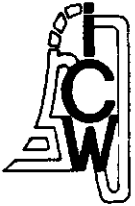


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**ACID SULPHATE SOILS, MODELLING OF PHYSICAL AND CHEMICAL
PROCESSES**

**Report on a laboratory installation and
In-service training mission to South-Kalimantan**

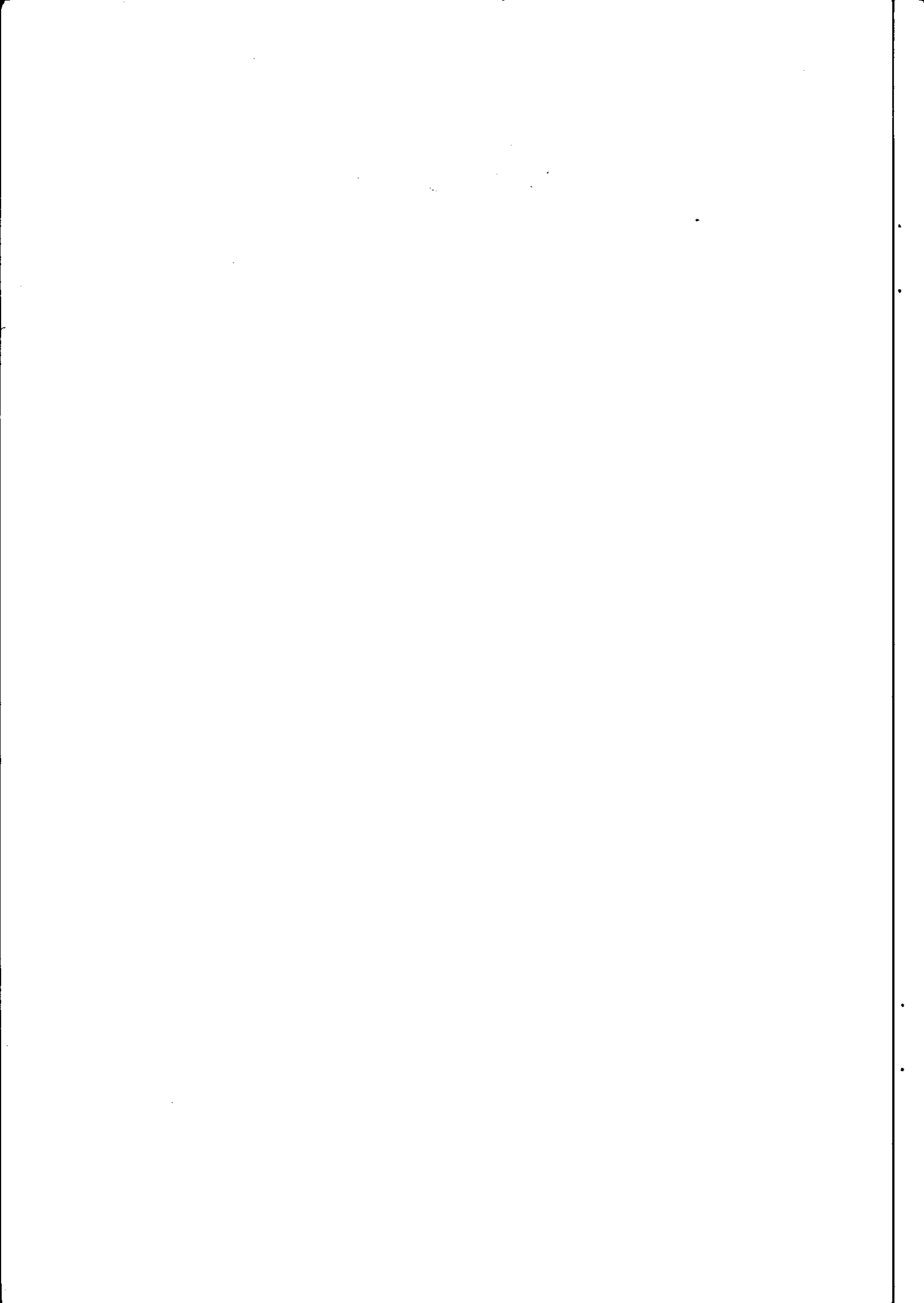
A. van den Toorn



Nota's (Notes) of the Institute are a means of internal communication and not a publication. As such their contents vary strongly, from a simple presentation of data to a discussion of preliminary research results with tentative conclusions. Some notes are confidential and not available to third parties if indicated as such

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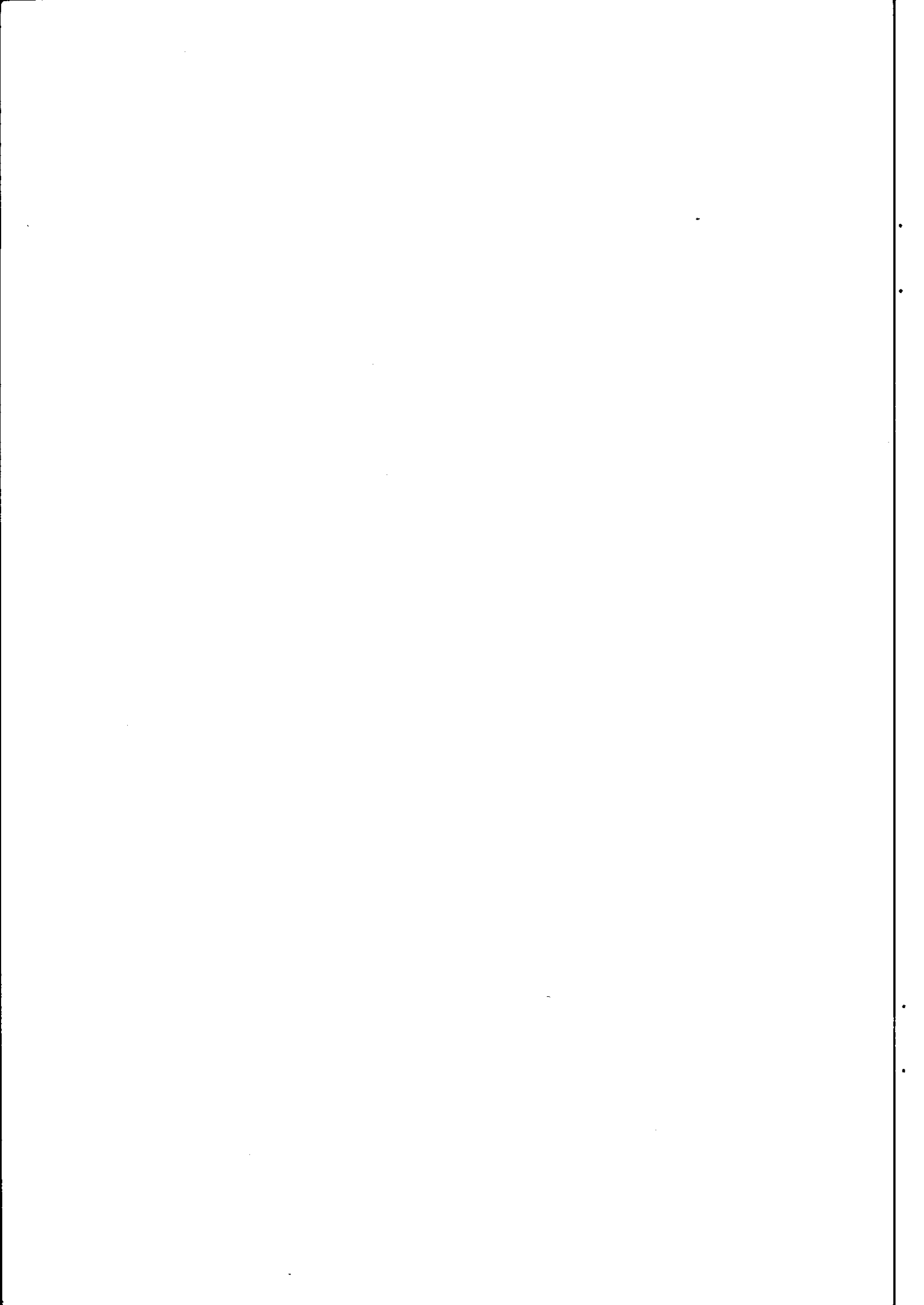
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1. INTRODUCTION

At 1 October 1987 the joint Dutch-Indonesian research program was started. In order to study the basic and chemical processes in acid sulphate soils column experiments will be used.

Water of the column experiments has to be analysed for a great number of specifications and anions.

In order to meet the specific requirements of the laboratory needed by the acid sulphate soil research project, a mission has been undertaken from half March till half April 1988 to install supplemental equipment. An inservice training was also given to the laboratory staff.

Much help was got from Ing. A. Hamming, Euroconsult and Mr. Supardi Suping, CSR Bogor. Debt of gratitude is owed to the local staff of BARIF for their cooperation and hospitality.

2. MEASUREMENTS

In order to study the chemical processes in the columns, several chemical measurements have to be carried out.

Chosen methods are methods which are proved to be reliable. Because it is difficult to repair instruments immediately at Kalimantan, for each method also an alternative method is installed, to be sure that the laboratory could work in all circumstances. The measurements, the used instruments, the principle of measurement and the alternative way is given in Table 1.

Table 1. Methods of the chemical laboratory

Parameter	Instrument	Principle
pH	pH meter	electrode
Conductivity	conductivity meter	electrode
Chloride	mV meter	titration/electrode
Carbonate	pH meter	titration/electrode
Bicarbonate	pH-meter	titration/electrode
Nitrate	spectrophotometer	color development
Sulphate	spectrophotometer	color development
Sodium	flamephotometer	atomic emission
Potassium	flamephotometer	atomic emission
Magnesium	AAS	atomic absorbtion
Calcium	AAS	atomic absorbtion
Iron	AAS	atomic absorbtion
Manganese	AAS	atomic absorbtion
Aluminium	spectrophotometer	color development

Parameter	Alternative way	Principle
pH	pH paper	color development
Chloride	digital buret	titration/color
Carbonate	digital buret	titration/color
Bicarbonate	digital buret	titration/color
Sodium	AAS	atomic absorbtion
Potassium	AAS	atomic absorbtion
Calcium	digital buret	titration/color
Magnesium	digital buret	titration/color
Nitrate	colorimetric*	color development
Sulphate	colorimetric*	color development
Aluminium	colorimetric*	color development

*Visual comparison with the standard series

This is a less accurate method

3. LAB FACILITIES

The lab facilities at BARIF did not satisfy completely the specific requirements of the project. Therefore the following instruments and goods are bought in Holland and send to Indonesia.

- 1 Atomic absorbtion spectrophotometer
- 1 Spectrophotometer
- 1 pH meter
- 1 Conductivity meter
- 4 Diluting systems
- 1 Line conditioner
- 1 Oil free compressor
- 3 Digital burets
- 1 Waterbath
- 2 Waterdestillation units
- 1 Freeze drier

Chemicals, necessary for the measurements were bought on the spot by Mr. A. Hamming.

4 . INSTALLATION

The first idea of installation was to extend the existing laboratory to carry out all measurements at one place. However, the existing lab was already very crowded and an other laboratory had to be set up. After some discussions with the local staff a suitable room was found in the agronomic section and could be used to install the lab equipment for the modelling component. First a wall had to be built in the middle, which was carried out by a local carpenter. After installation of the lineconditioner, which was necessary to keep the current stable 220 V, 50 Hz, it turned out that the electric wiring was fused too low. It was not possible to get more than 1 KW.

A new wiring plan, was made and carried out together with a local supplier. Also the water supply and the waterdrains had to be renewed. After all the technical supply was found in good order a start was made to install all equipment. A difficulty was that all the goods from Holland were repacked in Jakarta because the boxes which were used were to big for the local plane from Jakarta to Banjarmasin. For instance, the parts of the atomic absorbtion spectrophotometer were repacked in 12 different boxes, which made it very difficult to recombine the instrument.

During the installation much help was got from Ing. A. Hamming, logistic and scientific officer, Euroconsult and Mr. Supardi Suping from CSR Bogor. Also much help was got from the other members joining the acid sulphate soil research project.

5. RECOMMENDATIONS AND CONCLUSIONS

- Instruments sent to BARIF must be packed in boxes which fit in a DC 9 otherwise repacking in Jakarta is necessary.
- Most of the methods introduced in BARIF were new for the laboratory staff. It is necessary to evaluate these methods after one season of measuring.
- For good results for the modelling component, a good cooperation is necessary between the person responsible for the running columns experiments and the one responsible for the chemical measurements.
- Subjects which could not be discussed during the mission, but very important for a good quality of the laboratory measurements are:
 - maintenance of instrumentation;
 - quality control (Good Laboratory Practice)
 - theoretical background of methods.
- The laboratory staff was very interested in the inservice training and the measurement techniques. It is my impression that they should appreciate a further training to improve their theoretical background.
- It was found very useful by starting up the laboratory that Ing. Hamming was present at BARIF. With his scientific and logistic support it was possible to finish the work during the intended period.
- It was found to be very useful to have a manual for the laboratory in Bahasa Indonesia.

APPENDIX

PROGRAM

- 21.03-22.03 - Flight Amsterdam-Jakarta.
- 23.03 - Visit eurosconsult to get ticket Jakarta-Banjarmasin.
Flight Jakarta-Banjarmasin.
Picked from plane by Mr. A. Hamming.
- 24.03 - Visit BARIF.
Made acquaintance with Ir. Hairunsyah and Mr. Sagrani.
Unpacking first boxes. Inspection of existing lab and discussion about room for new laboratory.
- 25.03 - Made acquaintance with Ir. Muhrisal and Ir. R. Kselik.
Discussion about lab staffing Participants: Ir. R. Kselik, Drs. J. Jansen, Ing. A. Hamming and A. van den Toorn.
- 26.03 - Made acquaintance with Mr. Supardi Suping, the counterpart of CSR Bogor. Building up the first part of the atomic spectrophotometer.
- 28.03 - Unpacking new arrived boxes.
Discussion about staffing of the lab, amount of samples and amount of glassware for the survey component. Appointment made with Mr. Hamming and Mr. Hanlan, a local carpenter, about placing a new wall in the agronomic lab section.
- 29.03 - Start building wall.
Discussion with Mr. Supardi Suping and Ir. Hairunsyah about amount of samples and glassware for the survey component and the amount of chemicals and instruments.
- 30.03 - Discussion with Mr. Hamming and Mr. Hanlan about technical installation and new electric wiring. Discussion with Ir. Hairunsyah about measurements of soil for the survey component.
Till now 5 of the 15 boxes have been arrived.

- 31.03 - Installation of instruments for the chloride and conductivity measurements.
Another box arrived with among other things the compressor and test tubemixer.
It was necessary to make some adaption to the compressor which was done by Mr. Hanlan.
- 01.04 - Appointments made about placing bars for the windows and the door. Testing out the methods for bicarbonate, chloride and conductivity. Made standard solutions for several measurements.
- 04.04 - Installation of the Vapodest and Kjeldahl equipment in the other lab for the survey component.
Discussions with Mr. Supardi Suping and Ir. Muhrisal to improve the ventilation of the acid rooms.
Discussion with Drs. J. Jansen continuation of the stay of Mr. Supardi Suping after April 1988.
- 05.04 - Inspection of the flame photometer.
Discussions about earthing the flame photometer to provide forming of statical electricity.
Made stock solutions of Na, K, Ca, Mg, Fe and Mn. Discussion with Mr. Hamming and Mr. Hanlan about reduces for acethylene and air.
- 06.04 - Aluminium measurement completed.
Discussion with Ing. Hamming about placing an air conditioner in the lab.
Discussion with Ir. Muhrisal and other members from the survey component about the right use of the field pH meters and about using calibration lists.
- 07.04 - Electric wiring is finished. Also the technical part of the atomic absorbtion spectrophotometer. Made acquaintance with Mr. I. Gusti Made Subiksa from CSR. He will join the insert-vice training from next week, but will leave again after the training to West-Sumatra.

