MID TERM EVALUATION REPORT

ENVIRONMENTAL AND SANITARY

ENGINEERING PROJECT

KANPUR MIRZAPUR

(UNDER GANGA ACTION PLAN)

Delhi, July 1989

In this final version of the report one page which was inadvertently left out in earlier versions is included (page 32, chapter 8). The recommendatons are compiled in chapter 10. Apart from this the report is similar to former versions.

Leusden, September 1989

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1. INTRODUCTION

1.1 The Project

The Indo-Dutch Environmental and Sanitary Engineering Project, Kanpur and Mirzapur, which started in June 1987, has reached a stage in which emphasis will be further shifted to the implementation of physical works. According to plan the project shall be finalised by the end of 1991.

1.2 Joint Mid-Term Evaluation Mission

As per the Project agreement a mid term evaluation was to be done by a joint Indo-Dutch evaluation mission, constituted with the following objectives:

- Assess the progress made since the start of the project and determine the degree of accomplishment of the objectives originally formulated.

- Assess the effectivity of the means being used to reach the objectives; identify factors which may have imposed constraints on the implementation of the project.

- Identify factors which had a beneficial effect towards the achievement of the objectives.

- Draw conclusions and make recommendations in respect to the continuation of the:
  * project activities;
  * project organization;
  * project staffing;
  * project financing.

1.3 Composition of the Joint Indo-Dutch Mission

The mission consisted of the following persons:

1.	Dr. T. Chakrabarti member	: Scientist, NEERI, Nagpur
2.	Dr.J.M. Dave co-mission leader	: Professor of Environmental Management
3.	Mr. J. Gussenhoven member	: Development Economist, ETC - Foundation
4.	Mrs. J. Harnmeyer member	: Public Health Expert, ETC - Foundation
5.	Dr. S. Ramaseshan member	: Professor of Civil Engineering I.I.T. Kanpur

6. Mrs. Shamala Devi : Sociologist, resource person to the mission

7. Mr. H. Sorée : Managing Director, ETC Foundation
co-mission leader

8. Dr. J. Wiggers : Prof. Civil Engineering, T.U. Delft
member

1.4 Work Programme

During the first week and part of the second week, the mission members acquainted themselves with the project by means of discussions with the pertinent organizations and through field visits to Kanpur, Mirzapur and Lucknow, as a total team, later in smaller groups (Annex 2).

Further detailed information was obtained during the remainder of the second week, while report writing started. The mission met every day to discuss individual findings and to decide on further action to be taken.

During the third week, the draft report was discussed with the consultants and executing agencies regarding correctness of the presented data. The report was discussed with the Royal Netherlands Embassy and the Ganga Project Directorate. Thereafter, the report was finalised. The mission concluded her work on 7th July.

The evaluation was carried out between 19th June and 17th July 1989 The complete Terms of Reference are given in Annex 1.

1.5 Acknowledgement

The mission thanks all institutions and individuals involved, for their hospitality and readiness to discuss frankly all relevant issues during this evaluation.

2. OVERVIEW

2.1 Major Achievements

The project, which started in June 1987 witnesses the following major achievements.

- Finalization of nearly all required studies.
- Completion of design and commissioning of 5 mld UASB plant treating domestic sewage from Jajmau area and 10 cu.m. UASB plant treating combined domestic and tannery wastewater.
- Completion of design and commissioning of the chrome recovery plant.
- Finalization of nearly all the DPR's.
- Partial implementation of crash programmes in terms of handpumps and latrines.
- Training and training approach including development of promotion materials for various groups of health promoters.

These achievements have been made possible by the joint efforts of consultants and executing agencies. They are especially worth mentioning, taking into consideration that the consultants had to set-up their offices from scratch, that the executing agencies were more or less confronted with consultants and had to define their own role, and last but not least, the basic problems which in the view of the mission are rooted in the project design and/or the inception report.

2.2 Basic Problems

It is not the intention of the mission to look into the genesis of the problems which hindered the progress of the project to some extent. It is important, however, to identify the major problems and to suggest ways and means to resolve them. They are in brief:

- lack of well defined approach towards integration
- combination of experiment and demonstration
- lack of clarity in division of responsibilities amongst the organizations involved.

These basic problems will be further elaborated in this chapter.

2.3 Concepts of Integration

The various parties concerned apply different concepts of integration which are usually only defined in a vague manner. Such as: integration between parties concerned, integration between the Ganga Action Plan and the people's interest, between the technical and the social components etc.

Whatever interpretations are used by the various parties, no common meaning prevails. The project so far has insufficiently been able to describe its approach and methodology in this respect. Each party therefore uses its own approach which has inevitably led to some mis-communication.

The Terms of Reference for the consultants include one hundred and one separate activities to be undertaken during the project period. Although priorities are given, these do not seem to reflect any integrated thinking. In accordance with the Terms of Reference the project embarked on "crash programmes", soon discovering that sanctioning of these projects took as long as any other activity. Too much energy had to be put in these crash programmes. The crash programme proved to be "too crash" according to the project team.

Furthermore a large number of short term consultants assisted the project. The project produced eighty five reports during the last one and a half years. Their integration/coordination from a management point of view, seems rather difficult to the mission.

For the future however the picture looks less gloomy. The number of short term consultants will be reduced and the emphasis will be on implementation.

It should also be acknowledged that this for India is the first time an attempt is made to apply an integrated approach with regard to wastewater treatment and urban sanitation.

Recommendations

The mission recommends that this approach and methodology be specified by the consultants, as per their Terms of Reference and agreed upon by all parties, in order to avoid future misunderstandings and to create a basis for future priority setting and planning.

2.4 Experiment and Demonstration

The objectives of the project mention the development and demonstration of systems. The mission is of the opinion that an inbuilt conflict has been created this way.

The UASB is presently in the testing phase in India. The executing agencies and the consultants should work together to see if this technique, including its management, could be made appropriate for Indian circumstances. This will involve extensive training and cooperation, which has already started.

The other components of the programme such as water supply need not be demonstrated to the executing agencies, since they have a long standing experience with all relevant technologies. The consultants may be relieved from the burden of "demonstration" (including training) in these areas.

2.5 Responsibility and Authority

The side letter, signed by the Government of India and the Government of the Netherlands, indicates that the consultants will have overall responsibility for the studies and final technical designs, training of operation and maintenance staff, community participation and health education.

During execution the responsibility rests with the executing agency. Consultants provide advisory services with regard to problems and necessary quality control. Furthermore certification of reimbursement claims will be sought from the Dutch lead consultants.

The executing agencies are responsible for the implementation, including supervision. To the mission this is very clear. However, there seems to be confusion about the responsibilities of the various parties involved, especially with regard to those of the consultants:

- The mentioned responsibilities have not been made clear to the executing agencies.

- Consultants tried to exercise control on a very low-key basis. They could not, however, resist intervening in the supervision of the works.

During the evaluation, some rectifications were made on the initiative of the mission. However this is not enough.

Recommendations

The mission strongly recommends to prepare clear cut job descriptions for consultants and executing agencies in which the responsibilities and corresponding authority will be clearly spelt out and agreed upon by all parties.

3. ORGANIZATIONAL ISSUES

3.1 Present Organizational Structure

The organizational set-up given in the figure No. 5.1 page 174 of the Mid Term Status Report June 1989 by the consultant show that they will deal directly with Government of The Netherlands and the executing agencies like UPJN, KNMP, K.J.S, MNP, etc. as counterparts and will only maintain liaison with GPD. This is quite logical and rational but in practice proves difficult.

The Governments of India and U.P.-state as per the side letter created on site project working groups to be chaired by Project Managers, the Commissioner/Administrator of KNM in Kanpur and the D.M. in Mirzapur. Their function is to discuss and coordinate all municipal and state agencies in the programme and to monitor overall progress.

3.2 Responsibilities

The agreement or Terms of Reference for the Dutch Lead Consultants and Consortium are well defined and cover extensively various aspects of the project beginning from obtaining basic data, field work to design supervise and certify the quality and completion of work for payments.

The letter No. F17/1/85 EEC (NL) dated 1st April 1987 of Ministry of Finance Department of Economic Affairs along with the minutes of the meeting on January 19-20, 1987 defines that implementing agencies for the project will be G.P.D. and U.P. Government but execution of the work will be done by the U.P. Jal Nigam, for the water supply, sewerage and sewage treatment. The other activities of solid waste disposal, sanitation, LCS, sewer cleaning etc. are entrusted to municipal organizations of Kanpur and Mirzapur.

The consultants have the overall responsibility for the studies, technical designs, training of the staff, transfer of the technology, arranging the community participation and public health education. The primary responsibility of supervision of the contracted work rests with the executing agencies with powers to disburse funds to contractors and also to pay for additional items or changes up to 20 percent of the contract price.

The consultant will have a representative as a member on the official tendering committee and will provide advisory service with respect to the problems that may arise during execution of the work and the quality control aspects in order to ensure that the completed works meet the objectives of the project.

The consultants have to deal with various agencies for the execution of the works. They have singular overall responsibilities for technical designs, and an advisory function for the implementation of the project.

The consultants also have representation in the Project Review Panel, and in the on site working groups. They have access to GPD and Government of U.P., for liaison work.
The division of responsibilities between the consultants and the executing agencies along with authorities of the implementing agencies are clearly defined in the Terms of Reference for the consultants and the letter of the Ministry of Finance. There appears to be some communication gap between the consultants, the implementing and executing agencies. This has resulted in problems in the field work and some delays in the implementation of the project.

To make the organizational structure more effective, it would be desirable to restate the specific responsibilities and to develop a clear understanding of the functions. The consultants have to deal with executing agencies as counterparts and not with implementing agencies like GPD or UP Government. They should directly contact executing agencies on technical matters or such issues. This would avoid delays and provide sufficient opportunity to discuss the matter personally for early solution.

This lack of clarity has resulted in limitations to the introduction of new techniques and practices by the consultants, as they do not seem to know, whom to involve in it.

3.3 Procedures

The collaborating agencies of U.P. Jal Nigam, Kanpur Jal Sansthan, Kanpur Nagar Mahapalika and the Mirzapur Nagar Mahapalika have the project responsibilities in addition to their other projects and programme of works. U.P.J.N. has set up Ganga Action Unit with a General Manager at Kanpur, which looks after all the G.A.P. projects including the Indo-Dutch project. In Mirzapur Indo-Dutch project is looked after by the Superintending Engineer working under Chief Engineer Allahabad.

The routine procedures are followed by executing agencies. This adversely affects their work programmes as approvals and sanctioning take abnormally long time.

Recommendations

1. Present procedures of processing of DPR's by Jal Nigam through their HQ, Dept. of Urban Development, U.P. Government and GPD for project approval and the financial sanction are too time consuming. Therefore, to expedite the processing UPJN should send DPR copies simultaneously to its HQ, Dept. of Urban Development, U.P. Government and GPD for parallel processing. Also each of the agencies should have a mutually agreed upon time limit.

2. The defined primary responsibility of Jal Nigam is to supervise the construction at all stages. The consultants certify the claims for payments and have an advisory function regarding quality control. Therefore, consultants should not interfere into the day to day supervision of works by Jal Nigam.

3. Furthermore job description should be made for each agency and responsibilities and corresponding authorities should be clearly spelled out and agreed upon by all parties.

4. In order to increase fruitful interaction between consultant and Jal Nigam Head Quarters, U.P. Government, and Jal Nigam Kanpur Unit, it would be desirable that consultant activities are shifted to Kanpur and Mirzapur. However, in order to expedite the process of approval and sanctioning it may still be necessary to have a Liaison Officer stationed in Delhi.

5. The consultant and the executing agencies should have regular (weekly/bi-weekly) meetings to exchange views on the progress of the project. These should deal with issues related to field work, construction work and technical aspects, difficulties in execution, to promote day to day progress of the work and planning.

6. Inspection reports by the consultants, if any, should also be made available to the executing agencies (field and head quarters), so that rectification can be done without delay.

7. To expedite the process of approval and sanction of DPRs and to monitor the progress of the project, it is desirable to have a GPD liaison cell in Lucknow and a special cell in UPJN Headquarters. It is recommended that the possibility of creating such cells be examined by the agencies.

8. It was learnt from the discussion with executing agencies in Mirzapur and Kanpur and Lucknow that time taken for approval of DPR and its sanction ranged from two months to five months from the date of DPR was submitted. When high priority projects are to be completed in a period of 12 to 18 months such long delays are unaffordable. Therefore procedures adopted by G.P.D. and U.P. Government should be reviewed to reduce this period to not more than six weeks.

4. TECHNICAL ASPECTS

4.1 Introduction

The mission observed that several changes were made in the various project activities during the past period. It proved to be impossible for the mission to ascertain the reasons of these changes and their implications.

During the initial phase of the project a crash programme was initiated, in order to make the people aware that improvements would take place in a fairly short time. However, experience showed that the impetus of the crash programmes was lost to a large extent due to the delays in implementation.

Workplan and barcharts showing the progress up to June 1989 indicate a delay of three to six months in completing the planned activities.

The mission is of the opinion that this delay is of a limited magnitude when seen in the Indian context. However, these delays could have been foreseen before planning the activities. They could have been more limited by better consultations with local agencies and institutions which have ample information available on earlier studies and plans.

4.2 The UASB treatment plant

Delay in execution of the 5 mld plant in Kanpur was caused by:
- the acquisition of land;
- a strike at UP Jal Nigam;
- delays and changes in the design made by the consultants;
- delays by the contractor.

The agency(ies) responsible for carrying out the operation and maintenance of 5 mldand 10 cu.m. plants were not having adequate experience to run the plant. Already in December 1988 Jal Nigam was requested to supply the required manpower.

The consultants initiated two training programmes for the relevant personnel, with a few lectures. More systematic training is to follow.

So far there have been misunderstandings about who is the consultant's counterpart GPD or Jal Nigam. This general issue has been dealt with elsewhere in this report. As far as transfer of technology is concerned there is no doubt that Jal Nigam is the counterpart.

Technical viability of the plant will mainly depend upon:
- effective transfer of technology, skill and know-how to agency(ies) responsible for operation and maintenance strict influent quality control;
- an appropriate institutional set-up within the executing agency.

Conclusions

The performance of both UASB reactors is yet to reach the design efficiency. The observed low level of performance is due to the existing non-steady state condition of the reactor which may be attributed to the variable organic loadings to which the reactor is subjected as well as to the non-formation of granulated biomass which is an essential pre-requisite for the proper functioning of UASB. This steady state may be achieved by October 1989.

UASB technology alone will not enable the implementing agency to achieve the discharge standards set by the regulatory agency. The efficiency under the most optimal condition, cannot exceed beyond 80 per cent. Further, the removal of COD, following in 6 hours detention time, is mainly attributed to physico-chemical, rather than biological phenomena. A proper dynamic equilibrium must exist between physico- chemical processes and anaerobic digestion of the enriched biomass in the reactor.

Recommendations

1. The post treatment system for UASB is mandatory and the consultants must select the proper technology after assessing the performance of the plant.

2. Since the experiment with 10 cu.m. plant involves mixing of tannery wastewater with domestic sewage, the proposed conveyance system for the industrial wastewater is exclusively for tannery wastewater. Industries other than tanneries should treat their wastewater to the level acceptable to municipal sewerage system before discharge into the municipal sewers. If this is not done, the objective of carrying out the experiments with 10 cu.m. plant shall be defeated.

3. Technological viability of the project must be suitably ensured.

4. For cost comparison between UASB and other conventional treatment systems, only aerobic systems which are known for high cost, have been considered. Proven technologies such as fixed film-fixed-bed- anaerobic biological treatment systems, should also be included in the cost comparison to assess this new technology (UASB) on an equivalent basis. The mission recommends that this study be carried out by on independent agency.

5. The performance evaluation of both the UASBs should be based on soluble COD removal efficiency only, as the ratio of total COD to soluble COD is high. As steady state condition is normally achieved after 12 to 16 weeks of commissioning, and as July, August and September are monsoon months, the final performance evaluation should be made sometime in the month of November, 1989, well in time to influence the decision on the 20 mld plant.

4.3 Water Supply

The supply adopted in the design of water supply systems of Mirzapur and Jajmau, Kanpur are 150 lpcd for pipe connections and 35 lpcd for standpipes. With assumed losses of 20% the effective supply will correspond to only 120 lpcd for house connections and 27 lpcd for standposts. These are to be compared with:

a. The national norms of 270 lpcd supply.
b. The World Bank norms of at least 130 to 160 lpcd consumption for piped supply for low and middle income groups and 50 to 90 lpcd consumption for lowest to low income groups; and
c. Actual measured average consumption in handpumps/standposts of 38 to 42 litres per user is existing in the system at present.

Persons nearer the reservoirs and/or richer families can draw more water than the design level and so the actual supply at points further away from the reservoirs will be less. If the losses are also more than the 20% provided for, the actual supply at the standposts will be still less. The consultants have realised that people have to walk to the standposts and the consumption varies inversely with distance from 60 lpcd to 20 lpcd. The number of standposts in Kanpur have been reduced from above 300 to 120 double tap ones with presumably a corresponding increase in the average distance of carrying water from the tap. Accordingly the quality of service of water supply to the poor is very low. The recommendation of the consultants to close around 270 standposts may hence be reviewed.

4.4 Sanitation

The low and lowest income groups will not generally be provided with good sanitary facilities like flush toilets and sewer connections as provision of sewerage is linked to water supply and affordability. Cluster services in the original proposals of consultants seem to have been dropped. Even though public toilets are proven to be costlier than private facilities and the level of service in terms of accessibility of the latter are better, public toilets have been adopted in the LCS systems. The importance of privacy in the use of toilets has been ignored in the provision of LCS toilets. The introduction of a large number of soak pits in an urban area may lead to environmental pollution and hazard, unless proper precaution is taken regarding construction, maintenance of surroundings, effect of rodent holes on diffusion of pollutants and obnoxious gases.

Provision of low level services rather than a toilet and sewer connection where they are technically feasible need proper justification.

4.5 Sewerage

Since sewerage is based on the water supply and sanitation facilities, it is also at a low level. In an Indian environment with intense monsoon rainfall on dry silty alluvium, there is a high suspended and bed silt load in the natural drains. The use of combined sewers should make suitable provision for grit and silt removal at interception points to prevent and control silt entry into sewers as silt removal from sewers is costly and time consuming. Adequate provisions for silt interception in drains at the head of interception works as per available Indian technology has not been provided in the sewers. This will render the system ineffective due to choking, septic sewage, and pollution of environment in the city and overflow to Ganga river.

4.6 Drainage

Storm water drains have been designed for a return period of 1/2 year in Mirzapur and 1 year in Jajmau, Kanpur. This is at variance with the recommendations of Ministry of Works and Housing which recommends 1/2 year return period for outlying areas and 1 year for core areas, as well as with the practice in U.P. and other parts of India where a return period of 2 to 5 years is adopted for urban areas and a value of 2 years is adopted even for agricultural drainage. The actual rainfall intensities adopted are less than the India Meteorology Department recommendations. Consequently, the design may have a failure of, say once in 1 month or 1.5 month (in a monsoon period of 3 months) in Jajmau and Mirzapur respectively. As the drains are proposed to be covered, the consequences are likely to be serious.

4.7 Solid Waste Management

The solid waste management programme is basically catering to the non- hazardous solid wastes. In Mirzapur no consideration has been given to manage industrial solid wastes, e.g., washed metal bearing slags and casting moulds of local brass industries; and in Kanpur only part of solid wastes generated from tanneries are included. In Mirzapur, the existing practice of washing metal bearing slags directly in river Ganga should be discontinued. A separate facility for washing should be created at a place reasonably away from the river. The secured landfill site should be located close to this facility so that industries can themselves arrange dumping of their solid wastes. The washings and leachates should be analyzed for the presence of toxic elements and treated before discharging to municipal sewers. The existing incinerators at Mirzapur should be used to thermally destroy hospital-, and slaughter house wastes, animal carcasses, and city refuse.

At Jajmau, the solid waste scenario will change after the tanneries adopt mechanical fleshing process as these processes will no longer generate raw material for glue industries.

The prevailing situation of solid wastes containing low compostable matter can be improved by proper mixing of organic wastes (such as slaughter house & vegetable market wastes) with city refuse. The existing 200t composting plant should be brought back in operation again as proper handling of this plant shall ensure direct cash flow from the system.

Recommendations

1. In the context of the existing technology of water supply and sewage within India, the scope for introducing simple technology by the consultant is limited in this project. Therefore consultants should make efforts to incorporate more recent advanced technology instead of simple ones.

2. The consultant should take cognisance of the established engineering practices, codes, manuals etc. in water supply and sewage engineering in India.

3. Adopt improved levels of service for water supply, since existing sources are enough to meet a higher level of service at Mirzapur; and since integrated operation with perhaps a reservoir in Sector 5 of Jajmau and transfer from industry to public in Jajmau are possible.

4. Provision of flush toilets for houses with access to sewers and if necessary cluster toilets, rather than toilets with soak pits and public toilets in the sanitary facilities of Mirzapur and Jajmau, Kanpur.

5. Check the capacity of drains for 2 to 5 year frequency storms of appropriate concentration time and as per IMD recommendations. Provisions of lined cunettes for sewerage flow and non foreclosing of future options for drainage are to be kept in consideration.

6. Modify present design to the extent possible at improved level of service to the poorest of the poor, using modern concepts of integrated and/or optimal design.

7. It seems possible to improve the level of service by incineration of solid waste in Mirzapur and composting at Kanpur and secured land filling of hazardous industrial wastes.

8. In case of any deviation in design given by the consultants from that described in the design codes of India, the consultants must record the reasons for such deviation in writing and communicate the same to the executing agencies for comments. In case of controversy, the matter should be referred to GPD whose decision shall be final and binding to both consultants and executing agencies.

4.8 Chrome Recovery Plant

The chrome recovery plant is working satisfactorily and chrome is being recycled to tanning. However, this technology can be accepted as proven only after obtaining a certificate from Central Leather Research Institute (CLRI), that the long term chromium recycling practice does not have an adverse effect on the quality of leather produced and after obtaining a scheme for treatment and disposal of bleed-off liquid, if any, arising out of the system.

5. SOCIAL AND HEALTH ASPECTS

5.1 The Validity and Adequacy of socio-economic data collected

The project has carried out several surveys in order to understand the physical, social and economic conditions of the project areas. The data requirements ranged from basics such as maps and an inventory of type and level of services to community felt needs and water-related illnesses. A "community survey" dealt with the first type of data, while a "baseline survey" sought to collect data at household level. At a later stage a separate survey addressed specific health needs, health service utilization and practices pertaining to water use, defecation and personal and domestic hygiene.

The data collected have proven sufficient for the project to assess and arrive at different types of facilities suitable in different locations. In retrospect project staff feels that while the surveys were useful to get to know the conditions in project areas, some data at present appear to be less relevant or useful than was initially thought. Coding and subsequent analysis suffered from over-eagerness to get the surveys started and done with.

Recommendations for similar projects could be:

1. Make a clear distinction between inventory type of data and data that can be collected on a sample basis.

2. Collect qualitative type of data and get a feel for the area before embarking on full scale surveys. (The area classification used in the surveys serves as an example. It was given up only after the surveys were over).

3. Make sure that clusters studied represent all relevant strata.

4. Adopt a multi-stage cluster sampling method allowing for many clusters of modest size rather than a few large ones.

5. Collect data on the employment generated in the existing traditional occupations dealing with sanitation and solid waste.

6. Make an assessment of the impact of the technical interventions on the volume and type of these traditional occupations.

5.2 Community Participation and Health Education in the Project

The two factors identified in the project for the promotion of the environmental and sanitary programmes are:

a. improvement of the technical infrastructure in the area;
b. full and effective participation of the community in the programme.

The technical inputs and content of social change are conceived, formulated and implemented by the various official agencies. The participation of the community is understood in terms of:

a. acceptance of the programmes by the people;
b. financial contributions;
c. people's willingness to change their beliefs, attitudes and practices with regard to health and hygiene.

The agencies feel confident in assessing the following:

a. physical facilities required for the people;
b. required changes in the social attitudes, beliefs and practices;
c. designs and strategy of implementation including the 'aesthetic' aspects of the development.

Thus the major portion of the work of SEU has been to explain and request the community to accept the norms of the programmes. This approach has been followed with great zest and dedication.

In order to ensure effective community participation the project has identified several potential agents of change from among the community such as T.B.A., Private Medical Practitioner, Anganwadi Worker, school teachers and so on. These people are trained to convey the messages of the programme in order to achieve changes in the attitudes and practices of the people. So far in Jajmau (Kanpur) more than 300 health promoters were trained (total population 105,000). In addition to this, the project aims at forming 'mandals' (neighbourhood committees) which would act as pressure groups to implement the programme and to safeguard continuity.

The programme has developed promotion materials regarding the core messages. This proved necessary when urban-oriented W.S.S. health-education materials were found lacking. The development of these promotion materials was done in co-operation with UNICEF. At present most of the materials have been field-tested and UNICEF has adopted several of the promotion materials for its own programmes.

It is felt that the project services such as water supply and low cost sanitation on the whole address the basic needs of the population. Regarding the methodology chosen in identifying and conveying health education messages and other inputs there are some reservations, as expressed above. The project's concept of participation really boils down to the community's acceptance of whatever the project has to offer and to a change of health related behaviour according to messages identified by professionals.

It should be emphasized that this interpretation of community education and participation is not unusual or outdated.

It should also be realised that this approach has not proven successful elsewhere in the world as far as changes in behaviour are concerned. Project staff seem eager to understand and adopt new approaches of development by involving the community on a different footing.

Recommendations

1. Contact organizations in India involved in participatory CEP techniques, such as UNDP/PROWWESS in Delhi. The techniques referred to were developed specifically for water supply and sanitation projects. They have proven successful in training core staff of WSS projects in all parts of the world.

2. Allow for more say of the population in the decision making process regarding type of services. In particular allow for options regarding construction of facilities such as private latrines.

5.3 Social and Non-Governmental Organizations

The present project has a heavy emphasis on the participation of the community. This surely implies the involvement of NGO's. So far it has been impossible in both Kanpur and Mirzapur to identify a NGO which has a proper perspective of community development. However, it is felt that mandals (yet to be formed) could take this role. These mandals are informal groups of the community. The project staff aims for these mandals to become a strong force on behalf of the community. Project staff is not yet sufficiently clear about:

a. organizational structure of the mandals;
b. rights, duties and functions of the mandals;
c. the position of the mandals in the hierarchy of the project implementation;
d. legislative claims of the mandals in terms of project operation and monitoring.

A cursory observation of the functioning of the institutional structure gives the impression that there has been a sufficient attempt to strengthen the official implementing agencies. At the same time there is no adequate emphasis on strengthening the claims of the community over official agencies.

Recommendation

In order to ensure the participation of the community it is necessary to involve mandals at the different levels of project operation. Different mandals can be formed into a cluster. The cluster members must become members of policy making bodies such as the Project Management Group. The representation both at the cluster level and at the project level should have equal numbers of males and females. Representation should rotate periodically.

5.4 Health, Health Care and the Project

Water supply, sanitation and other hardware components of the project can be seen as interventions in an environmental engineering project. They also have a bearing on health and wellbeing of the recipient population. The improvement of living conditions of the recipient population has been made an explicit objective of the project. However, from the outset, ways and means to strive for improvement of living conditions were not firmly restricted to interventions in the realm of environmental and sanitary engineering.
In the concept of the project community education and participation were deemed essential in order to maximize possible health benefits of the engineering components of the project.

Data were collected on knowledge,attitudes and practices related to water supply and sanitation as well as on prevalence of water-related diseases and use of formal and informal health care systems.

This information helped the project to arrive at the content of a health education programme. It also assisted in identifying "agents of change" or "health promoters" through which the health education programme could be channeled to the population.

Amongst agents of change identified were birth attendants (dais) and private medical practitioners. The latter proved to be the main suppliers of health care both in Jajmau and Mirzapur. It has been a deliberate choice of the project to work with and improve on existing suppliers of health care. Since the main burden of health care is dealt with by the informal sector, this sector was incorporated in the training programme of the project.

The training programmes for various groups of health promoters as well as surveys executed, have resulted in increasing awareness that provision of institutionalised health services for curative care and referral are inadequate in project areas.

Solutions for Jajmau, advocated by senior medical staff in KNM and KMC (Kanpur Medical College) are to have a community centre which combines curative and preventive services. Project Development workers could use this centre as a basis. Kanpur Medical College has a specific interest in such a centre: they would like their freshly graduated doctors to have a centre to do their 6 months training in community medicine.

Another solution which overlaps with the former suggestion, is to further develop the idea of an urban Primary Health Care set-up in both Jajmau and Mirzapur. It stands to reason that an urban PHC system will benefit from the momentum, services and human resources generated in the WSS project. Likewise follow-up and expansion of training of community members by an urban PHC system would be complementary to the WSS project activities.

A proposal to this effect has been submitted for funding to a Non-Governmental Organization in the Netherlands.

It is felt that the request for improved health care services for the general population of Jajmau is valid. It must be realised however, that it is not only distance which makes for under-use of present institutions by Jajmau's population. Quality of care and integration of preventive and curative services should be safeguarded in whatever option is chosen. It is not clear at present in what way staff and graduates of KMC can contribute in this respect.

Recommendation

The mission supports the idea of community centres which feature curative and preventive services in both Jajmau and Mirzapur. These could be part of an urban PHC set-up outside project responsibility. The roles and responsibilities of various parties need to be well defined. A long term commitment of the municipality is particularly important.

5.5 Occupational Health

Occupational health was identified and taken up as an area of concern at an early stage of the project. In Jajmau (Kanpur) occupational health focuses on tannery workers, while in Mirzapur carpet weavers are the target group.

The argument for including occupational health in an environmental and sanitary engineering project is amongst others that protection of the environment should be considered in the wide perspective of the Ganga Action Plan as well as at factory and individual level. Moreover, tanneries are the industrial backbone of Jajmau and tannery workers and their families make up approximately one third of the total of Jajmau population. In Mirzapur the majority of weavers work on family looms in small homely set-ups. Both programmes are executed by the municipalities with support from SEU. At present health surveys of samples of both occupational groups have been concluded.

Morbidity data are alarming at first glance. For tannery workers data on controls, employed in non-hazardous jobs in tanneries (gate keepers, clerks) were provided. It appeared that both tannery workers and worker- controls had high rates of morbidity, with only few symptoms standing out as related to occupational hazard. For example, 81% of tannery workers versus 85% of worker- controls reported to have had symptoms of illness during the last 15 days, while 40% of workers versus 36% of controls took treatment in that period. Chrome ulcers of the skin, a typical occupational hazard, were found in 2% of the tannery workers surveyed.
It would not be fair at this stage based on this shallow evidence to deny the occupational health programme a chance to do what it has set out to do and what has been approved in Detailed Project Reports.

It is the feeling however, that occupational health would be better placed in a Primary Health Care programme than in a project mainly dealing with environmental and sanitary engineering. A practical point is that the work load of SEU staff involved in the main stream project is expected to rise sharply when technical interventions come into full swing, both in Mirzapur and Kanpur.

Recommendation

Safeguard continuity of occupational health programme particulary in Jajmau. Consider if both in Mirzapur and Jajmau occupational health can be incorporated in Primary Health Care programmes.

5.6 Involvement of Women in the Project

The project identifies the important role of women in various social processes related to the implementation of the programme. The project is fully aware of the specific problems of women due to inadequate water supply and poor sanitary conditions. The technical interventions towards improving these facilities will definitely help the majority of women. At the same time women's roles in promoting the objectives of the programmes are fully utilised, particularly in terms of changing the existing social attitudes and practices with regard to health and hygiene. Thus women are seen as potential agents of social change in the community.

In addition to this, the project identified the need for increasing the skill levels and the income of women. In view of this, an appreciable effort has been made to train female construction workers as masons. It is too early to draw any specific conclusions about the programme. However, the following limitations can be foreseen unless sufficient care is taken to provide adequate follow-up support.

A. The trained female masons may not be able to compete as full-fledged masons in the construction industry.

B. Even if they get employed they may be treated as second class masons by the contractors.

The project also foresees these limitations and is actually making an effort to strengthen the claims of women to get equal opportunities in the construction industry.

In view of the recognized important role of women in the implementation of the project it is necessary to incorporate the issues of women along with the main components of the project.

Recommendations

1. Training programmes especially for community volunteers should incorporate the specific attitudes about women and required changes.

2. The Staff in SEU should be given training in order to expose the staff to various aspects of women's interests.

3. The problems related to the occupational hazards of women should be recognized and women should be made equal partners in the occupational health programmes.

4. The employment of women masons should become obligatory on the part of the companies involved in the construction.

5.7 The Impact on Health

One of the more ambitious exercises of the project is a health impact evaluation using diarrhoea of under five year old children as an indicator for overall effect on health of the population. As stated in the project report dealing with this study "Diarrhoeal diseases are multifactoral and fluctuations in their magnitude cannot be attributed exclusively to water and sanitation facilities."

However, the project does address quite a number of the factors considered to be related to diarrhoea ranging from water supply and sanitation to personal and domestic hygiene, breastfeeding and immunizations (and of course oral rehydration therapy which reduces diarrhoea mortality rather than morbidity). It is thus not a far-fetched idea to see if a trend can be discovered in diarrhoea morbidity in project area's where diarrhoea is rampant and various components of the crash programme are being implemented.

A cohort study has been designed taking in all under-five year old children in approximately 200 randoms selected households in underprivileged area's in both Kanpur and Mirzapur.

Results of the first study rounds indicate seasonal peaks of diarrhoea prevalence during July-August in both towns. Diarrhoea prevalence was higher in relation to household practices considered to be harmful, but none of these relationships could be demonstrated as statistically significant.

Recommendation

Compare presence of risk factors in households with high and low diarrhoea prevalence. Such a case-control study may give a better indication of (combinations of) risk factors. Age of children and season should be accounted for. In addition the main purpose of the study to show a trend in relation to the interventions can be fulfilled, provided functioning and utilization of the services are established.

The idea to use community based health promoters such as Anganwadi's to execute the study seems useful. Feedback of results to the community should be established without stigmatizing certain households. Results of the longitudinal study should be depicted in graphs, for everybody to see and understand.

5.8 The Impact on Different Social and Economic Groups

The emphasis of the project on improving the physical facilities of the area implies differential impact on the different economic groups. The households with sufficient space to have private facilities, and in a position to afford the cost will definitely benefit from the project.

However, the improvement in the water supply, drainage, etc. will boost the land value in the area. Consequently the poorest of the poor who are not able to meet the cost might be pushed out of the area. Their conditions of living may become worse.

Similarly, it is important to make an approximate assessment of the impact the programme is likely to have on occupational groups such as scavengers.

The scheme of providing community toilet facilities for those who cannot afford private facilities does not appear very favourable for the poor. A simple estimate of cost incurred by a household for utilising the public toilets may serve as an example. An average size family of 6 persons with 2 adult males will incur a minimum of 50p per day. At the end of the month such a household will have spent Rs.15/-, which is more than the monthly installments paid for private latrines.

In this context there is a need to consider several issues with regard to the financial burden for the poor. The simple solutions of providing physical facilities may cause limitations for utilization of the facilities. In the long run it may even defeat the objective of the programme. The lack of attention for these aspects might aggravate the existing socio-economic inequalities between the households.

6. DEMONSTRATION, TRANSFER OF KNOWLEDGE AND TRAINING

6.1 Introduction

The mid-term status report in its Chapter "Training", does not differentiate between the terms Demonstration and Training. The mission is of the opinion that the term Demonstration be reserved for wastewater treatment only.

6.2 Impact of Demonstration

The Project anticipated a demonstration value on policy level within the Indian Administration. As the 5 mld UASB plant is not yet in a steady operational state there is no impact as yet.

As soon as the results of this plant prove to be positive under Indian conditions, it is expected to have a considerable impact on the policy in India regarding wastewater treatment.

6.3 Transfer of Knowledge

The transfer of knowledge regarding the UASB technology has started only recently.

Recommendations

1. The mission recommends that the provisional document: "Transfer of UASB Technology" which describes the organizational set-up and staffing for the 5 mld plant and the methodology used be made final immediately in concurrence with the executing agency. It is important that this transfer of knowledge be practical and recognises the existing experience of the counterpart staff.

2. Furthermore a provision is to be made in the technical budget for fellowships to allow staff of the implementing and executing agencies to acquaint themselves with anaerobic techniques in The Netherlands, notably the Wageningen Agricultural University and Colombia.

The mission does not see the necessity for the transfer of practical design experience from the consultants to the executing agencies regarding the other aspects of the programme.

In April a two day workshop was organised for the executing agencies. The subjects were: Application of UASB technology and the present project experiences in integrated project approach.

Recommendation

The mission recommends that the consultants evaluate whether this workshop has been satisfactory, if not, design another workshop together with the executing agencies.

6.4 Training of Health Promoters

Training of Health Promoters has been a carefully planned and executed process.
The Health Promoters addressed in the project cover a range of community based people. Some were already involved in health care (dais, private medical practitioners), others were newly identified (community volunteers, caretakers) or involved in formal education (primary school teachers). In addition, an Anganwadi scheme was set up in Jajmau.

Table 1 gives an estimate of Health Promoters trained in relation to the total number envisaged eventually for Jajmau area.

Type of Promoter	Total No.	Trained No.	Refresher Course
Anganwadi	26	25	2 times a year
Primary School Teacher	?	84	3 times a year
Dai (TBA)	±100	50	2 times a year
Private Medical Practitioner	±100	50	2 times a year
Community Volunteer	?	50	variable
Caretakers	±150	30	2 times a year

In Mirzapur as well these groups were trained, with the exception of Anganwadi's.

Training of all these groups of promoters has had several features in common:

1. A focus on environmental, domestic and personal hygiene.

2. Willingness to start from and build on existing practices (Dais, PMPs).

3. Incorporation of feedback of training results in order to arrive at a set approach in the form of training modules.

Furthermore interlinkages between the groups were encouraged, so that each neighbourhood would have a core of various health promoters.

Health promotion materials were developed and field-tested as part of the training. The promotion materials focus on a set of messages identified at an earlier stage.

At present project staff feels that they have well-nigh achieved the objective of arriving at a field-tested set approach of training courses for the various groups mentioned above. The interest of UNICEF in materials and approach developed has been supportive in this regard.

The methodology of the training has shifted from one way teaching to discussions, drama, song, etc. However, the content of what should be learnt and conveyed is still very much decided by course facilitators.

Recommendation

Similar to what is said in Chapter 5.2 it is felt that more attention should be given to release the creative capabilities of the trainees. They need to learn to hold back as "educators" and enable the actual target population to generate their own messages and actions. Some of the promotion materials developed in the project would do well in such participatory sessions. For issues that do require knowledge/skills such as preparation of oral rehydration solution, the material developed seems well suited.

6.5 Training in Water Supply

The training of Hand Pump Mechanics and Caretakers has been taken up with enthusiasm.

Recommendation

It is recommended to strengthen this programme and to allow for longer training period in which more practical experience can be gained. The number of trainees might also be increased.

6.6 Training of Female Construction Workers

The mission underlines the importance of the training of female masons and the supporting role of the project with regard to their employment.

Recommendations

1. It is recommended that the project should gradually try to have this training and follow-up more institutionalised.

2. Regarding the methodology, the mission is of the opinion that the initial two weeks should be more practical, taking into consideration that these trainees know part of the job already.

7. FINANCIAL AND ECONOMIC ASPECTS

7.1 Project Budgets and Financial Monitoring

From the information made available to the mission, regarding the investment costs of the different projects, the following picture emerges:

	As per	Amount in lakhs Rs
KANPUR		
Committed by GON (side letter) 30.5 mln. DGl. a 7 Rs	April 1987	2135
Administrative Sanctions GPD:	June 1988	1467
Estimates by consultants (mid term status report,and report on fin.requirements)	June 1989	1545
GPD investment ceiling Jajmau	July 1988	1500
MIRZAPUR		
Committed by GON (side letter) 19.5 mln. DGl. a 7Rs.	April 1987	1365
Administrative sanction GPD	June 1988	924
Estimate by consultants	June 1989	1316
GPD investment ceiling Mirzapur	July 1988	900

The original total commitment of 50 mln.DGl. was based on a preliminary project identification as well as a much stronger value of the Indian Rupee in relation to the Dutch guilder. This explains partly the discrepancy between the amount mentioned in the side letter and the actual estimates for the planned projects. At this moment it is highly unlikely that the amount of financial assistance, allocated by the Netherlands Government for this project will be depleted by the end of 1991.

In the mid term status report, the consultants indicate (page 150) that the GPD investment ceilings will probably be exceeded by the estimates. In that case, priorities will have to be set. It is also stated that for that reason a solid financial analysis is premature and that O & M aspects will only be attended after expenditure sanctions.

It might be argued however, that consequences for O&M budgets and the coherence within the integrated approach, should be the main factors influencing decisions on priorities.
Apparently, GPD decisions on allocation of funds are primarily based on investment ceilings. The investment ceilings are the result of a number of financial-political considerations regarding distribution of the total available GAP funds to all the cities along the Ganga River. Now that a spill over to the VIII plan period will take place resources will most probably not be a constraint.

For a successful integrated approach, it is desirable that the scope and details of the project are re-examined by a technical review committee, for possible enhanced bilateral cooperation.

The mission was not impressed by the way the project reports on its financial status. The quarterly progress reports, nor the mid term status report, do contain easily accessible overviews on the actual financial status in terms of estimates, sanctioned amounts, expenditures incurred, etc. The report on financial requirements, dated November 1988, still has a provisional status in July 1989. As a technical-financial report it could have been finalised and thus contributed to the development of the project without violating formal procedures for sanctioning of project proposals.

Recommendations

The mission recommends, that:

1. At the appropriate level, (GOI vs. GON) discussions be initiated on the long term expenditure planning, as far as the Netherland's financial assistance allocated to this project is concerned. It is suggested that this issue be taken up on the agenda of the forthcoming bilateral review meeting.

2. Operation and maintenance costs and financial planning of municipal corporations be seriously taken into consideration when projects have to be curtailed or priorities fixed, due to limitations posed by investment ceilings.

3. A format be developed, to be updated regularly, giving the major data on the financial status of the project, to permit both Dutch and Indian authorities to be properly informed and have an up-to-date overview.

7.2 Cost Evaluation UASB

Data on the investment costs are at this moment only available on the basis of projections (estimates). As far as the mission was informed no ex-post evaluation of investment costs could be finalised as yet.

The data serve the purpose of providing management information to the financing agencies (GPD; GON).

However, for an accurate economic evaluation of this treatment process, essential data should be added, checked, and updated, on the basis of real actual values and incurred expenditures. The cost of land acquisition needs specific attention as the value of land in the area seems to be increasing substantially.

Reliable assessment of the real cost of treatment of sewage water by way of UASB will require detailed study of capital costs and monitoring of operational costs over a reasonable time-span. The final results of such a study, combined with the technical efficiencies, would serve to compare the new technology with other treatment options for this particular city.

Recommendation

The mission recommends that an independent organization/steering group conducts a comparative study of the economic viability of the UASB treatment process vis-a-vis other processes, under Indian conditions. The study could be based on existing research results and monitoring data from the Kanpur plant. This exercise should be a joint effort by Indian and Dutch experts, and be completed by the end of 1989.

7.3 Operation and Maintenance Cost

From the (provisional) consultant's report on the financial requirements of the proposed projects in Jajmau and Mirzapur November 1988, the following observations can be made:

For Kanpur

The following table gives indicative amounts of the total budgets of municipal services for water supply, sewage, sanitation and public health (sum of budget components of KJS and KNM) and projected O & M costs for Indo-Dutch projects in lakhs rupees.

	85/86	86/87	87/88	88/89	89/90
Revenue	622	662	1041		
Expenditure	1232	1581	1717		
Deficit	610	919	676		
O&M costs Indo-Dutch				52	66

(Population of Kanpur: 2,500.00, Population Jajmau: 105.000 = 4%)

For Mirzapur

Indicative amounts of the budget for municipal services for water supply, sanitation and public health, and the projected O & M costs for Indo-Dutch projects in Lakhs rupees.

	85/86	86/87	87/88	88/89	89/90
Revenue	10	17	17		
Expenditure	52	78	81		
Deficit	42	61	64		
O&M costs Indo-Dutch				83	85

(Data taken from consultant's report on financial requirements, November 88)

It becomes very clear that the impact on O & M budgets for both municipalities is considerable!

For Mirzapur the expenditure will more than double. In Jajmau, where average income is lower than in the rest of Kanpur city, it will become a difficult task to collect water and sewerage taxes. At present it seems virtually impossible to effectively collect more than 60% of the water bills charged to the consumers in Kanpur. At the actual tariffs even 100% recovery would not be sufficient to cover the maintenance cost of the necessary facilities.

Consultants have made an important first step to investigate the financial requirements accruing from the Indo-Dutch project, in terms of O & M cost impacts. The respective authorities of both municipalities have expressed their awareness about this increasing burden on their resources.

The mission concludes that a more detailed discussion with the authorities shall be necessary, regarding the future financial basis of their municipal corporations.

Upon request of the institutions involved, advice may be provided on all organizational and administrative matters related to this problem.

Recommendation

The mission recommends that the relevant parties co-operating in the Indo- Dutch project, fix a time-table to increase their efforts to strengthen the future basis for O & M in the respective municipalities and to create long term solutions for adequate cost recovery and sustainability of the water and sanitation facilities. Essential elements should be:

a. more in depth study of the financial structure of the municipal corporations, their administrative and managerial systems;
b. description of options for future O & M strategies and financial models;
c. preparation for decision making on all proper levels.

7.4 "The Polluters Pay" Principle

In Jajmau tanneries will be major beneficiaries of the improved water supply and sewerage system and waste treatment. Also they are the main polluters in the area contributing about two third of the pollution.

Tanneries are required by law to provide treatment of the effluent before discharge into a water course or river. So far tanneries do not share in the capital costs of the services envisaged. It seems rational however, that they should at least contribute their share in the operation and maintenance costs.

It is rational that the "Polluter Pays" principle is applied to all industries particularly tanneries in Jajmau.

Recommendation

The mission strongly recommends that charging tanneries for the services be examined in detail. This will require adjustment in property taxes and water charges in such a way that they pay their due share of the cost.

Kanpur Mahanagar Palika and all concerned administrative authorities should take early steps to implement this recommendation.

8. WORKPLAN 1990 ONWARDS

Experience in this project has shown that accurate work-planning is rather difficult to develop and adhere to during implementation. Frequent adjustments seem to be unavoidable.

The workplan for 1990 onwards, was presented by the mission in the form of a four-sheet barchart "version June 1989", indicating time schedules for 1990, 1991 and 1992 (Annex 3). Upon request, some additional explanation was given regarding the reasons/justifications for the changes in this barchart compared to the one presented in the "Up-dated Workplan Phase II" (barchart version Sept. 1988) and the original version (1987).

The mission examined a number of projects (randomly selected), on the planned duration of execution for these components (in months), as an illustration:

BARCHART VERSIONS

	Sept. 1988	June 1989
PROJECTS:		
* Solid Waste Mirzapur:		
- System Managements & Support	12	15
- Procurement additional equipment	8	3
* Health education Mirzapur:		
Support for implementation	21	24
* UASB-Kanpur extension	15	18
* Domestic wastewater conv.Kanpur:	21	22
* Storm water drainage Kanpur	21	15
* Drainage non-core area Mirzapur	21	30

The mission concludes:
- Apparently, work planning is to be adjusted very frequently in this project.
- The apparent tendency to longer time schedules will probably lead to a request from consultants to extend the Technical Assistance to the project, also beyond 1st January 1992.
- Chronological coordination of different projects, once under execution, will demand amongst other things strong decision makers.

The consultants have expressed their confidence that the workplan as presented is realistic.

Nevertheless, the mission has observed that a fair number of critical conditions have to be fulfilled, to achieve the target. Apart from the five assumptions mentioned in the barchart it will be important to gain the co-operation of the population in a town like Mirzapur, with its narrow streets and densely populated areas.

The mission feels that the best guarantee for the realization of the implementation plan will be the commitment of the parties involved, to the mutually agreed targets.

Consequently, the mission would not judge negatively on the actually proposed workplan for 1990 onwards but does strongly recommend the following:

Recommendations

1. The mission recommends that a more detailed and clear proposal for a workplan 1990-onwards be discussed and formally agreed upon between consultants and executing agencies, subsequently to be presented for approval to GPD and GON. This should be finalised before the 1st October 1989.

2. In line with what has been said elsewhere in this report, concerning division of tasks and responsibilities, the mission recommends that the project's strategy to gradually phase out the consultants inputs be maintained. By the beginning of 1992 the executing agencies should have developed the capacity required to sustain the sanitary and environmental facilities.

9. REPORTING, MONITORING AND EVALUATION

The project features an exceptional range of interventions, which are thought to be complementary. Together they will have an impact on the environment as well as on the living conditions of the population concerned.

At this mid term stage of the project, just before implementation will come into full swing, there is a need to reflect again on the essentials the project wishes to demonstrate. This will make evaluation of the project towards the end more meaningful.

In order to do this, more is needed than a description of the different components and the way each component was tackled. One could take an accepted evaluation procedure such as the "Minimum Evaluation Procedures" of the WHO as a guidance, and focus on indicators of functioning, utilization and impact of various components.

However, the key-questions are not easily caught under the umbrella of one monitoring and evaluation system. Such key-questions range from fairly basic questions such as "Does the UASB work" and "Will it continue to work" to more ethereal issues such as "What is the beneficial effect, if any, of an integrated approach".

To obviate the need to accommodate all indicators in one system, a rather radical suggestion is made. It is felt that at this stage project staff and counterpart organizations may be in a position to generate hypotheses regarding the essentials of the project. Such hypotheses could be generated during brain- storming sessions in meetings at different levels. The hypotheses, if drawn from all parties concerned, would cover the full range of issues deemed important.

Examples could be:

1. The UASB is a feasible and cost-effective technology in industrial urban areas in India.

2. Acceptance and implementation of low cost sanitation in urban areas follows a S-shaped curve rather than a straight line.

3. Interventions dealing with WSS in urban situations, are likely to benefit higher rather than lower socio-economic classes. Therefore specific measures have to be taken to safeguard the interests of lower socio-economic classes.

Evidence to support or reject the hypotheses would have to be collected in the next stage of the project.

The mission feels that the mid-term status report goes a long way in providing data on all relevant issues. The report follows the outline suggested by the consultants for their final report.

It is felt that more emphasis could be given in the final report to:

1. The main achievements.

2. Interlinkages between various technical components.

3. Socio-economic components should be incorporated in the write-up on technical components.

4. The main problems and the problem-solving approaches taken should be illustrated.

Findings and data should be presented in an easily digestible attractive way, in order to get the attention they deserve. It is recommended to seek assistance of a scientific journalist in this respect.

10. ABSTRACT OF RECOMMENDATIONS

Chapter 2: Overview

2.3 Concept of Integration

The mission recommends that this approach and methodology be specified by the consultants, as per their Terms of Reference and agreed upon by all parties, in order to avoid future misunderstandings and to create a basis for future priority setting and planning.

2.5 Responsibility and Authority

The mission strongly recommends to prepare clear cut job descriptions for consultants and executing agencies in which the responsibilities and corresponding authority will be clearly spelt out and agreed upon by all parties.

Chapter 3: Organizational Issues

3.3 Procedures

1. Present procedures of processing of DPR's by Jal Nigam through their HQ, Dept. of Urban Development, U.P. Government and GPD for project approval and the financial sanction are too time consuming. Therefore, to expedite the processing, UPJN should send DPR copies simultaneously to its HQ, Dept. of Urban Development, U.P. Government and GPD for parallel processing. Also each of the agencies should have a mutually agreed upon time limit.

2. The defined primary responsibility of Jal Nigam is to supervise the construction at all stages. The consultants certify the claims for payments and have an advisory function regarding quality control. Therefore, consultants should not interfere into the day to day supervision of works by Jal Nigam.

3. Furthermore job description should be made for each agency and responsibilities and corresponding authorities should be clearly spelled out and agreed upon by all parties.

4. In order to increase fruitful interaction between consultant and Jal Nigam Head Quarters, U.P. Government, and Jal Nigam Kanpur Unit, it would be desirable that consultant activities are shifted to Kanpur and Mirzapur. However, in order to expedite the process of approval and sanctioning it may still be necessary to have a Liaison Officer stationed in Delhi.

5. The consultant and the executing agencies should have regular (weekly/bi-weekly) meetings to exchange views on the progress of the project. These should deal with issues related to field work, construction work and technical aspects, difficulties in execution, to promote day to day progress of the work and planning.

6. Inspection reports by the consultants, if any, should also be made available to the executing agencies (field and head quarters), so that rectification can be done without delay.

7. To expedite the process of approval and sanction of DPRs and to monitor the progress of the project, it is desirable to have a GPD liaison cell in Lucknow and a special cell in UPJN Headquarters. It is recommended that the possibility of creating such cells be examined by the agencies.

8. It was learnt from the discussion with executing agencies in Mirzapur and Kanpur and Lucknow that time taken for approval of DPR and its sanction ranged from two months to five months from the date of DPR was submitted. When high priority projects are to be completed in a period of 12 to 18 months such long delays are unaffordable. Therefore procedures adopted by G.P.D. and U.P. Government should be reviewed to reduce this period to not more than six weeks.

Chapter 4: Technical Aspects
4.2 The UASB Treatment Plant

1. The post treatment system for UASB is mandatory and the consultants must select the proper technology after assessing the performance of the plant.

2. Since the experiment with 10 cu.m. plant involves mixing of tannery wastewater with domestic sewage, the proposed conveyance system for the industrial wastewater is exclusively for tannery wastewater. Industries other than tanneries should treat their wastewater to the level acceptable to municipal sewerage system before discharge into the municipal sewers. If this is not done, the objective of carrying out the experiments with 10 cu.m. plant shall be defeated.

3. Technological viability of the project must be suitably ensured.

4. For cost comparison between UASB and other conventional treatment systems, only aerobic systems which are known for high cost, have been considered. Proven technologies such as fixed film-fixed-bed- anaerobic biological treatment systems, should also be included in the cost comparison to assess this new technology (UASB) on an equivalent basis. The mission recommends that this study be carried out by on independent agency.

5. The performance evaluation of both the UASBs should be based on soluble COD removal efficiency only, as the ratio of total COD to soluble COD is high. As steady state condition is normally achieved after 12 to 16 weeks of commissioning, and as July, August and September are monsoon months, the final performance evaluation should be made sometime in the month of November, 1989, well in time to influence the decision on the 20 mld plant.

4.3 - 4.7

1. In the context of the existing technology of water supply and sewage within India, the scope for introducing simple technology by the consultant is limited in this project. Therefore consultants should make efforts to incorporate more recent advanced technology instead of simple ones.

2. The consultant should take cognisance of the established engineering practices, codes, manuals etc. in water supply and sewage engineering in India.

3. Adopt improved levels of service for water supply, since existing sources are enough to meet a higher level of service at Mirzapur; and since integrated operation with perhaps a reservoir in Sector 5 of Jajmau and transfer from industry to public in Jajmau are possible.

4. Provision of flush toilets for houses with access to sewers and if necessary cluster toilets, rather than toilets with soak pits and public toilets in the sanitary facilities of Mirzapur and Jajmau, Kanpur.

5. Check the capacity of drains for 2 to 5 year frequency storms of appropriate concentration time and as per IMD recommendations. Provisions of lined cunettes for sewerage flow and non foreclosing of future options for drainage are to be kept in consideration.

6. Modify present design to the extent possible at improved level of service to the poorest of the poor, using modern concepts of integrated and/or optimal design.

7. It seems possible to improve the level of service by incineration of solid waste in Mirzapur and composting at Kanpur and secured land filling of hazardous industrial wastes.

8. In case of any deviation in design given by the consultants from that described in the design codes of India, the consultants must record the reasons for such deviation in writing and communicate the same to the executing agencies for comments. In case of controversy, the matter should be referred to GPD whose decision shall be final and binding to both consultants and executing agencies.

Chapter 5: Social and Health Aspects

5.1 The Validity and Adequacy of socio-economic data collected

Recommendations for similar projects could be:

1. Make a clear distinction between inventory type of data and data that can be collected on a sample basis.

2. Collect qualitative type of data and get a feel for the area before embarking on full scale surveys. (The area classification used in the surveys serves as an example. It was given up only after the surveys were over).

3. Make sure that clusters studied represent all relevant strata.

4. Adopt a multi-stage cluster sampling method allowing for many clusters of modest size rather than a few large ones.

5. Collect data on the employment generated in the existing traditional occupations dealing with sanitation and solid waste.

6. Make an assessment of the impact of the technical interventions on the volume and type of these traditional occupations.

5.2 Community Participation and Health Education in the Project

1. Contact organizations in India involved in participatory CEP techniques, such as UNDP/PROWWESS in Delhi. The techniques referred to were developed specifically for water supply and sanitation projects. They have proven successful in training core staff of WSS projects in all parts of the world.

2. Allow for more say of the population in the decision making process regarding type of services. In particular allow for options regarding construction of facilities such as private latrines.

5.3 Social and Non-Governmental Organizations

In order to ensure the participation of the community it is necessary to involve mandals at the different levels of project operation. Different mandals can be formed into a cluster. The cluster members must become members of policy making bodies such as the Project Management Group. The representation both at the cluster level and at the project level should have equal numbers of males and females. Representation should rotate periodically.

5.4 Health, Health Care and the Project

The mission supports the idea of community centres which feature curative and preventive services in both Jajmau and Mirzapur. These could be part of an urban PHC set-up outside project responsibility. The roles and responsibilities of various parties need to be well defined. A long term commitment of the municipality is particularly important.

5.5 Occupational Health

Safeguard continuity of occupational health programme particulary in Jajmau. Consider if both in Mirzapur and Jajmau occupational health can be incorporated in Primary Health Care programmes.

5.6 Involvement of Women in the Project

1. Training programmes especially for community volunteers should incorporate the specific attitudes about women and required changes.

2. The Staff in SEU should be given training in order to expose the staff to various aspects of women's interests.

3. The problems related to the occupational hazards of women should be recognized and women should be made equal partners in the occupational health programmes.

4. The employment of women masons should become obligatory on the part of the companies involved in the construction.

5.7 The Impact on Health

1. Compare presence of risk factors in households with high and low diarrhoea prevalence. Such a case-control study may give a better indication of (combinations of) risk factors. Age of children and season should be accounted for. In addition the main purpose of the study to show a trend in relation to the interventions can be fulfilled, provided functioning and utilization of the services are established.

2. The idea to use community based health promoters such as Anganwadi's to execute the study seems useful. Feedback of results to the community should be established without stigmatizing certain households. Results of the longitudinal study should be depicted in graphs, for everybody to see and understand.

Chapter 6: Demonstration, Transfer of Knowledge and Training
6.3 Transfer of Knowledge

1. The mission recommends that the provisional document: "Transfer of UASB Technology" which describes the organizational set-up and staffing for the 5 mld plant and the methodology used be made final immediately in concurrence with the executing agency. It is important that this transfer of knowledge be practical and recognises the existing experience of the counterpart staff.

2. Furthermore a provision is to be made in the technical budget for fellowships to allow staff of the implementing and executing agencies to acquaint themselves with anaerobic techniques in The Netherlands, notably the Wageningen Agricultural University and Colombia.

3. The mission recommends that the consultants evaluate whether the workshop regarding application of UASB technology and experience in integrated project approach has been

satisfactory. If not, design another workshop together with the executing agencies.

6.4 Training of Health Promoters

Similar to what is said in Chapter 5.2 it is felt that more attention should be given to release the creative capabilities of the trainees. They need to learn to hold back as "educators" and enable the actual target population to generate their own messages and actions. Some of the promotion materials developed in the project would do well in such participatory sessions. For issues that do require knowledge/skills such as preparation of oral rehydration solution, the material developed seems well suited.

6.5 Training in Water Supply

It is recommended to strengthen this programme and to allow for longer training period in which more practical experience can be gained. The number of trainees might also be increased.

6.6 Training of Female Construction Workers

1. It is recommended that the project should gradually try to have the training for female masons more institutionalised.

2. Regarding the methodology, the mission is of the opinion that the initial two weeks should be more practical, taking into consideration that these trainees know part of the job already.

Chapter 7: Financial and Economic Aspects

7.1 Project Budgets and Financial Monitoring

The mission recommends, that:

1. At the appropriate level, (GOI vs. GON) discussions be initiated on the long term expenditure planning, as far as the Netherland's financial assistance allocated to this project is concerned. It is suggested that this issue be taken up on the agenda of the forthcoming bilateral review meeting.

2. Operation and maintenance costs and financial planning of municipal corporations be seriously taken into consideration when projects have to be curtailed or priorities fixed, due to limitations posed by investment ceilings.

3. A format be developed, to be updated regularly, giving the major data on the financial status of the project, to permit both Dutch and Indian authorities to be properly informed and have an up-to-date overview.

7.2 Cost Evaluation UASB

The mission recommends that an independent organization/ steering group conducts a comparative study of the economic viability of the UASB treatment process vis-a-vis other processes, under Indian conditions. The study could be based on existing research results and monitoring data from the Kanpur plant. This exercise should be a joint effort by Indian and Dutch experts, and be completed by the end of 1989.

7.3 Operation and Maintenance Cost

The mission recommends that the relevant parties co-operating in the Indo- Dutch project, fix a time-table to increase their efforts to strengthen the future basis for O & M in the respective municipalities and to create long term solutions for adequate cost recovery and sustainability of the water and sanitation facilities. Essential elements should be:

a. more in depth study of the financial structure of the municipal corporations, their administrative and managerial systems;
b. description of options for future O & M strategies and financial models;
c. preparation for decision making on all proper levels.

7.4 "The Polluters Pay" Principle

The mission strongly recommends that charging tanneries for the services is examined in detail. This will require adjustment in property taxes and water charges in such a way that they pay their due share of the cost.

Kanpur Nagar Mahapalika and all concerned administrative authorities should take early steps to implement this recommendation.

Chapter 8: Workplan 1990 Onwards

1. The mission recommends that a more detailed and clear proposal for a workplan 1990-onwards be discussed and formally agreed upon between consultants and executing agencies, subsequently to be presented for approval to GPD and GON. This should be finalised before the 1st October 1989.

2. In line with what has been said elsewhere in this report, concerning division of tasks and responsibilities, the mission recommends that the project's strategy to gradually phase out the consultants inputs be maintained. By the beginning of 1992 the executing agencies should have developed the capacity required to sustain the sanitary and environmental facilities.

Chapter 9: Reporting, Monitoring and Evaluation

More emphasis could be given in the final report to:

- The main achievements.
- Interlinkages between various technical components.
- Socio-economic components should be incorporated in the write-up on technical components.
- The main problems and the problem-solving approaches taken should be illustrated.
- Findings and data should be presented in an easily digestible attractive way, in order to get the attention they deserve. It is recommended to seek assistance of a scientific journalist in this respect.

ANNEXES

May 17, 1989

TERMS OF REFERENCE

Joint Mid-term Evaluation of the Kanpur and Mirzapur Environmental - and Sanitary Engineering Project in India.

INTRODUCTION

Early 1987 the Governments of India and the Netherlands reached agreement to execute a sanitary engineering project in Kanpur and Mirzapur as a part of the Ganga Action Plan.

The principle long-term objectives of the project are as follows:

1. To develop an integration of sewerage, storm water drainage, water supply, sanitation, treatment of domestic and industrial wastewater, collection, disposal and possibly treatment of solid waste, and public health education and community participation, with the aim not only to control pollution on the river Ganga, but also to improve the general living conditions of the people.
2. To demonstrate the impact of such an intergrated approach for a low income settlement within the city of Kanpur and to develop basic criteria for the technical design in sanitary engineering projects for combined treatment of domestic and industrial wastewater.
3. To demonstrate the impact of such an integrated approach within the medium size rural city of Mirzapur and to develop basic criteria for the technical design in sanitary engineering projects for treatment of domestic wastewater.
4. To demonstrate that by using anaerobic wastewater treatment processes, a substantial part of the energy requirements for wastewater collection and treatment can be covered by its production of biogas.

Both Governments agreed to have a joint evaluation of the project three years after the formal start and a joint mid term review after one and half years.

The project started in april 1987. During the review panel in January 1989 the period for the mid-term evaluation has been fixed on June 1989.

The UASB pilot plant at Jajmau as per indications from the field is likely to be commisioned by 15th April 1989, and the pilot plant for industrial wastewater treatment and chromium recovery in one of the tanneries has already been commisioned and trial run has started. The mission will appraise the progress made so far in regard to the UASB process, and will recommend on the timing of final evaluation of the UASB pilot plant.

In november 1988 the executing consultants have drafted the "Revised Workplan for the Phase II". This workplan has been accepted for the period till dec. 31., 1989.. For the period of Phase II from 1990 onwards a new proposal has been formulated for the evaluation mission to be commented upon.

TASKS OF THE MISSION

1. The purpose of the evaluation is:

1.1 To assess the progress made since the start of the project and to determine the degree of accomplishment of the objectives originally formulated;
1.2 To assess the effectivity of the means being used to reach the objectives;
1.3 To identify factors which may have imposed constraints on the implementation of the project;
1.4 To identify factors which had a benificial effect towards the achievement of the objectives;
1.5 To draw conclusions and to make recommendations in respect to the continuation of the
- projectactivities;
- projectorganisation;
- project staffing;
- project financing.

2. The following aspects and activities will be assessed:

2.1 Technical aspects
2.1.1 The proposed servicelevels for watersupply, sanitation, solid wastecollection and -disposal, sewerage, stormwaterdrainage, and the interaction between these servicelevels;
2.1.2 The relation between the proposed servicelevels and the socio-economic data for the various areas within the project towns;
2.1.3 The proposed technical solutions for the conveyance system for the industrial wastewater in Jajmau (Kanpur);
2.1.4 The proposed sites and capacities of the treatment plants for domestic and industrial wastewater including provisions for resource recovery and pretreatment of effluents at the industrial sites;
2.1.5 The viability of the proposed technical designs in relation to the organisation(s) responsible for the execution, the supervision of the execution and the operation and maintenance of the proposed works.

2.2 Social aspects
2.2.1 The validity and adequacy of the collected data on the socio-economic situation in the projectareas;
2.2.2 The methodologies used in the project with respect to community participation, public health education and involvement of women;
2.2.3 The extent to which the community participation has been effective in the decisionmaking process on the services proposed/covered;
2.2.4 The degree in which public health education programmes have been implemented and have been effective;
2.2.5 The involvement of women in the social processes related to the project.
2.2.6 The role of the non-governmental organisations in promoting the community participation and achieving the objectives of the project.

2.3 Training aspects
2.3.1 The impact of the anticipated demonstration value of the project on policy level within the executing agencies in India;
2.3.2 The extent to which practical design experience has been transferred from the consultants' team to the Indian counterpart organisations
2.3.3 The effect of the trainingprogrammes as carried out by the Consultants' team.
2.3.4 To assess the gaps in training requirements of the executing agencies and recommend the solution.

2.4 Organisational aspects

2.4.1 The structure and the effectivity of the organisations responsible for the execution of the project;

2.4.2 The impact of the Netherlands technical assistance during the execution and the start up of the project and its future role during the second phase;

2.4.3 The institutional capability of the local authorities to operate and to maintain the proposed works on a sound technical and financial basis.

2.5 Economic Aspects

2.5.1 The factors which had or will have a positive or negative effect on the cost effectiviness of the project and the impact of those factors.

2.5.2 The financial requirements of operation & maintenance, repair/renewal of created or proposed to be created facilities duly taking into consideration the concept of cost recovery and sustainable development.

3. Workplan phase II 1990-onwards

The consultants have drafted a workplan for phase II from 1990-onwards. The evaluation mission will give its views on this proposal based on its findings during the evaluation.

4. Reporting system

To judge the demonstration value of the project, a project report will be prepared which would be used by the Planning Authorities in comparable situations in India. For these purposes the executing consultants have drafted a report "Approach and Methodology environmental and sanitary engineering project" Kanpur-Mirzapur", describing the experiences up to June 1989. The consultants intend to update this report at the end of the project.

The evaluation mission will give recommendations about the set up of this report, whether the updated version of the report will comply to the requirements mentioned in the first sentence of this paragraph, and whether amendments and/or additions are desirable.

DOCUMENTATION

- Technical Proposals Kanpur and Mirzapur
- Inception Report, september 1987
- Updated work plan phase II up to Dec. 31. 1989
- Updated work Plan Phase II, 1990 onwards
- "Approach and Methodology Environmental and Sanitary Engineering Project" Kanpur-Mirzapur.

COMPOSITION OF THE MISSION

The members of the team are actuigas independant experts.
Three members to be nominated by the GPD and the Indian authorities
1.
2.
3.
Three members to be nominated by the Netherlands Authorities
1. H.P.G.L. Sorée, senior sociologist, teamleader Dutch members
2. ir. J.B.M. Wiggers, senior sanitary engineer
3. drs. J.G. Gussenhoven, senior economist

DURATION OF THE MISSION

19 June 1989 to 7 July 1989.

REPORT OF THE EVALUATION MISSION

The mission will finalize its report at the end of the stay of the Netherlands members of the mission.

The Governments of India and the Netherlands will discuss the findings and recommendations of the report and will arrive at an agreement about the follow-up of the recommendations.
This discussion will take place during the next review panel of the project (to be held in September 1989).

ANNEX 2

ITINERARY

19/6 Delhi	Meeting at G.P.D. (J. S. Bagga, Mr. Johri) Presentations by Mr. Swamy, GAP, Mr. Schaapman, Haskoning and Mr. S.M. Sharma, U.P.J.N. Meeting with Mr. Veenbaas and Mrs. Van Vliet, Netherlands Embassy.
20/6 Delhi	Meeting with Haskoning Project Team (Mr. Schaapman, Mr. Maas, Mr. Frank, Mr. Ehrenberg, Mr. Abdullah Khan).
21/6 Mirzapur	Meeting with Project Team (Mr. Alam, Mr. Ehrenberg) Site Visits at Mirzapur.
22/6 Mirzapur	Meeting with Project Team Meeting with U.P.J.N. (Mr. K.K. Govilla, Mr. R.K. Khanna, Mr. J.B. Agarwal, Mr. A.K. Mathur) Meeting of Team leaders with Mirzapur Nagar Palika (Mr. R.K. Silas, Chairman; Mr. U.N. Tiwary, Mr. A. Bhowmik, and Dr. J.K. Jaiswal) Meeting with Mirzapur Administration (Mr. G.S. Tripathi, A.D.M.(F I R); Mr. H.M. Mishra).
23/6 Kanpur	Meeting with Project Team (Mr. Maas, Mr. Frank, Mr. Godilla, Mr. Abdullha Khan, Mr. Schaapman) Meeting with Mr. Lakha, Chief Administration, Kanpur, Mr. Y.D. Misra, Mr. B.N. Singh, Mr. S.M. Sharma and their teams.
24/6 Kanpur	Meeting with U.P.J.N. (Mr. S.M. Sharma) Meeting with Project Team Meeting with K.J.S. (Mr. Y.D. Misra) Site Visits. Discussions with SEU staff (Mr. Frank, Mr. S. Joshi, Dr. S. Kumar, Mr. M. Prasad (KNM) and other U.C.D. staff.
25/6 Kanpur	Technical discussions.
26/6 Kanpur	Meeting with K.N.M. (Mr. J.C. Seth, Dr. R.C. Gupta, Mr. M. Prasad) Meeting with Mr. Lakha and executing agencies. Meeting Mrs. Raman (K.M.C)
27/6 Kanpur	Meeting with Secretary, V.P. Dept. of Housing and Urban Development along with officers of the Govt/including (Mr. Lakha, Mr. Tripathy) and executing agencies at Kanpur and Mirzapur.
27/6 Lucknow	Meeting with U.P.J.N (Mr. S.K. Sharma, M.D; R.N. Singh, C.E.)

27/6	Mirzapur	Joint field visit and discussions with Project Team (I. Vanadarayan, M. Alam and others).
28/6	Kanpur	Joint PMG meeting with representatives KNM and medical staff KMC (Dr. R.K. Gupta, Dr. Gopala Krishnan).
29/6	Delhi	Meeting of Team Leaders with GPD Meeting with Haskoning.
30/6-2/7	Delhi	Report writing.
3/7	Delhi	Discussions and data verification with Haskoning and executing agencies.
5/7	Delhi	Debriefing meeting of Team Leaders with RNE. Debriefing meeting with GPD (Mr. J.S. Bagga, Mr. Johri, Mr. Swamy, Mr. Sikka).
6/7	Delhi	Finalize report.
7/7	Delhi	Presentation of Report to RNE & GPD.

REVISED ACTIVITY BARCHART — Version: June 1989

ACTIVITIES	1990	1991	1992	REMARKS
	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	
1. INDUSTRIAL WASTE WATER CONVEYANCE SYSTEM (JAJMAU)				The planning of the activities is based on the assumptions that
Execution				1. land will be available at the start of construction
- Pumping stations				2. there will be no court stay order incase of legal disputes on land ownership
- Rising mains				3. there will be no court injunctions because of disputes with the contractor
- Tannery waste water conveyance channels				4. there will be no public protest on the implementation works.
2. SEWER CLEANING (JAJMAU)				5. execution will only stop 1 month during monsoon
Execution				
- Repairs				
- Cleaning				
3. EXPANSION OF DOMESTIC WASTE WATER CONVEYANCE SYSTEM (JAJMAU)				
Execution				
- Replacement of stretches of sewer				
- Laying of new sewers				
4. STORMWATER DRAINAGE SYSTEM				
Execution				
5. UASB TREATMENT PLANT (JAJMAU)				
5.1 Extension of UASB Modules				
Preparation DPR				Design UASB completed in 1989.
Expenditure sanction				
Preparation of tender documents				
Tendering procedure				
Award of contract & mobilization				
Execution				
Commissioning, start-up, monitoring and training				

REVISED ACTIVITY BARCHART — Version: June 1989

ACTIVITIES	1990	1991	1992	REMARKS
5.2 Post Treatment (optional)				
Preparation DPR				Design completed in 1989.
Expenditure sanction				Execution parallel to UASB
Preparation of tender documents				construction.
Tendering procedure				
Award of contract & mobilization				
Execution				
16. LOW-COST SANITATION (JAJMAU)				
Execution				
- Public Latrines				
- Private Latrines				
17. WATER SUPPLY (JAJMAU)				
Execution				
- Tubewells (incl. elec./mech. works)				- Start T/K in Sept. 89
- Overhead Tanks				
- Repair (incl. leak detection)				
- Laying of new pipeline				
18. SOLID WASTE MANAGEMENT (JAJMAU)				
- Procurement equipment for demo-areas				
- Construction zonal offices				
- Systems management and support in demo-areas				Discontinuous inputs.
- Procurement additional equipment to cover whole project area				
- Pilot scheme for tannery waste disposal				
- Systems management and support				- do -

REVISED ACTIVITY BARCHART — Version: June 1989

ACTIVITIES	1990	1991	1992	REMARKS
9. INTERCEPTOR SEWER AND PUMPING STATIONS (MIRZAPUR)				
Execution				
- Pumping stations				Start Oct'89.
- Rising mains				Jan'90(procure pipes Aug'89
- Interceptor sewer				Oct'89 -do-
10. WIDE-MESH SEWERAGE SYSTEM FOR CORE AREA (MIRZAPUR)				
Execution				
- Laying of sewers				Procurement Aug'89. Start work Jan'90.
11. EXPANSION OF DRAINAGE SYSTEM IN NON-CORE AREA (MIRZAPUR)				
Execution				
- Laying of sewers				Start Jan'90.
- Rehabilitation of drains				
- Stormwater drains with culverts				
12. UASB SEWAGE TREATMENT PLANT (MIRZAPUR)				
- Preparation of DPR by UPJN				
- Expenditure sanction by GPD				
- Preparation of Tender Documents				
- Tendering procedures				
- Award of contract and mobilization				
- Execution				
- Commissioning, start-up, monitoring and training				
13. LOW-COST SANITATION				
Execution				
- Public latrines				
- Private latrines (incl. conversions/soak pits/ new pour flush latrines)				

REVISED ACTIVITY BARCHART — Version: June 1989

ACTIVITIES	1990	1991	1992	REMARKS
	11 12 13 14 15 16 17 18 19 110 111 112	11 12 13 14 15 16 17 18 19 110 111 112	11 12 13 14 15 16 17 18 19 110 111 12	
14. WATER SUPPLY (KIRIAPUR)				
Execution				
- Overhead Tank (zone III)				Start Sep.'89.
- Tubewell (zone IV)				Start Dec'89.
- Repair/leak detection (zone II + III)				- do -
- Laying of new pipe lines (zone II + III)				- do -
15. SOLID WASTE MANAGEMENT (KIRIAPUR)				
- System management support in demonstration areas				Discontinuous inputs.
- Procurement of additional equipment for final phase				Seperate expenditure sanction for 3 zonal
- Construction of zonal offices				offices is needed as soon
- Incineration for hospital waste				as sites are available.
- System management support				Discontinuous inputs.
16. HEALTH PROMOTION AND COMMUNITY PARTICIPATION ASPECTS				
- Implementation support				
- Impact monitoring				
- Final impact assessment report				
17. TRAINING				
- Execution of training programme				Discontinuous inputs
- Impact monitoring and evaluation				- do -
- Final evaluation report				
18. INSTITUTIONAL DEVELOPMENT				
- Operation and maintenance aspects				Discontinuous inputs

REVISED ACTIVITY BARCHART

Version: June 1989

ACTIVITIES	1990	1991	1992	REMARKS
	11 12 13 14 15 16 17 18 19 110 111 112 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12			
14. WATER SUPPLY (HIRIAPUR)				
Execution				
- Overhead Tank (zone III)				Start Sep.'89.
- Tubewell (zone IV)				Start Dec'89.
- Repair/leak detection (zone II + III)				- do -
- Laying of new pipe lines (zone II + III)				- do -
15. SOLID WASTE MANAGEMENT (HIRIAPUR)				
- System management support in demonstration areas				Discontinuous inputs.
- Procurement of additional equipment for final phase				Seperate expenditure sanction for 3 zonal offices is needed as soon as sites are available.
- Construction of zonal offices				
- Incenaration for hospital waste				
- System management support				Discontinuous inputs.
16. HEALTH PROMOTION AND COMMUNITY PARTICIPATION ASPECTS				
- Implementation support				
- Impact monitoring				
- Final impact assessment report				
17. TRAINING				
- Execution of training programme				Discontinuous inputs
- Impact monitoring and evaluation				- do -
- Final evaluation report				
18. INSTITUTIONAL DEVELOPMENT				
- Operation and maintenance aspects				Discontinuous inputs

COLL No. EVRPTI/casmirz/11

ANNEX 4

LIST OF ABBREVIATIONS

BOD	Biological Oxygen Demand
CLRI	Central Leather Research Institute
CMO	Chief Medical Officer
COD	Chemical Oxygen Demand
DPR	Detailed Project Report
GPD	Ganga Project Directorate
KJS	Kanpur Jal Sansthan
KMC	Kanpur Medical College
KNM	Kanpur Nagar Mahapalika
LCS	Low-Cost Sanitation
Lpcd	Litres per capita per day
MLD	Million Litres per Day
MNP	Mirzapur Nagar Palika
NGO	Non Governmental Organization
O & M	Operation and Maintenance
PHC	Primary Health Care
PMG	Project Management Group
PMP	Private Medical Practitioner
Rs.	Rupees
RNE	Royal Netherlands Embassy
SEU	Socio Economic Unit
TBA	Traditional Birth Attendant
UASB	Upflow Anaerobic Sludge Blanket
UCD	Urban Community Development
UPJN	Uttar Pradesh Jal Nigam
WSS	Water Supply & Sanitation