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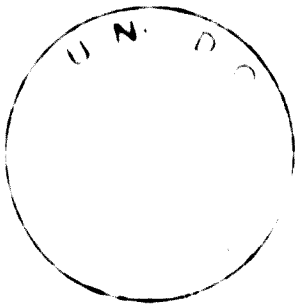

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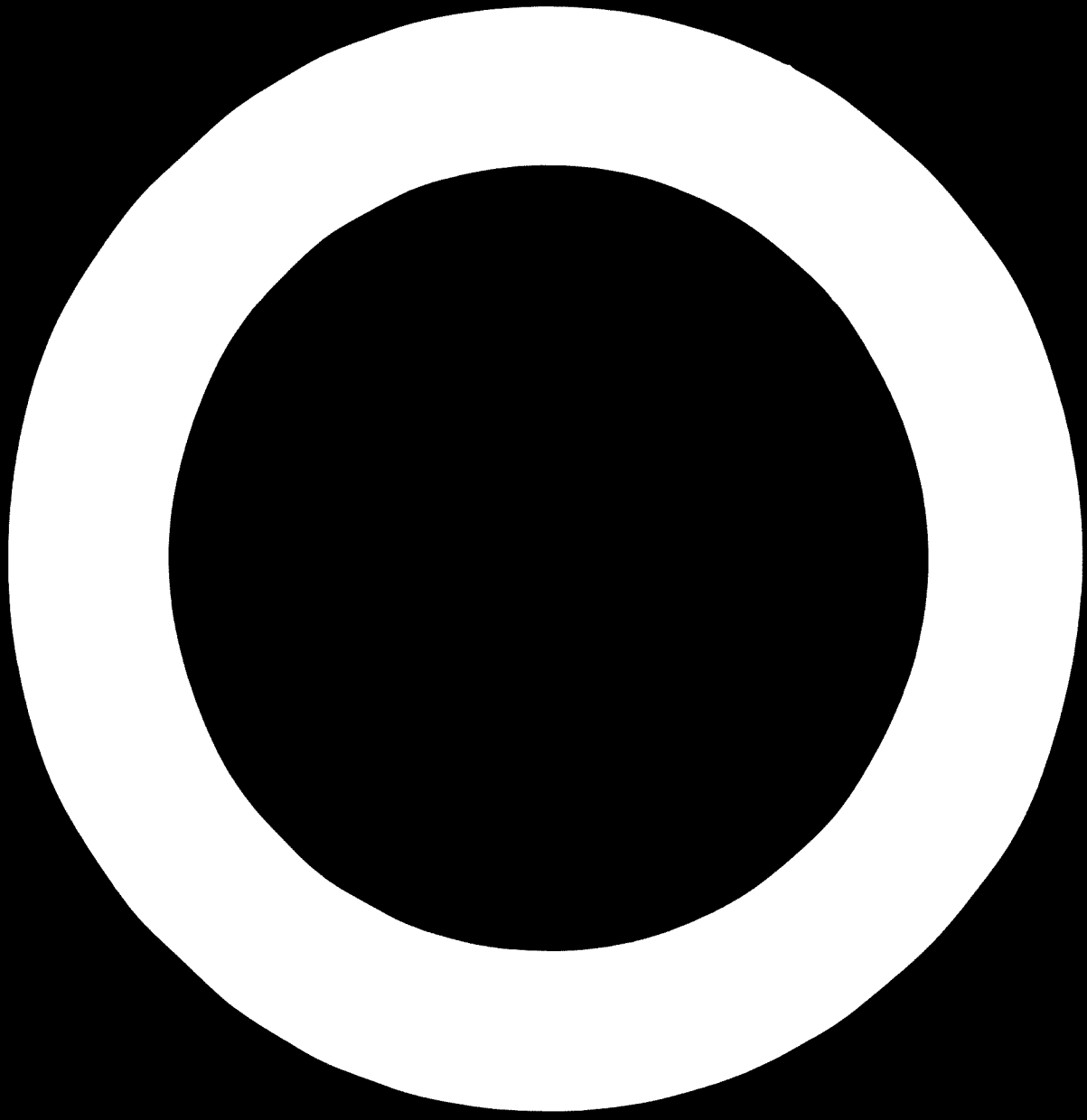


I - Introduction

At its tenth session in June 1963, the Gover... the Special Fund approved a project (see document ...) assist the Government of Sudan in the establishment ... of Industrial Research at Khartoum. The main objectives Institute were to promote and assist industrial develo... country through the provision of standards and testing serv... industrial feasibility studies, industrial inform... services, industrial production, costing and mana... material and process research services. The United ... as the Participating and Executing Agency and the Unit... Industrial Development Organization, UNIDO, ... for the project on 1 July 1967. The Plan of Oper... 14 February 1965, the project became operational ... Apr... and was completed in December 1969.

The major achievements of the project incl...

a) completion of feasibility studies for sever... including a nitrogen fertiliser plant, a sugar factory, ... processing factory and a paper mill;

b) preparation of about fifty draft Standards;

c) completion of a large number of chemical analyses an... evaluation of products and raw materials;

d) assistance to a number of enterprises in such areas as re-organisation production, layout and engineering, and marketing.

[illegible] cost accounting system in a number of [illegible] and the determination of the costs of production [illegible] prices of the products; and

[illegible] courses conducted in several fields including cost [illegible], [illegible] control, instrumental methods of analysis, production [illegible] project selection criteria. About 200 trainees participated in these courses.

The Sudan Industrial Research Institute has been receiving the [illegible] of the Government and has been called upon to perform increasing functions both by the Government and to a lesser degree by industry. The demand for its services is steadily increasing and the continuation of the services of international experts and more training of counterpart [illegible] for years beyond the termination of this project is essential [illegible] satisfactorily meeting these demands. The Governing Council of the UNDP [illegible] approved the request of the Government in January 1970 [illegible] DP/GC/R.9/Add.89) for the continuation of the project into [illegible] to assist the Government in strengthening the facilities at the Institute for assistance to industry.

I - [illegible] Organizational Structure Staff and Facilities

a) Organizational Structures

The Institute was established as an autonomous non-profit body by the Industrial Research Institute Act of 1967. The Board of the Institute responsible for laying down general policies to ensure that the objectives of the Institute are successfully carried out was also established by the same Act. It consists of eleven members: representatives of four key ministries and the Industrial Development Corporation, deans of the faculties of Science and Engineering and Architecture of the University of Khartoum, two members of the private Sector and the Director of the Institute. The full time Director of the Institute is to be appointed by the Government to assume responsibility for the management and discharge of the duties of the Institute along the guidelines set forth

by the Board and under its supervision.

The Institute comprises various sections headed by [illegible] recruited experts. Local counterparts are expected to [illegible] duties as heads of these departments at a later stage in the project.

b) Buildings

The Institute started and is still operating in rented buildings. With the development of the Institute these quarters have [illegible]. The original plans for new functional and modern premises [illegible] finalized with the assistance of a specialized [illegible] premises with its 7,700 square metres of floor space, [illegible] facilities for offices, laboratories, workshop, library and [illegible].

c) Project Personnel

1. International Staff

In addition to two successive Project Managers a total of 33 other experts and 2 short-term consultants served in various fields as detailed in Appendix I A.

The Project Manager assisted in preparing the planning of the Industrial Survey for the Sudan and in preparing the Five Years Plan.

2. Fellowships

Twelve local staff members of the Institute were trained abroad on UNDP fellowships. Training of 15 other professionals was financed by either the Government or through bilateral aid programmes. Training of local counterparts on the job was also accomplished, and was instrumental in strengthening their abilities to supply assistance to industry. Details on UNDP fellows are shown in Appendix I B.

3. Counterpart Staff

At the end of the project a total of 48 professional and 71 auxiliary counterpart staff were employed by the Institute. Some of the trained professional staff were assigned for various periods to a number of Government departments to undertake responsibilities in both national and regional projects in various capacities. In a few cases these assignments were of a permanent nature.

UNDP equipment amounting to a total cost of
and most of it received. The total
ment was US $ 150,000. A large amount of
from the contribution of the Government.
from UNDP funds are available with the

the UNDP and Government Contribution to the project
estimated at US $ 400,000 was allocated to the
. Income from the sale of publications, fees charged
chemical analysis, or otherwise were minor. The
expenditure was in paying the salaries of
. A smaller percentage was devoted to purchasing,
and maintaining project equipment, and in providing
ed services - electricity, transportation,
laboratory materials and others.

Programme and Advisory and Training Services

During the course of the project, the major activities of the Institute were concentrated in the following areas:

a) Feasibility Studies;
b) Chemical analysis and evaluation of products and raw materials;
c) Testing and quality control;
d) Standards and specifications;
e) Cost accounting;
f) Technical assistance to Industry;
g) Training.

Significant achievements were made in these areas leading in many cases to practical application by industry. These achievements include:

a) Feasibility Studies

A number of feasibility studies were completed for various projects, requested by either the Government or the private sector, with an estimated potential investment of US $ 71.5 million. Loans are under negotiation with some industrialised countries for some of the projects identified

and others are likely to be included in the 5 year [illegible]. Appendices II-A (1) and II-A (2) list the [illegible] were completed or started during the [illegible].

b) Chemical Analyses and Evaluations

A large number of chemical analyses and evaluations [illegible] and raw materials listed in Appendix II-B were completed for [illegible] Government and industry. Fees were charged for some of the [illegible].

c) Testing and Quality Control

The work done in this area is summarized in the [illegible] reports prepared for local industry and Government [illegible] in Appendix II-C. Some of the required tests were carried out in other laboratories more suitably located.

d) Standards and Specifications

Work in this area developed in the latter part of the [illegible]. A manual on the preparation of Standards Specifications [illegible] and almost fifty draft standards as listed in Appendix II-D [illegible]. Seventeen Technical Sub-committees representing producers, consumers, the Institute and the Ministry of Industry and Natural [illegible] have been formed and are holding periodic meetings to revise and finalize the preliminary draft standards.

e) Cost Accounting

Costing systems have been devised for various fields including canning, furniture, clothing and dairy. Under the "Organization and Promotion of Industrial Investment Act 1967", the Government is empowered to fix the selling prices on manufactured products. In this connection the Institute was requested to carry out investigations into costs of products at three factories and advise on the fixing of selling prices and is currently undertaking this work. Employees at the Ministry of Industry are also being trained and assisted in carrying out similar investigations.

f) Technical Assistance to Industry

The Institute undertook a large number of industrial sectorial evaluations to assist in identifying investment possibilities. This led to a considerable increase in interest within the private sector on investment possibilities, particularly at the latter part of the project. Some of the feasibility studies requested by industry have readily

[illegible] one of the projects accepted by the Government [illegible] from the Industrial Bank.

[illegible]

Several courses were given in various fields as detailed below:

(i) Quality control (15 hours) attended by 29 participants

(ii) Instrumental methods of analysis (15 hours) attended by 28 participants

(iii) Production engineering course (15 hours) attended by 26 participants

(iv) Project selection criteria (15 hours) attended by 25 participants

(v) Industrial cost accounting (three, 30 hours each) attended by a total of 85 participants

(vi) Chemical engineering (15 hours) attended by 25 participants.

IV - Assessment of Progress Achieved

The project, which encountered considerable difficulties in the first stage of its operation steadily improved since August 1966. The Institute evolved as an important technical arm of the Government for preparing major industrial feasibility studies, formulating industrial standards, conducting laboratory tests for quality control and determining "fair prices" for goods and services for private and public enterprises. It received the support of the Government including an annual budget of about US $ 400,000 and most of its services were utilised by the Government in its various departments and to a lesser degree by the private sector and has established contact with industry. The achievements of the Institute have been considerable since the beginning of 1967 - including the training of local counterparts both abroad and on the job. The project also co-operated with projects executed by other UN Specialised Agencies (ILO, FAO)

[illegible]

V - Re[illegible]

The project is now in Phase I of [illegible] of Operations has not yet been signed. It is expected that the activities in Phase II will result in:

(a) Contribution to the creation of new industries [illegible] means of identifying investment opportunities and preparing feasibility studies;

(b) Contribution to the standardization of processes, raw materials, components, equipment and finished goods in industry;

(c) Improvement in efficiency of enterprises and the quality of industrial output;

(d) Formation of a nucleus of national expertise in economic and technical investigations, consultancy work, and industrial technology;

(e) Introduction of cost accounting systems in important enterprises facilitating the determination of fair prices for their outputs.

In order to enable the Institute achieve the above mentioned targets, particular attention must be paid to the following:

a) [illegible] and Secretariat

It is advisable that the Board meets more regularly to review the work and progress of the Institute and play a more active role in establishing its policies.

The Government must undertake the necessary action to provide the Institute with a full-time Co-Director. The Board of the Institute should take a decision, in principle, on the transfer of staff from the Institute to the Ministry of Industry and Natural Resources. The training programmes of counterpart staff on the job must be strengthened.

b) Equipment

All the equipment ordered during Phase I should be installed, tried and put in good working conditions. Counterpart staff should also be trained to install, operate and maintain them.

c) Buildings

It is very essential that the Government undertakes all necessary efforts to ensure that the new buildings of the Institute are made available as soon as possible, preferably before mid 1972. Without the new buildings, some of the equipment purchased under Phase I would remain unused and most of that purchased under Phase II could not be made operational by the experts before the expiration of their contracts.

d) Activities

Most of the Institute's services during Phase I were being utilized by the Government and its various departments. While this is a clear indication of the contribution of the Institute to the public sector, direct involvement of the Institute in providing technical assistance to the private sector of industry should be increased in Phase II. In this connection, the public relations service of the Institute should be strengthened so as to make the Institute and its services better known. More attention should also be given to the industrial information and documentation section and more assistance directed towards those industries that employ a large portion of the working population. Projects connected with projects executed by other UN Specialized Agencies or organizations in Sudan, started in Phase I, should be continued.

APPENDICES

APPENDIX I

A - International Experts

	Expert (Nationality)	Date of assignment
1) Project Manager	a- Mr. Godwin (USA)	15-1-64 to 19-1-66
	b- Mr. El Halfawy (UAR)	20-3-66 to 30-6-69
2) Mechanical Testing Engineer	Mr. Shahwaa (UAR)	30-3-68 to 31-12-69
3) Analytical Chemist	a- Mr. Saper (Yugosl.)	30-1-67 to 29-1-68
	b- Mr. El Ghasouli (UAR)	1-9-66 to 31-12-69
4) Industrial Cost Accountant	a- Mr. Rodriguez (UK)	31-5-65 to 30-5-66
	b- Mr. Hillesley (UK)	14-4-66 to 31-12-69
5) Chemical Engineer	a- Mr Marek (Czech.)	23-3-67 to 22-3-68
	b- Mr. Kolchin (USSR)	12-12-68 to 11-12-69
6) Industrial Management	Mr. Lidstrom (USA)	18-10-65 to 17-10-67
7) Production Engineer	Mr. Smith (UK)	18-10-65 to 17-11-68
8) Short Term Consultants	a- Mr. Kamel (UAR)	7-1-68 to 6-3-68
	b- Mr. Grant (UK)	2 months

APPENDIX I (continued)

B - Fellowships

	Field	Participant (Host Country)	Man-Months
1)	Industrial Microbiology	Mr. Idris (USA)	1/29
2)	Mechanical Engineering	Mr. El Hussein (USA)	1/7
3)	Analytical Chemistry	Mr. El Madi (USA)	1/33
4)	Organic Chemistry	Mr. El Agib (UK)	1/24
5)	Chemical Engineering	Mr. Mustafa (UK)	1/12
6)	Chemical Engineer	a- Mr. Obed (UK) b- Mr. Ginawi (USA)	1/12 1/12
7)	Metallic Corrosion	Mr. Nour (UK)	1/15
8)	Production Engineer	Mr. Abdu (Netherl.UK)	1/12
9)	Pulp and Paper Workshop Management	a- Mr. Abdel-Ratah (UK) b- Mr. Baracca (Italy)	1/12 1/12
10)	P. M. Meeting	Mr. Soliman (Vienna)	1 week

APPENDIX II

A (i) - List of Feasibility Studies completed

(1) Nitrogen fertilizer (urea) plant with a capacity of 170,000 tons p.a.

(2) Tannery with a capacity of 150,000 hides and 450,000 pickled sheep skins p.a.

Loan facilities for (i) and (ii) have been granted by the Government of Czechoslovakia. Tenders for (ii) have been received from a number of countries and are at present under consideration.

(3) Grey iron foundry with an output of 1200 tons p.a. of castings varying from ¼ lb. to 50 lb.

(4) Asbestos cement sheet and pipe factory with a capacity of 5600 tons p.a. of sheeting, 3,300,000 ft. of piping p.a.

(5) Castor oil factory to produce 2250 tons of oil and 2750 tons of cake p.a.

(6) Starch and glucose production from durra with an output of 7500 tons per year.

(7) Growing of kenaf and use of fibres for production of cooking to the extent of 5000 tons p.a. Further growing trials are necessary before the project should proceed.

(8) Tomato paste and dehydrate onion factory. This feasibility study was conducted in conjunction with the Food Processing and Research Centre covering a number of potential production units.

(9) Plywood, an initial survey has been carried out to be followed by an intensive feasibility study.

Items (1) to (9) are all likely to be included in the new 5 year development plan, with the possible exception of (1) where the magnitude of expenditure is high in relation to the total allowed in the plan.

(10) Wrapping paper mill based on bagasse.

(11) Textile dyeing and finishing factory with a capacity of 3500 tons p.a. of bleached, dyed and printed fibres.

(12) Bicycle tyres and tubes factory with a capacity of 100,000 tyres and 200,000 tubes p.a.

(13) Cottonseed oil factory to produce 1500 tons p.a. of oil and 2000 tons of cake.

APPENDIX II (continued)

A (i) - Feasibility Studies Completed (continued)

(14) Dinner and sanitary ware factory with an output of 1400 tons p.a.

• (15) Extension to a spinning and weaving factory.

(16) Peanut processing plant with an output of 16,650 tons p.a. of oil and 19,350 tons of cake.

• (17) Laundry soap factory to produce 2400 tons of soap p.a.

(18) Motor car tyres.

(19) Glue from bones with a capacity of 150 to 200 tons p.a.

(20) Small horse power electric motors to produce 1500 units p.a.

• (21) Silica lime bricks.

• (22) Electric switch, fuse boxes, fluorescent lamp fittings.

• (23) Cold store plant with a capacity of 300 tons of fruit and vegetables.

• (24) Animal feed to produce 12,500 tons p.a.

• (25) Biscuit with a capacity of 1500 tons p.a.

• (26) Continuous method of refining cotton seed oil.

• Studies requested by private sector where capital available either in part or in whole.

Item (16) requested by the Agricultural Bank.

APPENDIX II (continued)

A (ii) List of Feasibility Studies started:

1) Nuts, screws and washers
2) Certain types of building hardware
3) Blankets
*4) Pelletising of animal fodder
*5) Pickled sheep skins
*6) Canning and dehydrating of fruits and vegetables
*7) Spinning of threads
*8) Iron foundry
*9) Enamelled tubes
*10) Improvement of retting methods and mechanisation of traditional rope manufacture
*11) Dry batteries
12) Upgrading of gum arabic through spray drying
*13) Solvent extraction of vegetable oil products
14) Setting up a glue and gelatine unit at the Government Tannery
15) Insecticide production in the Sudan

* Requested by the Private Sector and most of the capital requirements are readily available.

APPENDIX I. [illegible]

B - List [illegible]

1) [illegible]
2) [illegible]
3) [illegible]
4) [illegible]
5) [illegible]
6) [illegible]
7) [illegible]
8) [illegible]
9) [illegible]
10) [illegible]
11) [illegible]
12) [illegible]
13) [illegible]
14) [illegible]
15) [illegible]
16) [illegible]
17) [illegible]
18) [illegible]
19) [illegible]
20) [illegible]

APPENDIX II (continued)

B - List of Chemical Analyses and Evaluations (continued)

23) Chemical analysis of locally available earth colouring pigments and two imported samples;

25) Analysis of locally available sand sample and its possible use as raw material for producing colourless glass;

24) Full analysis of locally available talc samples;

25) Determination of iron content in quarts samples;

26) Tin-plates scraps- analysis and possible uses;

27) Determination of elemental sulphur in a rock sample;

28) Analysis of locally available lime stone samples intended to be used in glass industry;

29) Analysis of local ores expected to be iron or manganese ores;

30) Assessment of quality for locally produced toilet soaps;

31) Analysis of acetyl salicylic acid samples to confirm that they are conforming to the specifications;

32) Analysis of samples intended to be used as raw materials for a lime factory;

33) Analysis of pyroclean and benderite cleaner;

34) Analysis of potassium Chlorate samples to assess the degree of damage due to contamination with sea water;

35) Endurance of two rubber samples during a parkerising process;

36) Analysis of glue samples;

37) Moisture content in wood board samples

38) Analysis of cottonseed, cottonseed cake and cottonseed oils;

39) Properties and suitability for use of locally manufactured safety matches;

40) Analysis of soap flakes;

41) Analysis of laundry and carbolic soaps offered in a government call for tender;

42) Analysis of sodium chloride sample used in preserving raw hides;

43) Determination of rubber in vulcanised rubber samples;

44) Determination of melting point of paraffin wax samples;

45) Full analysis of locally manufactured laundry, carbolic and toilet soap, for the preparation of standard specifications;

46) Testing of canteen cooperate handles to verify whether they are galvanised or not.

APPENDIX II (continued)

C - List of Reports on Testing and Quality Control Work

The following technical reports have been prepared for [illegible] industry and government departments:-

1. United Plastic Industries Ltd.

A report on tests carried out on samples of polythene tubing manufactured by this company for [illegible] supply piping.

2. Khartoum Refinery

Calibration and adjustment of the Blaine air permeability surface area measuring machine at the Khartoum Refinery.

3. El Khelin Electric and Plastics Industry Co.

a) A report on the possibility of issuing a test certificate for electric ceiling fans, assembled and partly manufactured locally.

b) A report on equipment required for testing electric ceiling fans.

c) A test report on the suspension system and fan blades of ceiling fans manufactured by the company.

d) A report on a new type of shackle and downrod for electric ceiling fans manufactured by the company.

4. Arona Cardboard Factory

A report giving the specifications for the necessary equipment to establish a qualit control system for the factory.

5. Reynolds Aluminium Rolling & Spinning Mills Ltd.

A report on aluminium circles supplied to the factory by Gellatly Co. Ltd. and by Alcan S.A. Zurich.

6. The Organisation for Standard Specifications

a) A report on the use of the metric system in the Sudan

b) A report on standardisation

7. Sponge, Rubber and Leather Products Factory

A report on rubber sheets for making rubber beach sandals.

8. Hassan A. Aboughaleb and Co.

A report on the physical properties of bentonite clay.

APPENDIX II (continued)

[illegible] and Quality Control Work

[illegible] Steel Products Ltd.

[illegible] production of corrugated steel

[illegible].

[illegible] of the physical and mechanical properties of [illegible].

[illegible] Clothing and Equipment

[illegible] rubber soles for police sandals

[illegible] the specifications for acceptance of [illegible] Police Boots.

APPENDIX II (continued)

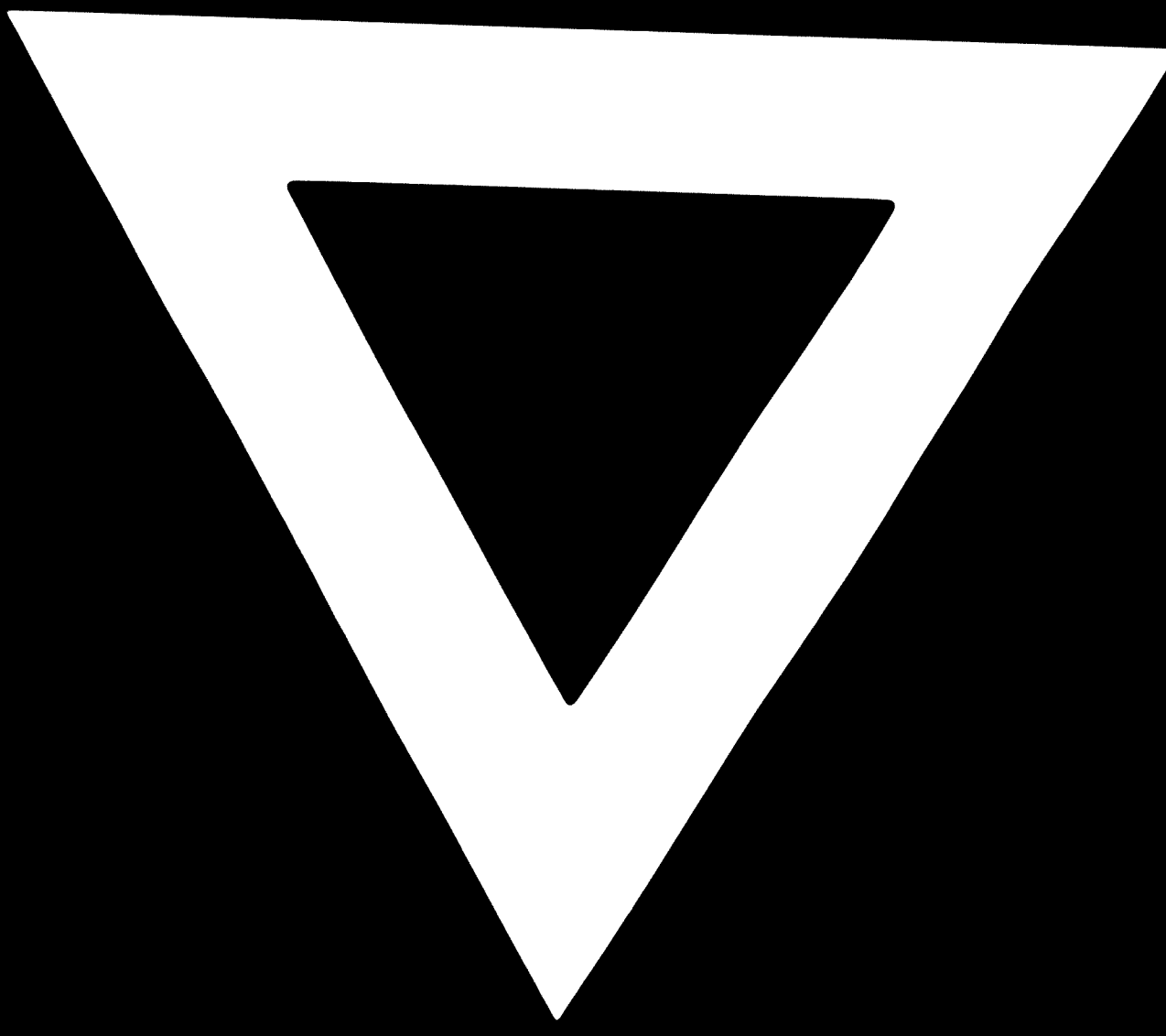
B - List of Sudanese Standards

1) Steel furniture for office use;
2) Methods for sampling and testing for soaps;
3) Alcohol (Ethyl)
4) Hydrogenated oils;
5) Evaporative air coolers;
6) Safety matches;
7) Aluminium paint for general purposes;
8) Distemper;
9) Animal glue;
10) Quick lime and hydrated lime for chemical industries;
11) Methods for tensile testing of metals;
12) Ordinary, rapid-hardening, low heat and sulphate resisting Portland cement;
13) Methods of sampling and test for quick lime and hydrated lime;
14) Methods of test for ready mixed paint and enamels;
15) Ready mixed paints and enamels for use on wood;
16) Methods of test for varnishes and lacquers;
17) Ready mixed paint, red oxide-zinc chrome, priming;
18) Dissolved acetylene (gas)
19) Compressed oxygen gas;
20) Method of Brinell hardness test;
21) Method for Vickers hardness test;
22) Liquid driers for oil paints;
23) White spirit;
24) Low-heat portland cement for iron and steel;
25) Method for Rockwell hardness test;
26) Linseed oils;
27) Boiled linseed oil for use in paints;
28) Raw linseed oil for use in paints;
29) Turpentine;
30) Methods for determination of cotton fibres

APPENDIX II (continued)

D - List of Indian Standards (continued)

31) Polythene pipe (type 32) for cold water services;
32) Laundry soap;
33) Toilet soap;
34) Carbolic soap;
35) Motor gasoline;
36) Aluminium paste for paints;
37) Varnish medium for aluminium paint;
38) Method of determination of Micronaire value of cotton fibres;
39) Method of test for oil paste for paints;
40) Alcohol (medicinal)
41) Methods of chemical analysis of aluminium and its alloys;
42) Method of test of cotton fibre maturity;
43) Automotive gasoil;
44) Fuel oil;
45) Raw milk;



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