ink and paint factories in each country of the sub-region.

VII.. PRESENT AND FUTURE DEVELOPMENT OF DIVISION 53 (summary)

VII.1. Demand

Tables 47 and 48 show the estimate of present and future demand of dyeing, tanning and colouring materials (division 53).

Table 47

(Tons)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|--------|--------|--------|--------|--------|--------|---------|---------|---------|
| Morocco | A | 365 | 317 | 385 | 493 | 592 | 675 | 1,100 | 1,700 | 2,500 |
| | B | 716 | 878 | 1,134 | 1,117 | 1,099 | 736 | 1,465 | 2,085 | 2,955 |
| | C | 9,502 | 10,760 | 11,023 | 12,600 | 13,811 | 13,378 | 17,700 | 24,900 | 35,000 |
| | D | 10,583 | 11,955 | 12,542 | 14,210 | 15,502 | 14,789 | 20,265 | 28,685 | 40,455 |
| Algeria | A | 353 | 331 | 250 | 300 | 330 | 360 | 500 | 900 | 1,600 |
| | B | 162 | 187 | 211 | 223 | 225 | 251 | 660 | 1,100 | 1,740 |
| | C | 29,613 | 26,725 | 12,290 | 14,913 | 15,753 | 18,744 | 23,450 | 34,100 | 49,300 |
| | D | 30,128 | 27,243 | 12,751 | 15,436 | 16,308 | 19,355 | 24,610 | 36,100 | 42,640 |
| Tunisia | A | 203 | 171 | 213 | 189 | 276 | 242 | 370 | 520 | 700 |
| | B | 203 | 330 | 242 | 270 | 244 | 286 | 426 | 602 | 874 |
| | C | 3,978 | 4,695 | 5,316 | 6,492 | 7,549 | 7,774 | 10,550 | 13,950 | 18,600 |
| | D | 4,384 | 5,196 | 5,771 | 6,951 | 8,069 | 8,302 | 11,346 | 15,072 | 20,174 |
| Libya | A | - | - | - | 63 | 85 | 61 | 100 | 150 | 220 |
| | B | 10 | 58 | 111 | 68 | 17 | 92 | 160 | 225 | 300 |
| | C | 1,549 | 2,292 | 2,339 | 3,450 | 5,043 | 5,134 | 6,495 | 8,600 | 11,470 |
| | D | 1,559 | 2,350 | 2,450 | 3,581 | 5,145 | 5,287 | 6,755 | 8,975 | 11,990 |
| Total Maghreb | A | 921 | 819 | 848 | 1,045 | 1,283 | 1,338 | 2,070 | 3,270 | 5,020 |
| | B | 1,091 | 1,453 | 1,698 | 1,678 | 1,585 | 1,365 | 2,711 | 4,012 | 5,869 |
| | C | 44,642 | 44,472 | 30,968 | 37,455 | 42,156 | 45,030 | 58,195 | 81,550 | 114,370 |
| | D | 46,654 | 46,744 | 33,514 | 40,178 | 45,024 | 47,733 | 62,976 | 88,832 | 125,259 |
| Sudan | A | 219 | 163 | 155 | 267 | 196 | 152 | 250 | 450 | 750 |
| | B | 128 | 107 | 92 | 248 | 200 | 317 | 725 | 1,300 | 2,390 |
| | C | 3,757 | 2,892 | 3,355 | 4,495 | 4,637 | 5,109 | 6,860 | 8,890 | 11,480 |
| | D | 4,104 | 3,162 | 3,602 | 5,010 | 5,033 | 5,578 | 7,835 | 10,640 | 14,620 |
| UAR | A | 1,746 | 1,209 | 1,787 | 1,683 | 1,504 | 1,724 | 3,050 | 4,750 | 7,000 |
| | B | 5,037 | 3,291 | 5,533 | 4,454 | 2,666 | 4,547 | 5,815 | 9,125 | 13,545 |
| | C | 20,266 | 16,857 | 17,385 | 19,291 | 16,335 | 25,662 | 33,445 | 44,310 | 58,120 |
| | D | 27,049 | 21,357 | 24,705 | 25,428 | 20,555 | 31,933 | 42,310 | 58,185 | 78,665 |
| Total sub-region | A | 2,886 | 2,191 | 2,790 | 2,995 | 2,983 | 3,214 | 5,370 | 8,470 | 12,770 |
| | B | 6,256 | 4,851 | 7,323 | 6,380 | 4,451 | 6,229 | 9,251 | 14,437 | 21,804 |
| | C | 68,665 | 64,221 | 51,708 | 61,241 | 63,178 | 75,801 | 98,500 | 134,750 | 183,970 |
| | D | 77,807 | 71,263 | 61,821 | 70,616 | 70,612 | 85,244 | 113,121 | 157,657 | 218,544 |

Table 48

(\$1000)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| Morocco | A | 612 | 593 | 696 | 1,003 | 1,076 | 1,316 | 2,200 | 3,400 | 5,000 |
| | B | 208 | 236 | 247 | 317 | 297 | 258 | 451 | 629 | 879 |
| | C | 3,904 | 4,606 | 4,419 | 5,485 | 5,795 | 5,817 | 7,590 | 11,250 | 16,180 |
| | D | 4,724 | 5,435 | 5,362 | 6,805 | 7,168 | 7,391 | 10,241 | 15,279 | 22,059 |
| Algeria | A | 388 | 416 | 339 | 371 | 415 | 443 | 680 | 1,335 | 2,620 |
| | B | 59 | 53 | 61 | 69 | 70 | 86 | 190 | 320 | 500 |
| | C | 17,316 | 15,458 | 6,593 | 9,022 | 9,540 | 11,471 | 14,210 | 19,510 | 28,220 |
| | D | 17,763 | 15,927 | 6,993 | 9,462 | 10,025 | 12,000 | 15,080 | 21,165 | 31,340 |
| Tunisia | A | 211 | 198 | 253 | 293 | 452 | 496 | 645 | 910 | 1,260 |
| | B | 67 | 88 | 70 | 87 | 80 | 109 | 145 | 208 | 306 |
| | C | 1,620 | 1,765 | 2,319 | 2,867 | 3,253 | 3,548 | 4,384 | 5,938 | 8,292 |
| | D | 1,898 | 2,051 | 2,642 | 3,247 | 3,785 | 4,153 | 5,174 | 7,056 | 9,858 |
| Libya | A | - | - | - | 31 | 41 | 29 | 100 | 200 | 330 |
| | B | 2 | 10 | 32 | 31 | 10 | 27 | 50 | 75 | 100 |
| | C | 589 | 827 | 984 | 1,317 | 2,129 | 2,237 | 2,814 | 3,732 | 5,044 |
| | D | 591 | 837 | 1,016 | 1,379 | 2,180 | 2,293 | 2,964 | 4,007 | 5,474 |
| Total | A | 1,211 | 1,207 | 1,288 | 1,698 | 1,658 | 2,284 | 3,625 | 5,845 | 9,210 |
| | B | 336 | 387 | 410 | 504 | 457 | 480 | 836 | 1,232 | 1,785 |
| | C | 23,429 | 22,656 | 14,315 | 18,691 | 20,717 | 23,073 | 28,998 | 40,430 | 57,736 |
| | D | 24,976 | 24,250 | 16,013 | 20,893 | 23,158 | 25,837 | 33,459 | 47,507 | 68,731 |
| Sudan | A | 330 | 241 | 208 | 322 | 312 | 224 | 380 | 700 | 1,230 |
| | B | 24 | 16 | 28 | 84 | 77 | 136 | 235 | 398 | 690 |
| | C | 1,342 | 1,027 | 1,171 | 1,609 | 1,654 | 1,712 | 3,135 | 4,080 | 5,450 |
| | D | 1,696 | 1,284 | 1,407 | 2,015 | 2,043 | 2,072 | 3,750 | 5,178 | 7,370 |
| UAR | A | 5,213 | 3,140 | 6,460 | 4,790 | 3,956 | 5,023 | 8,415 | 12,675 | 18,350 |
| | B | 909 | 533 | 930 | 854 | 469 | 874 | 1,262 | 1,967 | 2,917 |
| | C | 7,608 | 7,265 | 7,523 | 8,994 | 8,121 | 10,781 | 14,960 | 19,830 | 26,900 |
| | D | 13,730 | 10,938 | 14,913 | 14,638 | 12,546 | 16,678 | 24,637 | 34,472 | 48,167 |
| Total sub-region | A | 6,754 | 4,588 | 7,956 | 6,810 | 6,252 | 7,531 | 12,420 | 19,220 | 28,790 |
| | B | 1,269 | 936 | 1,368 | 1,442 | 1,003 | 1,490 | 2,333 | 3,597 | 5,392 |
| | C | 32,379 | 30,948 | 23,009 | 29,294 | 30,492 | 35,566 | 47,093 | 64,340 | 90,086 |
| | D | 40,402 | 36,472 | 32,333 | 37,546 | 37,747 | 44,587 | 61,846 | 87,157 | 124,268 |

A = Synthetic organic dyestuffs, natural indigo and colour lakes (group 531).
 B = Dyeing and tanning extracts, synthetic tanning materials (group 532).
 C = Pigments, paints, varnishes and related materials (group 533).
 D = Total division 53.

The demand for dyeing, tanning and colouring materials (division 53) will increase from 45,024 t (US\$23.2 million) in 1964 to 125,259 t (US\$68.7 million) in 1980 in the Maghreb countries and from 70,612 t (US\$37.8 million) to 218,544 t (US\$124.3 million) in the whole sub-region.

The most important group consists of pigments, paints, varnishes and related materials (group 533) which totals about 92 per cent in the Maghreb and 84 per cent in the sub-region of total demand of dyeing, tanning and colouring materials (division 53) in quantity and about 85 per cent and 74 per cent respectively in value.

There are some insignificant differences between the figures in Table 2 and in Table 48 resulting from the fact that the last table also includes "Mineral tanning agents" and "Other mineral pigment materials" as organically belonging to the report.

VII.2. Domestic demand per capita

The per capita domestic demand for dyeing, tanning and colouring materials (division 53) is shown in Tables 49 and 50.

Table 49
(kg)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------------|---|------|------|------|------|------|------|------|------|------|
| Morocco | A | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.07 | 0.10 | 0.13 |
| | B | 0.06 | 0.08 | 0.09 | 0.09 | 0.09 | 0.06 | 0.10 | 0.12 | 0.15 |
| | C | 0.84 | 0.92 | 0.92 | 1.02 | 1.10 | 1.03 | 1.17 | 1.43 | 1.75 |
| | D | 0.93 | 1.03 | 1.04 | 1.15 | 1.24 | 1.14 | 1.34 | 1.65 | 2.03 |
| Algeria | A | 0.03 | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.06 | 0.09 |
| | B | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.05 | 0.07 | 0.10 |
| | C | 2.82 | 2.50 | 1.13 | 1.34 | 1.39 | 1.62 | 1.71 | 2.15 | 2.70 |
| | D | 2.87 | 2.55 | 1.17 | 1.39 | 1.44 | 1.67 | 1.80 | 2.28 | 2.89 |
| Tunisia | A | 0.05 | 0.04 | 0.05 | 0.04 | 0.06 | 0.06 | 0.07 | 0.09 | 0.10 |
| | B | 0.05 | 0.08 | 0.06 | 0.06 | 0.06 | 0.07 | 0.08 | 0.10 | 0.13 |
| | C | 0.97 | 1.13 | 1.26 | 1.54 | 1.76 | 1.77 | 2.08 | 2.37 | 2.74 |
| | D | 1.07 | 1.25 | 1.37 | 1.64 | 1.88 | 1.90 | 2.23 | 2.56 | 2.97 |
| Libya | A | - | - | - | 0.04 | 0.05 | 0.04 | 0.05 | 0.07 | 0.09 |
| | B | 0.01 | 0.04 | 0.08 | 0.05 | 0.01 | 0.06 | 0.08 | 0.10 | 0.12 |
| | C | 1.15 | 1.63 | 1.62 | 2.31 | 3.16 | 3.10 | 3.42 | 3.91 | 4.59 |
| | D | 1.16 | 1.67 | 1.70 | 2.40 | 3.22 | 3.20 | 3.55 | 4.08 | 4.80 |
| Total Maghreb | A | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.06 | 0.08 | 0.10 |
| | B | 0.04 | 0.05 | 0.06 | 0.06 | 0.05 | 0.04 | 0.08 | 0.10 | 0.12 |
| | C | 1.64 | 1.60 | 1.09 | 1.29 | 1.41 | 1.18 | 1.63 | 1.97 | 2.40 |
| | D | 1.71 | 1.68 | 1.18 | 1.39 | 1.50 | 1.56 | 1.77 | 2.15 | 2.62 |
| Sudan | A | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 | 0.03 | 0.04 |
| | B | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 | 0.05 | 0.07 | 0.12 |
| | C | 0.33 | 0.24 | 0.29 | 0.37 | 0.36 | 0.38 | 0.44 | 0.50 | 0.55 |
| | D | 0.36 | 0.26 | 0.31 | 0.41 | 0.40 | 0.42 | 0.51 | 0.60 | 0.71 |

Table 49 (cont'd)
(kgs)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|------|------|------|------|------|------|------|------|------|
| UAR | A | 0.07 | 0.05 | 0.07 | 0.06 | 0.05 | 0.06 | 0.09 | 0.12 | 0.16 |
| | B | 0.19 | 0.12 | 0.20 | 0.16 | 0.09 | 0.16 | 0.18 | 0.24 | 0.31 |
| | C | 0.78 | 0.64 | 0.64 | 0.69 | 0.58 | 0.88 | 1.01 | 1.17 | 1.35 |
| | D | 1.04 | 0.81 | 0.91 | 0.91 | 0.72 | 1.10 | 1.28 | 1.53 | 1.82 |
| Total sub-region | A | 0.05 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.06 | 0.09 | 0.11 |
| | B | 0.10 | 0.07 | 0.11 | 0.09 | 0.06 | 0.09 | 0.11 | 0.15 | 0.20 |
| | C | 1.07 | 0.97 | 0.76 | 0.89 | 0.90 | 1.04 | 1.17 | 1.39 | 1.65 |
| | D | 1.22 | 1.07 | 0.91 | 1.02 | 1.00 | 1.17 | 1.34 | 1.63 | 1.96 |

Table 50
(\$)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|---------------|---|------|------|------|------|------|------|------|------|------|
| Morocco | A | 0.05 | 0.05 | 0.06 | 0.08 | 0.09 | 0.10 | 0.15 | 0.20 | 0.25 |
| | B | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.03 | 0.04 | 0.05 |
| | C | 0.34 | 0.39 | 0.36 | 0.44 | 0.47 | 0.44 | 0.51 | 0.65 | 0.82 |
| | D | 0.41 | 0.46 | 0.44 | 0.55 | 0.58 | 0.56 | 0.69 | 0.89 | 1.12 |
| Algeria | A | 0.04 | 0.04 | 0.03 | 0.03 | 0.04 | 0.04 | 0.05 | 0.08 | 0.14 |
| | B | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 |
| | C | 1.65 | 1.43 | 0.60 | 0.81 | 0.84 | 0.99 | 1.04 | 1.22 | 1.54 |
| | D | 1.70 | 1.48 | 0.64 | 0.85 | 0.89 | 1.04 | 1.10 | 1.32 | 1.71 |
| Tunisia | A | 0.05 | 0.05 | 0.06 | 0.07 | 0.11 | 0.11 | 0.13 | 0.15 | 0.19 |
| | B | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.04 | 0.05 |
| | C | 0.40 | 0.43 | 0.55 | 0.68 | 0.76 | 0.81 | 0.87 | 1.01 | 1.22 |
| | D | 0.47 | 0.50 | 0.62 | 0.77 | 0.89 | 0.94 | 1.03 | 1.20 | 1.46 |
| Libya | A | - | - | - | 0.02 | 0.03 | 0.02 | 0.05 | 0.09 | 0.13 |
| | B | - | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 | 0.03 | 0.03 | 0.04 |
| | C | 0.44 | 0.59 | 0.68 | 0.88 | 1.34 | 1.35 | 1.48 | 1.69 | 2.02 |
| | D | 0.44 | 0.60 | 0.70 | 0.92 | 1.33 | 1.39 | 1.56 | 1.81 | 2.19 |
| Total Maghreb | A | 0.04 | 0.04 | 0.05 | 0.06 | 0.07 | 0.07 | 0.10 | 0.14 | 0.19 |
| | B | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.04 |
| | C | 0.86 | 0.82 | 0.50 | 0.64 | 0.70 | 0.75 | 0.82 | 0.98 | 1.21 |
| | D | 0.91 | 0.87 | 0.56 | 0.72 | 0.79 | 0.84 | 0.94 | 1.15 | 1.44 |
| Sudan | A | 0.03 | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 | 0.03 | 0.04 | 0.06 |
| | B | - | - | - | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 |
| | C | 0.12 | 0.09 | 0.10 | 0.13 | 0.13 | 0.13 | 0.20 | 0.24 | 0.26 |
| | D | 0.15 | 0.11 | 0.12 | 0.17 | 0.17 | 0.16 | 0.25 | 0.30 | 0.35 |
| UAR | A | 0.20 | 0.12 | 0.24 | 0.17 | 0.14 | 0.17 | 0.25 | 0.33 | 0.42 |
| | B | 0.04 | 0.02 | 0.03 | 0.03 | 0.02 | 0.03 | 0.04 | 0.05 | 0.07 |
| | C | 0.29 | 0.27 | 0.28 | 0.32 | 0.30 | 0.37 | 0.45 | 0.52 | 0.62 |
| | D | 0.53 | 0.41 | 0.55 | 0.52 | 0.46 | 0.57 | 0.74 | 0.90 | 1.11 |

Table 50 (cont'd)
(\$)

| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|------|------|------|------|------|------|------|------|------|
| Total sub-region | A | 0.10 | 0.07 | 0.12 | 0.10 | 0.09 | 0.10 | 0.15 | 0.20 | 0.26 |
| | B | 0.02 | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 |
| | C | 0.50 | 0.47 | 0.34 | 0.42 | 0.44 | 0.49 | 1.56 | 0.66 | 0.81 |
| | D | 0.62 | 0.55 | 0.48 | 0.54 | 0.54 | 0.61 | 0.74 | 0.90 | 1.12 |

A = Synthetic organic dyestuffs, natural indigo and colour lakes (group 531).

B = Dyeing and tanning extracts, synthetic tanning materials (group 532).

C = Pigments, paints, varnishes and related materials (group 533).

D = Total division 53.

The increase of per capita domestic demand for dyeing, tanning and colouring materials in the periods 1964-1980 will be about 1.8 times in Maghreb countries and 2 time in the whole sub-region. The largest growth is in groups 531 and 532, the smallest in group 533.

VII.3. Production capacity

The suggested capacities for dyeing, tanning and colouring materials are shown in Table 51.

Table 51

| | | Capacity (tons) | | | | | Additional capacity (tons) | | | | |
|---------------|---|-----------------|--------|--------|---------|---------|----------------------------|-------|--------|--------|--------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Morocco | A | - | - | - | 2,600 | 5,500 | - | - | - | 2,600 | 2,900 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 10,620 | 10,620 | 20,300 | 29,200 | 42,100 | - | - | 9,680 | 8,900 | 12,900 |
| | D | 10,620 | 10,620 | 20,300 | 31,800 | 47,600 | - | - | 9,680 | 11,500 | 15,800 |
| Algeria | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 22,450 | 22,500 | 27,500 | 39,800 | 56,200 | - | 50 | 5,000 | 12,300 | 16,400 |
| | D | 22,450 | 22,500 | 27,500 | 39,800 | 56,200 | - | 50 | 5,000 | 12,300 | 16,400 |
| Tunisia | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 8,160 | 8,160 | 11,300 | 14,400 | 18,600 | - | - | 3,140 | 3,100 | 4,200 |
| | D | 8,160 | 8,160 | 11,300 | 14,400 | 18,600 | - | - | 3,140 | 3,100 | 4,200 |
| Libya | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 5,500 | 7,000 | 17,000 | 19,000 | 25,000 | - | 1,500 | 10,000 | 2,000 | 6,000 |
| | D | 5,500 | 7,000 | 17,000 | 19,000 | 25,000 | - | 1,500 | 10,000 | 2,000 | 6,000 |
| Total Maghreb | A | - | - | - | 2,600 | 5,500 | - | - | - | 2,600 | 2,900 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 46,730 | 48,280 | 76,100 | 102,400 | 141,900 | - | 1,550 | 27,820 | 26,300 | 39,500 |
| | D | 46,730 | 48,280 | 76,100 | 105,000 | 147,400 | - | 1,550 | 27,820 | 28,900 | 42,400 |

Table 51 (cont'd)

| | | Capacity (t) | | | | | Additional capacity (t) | | | | |
|------------------|---|--------------|--------|---------|---------|---------|-------------------------|-------|--------|--------|--------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Sudan | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | 3,000 | 6,000 | 12,000 | - | - | 3,000 | 3,000 | 6,000 |
| | C | 1,400 | 2,000 | 5,000 | 7,500 | 10,200 | - | 600 | 3,000 | 2,500 | 2,700 |
| | D | 1,400 | 2,000 | 8,000 | 13,500 | 22,200 | - | 600 | 6,000 | 5,500 | 8,700 |
| UAR | A | - | - | 2,210 | 5,300 | 7,600 | - | - | 2,210 | 3,090 | 2,300 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 6,600 | 6,600 | 16,800 | 23,600 | 32,600 | - | - | 10,200 | 6,800 | 9,000 |
| | D | 6,600 | 6,600 | 19,010 | 28,900 | 40,200 | - | - | 12,410 | 9,890 | 11,300 |
| Total sub-region | A | - | - | 2,210 | 7,900 | 13,100 | - | - | 22,100 | 5,690 | 5,200 |
| | B | - | - | 3,000 | 6,000 | 12,000 | - | - | 3,000 | 3,000 | 6,000 |
| | C | 54,730 | 56,880 | 97,900 | 133,500 | 184,700 | - | 2,150 | 41,020 | 35,600 | 51,200 |
| | D | 54,730 | 56,880 | 103,110 | 147,400 | 209,800 | - | 2,150 | 46,230 | 44,290 | 62,400 |

A = Synthetic organic dyestuffs, natural indigo and colour lakes (group 531).

B = Dyeing and tanning extracts, synthetic tanning materials (group 532).

C = Pigments, paints, varnishes and related materials (group 533).

D = Total division 53.

According to consumption trends, it may be concluded that during the period 1965-1980 the conditions for the manufacture of the following products will be favourable in North Africa at the sub-regional level:

| | |
|------------------------------------|--------------------|
| <u>Synthetic organic dyestuffs</u> | in UAR and Morocco |
| <u>Tanning extracts</u> | in Sudan |
| <u>Lithopone</u> | in Algeria |
| <u>Zinc white</u> | in Morocco |
| <u>Iron pigments</u> | in Morocco and UAR |
| <u>Lead pigments</u> | in Tunisia |
| <u>Chrome derivatives</u> | in Morocco and UAR |
| <u>Carbon black</u> | in Libya |

The development of local ink and paint production in each country of the sub-region (except Libya where the local ink production is not suggested) is also proposed.

Consequently, it is possible to establish the following capacities (in tons) in the sub-region:

| Morocco | 1970 | 1975 | 1980 |
|-----------------------------|-------|-------|-------|
| Synthetic organic dyestuffs | - | 2,000 | 5,000 |
| Colour lakes | - | 400 | 500 |
| Zinc white | 4,000 | 6,000 | 8,000 |

| <u>Morocco</u> | 1970 | 1975 | 1980 |
|-----------------------------|--------|--------|--------|
| Iron pigments | 1,500 | 2,000 | 2,500 |
| Chrome derivatives | 2,400 | 2,400 | 3,600 |
| Inks | 400 | 800 | 1,000 |
| Paints | 12,000 | 18,000 | 27,000 |
| Total | 20,300 | 31,800 | 47,600 |
| <u>Algeria</u> | | | |
| Lithopone | 7,000 | 9,000 | 10,000 |
| Inks | 500 | 800 | 1,200 |
| Paints | 20,000 | 30,000 | 45,000 |
| Total | 27,500 | 39,800 | 56,200 |
| <u>Libya</u> | | | |
| Carbon black | 10,000 | 12,000 | 15,000 |
| Paints | 7,000 | 7,000 | 10,000 |
| Total | 17,000 | 19,000 | 25,000 |
| <u>Tunisia</u> | | | |
| Lead pigments | 4,000 | 5,000 | 6,000 |
| Inks | 300 | 400 | 600 |
| Paints | 7,000 | 9,000 | 12,000 |
| Total | 11,300 | 14,400 | 18,600 |
| <u>Sudan</u> | | | |
| Garad tan | 2,000 | 3,000 | 6,000 |
| Vegetable tanning extracts | 1,000 | 3,000 | 6,000 |
| Mineral pigments | - | 1,500 | 3,000 |
| Inks | - | - | 200 |
| Paints | 5,000 | 6,000 | 7,000 |
| Total | 8,000 | 13,500 | 22,200 |
| <u>UAR</u> | | | |
| Synthetic organic dyestuffs | 2,200 | 5,000 | 7,000 |
| Colour lakes | 10 | 300 | 600 |
| Iron pigments | 3,000 | 4,000 | 5,000 |
| Chrome derivatives | 2,400 | 3,600 | 3,600 |
| Inks | 2,400 | 3,000 | 4,000 |
| Paints | 9,000 | 13,000 | 20,000 |
| Total | 19,010 | 28,900 | 40,200 |

The total additional capacity for the dyeing, tanning and colouring materials added to plants in existence in 1964 will total 100,670 t in Maghreb countries and 155,070 t in the wholesub-region by 1980.

VII.4. Production level

The expected local production of dyeing, tanning and colouring materials in quantity and value is given in Table 52.

Table 52

| | | Production (tons) | | | | | Gross business output (\$1,000) | | | | |
|------------------|---|-------------------|--------|--------|---------|---------|---------------------------------|--------|--------|--------|---------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Morocco | A | - | - | - | 2,300 | 4,400 | - | - | - | 4,500 | 10,500 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 7,600 | 7,700 | 16,600 | 24,100 | 35,100 | 3,525 | 3,625 | 6,880 | 10,380 | 15,330 |
| | D | 7,600 | 7,700 | 16,600 | 26,400 | 39,500 | 3,525 | 3,625 | 6,880 | 14,880 | 25,830 |
| Algeria | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 8,342 | 11,284 | 22,500 | 32,800 | 47,000 | 6,235 | 8,250 | 12,960 | 17,880 | 26,280 |
| | D | 8,342 | 11,284 | 22,500 | 32,800 | 47,000 | 6,235 | 8,250 | 12,960 | 17,880 | 26,280 |
| Tunisia | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 4,240 | 4,656 | 8,850 | 11,500 | 15,300 | 2,098 | 2,178 | 3,510 | 4,760 | 6,650 |
| | D | 4,240 | 4,656 | 8,850 | 11,500 | 15,300 | 2,098 | 2,178 | 3,510 | 4,760 | 6,650 |
| Libya | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 1,000 | 1,400 | 12,000 | 15,600 | 20,000 | 400 | 600 | 3,800 | 5,100 | 6,600 |
| | D | 1,000 | 1,400 | 12,000 | 15,000 | 20,000 | 400 | 600 | 3,800 | 5,100 | 6,600 |
| Total Maghreb | A | - | - | - | 2,300 | 4,400 | - | - | - | 4,500 | 10,500 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 21,182 | 25,040 | 59,950 | 84,000 | 117,400 | 12,258 | 14,653 | 27,150 | 38,120 | 54,860 |
| | D | 21,182 | 25,040 | 59,950 | 86,300 | 121,800 | 12,258 | 14,653 | 27,150 | 42,620 | 65,360 |
| Sudan | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | 3,000 | 5,400 | 10,800 | - | - | 420 | 750 | 1,500 |
| | C | 900 | 1,100 | 3,600 | 5,700 | 8,500 | 500 | 600 | 2,000 | 2,860 | 4,310 |
| | D | 900 | 1,100 | 6,600 | 11,100 | 19,300 | 500 | 600 | 2,420 | 3,610 | 5,810 |
| UAR | A | - | - | 2,210 | 4,250 | 6,500 | - | - | 6,000 | 11,200 | 16,500 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 5,300 | 5,700 | 13,800 | 19,600 | 27,400 | 4,650 | 5,050 | 8,980 | 11,960 | 17,500 |
| | D | 5,300 | 5,700 | 16,010 | 23,850 | 33,900 | 4,650 | 5,050 | 14,980 | 23,160 | 34,000 |
| Total sub-region | A | - | - | 2,210 | 6,550 | 10,900 | - | - | 6,000 | 15,700 | 27,000 |
| | B | - | - | 3,000 | 5,400 | 10,800 | - | - | 420 | 750 | 1,500 |
| | C | 72,382 | 31,840 | 77,350 | 109,300 | 153,300 | 17,408 | 20,303 | 38,130 | 52,940 | 76,670 |
| | D | 72,382 | 31,840 | 82,560 | 121,250 | 175,000 | 17,408 | 20,303 | 44,550 | 69,390 | 105,170 |

A = Synthetic organic dyestuffs, natural indigo and colour lakes (group 531).

B = Dyeing and tanning extracts, synthetic tanning materials (group 532).

C = Pigments, paints, varnishes and related materials (group 533).

D = Total division 53.

During the period 1965-1980 the local dyeing, tanning and colouring materials production is estimated to increase to about 121,800 t (US\$ 65.4

million) in Maghreb countries and to 175,000 t (US\$ 105.2 million) in the whole sub-region or, respectively, to about 100,618 t (US\$ 53.1 million) and to 147,618 t (US\$ 87.8 million) above 1964.

Local production will cover the following percentages of domestic demand in the Maghreb countries in 1970, 1975 and 1980 respectively: 95, 97 and 97 per cent and in the whole sub-region 73, 77, and 80 per cent in terms of quantity. The respective figures in value for Maghreb countries will be 81, 90 and 95 per cent and for the whole sub-region 72, 80 and 85 per cent.

Importation of certain products will still be required because of the variety of finishes needed, in small quantities, for specialized application.

VII.5. Investment

Table 53 presents the estimated additional fixed investment and working capital for new capacities in dyeing, tanning and colouring materials added in the years 1965, 1970, 1975, and 1980.

Table 53

| | | Additional fixed investment (\$1,000) | | | | | Additional working capital (\$1,000) | | | | |
|------------------|---|--|------|-------|--------|--------|---|------|-------|-------|-------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Morocco | A | - | - | - | 24,000 | 18,000 | - | - | - | 900 | 1,200 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | - | - | 1,370 | 810 | 1,010 | - | 20 | 647 | 655 | 980 |
| | D | - | - | 1,370 | 24,810 | 19,010 | - | 20 | 647 | 1,555 | 2,180 |
| Algeria | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | - | 40 | 560 | 1,010 | 1,100 | - | 405 | 841 | 946 | 1,652 |
| | D | - | 40 | 560 | 1,010 | 1,100 | - | 405 | 841 | 946 | 1,652 |
| Tunisia | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | - | - | 270 | 300 | 470 | - | 40 | 207 | 239 | 358 |
| | D | - | - | 270 | 300 | 470 | - | 40 | 207 | 239 | 358 |
| Libya | A | - | - | 0 | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | - | 160 | 2,600 | 400 | 830 | - | 40 | 640 | 260 | 300 |
| | D | - | 160 | 2,600 | 400 | 830 | - | 40 | 640 | 260 | 300 |
| Total Maghreb | A | - | - | - | 24,000 | 18,000 | - | - | - | 900 | 1,200 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | - | 200 | 4,800 | 2,520 | 3,410 | - | 505 | 2,335 | 2,100 | 3,290 |
| | D | - | 200 | 4,800 | 26,520 | 21,410 | - | 505 | 2,335 | 3,000 | 4,490 |

| | | Additional fixed investment (\$1,000) | | | | | Additional working capital (\$1,000) | | | | |
|------------|---------|--|-------|--------|--------|--------|---|------|-------|-------|-------|
| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
| Sudan | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | 250 | 100 | 250 | - | - | 65 | 50 | 115 |
| | C | - | 100 | 400 | 170 | 350 | - | 20 | 280 | 150 | 270 |
| | D | - | 100 | 650 | 270 | 600 | - | 20 | 345 | 200 | 385 |
| | A 4,000 | 4,000 | 4,000 | 16,000 | 18,000 | 18,000 | - | - | 1,200 | 1,000 | 1,100 |
| UAR | B | - | - | - | - | - | - | - | - | - | - |
| | C | - | - | 1,830 | 840 | 760 | - | 80 | 772 | 610 | 1,060 |
| | D 4,000 | 4,000 | 4,000 | 17,830 | 18,840 | 18,760 | - | 80 | 1,972 | 1,610 | 2,160 |
| | Total | 4,000 | 4,000 | 16,000 | 42,000 | 36,000 | - | - | 1,200 | 1,900 | 2,300 |
| sub-region | B | - | - | 250 | 100 | 250 | - | - | 65 | 50 | 115 |
| | C | - | 300 | 7,030 | 3,530 | 4,520 | - | 605 | 3,387 | 2,860 | 4,620 |
| | D 4,000 | 4,300 | 4,300 | 23,280 | 45,630 | 40,770 | - | 605 | 4,652 | 4,810 | 7,035 |

- A = Synthetic organic dyestuffs, natural indigo and colour lakes (group 531).
 B = Dyeing and tanning extracts, synthetic tanning materials (group 532).
 C = Pigments, paints, varnishes and related materials (group 533).
 D = Total division 53.

The suggested expansion of the dyeing, tanning and colouring materials industry will require by 1980 additional investment of about US\$52.9 million in Maghreb countries and US\$118 million in the whole sub-region.

Total additional working capital by 1980 will reach US\$10.3 million in Maghreb and 17.1 million in the whole sub-region.

VII.6. Employment

Table 54 shows the number of workers in the years 1964, 1965, 1970, 1975 and 1980 and the additional workers needed in this period.

Table 54.

| | | 1964 | 1965 | 1970 | 1975 | 1980 | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-------------------|------|------|------|------|--------------------|------|------|------|------|
| | | Number of workers | | | | | Additional workers | | | | |
| Morocco | A | - | - | - | 1400 | 1800 | - | - | - | 1400 | 400 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 420 | 430 | 578 | 660 | 792 | - | 10 | 148 | 82 | 132 |
| | D | 420 | 430 | 578 | 2060 | 2592 | - | 10 | 148 | 1482 | 532 |
| Algeria | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 629 | 632 | 805 | 965 | 1155 | - | 3 | 173 | 160 | 190 |
| | D | 629 | 632 | 805 | 965 | 1155 | - | 3 | 173 | 160 | 190 |
| Tunisia | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 185 | 171 | 195 | 235 | 290 | - | - | 13 | 37 | 55 |
| | D | 185 | 171 | 195 | 235 | 290 | - | - | 13 | 37 | 55 |
| Libya | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 63 | 63 | 127 | 180 | 234 | - | - | 64 | 53 | 54 |
| | D | 63 | 63 | 127 | 180 | 234 | - | - | 64 | 53 | 54 |
| Total Maghreb | A | - | - | - | 1400 | 1800 | - | - | - | 1400 | 400 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 1297 | 1296 | 1705 | 2040 | 2471 | - | 13 | 398 | 332 | 431 |
| | D | 1297 | 1296 | 1705 | 3440 | 2471 | - | 13 | 398 | 1732 | 831 |
| Sudan | A | - | - | - | - | - | - | - | - | - | - |
| | B | - | - | 100 | 150 | 250 | - | - | 100 | 50 | 100 |
| | C | 81 | 50 | 120 | 140 | 185 | - | - | 39 | 20 | 45 |
| | D | 81 | 50 | 220 | 290 | 435 | - | - | 139 | 70 | 145 |
| U.A.R. | A | - | - | 1400 | 1800 | 2200 | - | - | 1400 | 400 | 400 |
| | B | - | - | - | - | - | - | - | - | - | - |
| | C | 440 | 440 | 599 | 652 | 700 | - | - | 159 | 53 | 48 |
| | D | 440 | 440 | 1999 | 2452 | 2900 | - | - | 1559 | 453 | 448 |
| Total sub-region | A | - | - | 1400 | 3200 | 4000 | - | - | 1400 | 1800 | 800 |
| | B | - | - | 100 | 150 | 250 | - | - | 100 | 50 | 100 |
| | C | 1818 | 1786 | 2424 | 2832 | 3356 | - | 13 | 596 | 405 | 524 |
| | D | 1818 | 1786 | 3924 | 6182 | 7606 | - | 13 | 2096 | 2255 | 1424 |

A = Synthetic organic dyestuffs, natural indigo and colour lakes (group 531).

B = Dyeing and tanning extracts, synthetic tanning materials (group 532).

C = Pigments, paints, varnishes and related materials (group 533).

D = Total division 53.

The number of workers will increase in the period 1965-1980 to about 4271 in Maghreb countries and 7606 persons in the whole sub-region.

The employment increases would total respectively some 2974 and 5788 persons above 1964.

VII.7. Value added

The expected value added of local dyeing, tanning and colouring materials manufacture is shown in Table 55.

Table 55

| | | 1964 | 1965 | 1970 | 1975 | 1980 |
|------------------|---|-----------------------|------|-------|-------|-------|
| | | Value added (1000 \$) | | | | |
| Morocco | A | - | - | - | 1800 | 4200 |
| | B | - | - | - | - | - |
| | C | 1220 | 1240 | 2720 | 4080 | 6010 |
| | D | 1220 | 1240 | 2720 | 5880 | 10210 |
| Algeria | A | - | - | - | - | - |
| | B | - | - | - | - | - |
| | C | 2115 | 2730 | 4650 | 6430 | 9290 |
| | D | 2115 | 2730 | 4650 | 6430 | 9290 |
| Tunisia | A | - | - | - | - | - |
| | B | - | - | - | - | - |
| | C | 740 | 750 | 1270 | 1710 | 2390 |
| | D | 740 | 750 | 1270 | 1710 | 2390 |
| Libya | A | - | - | - | - | - |
| | B | - | - | - | - | - |
| | C | 130 | 200 | 1600 | 2100 | 2690 |
| | D | 130 | 200 | 1600 | 2100 | 2690 |
| Total Maghreb | A | - | - | - | 1800 | 4200 |
| | B | - | - | - | - | - |
| | C | 4205 | 4920 | 10240 | 14320 | 20380 |
| | D | 4205 | 4920 | 10240 | 16120 | 24580 |
| Sudan | A | - | - | - | - | - |
| | B | - | - | 210 | 400 | 830 |
| | C | 160 | 200 | 660 | 1000 | 1560 |
| | D | 160 | 200 | 870 | 1400 | 2390 |
| UAR | A | - | - | 2400 | 4480 | 6600 |
| | B | - | - | - | - | - |
| | C | 1620 | 1760 | 3590 | 4770 | 6810 |
| | D | 1620 | 1760 | 5990 | 9250 | 13410 |
| Total sub-region | A | - | - | 2400 | 6280 | 10800 |
| | B | - | - | 210 | 400 | 830 |
| | C | 5985 | 6880 | 14490 | 20090 | 28750 |
| | D | 5985 | 6880 | 17100 | 26770 | 40380 |

A = Synthetic organic dyestuffs, natural indigo and colcurlakes (group 531).

B = Dyeing and tanning extracts, synthetic tanning materials (group 533).

C = Pigments, paints, varnishes and related materials (group 533).

D = Total division 53.

The programme for the development of the local dyeing, tanning and colouring materials industry to 1980 would have, beyond doubt, positive effects on the economic growth of the North African sub-region.

The value added factor (about 38 per cent) in the total product value would contribute US\$ 24.6 million to GDP in Maghreb countries and 40.4 million in the whole sub-region in 1980.

VIII. REMARKS ON SUB-REGIONAL CO-OPERATION IN THE NORTH AFRICAN SUB-REGION RELATED TO SUBJECT SECTOR

Sub-regional co-operation in the dyeing, tanning and colouring materials sector could result in savings of licensing fees for production know-how and marketing by exchange of know-how and mergers between industrial national companies in the sub-region.

A regional paint research institute could be supported by all paint industries of the sub-region.

The same is true for a regional leather research institute.

Different industrial projects require different market conditions. This report made clear, for example, that the organic dye factories will benefit from protected access to the sub-region comprising as many countries as possible. The vegetable tanning agent project of Sudan and the inorganic mineral pigment projects, however, would benefit from export incentives. There is ample room for discussion on degree of specialization and sub-regional co-operation in the ink and paint industry between the governments of these States.

Through sub-regional co-operation, projects for the manufacture of paint-making raw materials will become feasible at a much earlier date than if these projects are studied on a national basis.

It was stressed that successful sub-regional integration and co-operation calls first of all for a well organized low cost transport system between the countries of the sub-region and secondly that experience is required in international trade.

If, as a result of the intended co-operation, manufacturing units are created which should serve multinational markets it will be necessary to build up experience in the machinery and techniques for export marketing and distribution.

During the field trip of the experts to the six North African countries, a great number of contacts were made with government officials, with the Directors of industry, banks and with the local business managers of the paint and allied products sector. The main objectives of the mission, industrial development through sub-regional co-operation, has been in the centre of these discussions, and the advantages of sub-regional co-operation for industrial development were amply explained.

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