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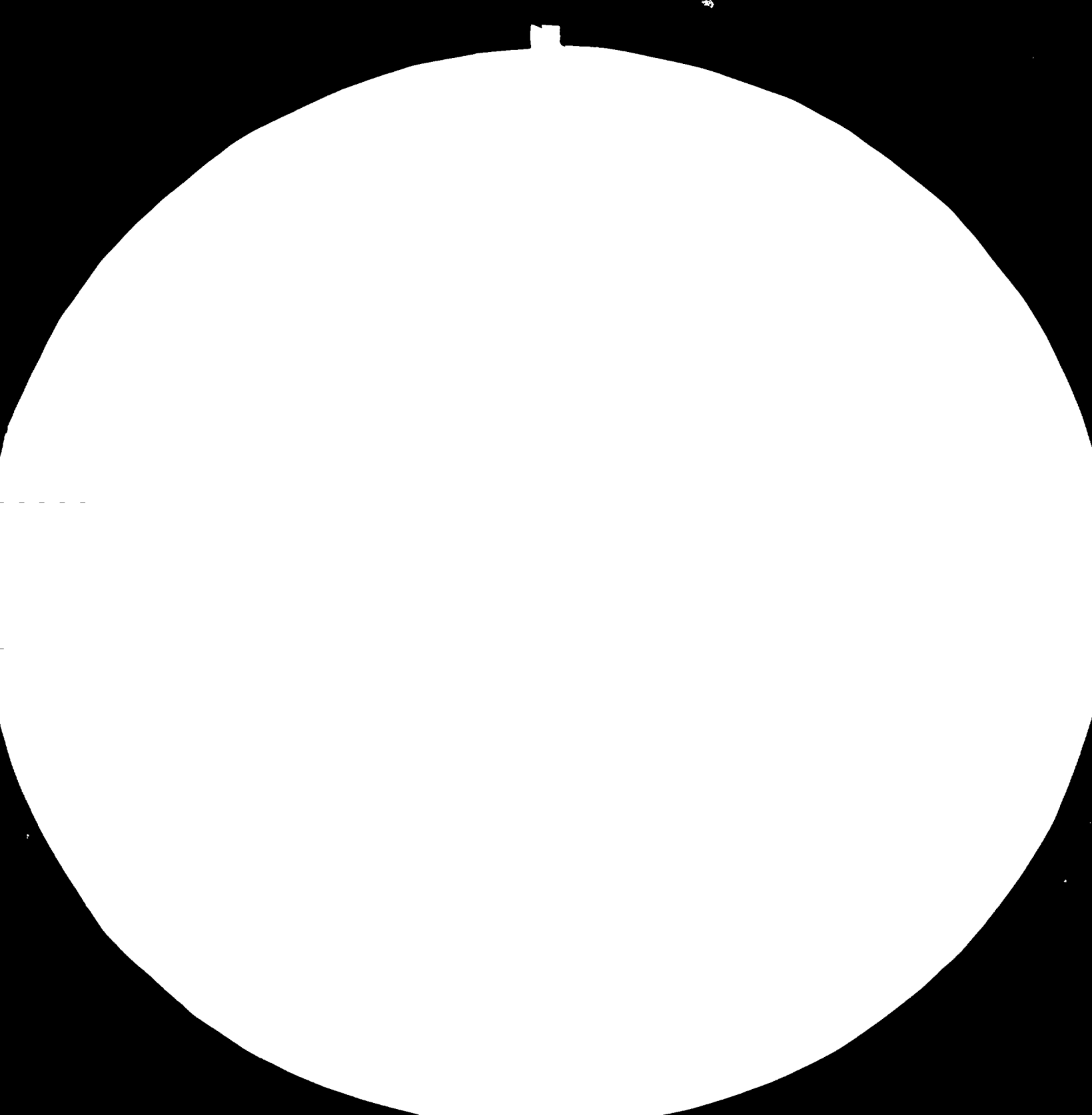
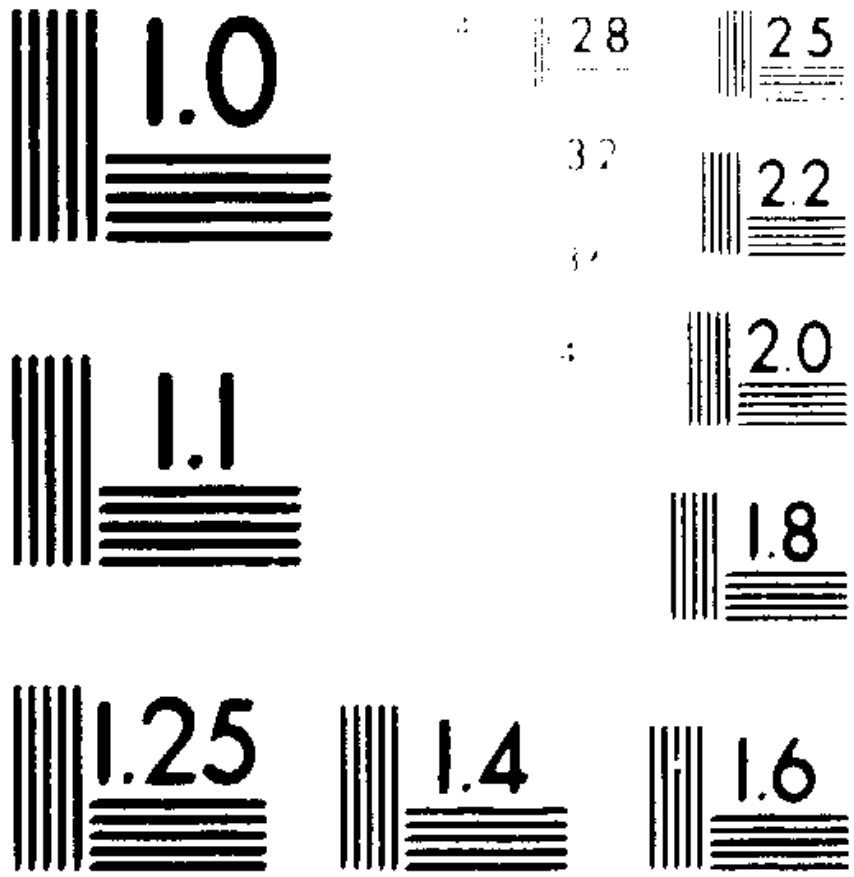
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org





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1983

Jamaica.

REPORT ON THE INSTALLATION/COMMISSIONING AND TRAINING ON THE GAMMA RAY SETTLER AT ALUTERV-FKI AND J.B.I.

W. Wallen-Bryan

INTRODUCTION

The SAM Soft Gamma Ray Absorption Model Settler was designed to obtain the real settling parameters of hydrometallurgical suspensions. That is the characterization of solid/liquid separation.

The SAM was developed on the basis of the theory of settling, radiometric properties of solid and liquid phases, particularly taking into account the dynamic behaviour of the settling process. The SAM ordered by UNIDO for JBI was designed with the aim to have measuring parameters to meet the requirements of red mud settling investigations of the alumina industry. With the use of the SAM, data can be obtain for full characterization of different red muds which can be directly related to the design of commercial scale settlers. This equipment in conjunction with X-Ray, DTG, wet chemical analysis and SEM provides information on bauxites required by the bauxite/alumina industry.

1. TRAINING IN HUNGARY

For the utilization of all benefits offered by SAM properly trained scientific staff is needed.

In period of 15.6-30.9.1982 two experts Mr. Worrel Lyew-You and Mr. George Wright from the JBI took part on a training course in ALUTERV-FKI Budapest, Hungary. The program covered characterization and technological evaluation of bauxites and red muds. The main task of the training was to give the theoretical background of settling and radiometry, carry out investigations and evaluate the obtained data. The training course had been satisfactorily completed. The preliminary copy of the know-how manual was handed over at that time.

2. DELIVERY OF EQUIPMENT

Hardware

- Mechanical unit containig the double walled settling tube, motor drive, frame, radiation source Americium-241 of 18.8 GBq activity, scintillation

detector, thermostat, thermic paper, printer paper, 4 sets tape cartridge containing SAM program pac, tools for maintenance.

- Electrical and electronic units. Transformer, power unit, motor control, Intelligent Measuring Controller (IMC).
- HP-85 computer with interface and external pointer.

Software

- Know-how, Owners Manual, Hardware/Software Reference Manual (Three sets each. One extra set posted to JBI in February 1983). Thermostat Manual, HP-85 Manuals, Technical description of scintillation detector.

Spare Parts

- Scintillation detector, pumps and heater for thermostate, double-walled settling tube.

Aluterv-FKI is prepared to supply any additional spare parts as ordered by JBI within 5 years.

3. INSTALLATION

The equipment was installed within one week (21-25 March) and minor repairs were made to equipment which had been damaged during transportation with the help of JBI personnel.

- Electricl connections were made taking into account the present power capabilities of the JBI. However a transformer has been supplied and installed which will enable conversion to the new power facilities which will be acquired by the JBI. Instruction for rewiring were given.
- The present space and facilities are suitable for handling encapsulated isotopes only. (Further improvement needed in the event that open isotopes are used in the future).

4. SAFETY REGULATIONS

The designated users of the equipment were instructed in the proper procedures for handling the isotopes and for monitoring the exposure of personnel to radiation.

Only authorised persons should be allowed in the radio-isotope laboratory which should be considered OFF-LIMITS and so indicated by proper posting of the international radiation symbol.

5. COMMISSIONING

Three (3) bauxites were selected for investigation under different digestion conditions and dosages of flocculants.

The composition of these bauxites were as follows:

	Al_2O_3	SiO_2	Fe_2O_3	TiO_2	P_2O_5	H/G	HP-85 Program Code #	Remarks
#(1)	47.81	1.55	18.75	2.42	0.53	2/98	(002 (004	
#(2)	46.79	0.73	22.56	2.5	0.50	3/97	006	This determination is documented in the appended reports.
#(3)	48.54	5.32	17.85	2.42	0.16	65/35	007	

The following data were obtained:

- Concentration profiles giving concentration as a function of height in the settling column.
- Flux Diagrams giving solid-flux (Kg/m^2h) as a function of solid concentration.
- Conventional Settling Curve giving mud-level as a function of time.

As a product of the above the following information was also obtained:

Stokes velocity of settling species (agglomerates, flocs.)
Diameter " " "
Solvation coefficient " "
Degree of flocculation
Occurrence of segregation
Migration of layers of specific concentration

From the limiting flux data - loadability curves giving specific loadability as a function of discharge solids concentrations can be plotted.

This is directly applicable to the design of commercial scale settlers and to characterize flocculant for existing settlers.

(See attached computer print-out and plotted flux-diagram and loadability curve as an example for #2 bauxite digested at 230°C for 40 minutes with 2.5% CaO added. Settled with 4.4 Kg starch/ton (dried red mud).)

6. TRAINING IN JAMAICA

Four (4) appointees, W. Lyew-You, G. Wright. P. Harris, W. Wallen-Bryan from the JBI were given a training course as outlined in the accompanying programme.

Each appointee carried out a complete investigation during the training programme.

Both sides are satisfied that the three (3) weeks training programme provided sufficient information for the proper operation of the equipment and evaluation of the data generated.

The JBI team is now competent to design and implement investigations and to evaluate the data obtained.

7. RECOMMENDATIONS

(a) A voltage stabilizer will be needed because the long-term voltage fluctuations experienced in Jamaica do affect significantly the the measured intensities which form the basis of the entire evaluation.

(b) It is recommended that an independent staff member should be made responsible for observing safety regulations including monitoring of the movement of personnel in and out of the laboratory

(c) Computer Accessories to be ordered:

5 rolls of thermic paper
4 packs of printing paper
10 data cartridges

As the Absorption Model Settler should be an integral part of the technological evaluation of bauxite by the Process Laboratory and Pilot Plant complex it is recommended that the following research programme be undertaken in order to gain proper experience.

(i) A fully characterised bauxite should be chosen and digestion carried out under standard conditions using different flocculants (e.g. strach, synthetic flocculants) for the determination of optimum flocculant doses and comparisons of the effectiveness of each flocculant.

(ii) The varied types of Jamaican bauxites should be selected for investigation in order to determine the settling properties of the derived muds as a function of mineralogical compositions, morphology and digestion parameters.

(iii) Based on the data obtained in the laboratory investigation the Pilot Plant can be operated under the conditions determined.

Signed by:

W. Wallen-Bryan ..... 8·4·83
W. Wallen-Bryan - JBI — Date

..... 5. 4. 83
C. Douglas - UNIDO — Date

..... 08.04.83.
T. Turmezey - ALUTERV-FKI — Date