

3 0 4

8 1 R U

ION  
CT

COORDINATION AND  
INFORMATION CENTER

Operated by CDM FIVE  
for the U.S. Agency  
for International Development

1611 N. Kent Street, Room 1002  
Arlington, Virginia 22209 USA

Telephone: (703) 243-8200  
Telex No. WUI 64552  
Cable Address WASHAID

# RURAL SANITATION AND MANPOWER DEVELOPMENT PROJECT (RSMD)

## The Development of Appropriate Technology and the Improvement of Curricula for Training of Sanitarians

### WASH FIELD REPORT NO. 10<sup>6</sup>

7 March, 1981

LIBRARY  
International Reference Centre  
for Community Water Sup.

Submitted To:  
Phillip Smart, Public Health Advisor  
USAID Mission, Jakarta, Indonesia

Contract No. AID/DSPE-C-0080

Project No. 931-1176

CDM FIVE is operated by  
Camp Dresser and McKee  
Incorporated; Principal Col-  
laborators: Center for Educa-  
tional Development in  
Health, Boston University;  
International Science and  
Technology Institute; Re-  
search Triangle Institute;  
University of North Carolina  
at Chapel Hill.

304-81RU-2774

1135

827  
10 81

INDONESIA  
RURAL SANITATION AND MANPOWER DEVELOPMENT PROJECT  
The Development of Appropriate Technology  
and the  
Improvement of Curricula for Training of Sanitarians

Prepared for USAID Mission Indonesia  
Under Order of Technical Direction No. 25

Prepared by:  
Robert A. Gearheart, Ph.D.  
and  
Clarence E. Calbert, Dr.P.H.  
March 7, 1981

Contract No. AID/DSPE-C-0080

Project No. 931-1176

LIBRARY  
International Reference Centre  
for Community Water Supply

LIBRARY, INTERNATIONAL REFERENCE  
CENTRE FOR COMMUNITY WATER SUPPLY  
AND SANITATION (IRC)  
P.O. Box 93190, 2509 AD The Hague  
Tel. (070) 814911 ext. 141/142  
RN: 15N 2774  
LO: 304 81RU

## TABLE OF CONTENTS

	<u>Page</u>
Acknowledgements.....	ii
Introduction	
Technological Factors.....	1
Community Factors.....	1
Background.....	2
Workshop Summary	
Group A - Proceedings.....	4
Group B - Proceedings.....	5
Appropriate Technology Development.....	7
Coordination of Appropriate Technology in Indonesia	7
Research Proposals from RSMD Project.....	11
Recommendations.....	13
Appendices	
A. Water and Sanitation for Health Project Order of Technical Direction #25.....	15
B. Results of Discussion of Group I.....	16
C. Development of Technology Through Institutions for Sanitation Education.....	17
Figures	
1. Example of Problem Identification Matrix for Two Areas of Interest.....	8
2. Example of a Coordination and Implementation Matrix Applied to Technological Development.....	9

## ACKNOWLEDGEMENTS

The writers wish to acknowledge with indebtedness and appreciation the professional assistance and personal courtesies extended during the course of this assignment by Mr. Phillip Smart, Public Health Advisor at the USAID mission in Jakarta.

Special thanks are also given to Mrs. Helen Exawirya, Program Assistant in the Office of Health and Nutrition USAID, for her invaluable assistance as interpreter during the Workshop sessions as well as sharing her knowledge of the intricacies of the RSMD Project and the structure and functions of the Ministry of Health.

Finally, the writers extend their sincere appreciation to officials of the Government of Indonesia Ministry of Health who with courtesy, patience and understanding helped us to complete our assignment with apparent success.

## INTRODUCTION

Safe drinking water and effective waste disposal in Indonesia is a desirable goal with identifiable objectives to insure maximum individual potential, community development, and economic development. This goal was developed and presented at the workshop in Batu in support of the goals of the Water Decade for the "80's". The problem in Indonesia is being addressed on many fronts and by a variety of professional health disciplines in various Ministries within the government. As it stands today, the following factors have been observed and identified as constraining action plans which need to be overcome to insure successful programs.

### Technological Factors

1. Lack of appropriate technological alternatives.
2. Degree of difficulty associated with operating and maintaining water and wastewater treatment systems.
3. Lack of maintenance and repair programs.
4. Lack of management systems to supply parts, chemicals, supplies, etc.
5. Lack of a suitable organization, especially in rural areas for implementing a water and sanitation program.
6. Lack of trained manpower.

### Community Factors

1. Lack of awareness of the relationship between safe drinking water and excreta disposal and community health.
2. Community apathy in resolving problems.
3. Socio-cultural factors resulting in non-acceptance of solutions or as barriers to technology transfer penetration.
4. Economic limitation - capital cost and maintenance cost.

## BACKGROUND

A cable was received January 28, 1981 from USAID/Indonesia requesting technical assistance in certain aspects of their Rural Sanitation and Manpower Development Project. The WASH Contractor responded within two weeks by sending two consultants with backgrounds in technology development and training. These consultants spent approximately 30 person-days collectively participating in a workshop in Batu, East Java and consulting with USAID personnel and Indonesian counterparts in Jakarta. Mr. Phil Smart of AID-Indonesia was the principal contact within the Mission and assisted the team greatly in meeting with counterparts, arranging appointments, and assisting directly and indirectly with translations of material. The scope of work in the OTD-25 is outlined below:

1. Presentation at workshop of latest water supply and sanitation appropriate technology alternatives. This includes the development and adaptation of simple low-cost effective technologies.
2. Formulation and servicing of plans for technological research and development.
3. Consultation with groups of individuals engaged in work related to the development of systems and practices for effective wide-scale application of appropriate techniques and methods.
4. Consultation on incorporating recent techniques and methods into the training of sanitation personnel, specifically for the training of trainers.
5. Consultation on curriculum development for in-service training and/or retraining of existing sanitation personnel.
6. Review and comment on approximately 12 proposals for research already submitted by RSMD staff in Regional Centers.
7. Input on planning and conduct of future workshops, conferences and seminars on water supply and sanitation.
8. Consultation and advice on integration of elements of the University of Hawaii curricula and educational materials, as requested by the government of Indonesia staff.

Upon advice from the U.S. AID Mission in Indonesia the last two items in the scope of work were omitted by the consultants.

The workshop was held in Batu-Malang, a city in East Java, a resort area located in the mountainous and volcanic region of this most populous island of the Indonesian Archipelago. The participants numbering approximately 70 persons were representative of many of the islands comprising the country of Indonesia. Also in attendance were high officials of the Ministry of Health, Government of Indonesia, and Consultants from the WHO and UNICEF.

The Workshop was structured into two discussion groups following a plenary session which set out the objectives of the conference.

## THE WORKSHOP SUMMARY

### Group A - Curriculum Development for Training of Sanitarians

The participants in the Workshop spent considerable time discussing the training of Sanitarians, a category of workers responsible for promoting water supply and sanitation programs. Discussion topics included solid waste, and garbage disposal, rodent control, and food sanitation. Because of a shortage of personnel, the Ministry of Health plans to embark on a program that will train new sanitarians and retrain existing sanitarians.

One of the main purposes of this Workshop was to determine basic training needs and to develop a curriculum to meet those needs. The details of curriculum content and a summary of the proceedings of this conference are shown in Appendix II and III, as translated from the Bahasa Indonesian into English.

The consultants in attempting to strengthen the training program and to augment the development of Sanitarian manpower suggested that before actually developing the curriculum the planners should direct their attention to the following categories of effort:

- (a) Perform initial assessments - an inventory of personnel profiles on all encumbered positions. This body of data should be developed concerning the personal characteristics of the present work force relative to such factors as age, education levels, specialized training, experience, and attrition rates. This information would enable planners to determine what skills and levels of competence are present and lacking in terms of current and future program requirements. This activity should be developed for continuity of response to changing program needs.
- (b) Carry out task analyses. The end product of this activity would provide more accurate reflection of actual job requirements. It would also provide a realistic base for planning training or career development programs for current employees.
- (c) Plan for special skills development - identification of special training needs including long-term or short-term technical training, a part of which may have to be out of the country.
- (d) Establish policies necessary to accomplish the goals and objectives of the training program.



- (e) Develop and maintain effective liaison with other government and private agencies in conducting supporting and promoting research on problems of manpower recruitment, training and utilization in the sanitation field.
- (f) Develop interrelationships among educational institutions which will facilitate the training, retraining or utilization of sanitarians.
- (g) Evaluate new or improved teaching methods or curricula.
- (h) Evaluate new types of sanitation personnel who could work in subordinate roles to the professional sanitarian. These sub-professionals could be deployed to areas where it would be impractical or undesirable to send the highly trained professional sanitarians. There would not be enough of this cadre even if it were desirable.
- (i) Provide training which will lead to more efficient utilization of sanitation personnel.

These general topics were discussed in detail during and following the workshop.

#### Group B - Appropriate Technology and Research

Work Group B was assigned the task of developing the outline and supplying sufficient detail for developing a perspective on the potential of the RSATR schools as future technological development centers. Included within this task was the development of the possibility of using the training centers for an information dissemination and for centers of applied research in appropriate technology and technology dissemination.

In the course of the workshop the following objectives corresponding to three functions as stated in the workshop for the technological development centers were identified. The primary mission of the center is the education and training of Health Controllers. A second and complementary function is the support of technological development in various areas of sanitation. The third function, which is a necessary part of the above mentioned items is the development of methodologies for information production and dissemination. Both technology development and information collection and dissemination have high feedback contributions to the primary mission of training of health controllers and sanitarians. The functions of specialists in these areas is (partly) as follows:

1. To assist in the identification and isolation of implementation problem areas for the various environmental health programs within the various regions.
2. To analyze, evaluate, and catalogue information developed in item 1.
3. To produce (print) and distribute information for local and regional dissemination relative to sanitation problem solutions, general sanitation awareness, management alternatives, and operation and maintenance procedures.
4. To perform applied research on locally identified and prioritized projects.
5. To perform those identified field demonstration projects under local conditions.
6. To evaluate hardware and software solutions to environmental health problems introduced as alternative solutions from donor countries and from the Ministry of Health.
7. To develop instructional material relative to technology development for use in the various training functions of the centers.
8. To promote technological development by creating awareness and identifying priorities within the various user groups in the country and by packaging alternative solutions.
9. To coordinate and disseminate information relative to technological development in various programs within the government and by other Countries assisting Indonesia - to serve as a bridge for information between local agencies, the Ministry of Health, the Ministry of Public Works, etc.
10. To administer and implement applied research projects in technological development, administrative control, fiscal control, report production, and graphic and media production.
11. To implement information transfer functions relative to technological development in the area of sanitation.
12. To assist in the full scale development of appropriate technological solutions to sanitation problems by assisting in testing, promoting, fabrication and manufacturing of proper technical devices.

## Appropriate Technology Development and Technology Transfer

An example of an approach to identifying appropriate technology was developed and presented by the consultants to members of workshop planning committee, (Figure 1). This matrix breaks down the system of water and waste water treatment into smaller components of the total. Each of these sub-components can then be addressed as to its appropriateness. This illustration broadens the approach to appropriate technology by allowing subcomponent development to resolve the problem rather than searching for a new and more comprehensive solution. The approach, however, does not necessarily eliminate viable comprehensive solutions from being practical.

In applying this matrix to technological development certain factors must be considered, such as, the type and efficiency of the device, the availability of indigenous resources, economic limitation, socio-cultural limitation, and degree of community involvement (volunteerism, etc.). This matrix forces the prioritization of the critical component of the treatment with the limiting factors of implementation, but within any community there is first a need for inventory and problem identification.

The concept of this approach is that any small component of the system can be limiting to the success of the whole process. Therefore, appropriate technology can be defined as overcoming an obstacle (one of the limiting factors) of any part of a system. You can take a pump for example and divide it into its components and make a similar analysis at the equipment level.

## Coordination of Appropriate Technology in Indonesia

There are several other organizations and agencies in Indonesia that are involved in appropriate technology. A major element of any communication media function and technology development program is that of coordination of activities. An example of an approach for the coordination and implementation of technological development is shown in Figure 2. For effective technology development, review and coordination must be conducted at all levels from the local community to the national level.

The matrix shown in Figure 2 demonstrates the role the RSMD centers could play in technology development and transfer as initiated at both the local and national levels. Steps of the process are shown on the right hand side of the table and committees and/or organizations are shown across the top of the page. The relationship is hypothetical at this point, but the necessary interests and informal linkages exist presently in Indonesia to suggest this as a possible approach.

FIGURE 1

EXAMPLE OF PROBLEM IDENTIFICATION MATRIX FOR  
TWO AREAS OF INTEREST - WATER TREATMENT AND WASTE DISPOSAL

Technological Device		Indigenous Materials		Economic Limitations		Socio-Cultural	Community Volunteers
Eff.	Process	Con.	O&M	Cons.	O&M		

Wastewater

Greywater conveyance  
 Greywater treatment  
 Greywater reuse  
 Human fecal waste storage  
 Human urine waste conveyance  
 Human fecal waste conveyance  
 Human fecal waste treatment  
 Human urine waste treatment  
 Human fecal waste disposal  
 Human fecal urine disposal  
 Resource utilization

Water

Raw water source identification  
 Raw water source development  
 Raw water supply protection  
 Water treatment  
 Off-site storage  
 On-site storage  
 Water conveyance  
 Water storage protection  
 Water reuse

Efficiency - treatment level is not satisfactory  
 Process - type of process has some limitation  
 physical, chemical, or biological

Cons. - construction cost (capital investment)  
 O&M - operation and maintenance cost

FIGURE 2

EXAMPLE OF A COORDINATION AND IMPLEMENTATION MATRIX APPLIED TO  
TECHNOLOGICAL DEVELOPMENT  
(SPECIFICALLY IN THE AREA OF SANITATION)

Steps involved in technological development	Committees and/or organizations  Local Appropriate Technology Advisory Committee	Technology development staff	Technology Development Steering Committee	National Ministry of Health review coordination	National Technology Development Coordination Committee
1. Inventory of needs	X	X			
2. Analysis of review of needs inventory		X	X	X	X
3. Local review & priori- tizing of needs	X	X			
4. Coordination & review of Technological Development Centers		X	X	X	
5. Implementation of applied research		X			
6. Analysis and publication of results		X	X	X	X
7. Field testing	X	X	X		
8. Results and analysis of field testing		X			
9. Marketing analysis for acceptance and usage		X	X		X
10. Production marketing promotion	X	X	X		X
11. Follow-up user study	X	X	X		

The committees or advising groups suggested in this proposal are: 1) Local Appropriate Technology Advisory Committee, 2) Technology Development Center Staff, 3) Technology Development Steering Committee, 4) Ministry of Health Review on Coordination, and 5) National Appropriate Technology Development Committee. The Local Appropriate Technology Advisory Committee would be made up of local decision makers, RSMD staff, and local health officials. This group would be charged with determining local conditions, priority of health problems, technology penetration strategies and assisting within the implementation and education associated with appropriate technology.

The Technology Development Center Advisory Committee of the RSMD would consist of directors from the various schools. Their function would be to assist in the establishment of priorities for research needs and media production both for community health programs and the Health Controller curriculum. This group has worked closely together in the past in developing curriculum and instructor development programs.

The Ministry of Health Review and Coordination Committee would coordinate with other programs within the Ministry dealing with appropriate technology and media production. Since other sanitarian training programs are also interested in developing appropriate technology research capabilities, this review and coordination step would be essential. The Ministry level would also be the focal point for various international programs supporting appropriate technology and media development/production. Elements of this review process are currently functioning within the Ministry of Health.

There is an existing research institute within the Ministry of Health which presently deals with all of the research activities of health and medicine within the country. This group historically is not strongly committed to sanitation problems and appropriate technology, but can be identified as an important resource in any future WASH effort.

A national level of review and coordination of appropriate technology is necessary. This committee, referred to as the National Technology Development Coordination Committee would consist of members from the other research institutes and university research groups within Indonesia. At the present time, appropriate technology research is being actively pursued through various international programs at LIPI - Institute for Appropriate Technology in Bandung, TDC - Technology Development Center at ITB (Institute of Technology Bandung) through their Chemical Engineering Departments.

## RESEARCH PROPOSALS FROM RSMD PROJECT

Sixteen research proposals submitted by the RSMD schools were reviewed and critiqued by the consultants for appropriateness, experimental approach, and suggested work effort. The proposals were well written and well thought out, and all but one of the proposals focused on some element of appropriate technology. For the most part, the proposals addressed needs within their respective local settings. The projects varied widely in their experimental approach and sophistication of methodology with respect to problem solution. Since the problems and the experience of the principal investigations varied considerably between proposals, it was not unusual to find a wide divergence in approaches and methods.

Each proposal was carefully reviewed and constructive suggestions were made to improve the quality of each as well as to improve the quality of the research. It was kept in mind, however, that this is the first attempt these schools have made in the area of applied research and that they should proceed with caution. A general discussion of the types of proposals and the suitability of the schools to engage in technology development was discussed. Listed below are the proposals by general topic and the priorities assigned in descending numerical order.

### Proposed Research Project for SPPH/ARK (I-IV - approved, V - not approved)

- (II) 1. "Quantity and Distribution of Potable Water Used by Rural Community" - SPPH Department of Health - Sarabaya.
- (V) 2. "Deposit of Lead (Pb) in Penaeus monodon fabricus (shrimp) on the Pond Situated Around the River Contaminated by Industrial Waste Water" - SPPH Department of Health - Sarabaya.
- (III) 3. "Exploring the Possibility of Re-using Animal Feces to Control Physical Environment Pollution" - SPPH Banjarmasin - South Kalimantan
- (II) 4. "Study of Type and Amount of Market Garbage and the System of Processing in the Markets of Sarabaya" - Sanitary Technology Academy - Sarabaya
- (III) 5. "Study on the Most Effective Angle for the Blades of the Rotor Savonius Windmill Used with Pumps" - Regional Hygiene Assistants School - Manado

- (IV) 6. "Research on the Effects of the Use of Effective Air Volume Measurement and Fixing of Valves Along the Conducting Pipe on the Vertical Levering Power and Efficiency of Automatic Ram Hydraulic Pump" - Regional Hygiene Inspector Schools - Manado
- (I) 7. "Influence of Colour and Type of Container on the Habit of Spawn of the Aedes Aegypti Mosquito" - Regional Hygiene Inspector School - Medan
- (II) 8. "Effort to Reduce Content of Iron in Water of Hand Pump Wells in Martapura and Its Surroundings by Aerosol and Simple Sand Filters" - Regional Hygiene Assistants School - Banjarmasin
- (II) 9. "Benefits of Utilizing Gas (Bio-gas) for Rural Communities" - School for Hygiene Control Assistants - Bandung
- (III) 10. "System of Waste Processing at Kecamatan of T. Karang Barata Kotamadya, Tanjungkarang, and Telukbetung" - Kanwil Department of Health - Lampung Province.
- (II) 11. "Reduction of Ferrous<sup>ic</sup> Deposit by Aerosol<sup>alun?</sup> in a Cascade Way" - SPPH Staff - Tanjung Karang
- (I) 12. "Research on the Use of Wells for Filtering Sand to Reduce Turbidity and Total Number of Foot Itch Cases in River Water" - APK - Sarabaya
- (I) 13. "Research on Model of Sand Filter in the System of Lake Water Purification" - APK - Sarabaya
- (IV) 14. "Impact of Height of Place on Density of Various Types of Flies" - SPPH - Medan
- (I) 15. "Experiment of Making Simple Pumps from Pralon for the Public" - SPPH, Ujung Pandong
- (III) 16. "Quality of Output of Bio-gas preparation toward the Living Environment in Usage as Fertilizer" - SPPH - Ujung Pondong



## RECOMMENDATIONS

The Environmental Health Controller and Sanitarian training programs in Indonesia have reached a critical point in terms of implementation. Schools have been constructed, faculty have been recruited and hired, and curricula have been developed and initiated. The technological development and communication media functions will be added in the next two years. Progress is being made but for the project to be maintained and develop to its full potential, further technical assistance will be required. Accordingly, the consultants are recommending that requests be made to WASH/AID for assistance in the following areas:

1. The RSMD project should be evaluated and reviewed to establish the status to date and to determine the initiation point for the next stage of development. Request should be made for an experienced field Sanitarian and an Educator versed in competency based training at the technician-technologist level. The suggestions presented by the consultant in Group A of the workshop and cited earlier in this report are to be considered as recommendations and should be incorporated in the planning. The timing of this request should be relatively soon and should include an in-country review team component.
2. A request should be made to WASH/AID for an Appropriate Technology Specialist in the area of water and wastewater treatment and equipment devices to assist the schools in problem identification and surveying techniques for establishing priorities within their respective regions. This Specialist can also assist in experimental methods, data analysis, testing techniques, etc. Since this particular function would span a period of several years it is suggested that the request for assistance be staged over several years with actual consultation occurring for short periods of time. An example of the advisory role needed in coordinating this applied research is given below.

	Period	Timing
a. Problem identification + experimental design	6 weeks	0
b. Applied research methods	2 weeks	4 months
c. Applied research progress	3 weeks	8 months
d. Data analysis	6 weeks	12 months

3. A request should be made to support technological research at the regional environmental Health Controller schools. This request should include a statement of need, a complete proposal for the applied research, and a discussion of the coordination and review process.
4. A request should be made for an information and communication media specialist. This person would review the existing information system being developed within the other agencies of the government and consult with the RSMD schools to determine education, community service and technological development needs. This request should be made fairly early in the development of the communication media function at the various schools. It is envisioned that this advisory role will be needed over a long term.
5. A request should be made to WASH for documents and literature to be included in the local communication media system. This could also include multiple copies of textbooks to be used in courses determined critical by the faculties of these schools. This request could also include translation service of technical books and technology development.
6. The final request should be for coordination and management support to insure the implementation of these key elements listed above for technology development, communication functions and training at the regional schools. This is a request for a 1/2 time commitment for two years. Part of this request could be in the form of supporting a seminar in appropriate technology after one year of research activities at the RSMD centers. This seminar could be open to all agencies and institutions actively pursuing appropriate technology research and could be used as a milestone and focal point for long term strategies.

APPENDIX A

WATER AND SANITATION FOR HEALTH PROJECT  
ORDER OF TECHNICAL DIRECTION #25

WATER AND SANITATION FOR HEALTH PROJECT

ORDER OF TECHNICAL DIRECTION #25

February 12, 1981

TO: WASH Contract Project Director  
Mr. James Arbuthnot, P.E.

FROM: AID WASH Project Manager *qjww*  
Mr. Victor W. R. Wehman, Jr., P.E., R.S.

SUBJECT: Provision of Technical Assistance Under WASH Project Scope of  
Work for USAID/Indonesia

REFERENCES: A) Jakarta 1280  
B) State 24630  
C) Jakarta 1837

1. WASH contractor requested to provide technical assistance to USAID/Jakarta as per Ref A scope of work and per responses to Ref B in Ref C.
2. WASH contractor/subcontractor/consultants authorized to expend up to 70 person days effort over a three (3) month period to accomplish this technical assistance effort.
3. Contractor to provide final report to mission on scope of work elements before leaving mission. Contractor to make arrangement for local secretary and typewriter to accomplish final report on project elements.
4. Contractor to coordinate directly with USAID/Jakarta (Mr. Phil Smart or Mr. Bob Pratt) in Health Office of Mission. Make sure Dr. Curlin (ASIA/TR/HNP), ASIA/(PD) Indonesia Officer and Indonesia AID Desk Officer aware of this technical assistance effort and of travel itineraries and clearances of all consultant staff.
5. Contractor authorized up to 50 days of per diem for this effort.
6. Contractor authorized two (2) RT travel from consultants home base through Washington to Jakarta, return to Washington for debriefing and return to their home base.

OTD #25  
Feb 12. 1981

7. Contractor should insure a timely and thorough debriefing for ASIA Bureau and DS/HEA personnel upon return to Washington, D.C.
8. Contractor authorized to pay local expenses in Jakarta for local hire of secretary, intrepeter, xeroxing, car rental or other miscellaneous expenses.
9. Contractor authorized four (4) RT within Indonesia to RSMD sites if required from Jakarta to site and return to Jakarta if necessary to carry out mission.
10. Mission should be contacted immediately and technical assistance initiated as soon as possible and convenient to mission/GOI.
11. Appreciate your prompt attention to this matter. Good luck.

UNCLASSIFIED

SSA243

07 522

PAGE 01  
ACTION AID-35

JAKARTA 01837 040618Z

ASSP

INFO OCT-31 SSO-20 /036 W

-----277733 340631Z /11

O 242811Z FEB 81  
FM AMEMBASSY JAKARTA  
TO SECSTATE WASHDC IMMEDIATE 1731

AND

UNCLAS JAKARTA 01837

AIDAC

EO 12065: N/A

SUBJECT: RSMD/WASH CONSULTANTS

REF: A) JAKARTA 1280. P) STATE 24630

1. MISSION AND GOI PLEASED WITH PROMPT AFFIRMATIVE RESPONSE TO REQUEST WASH ASSISTANCE REPTEL A).

2. PRIMARY NEED FOR PRESENTATION WS AND 5 APPROPRIATE TECHNOLOGY (A.T.) ALTERNATIVES. SOME ADVICE ON INTEGRATION OF ELEMENTS UNIVERSITY OF HAWAII RSMD CURRICULA AND EDUCATIONAL MATERIALS INTO GOI CURRICULA MAY REPEAT MAY BE REQUESTED. ALSO DEVELOPMENT CONTENT FOR CURRICULUM RETRAINING EXISTING SANITATION PERSONNEL WILL BE INITIATED IN WORKSHOP.

3. OBJECTIVE OF WORKSHOP IS TO CONSIDER LINES OF INVESTIGATION, TYPES OF STUDIES WHICH MIGHT COMPRISE INITIAL SUBSTANCE OF A.T. DEVELOPMENT IN THE TEN REGIONAL TRAINING SITES WITH RSMD DEVELOPED SCHOOLS. CONSULTANT REVIEW AND COMMENT APPROXIMATELY 12 PROPOSALS FOR RESEARCH ALREADY SUBMITTED BY RSMD STAFF WOULD BE OF VALUE. ADVICE IN DEVELOPMENT OF WORKSHOP SUBSTANCE AND METHODOLOGY WOULD BE WELCOME BUT THE ORGANIZATION AND RUNNING OF THE WORKSHOP

UNCLASSIFIED

UNCLASSIFIED

2/2

WILL BE CARRIED OUT BY PROFESSIONAL MS LEVEL GOI ENVIRONMENTAL SANITATION STAFF.

S/S-0

3

4. TECH. CONSULTANTS SHOULD HAVE BROAD KNOWLEDGE OF PRACTICAL MS AND S ALTERNATIVES ESPECIALLY LATEST CONCEPTS A.T. AND IF POSSIBLE EXPERIENCE LEC'S PREFERABLY ASIA. SPECIFIC TECHNOLOGY IMPLEMENTATION AND HANDS-ON EXPERIENCE IN A.T. AND COMMUNICATION MEDIA FOR PRODUCTION EDUCATIONAL MATERIALS COULD BE HELPFUL DURING WORKSHOP BUT WILL ASSUME MORE IMPORTANCE LATER AS PLANS FOR DEVELOPING CAPABILITY ARE IMPLEMENTED.

5. REFERENCE MATERIALS IN A.T. WOULD BE WELCOMED. INFORMATION KINDS AND NUMBERS OF COPIES NEEDED WILL BE PROVIDED ASAP.

6. THIS ACTIVITY NOT DIRECTLY RELATED TO IAC, WHO OR UNIVERSITY OF OKLAHOMA. EFFORTS WILL BE MADE BY GOI PROJECT OFFICIALS TO COORDINATE SUCH RELATED ACTIVITIES.

7. GOI CONCURS WITH SANITARY ENGINEER IF ALSO PROFESSIONAL SANITARIAN TWO WEEKS PRIOR TO 5 DAYS WORKSHOP NOW PLANNED TO BE HELD FEBRUARY 24.

2. PLEASE PROVIDE NAMES AND CV'S PROPOSED CONSULTANTS ASAP FOR GOI APPROVAL. MASTERS

## Department of State

OUTGOING  
TELEGRAMPAGE 01 STATE 024630  
ORIGIN AID-35

066148 AID1476

-----  
ORIGIN OFFICE ASTR-01  
INFO AAAS-01 ASEM-01 ASDP-02 PPCE-01 PDPR-01 PPEA-01 ASPD-03  
AADS-01 DSHE-01 ENGR-02 CH8-01 ASSP-02 /018 A1 1231  
-----

INFO OCT-00 /035 R

DRAFTED BY ID/ASIA/TR/HPN: HKELLER: ES

APPROVED BY AID/ASIA/TR/HPN: GCURLIN

AID/DS/HEA: (INFO)

AID/ASIA/PD: (INFO)

AID/ASIA/ISPA: (INFO)

DESIRED DISTRIBUTION

ORIGIN ASTR CH8 INFO AAAS ASEM ASSP ASDP PPEA PPCE PDPR PPPB ASPD

AADS DSHE ENGR 7C-00 END

-----182344 310322Z /63

O 310140Z JAN 81  
FM SECSTATE WASHDC  
TO AMEMBASSY JAKARTA IMMEDIATE

UNCLAS STATE 024630

ADM AID

E. O. 12065: N/A

TAGS:

SUBJECT: RSMD PROJECT REQUEST FOR WASH

REF: JAKARTA 1280

1. DISCUSSED JAKARTA 01280 WITH DS/HEA AND WASH CONTRACTOR  
BROAD SENSE OF YOUR REQUEST FOR TA APPEARS TO FALL CLEARLY  
WITHIN WASH SCOPE OF WORK AND CAN BE FURNISHED AT NO  
COST TO YOUR MISSION. WASH CONTRACTOR REQUESTS RESPONSE  
TO FOLLOWING QUESTIONS.

2. IS NEED FOR ASSISTANCE IN A) DEVELOPMENT OR REVIEW OF  
RSMD CURRICULUM IN APPROPRIATE WATER SUPPLY AND SAN-  
ITATION TECHNOLOGY B) PRESENTATION OF APPROPRIATE WS AND S  
TECHNOLOGY ALTERNATIVES AT WORKSHOP C) BOTH D) OTHER.

3. IF HELP IN WORKSHOP REQUIRED? WHAT IS THE OBJECTIVE OF  
WORKSHOP BACKGROUND AND COMPETENCY LEVEL OF PARTICIPANTS?  
WHAT DO YOU WANT THEM TO GET OUT OF THE WORKSHOP?

4. SHOULD CONSULTANTS HAVE A) BROAD KNOWLEDGE OF RURAL  
WS AND S ALTERNATIVES B) HANDS-ON EXPERIENCE OR SPECIFIC  
TECHNOLOGY IMPLEMENTATION C) FAMILIARITY WITH TRAINING  
AND CURRICULUM DEVELOPMENT.

5. SHOULD CONSULTANTS BRING DETAILED TRAINING AND  
REFERENCE MATERIALS IN A. T. FOR DISTRIBUTION, OR IS  
OBJECTIVE TO OUTLINE OPTIONS IN PRESENTATION WITH INFO  
ON WHERE TO GET MORE HELP.

6. IS THIS INVOLVED WITH RUMORED INTERNATIONAL/REFERENCE  
CENTER/WHO OR UNIV. OF OKLAHOMA EFFORTS IN INDONESIA ON  
APPROXIMATELY SAME LINES?

7. CURRENT PLANNING EFFORT ASSUMES SENDING ONE SANITARY  
ENGINEER TWO WEEKS PRIOR TO WORKSHOP TO COORDINATE EFFORTS  
PLUS ONE OR MORE SPECIALISTS IN FIELDS TO BE SELECTED  
DEPENDENT UPON YOUR RESPONSE TO ABOVE QUESTIONS. HAIG

→ E.M.S  
V.W.



ACTION  
COPY

UNCLASSIFIED  
Department of State

INCOMING  
TELEGRAM

PAGE 01  
ACTION AID-35

JAKART 01280 261147Z

063195 AID9432

ACTION OFFICE ASSP-02  
INFO ASEM-01 ASDP-02 ASPD-03 ASTR-01 AADS-01 CMGT-02 CTR-02  
OSRD-02 CH8-01 RELO-01 MAST-01 /019 AI 1126

INFO OCT-01 /036 W

-----050444 271203Z /15

R 260653Z JAN 81  
FM AMEMBASSY JAKARTA  
TO SECSTATE WASHDC 1531

*Transferred to  
Howard Keller  
ASIA/TR 1/28*

UNCLAS JAKARTA 01280

AIDAC

EO 12065: N/A

SUBJECT: RSMD PROJECT REQUEST FOR WASH CONSULTANT.

1. RSMD PROJECT IN FINAL STAGES OF SOFTWARE AND HARDWARE DEVELOPMENT. IMPLEMENTING AGENCY HAS DECIDED THAT CAPABILITY FOR APPROPRIATE TECHNOLOGY DEVELOPMENT AND INFORMATION PRODUCTION AND DISSEMINATION IS NEEDED TO ROUND OUT MANPOWER DEVELOPMENT CAPABILITY. MISSION HAS AGREED IN PRINCIPLE TO PLAN INCLUDING A TECHNOLOGY DEVELOPMENT AND CURRICULUM REVIEW WORKSHOP TO BE HELD IN EAST JAVA FEBRUARY 27 TO MARCH 7.

2. GOI REQUESTS ONE OR TWO CONSULTANTS WITH BROAD KNOWLEDGE IN RURAL ENVIRONMENTAL SANITATION (ES) TECHNOLOGY AND ES BROCHURE PRODUCTION WITH EXPERIENCE IN TROPICAL LDC'S PREFERABLY IN ASIA.

3. PLEASE ADVISE IF WASH COULD PROVIDE SUCH TA AT NO COST TO PROJECT OR MISSION. MASTERS

*VIC -  
Please call  
me on this  
Howard*

UNCLASSIFIED

APPENDIX B

RESULTS OF DISCUSSION OF GROUP I

RESULTS OF DISCUSSION OF GROUP I

TOPIC : CONSIDERATIONS FOR ADDITIONAL TRAINING FOR SANATARIANS

1. Considerations :

To realize equity in the field of health, Department of Health has determined four main activities :

1. Even distribution of health service
2. Adequate supply of medicines
3. Utilization of manpower
4. Environmental Health.

To carry out the efforts in the field of environmental health, a policy has been drawn up covering the following items :

1. The government is responsible for arrangement, supervision and guidance as well as the granting of aid to organize environmental health efforts.
2. To achieve equity and since funds and power are limited, appropriate technology will be developed.
3. All Indonesian inhabitants and newcomers are obliged to abide by the regulations and provisions on environmental health valid in Indonesia.

To carry out the above-mentioned policy, it is necessary to have adequate sanitariums, either in quantity, type as well as quality.

Legal Foundation:

1. Act No. 9 of 1960 on Principles of Health.
2. a. Act on Hygiene No.2/66  
b. Act on Hygiene for the public No.II/62
3. Act No.6/63, explanation to article 10.
4. Decision of Minister of Education & Culture concerning Program of Higher Education and Program of Teaching Act.
5. Decision of President No.34/72 on Functional Responsibility of Education and Training.

6. Inpres No. 15/1974 on Implementation of Keppres 34/72.

Philosophy :

1. Education adopted in Indonesia is Life-time Education.
2. The educational system adopted is the open system.
3. Scientific Development and Technological Education can be used to accelerate process of education.

The present facts :

1. The existence of negative environmental dampak as a result of the utilization of modern technology in the development, so that it is necessary to upgrade the knowledge of officers working in the field of sanitation.
2. The ever-increasing problems of sanitation in addition to the scientific development and technology of sanitation (rapid development of sanitation technology), require more manpower, with the career and profession developed through education and training (additional education and training).
3. The ever-increasing program of environmental health demands the increase in the implementing staffs, either in quality as well as in quantity.
4. Supply of resources and funds which can be used as a basic capital to upgrade education and training for sanatarians.

Projection of future demand on manpower

The projection of demand on manpower until year 2.000 based on development of program desired in that year , is as follows :

1. 453 sanitation scholars
2. 4.906 Bachelor Degrees in Technology of Sanitation
3. 12.000 Sanatarians

II. Notion and Definition:

General :

Education is a change in behavior of someone acquired through guidance (planned guidance), so that the person can develop himself in accordance with his own capabilities.

Training is a process of learning to change appearance of someone in doing his work.

Special :

1. Adjustment education I :

Program of education for PK/AB for being degreed with graduates of SPPH.

2. Supplementary Education :

Educational program for graduates of CTP to be equalized with graduates of SPPH.

3. Education of Diploma I :

Program of Education on General Basic Sanitation (SPPH) is program  $D_1$ .

4. Education of Diploma II :

Continuation of educational program  $D_1$  which is specialization to meet the requirements of SKS fixed.

5. Education of Diploma III :

The same as No.4

6. Educational Program of  $S_0$  :

Educational Program of General Sanitation at Academic level (APK)

7. Training on Certification :

Continuation of Training Program for graduates of APK ( $S_0$ ) which is specialization to meet the fixed requirements of SKS.

8. Functional Technical Training:

Training for sanitaricians to carry out program of environmental health.

III. Objectives :

Education :

Upgrading knowledge, attitude and skill of sanitaricians to develop their devotion as sanitaricians, which has a direct civil effect governed for the relevant career.

Training :

Upgrading knowledge, attitude and skill of sanitaricians to develop their devotion as sanitaricians which have values which can be cumulatively calculated toward the relevant career.

Target of Education and Training :

1. Graduates of APK
2. Graduates of SPPH/SMKA Sanitation
3. Graduates of CTP
4. Graduates of SPK A/B
5. Graduates of SMA IPA/Paspal
6. Health staffs working in the field of environmental health or they are prepared to work in the field of environmental health.
7. Health staffs who work or are prepared to work in educational institutions for sanatarians.

Recommendations :

1. It is necessary to make data on demand of education and training for sanatarians for all types, covering among other things :
  - a. Total staffs required
  - b. Total of would-be staff requiring additional education (type of staff, work distribution and work responsibility)
  - c. Type of diklat required.
2. It is necessary to make data on resources which have been possessed and must be possessed by the Diklat Institution to carry out the program of Diklat for sanatarians.
3. It is necessary to work out the master plan of education for sanatarians by the Pusediklat.
4. To develop career of teachers, it is necessary to develop the teachers through AKTA program.
5. To meet the demand on Sanatarians at Academic level and to develop the existing educational institutions, it is necessary to think about the possibility of upgrading the SPPH educational institution into APK Sanitation Technology.
6. It is necessary to conduct a survey on utilization, in connection with "mis-utilization" of sanatarians.
7. To more effectively manage educational institution, an upgrading should be immediately held on management of school for head-master.

V. TYPE OF EDUCATION AND TRAINING

1. Adjustment Education :

a. Aim :

- Producing environmental health staffs who are able to carry out the program of Basic Sanitation ( as sanitararians)

b. Duration :

- 1 (one) year.

c. Target :

Graduates of SPK-A/B

d. Requirements :

- Working in the field of environmental health
- Prepared to work in environmental health
- Able to be utilized minimum for 10 years

e. Institution : S.P.P.H.

f. Certificate : Ijazah (diploma)

2. Supplementary Education :

a. Aim :

- Producing environmental health staffs who are able to carry out the program of Basic Sanitation(as sanitararians).

b. Duration :

- 9 (nine) months.

c. Target :

- Graduates of CPT.

d. Requirements :

- Working in the field of environmental health
- Prepared to work in environmental health
- Able to be utilized for at least 10 years
- Having worked in the field of sanitation for at least 2(two) years.

e. Institution : S.P.P.H.

f. Certificate : Ijazah of S.P.P.H.

3. S.P.P.H. D<sub>1</sub> has been in progress.

4. Education of D<sub>II</sub> :

4. Education of D II :

a. Aim :

- Producing proficient staffs in the field of Sanitation level one

b. Duration :

- 1 (one) year.

c. Target :

- Graduates of SPPH and SMKA Sanitation.

d. Requirements :

- Working in the field of environmental health
- Prepared to work in environmental health
- Able to be utilized for at least 10 years
- Having worked in the field of sanitation for at least 2(two)years
- Having worked in the field of sanitation for at least 2(two) years calculated from graduation of SPPH.

e. Institution : S.P.P.H.

f. Certificate : Ijazah D II.

5. Education of D III:

a. Aim :

- Producing proficient staffs in the field of sanitation level II.

b. Duration :

- 1 (one) year

c. Target :

- Graduates of D II.

d. Requirements :

- The same as D II.

e. Institution : A.P.K.

f. Certificate : Ijazah D III.

6. Education of SO (APK) : has been in progress.

7. Certification Training :

a. Aim :

- Producing sanitaricians who possess special skills in the field of Environmental Health Study as stipulated in SKS.



b. Duration :

- In accordance with the fixed SKS.

c. Target :

- Graduates of APK and D III diploma holders

d. Requirements :

- The same as D III plus having worked for 3 years.

e. Institution : A.P.K.

f. Certificate : Special certificate.

8. Functional Technical Training :

a. Aim :

- Upgrading the capability and skills of Environmental Health staffs in work appearance.

b. Duration:

- Based on demand.

c. Target :

- All staffs working in the field of sanitation.

d. Requirements :

- Needs of the program.

e. Institution :

- BLKM/Pusdiklat

Committee appointed.

f. Certificate : Certificate of Upgrading.

APPENDIX C

DEVELOPMENT OF TECHNOLOGY THROUGH  
INSTITUTIONS FOR SANITATION EDUCATION

DEVELOPMENT OF TECHNOLOGY THROUGH  
INSTITUTIONS FOR SANITATION EDUCATION

INTRODUCTION

The National Health System is a basic consideration and concept which give directions and aims, forms as well as characteristics of health development in Indonesia in overall, integrated and harmonious manners.

To support implementation of health, it is absolutely necessary to have an adequate system of manpower as well as development and application of accurate innovative technology, which are able to carry out the change as well as reform in the public.

It is realized that condition of healthful living environment is one of the main capitals to realize and develop a healthful, prosperous, happy and spiritful society.

Starting from Act No. 9 of 1960 on Principles of Health, Article 4 stated that the Government is obliged to organize education for health staffs as well as giving opportunities to the staffs available to pursue the highest career through higher education. So, it cannot be denied anymore that education is an important potential element to promote people and country.

To pursue good education on environmental health and high education on environmental health, it is necessary to develop technology of environmental health.

So far the Department of Health has made efforts to lay down foundation for the development which is important for upgrading environmental health staffs either in quality as well as in quantity, although it is still necessary to have improvement steps to meet the demand of environmental health program and a more stable plan for manpower, particularly because of more urgent demand on environmental health staffs and more extensive scope of environmental health.

To realize the improvement efforts as well as upgrading the educational system on environmental health, the PUSDIKLAT

R.I. Department of Health through the RSMD has succeeded in creating institutions for education on environmental health scattered throughout the territory of the Republic of Indonesia with adequate staffs and facilities, so that it can carry out duties of regular education and duties of developing appropriate technology as well as becoming a source of information and innovation for the reforms in the field of environmental health.

FORMULATION OF GROUP II CONCERNING  
DEVELOPMENT OF TECHNOLOGY THROUGH INSTITUTIONS  
FOR EDUCATION ON SANITATION

I. CONSIDERATIONS:

Rapid development of technology in all fields, including the technology of Environmental Health results in change in the national education and educational pattern for health staffs as well as intensifying efforts of environmental health to overcome present and future problems of living environmental health.

The above-mentioned health staffs (environmental health staffs) are developed not only through programs of education (regular programs of education), but also through various aspects of Environmental Health from various types, categories and levels of Environmental Health staffs required.

To develop the staffs, it is necessary to upgrade the quality of education as well as increasing the quantity as a logical consequence to the development of health service in order to support the National Health System (SKN).

It is also expected that the development of technology and scientific information for an approach to environmental health, can be carried out through institutions for education on environmental health/sanitation with the following considerations:

1. That the aspect of environmental health is so extensive that it is necessary to mobilize various resources and potentials to solve various problems including the side effect of the development of technology.

2. That technological development is a system which requires basic foundation in the form of research process which must be supported by educational infrastructure and its dissemination in the public.
3. That in line of the idea of University Tridarma, the development of technology and scientific information is one of the duties and responsibilities of institution (educational institution) in order to socialize science and upgrade knowledge of the public.
4. That in the future the educational institution can be projected to become one source of innovation and source of scientific information on environmental health.
5. That the development of technology and scientific information in educational institutions for environmental health is a positive and absolute supporting element for program of health service in general and program of environmental health in particular.
6. That the educational institutions for sanitation are considered to be capable enough of making efforts on developing the environmental health technology by the available educational facilities, including the building, staff and other equipment.

## II. Objectives :

### A. General Objectives :

Maximumly utilizing and making effective potentials of Educational Institutions available in order to develop technology of environmental health and scientific information through institution for Education on Environmental Health.

### B. Special Objectives :

1. Assisting the public in overcoming the problems of environmental health faced.
2. Helping formulate various alternatives to the solution of environmental health problems in the government program.

3. Giving appropriate technological discoveries in the field of environmental health. The discoveries are results of research.
4. Making educational institutions as one of sources of scientific information on environmental health.
5. Developing mental attitude of teachers and pupils/students in order that they are responsive to changes.
6. Encouraging teachers and pupils/students to be sensitive to problems of living environment as well as to individual development.
7. Upgrading the quality of learning-teaching process.

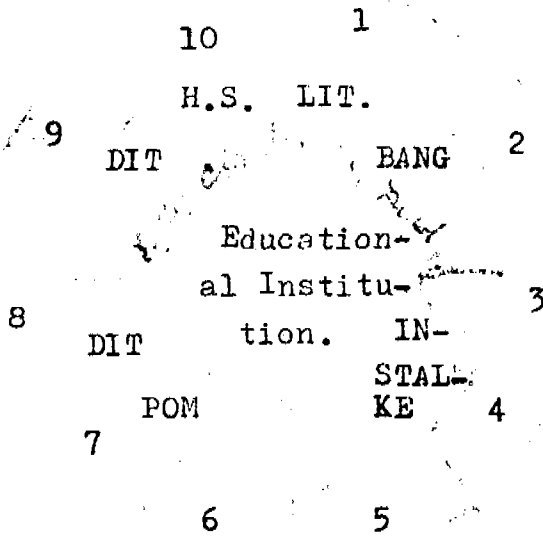
III. FORM OF DEVELOPING EDUCATIONAL INSTITUTION AS A CENTER FOR DEVELOPING TECHNOLOGY AND SCIENTIFIC INFORMATION.

1. The Center for Development of Technology and Scientific Information on Environmental Health can be realized in the following forms :
  - 1.1. Self-dependence by Educational Institution for Sanatarians available.
  - 1.2. Cooperation between Institution and development agency in the circles of R.I. Department of Health.
  - 1.3. Cooperation with other agencies, either Government agencies as well as Non-Government agencies.
2. All forms of development mentioned above are functional activities which can be carried out by :
  - 2.1. Educational Unit as an organizer of regular education, re-training, additional education and courses for environmental health staffs, other health staffs and members of society.
  - 2.2. Development and research unit as the organizer of scientific information development as well as development of appropriate technology on environmental health.
  - 2.3. Pupil/student unit and public devotion as the organizer of pupil's/student's achievement and public devotion.

IV. STRATEGY OF APPROACH AND FUNCTIONAL COOPERATION AMONG INSTITUTIONS AND OTHER AGENCIES .

1. Maintaining cooperation relations with other agencies/ institutions in the following fields :
  - 1.1. Documentation and information
  - 1.2. Research and development of appropriate technology in the field of environmental health.
2. The above-mentioned cooperation relations can be formulated in the following chart :

Chart :



1. International Organization
2. Sectoral Department
3. PTP - ITB
4. Research and Technology
5. Regional Government
6. LIPI
7. ORNOP
8. PPLH (Living Environment)
9. Domestic and foreign Universities .
10. Miscellaneous.

3. With the principles of self-dependence, flexibility and integration, the cooperation can be established through direct as well as indirect communications either officially as well as unofficially.

V. Scope of Activity

The activities which must be done by the Institution (Educational Institution) for Education on Sanitation as a Center for Development of Technology and Scientific Information on environmental health are as follows :

1. The Educational Unit organizes the following :
  - 1.1. Regular education
  - 1.2. Retraining graduates of SMKA/SPPH/APK/APK-TS
  - 1.3. Additional education for graduates of ex CTP and SPK-A/B.
  - 1.4. Courses on environmental health for environmental health staffs as well as other health staffs and members of society.
2. The Research and Development Unit organizes the following :
  - 2.1. Technological Development :
    - 2.1.1. development of instructors
    - 2.1.2. development of curriculum
    - 2.1.3. development of educational facilities
    - 2.1.4. conducting researches; development and application of appropriate technology, particularly in the field of environmental health technology through :
      - a. exploration
      - b. laboratory test
      - c. field test.
  - 2.2. Development of scientific information :
    - 2.2.1. collection and documentation of information
    - 2.2.2. processing of information
    - 2.2.3. dissemination of information
3. Unit of pupil/student and public devotion organizes the following:
  - 3.1. development of writing achievement of lecturer/instructor/student/pupil.
  - 3.2. K.K.N= Concrete Lecture Work
  - 3.3. Development of extra curricular activities relating to environmental health.
  - 3.4. Development of training on public skills in appropriate technology in the field of environmental health.

#### VI. Scale of Priority for Implementation of Activities

Since there are many activities which will be made and the resources are limited (manpower, money and material), the following scale of priority is worked out :





No.	Demand	a	b	c	d	e	f	g	h	i
IV.	<u>Facilities :</u>									
7.	Teacher's house	-	-	-	-	-	-	-	-	-
8.	Transport	+	-	+	-	-	-	-	-	+
9.	Teaching aid	+	+	+	-	+	+	-	-	+
10.	Laboratory equipment	+	-	+	-	+	+	-	-	+
11.	Dormitory equipment	+	-	+	-	-	-	-	-	+
12.	Workshop equipment	+	-	+	-	+	+	-	-	+
13.	Book	++	++	++	++	++	++	-	-	++
14.	Office household utensils	+	-	+	-	+	+	-	-	-
15.	Practice location	-	-	-	-	-	-	-	-	-

Note : ++ : Top Priority  
 + : Priority  
 - : Not given priority  
 \* : Review.

a = Educational Unit, regular education ;  
 b = Retraining SMKA/SPPH/APK/APK TS.  
 c = Additional education for Ex.CTP& SPK-A/B. d = Courses  
 e = Lit.Bang Unit, Development of Appropriate Technology .  
 f = Lit.Bang Unit, Development of Scientific Information.  
 g = Unit of Student & Public Devotion, Intra-Curricular  
 h = Unit of Student & Public Devotion, Extra-Curricular  
 i = Allocation of funds.

Recommendations :

Based on the above-mentioned considerations and analysis, the group appeals for the following :

1. Educational Institutions of APK and SPPH in the regular education should immediately conduct top-priority activities covering : review and development of curriculum and supply of books.
2. Puskdiklat should immediately set up a "task force" to formulate the plan for the development of additional education outside regular education.
3. Puskdiklat should immediately set up another "task force" to formulate

Recommendations :

3. Pusdiklat should immediately set up another "task force" to formulate the plan for organization and activities to realize a center or centers for development of accurate technology and scientific information on environmental health.

### About the authors

Robert A. Gearheart is currently Professor of Environmental Resources Engineering at Humboldt State University in Arcata, California. He has both an M.S. and a Ph.D. in Civil Engineering from the University of Oklahoma. He has taught engineering since 1968. His major interests are in the areas of appropriate technology for water and sanitation and in the development of relevant personnel.

He has been a consultant in Indonesia for the WHO on curriculum development in sanitary engineering.

Clarence E. Calbert is an environmental chemist, sanitarian, and teacher of sanitarians. He has an M.S. in Biochemistry and an M.P.H. in Health Education from the University of Michigan, and has completed advanced work on a Ph.D. in Biochemistry at the University of Southern California. He has worked as a sanitarian in the United States and as a sanitarian trainer in India for the WHO and in Taiwan. He has been a senior officer and trainer in organic chemistry, aquatic chemistry, solid wastes, and general public health. In 1978 he was a consultant in environmental health manpower development for the WHO in Malaysia.