

March 18, 2011

Ms. S. Malathi
Chief Secretary
Government of Tamil Nadu
Secretariat, Fort St. George
Chennai- 600 009

Dear Ms. Malathi:

***INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water-Bodies
Restoration and Management (IAMWARM) Project- Implementation Support Mission
February 1-10, 2011***

We would like to thank the Multi-Disciplinary Project Unit and all the project counterparts who contributed to hosting the recent implementation support mission for the TNIAMWARM Project and for arranging the extensive program of field travel. We would also like to thank you for your continued support to this important Project. Please find enclosed the Aide Memoire of the mission. While the Aide Memoire provides full detail on the work and results of the mission, we would like to summarize the key points here.

Project performance: The Project continues to progress well where institutional capacity exists, but continues to lag in those areas where institutional capacity needs to be created. An area of particular strength is the Agriculture Intensification and Diversification Component. The activities of the participating line departments and TNAU are pointing the way to improved crop and livestock yields and increased farmer incomes. The achieved results will need to be further strengthened during the remainder of the Project life and beyond. Further, it will be important to document these accomplishments adequately. As an important part of that effort, the M&E efforts under the Project need to be given top priority. The issue of demonstrated linkages between irrigation rehabilitation and modernization, and improvements in the agricultural economy, is of particular importance, and the TNIAMWARM Project is well positioned to achieve success on this.

The mission also noted during its field visits that correct construction procedures conforming to technical guidelines and quality control requirements were being followed under the Irrigation Systems Modernization Component. The recent hiring of the Third Party Construction Quality Supervision Consultant will be an important element in ensuring that construction is of high quality across the board.

Progress continues to be less than planned for the components devoted to Institutional Modernization for Agriculture and to Water Resources Management. Success in these areas is important for addressing sustainability of water use, and in underpinning and enhancing the improvements in yields and farm incomes noted above. But these are also areas that go beyond the traditional orientation of WRO and will require a vision of, and commitment to, successful change that remains lacking.

During the mission agreement was reached on a strategy for moving forward with strengthening the Water Users Associations (WUAs). Along with this, following the conclusion of the mission the Support Organizations for WUA development were hired. This work is important for ensuring that water is used more effectively at the village level. The Bank Task Team will be tracking this issue closely.

The mission noted little if any demonstrative progress on establishing the State Water Resources Management Authority (SWARMA). The primary purpose of creating SWARMA is to have an apex body for providing policy guidance, particularly on the important issue of longer-term sustainability of water use in Tamil Nadu. It is now clear that to be successful; this will require leadership and commitment from high levels in GoTN.

Project ratings: On the basis of the improvements noted in the Irrigation Systems Modernization Component, agreement on the approach for moving forward on WUA development, and continued strong performance under the Agriculture Intensification and Diversification Component, the mission has raised the Development Objective rating of the Project from Moderately Satisfactory to Satisfactory. The rating for Implementation Progress remains Moderately Satisfactory. Raising this rating will depend on accelerating the pace of completion of the Phase III works and moving promptly into Phase IV of the Project. In that regard, *it is important to emphasize the need for prompt issuing of Administrative Sanctions*, as delays in these have been a factor in putting project implementation behind schedule.

Project savings: Previous missions have noted the need to reach decisions on the disposition of savings that have accumulated in the Project. These total approximately Rs. 200 cr. The mission reviewed a number of proposals for additional spending under the Project, approving some and requesting additional information on others. The mission noted that with the Project Closing Date now barely two years away, that time is running out for undertaking any substantial new investments and that these will need to be submitted to the Bank for consideration by May of this year. At that time, an assessment will need to be made of the plan for utilization of the savings and possible cancellation of the remaining amount.

Thank you for your continued support of this important project. Please do not hesitate to contact Mr. Edward Cook (em: ecook@worldbank.org) for any clarification on the letter or the aide memoire attached.

With regards,

Yours sincerely,



Roberto Zagha
Country Director, India

Attachment: *Aide Memoire*

cc: Mr. Venu Rajamony, Joint Secretary (MI), Department of Economic Affairs,
Ministry of Finance, Government of India
Ms. Kavita Prasad Director, Department of Economic Affairs, Ministry of
Finance, Government of India
Mr. D.V.Singh, Secretary, Ministry of Water Resources, Government of India
Mr. G. Mohan, Special Secretary, Ministry of Water Resources, Government of
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Mr. Rajaretinam, Secretary to Chief Minister, Government of Tamil Nadu
Mr. K. Dhanvel, Secretary to Government Public Works Department,
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Mr. K. Shanmugam. Principal Secretary, Finance, Government of Tamil Nadu
Dr. P. Rama Mohana Rao, Secretary, Agriculture, Government of Tamil Nadu
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Mr. Vibhu Nayar, Project Director, IAM WARM Project, Government of Tamil
Nadu
Mr. S. Kumaresan, Engineer-in-Chief, Water resources Organization,
Government of Tamil Nadu

AIDE MEMOIRE

TAMIL NADU IRRIGATED AGRICULTURE MODERNIZATION AND WATER-BODIES RESTORATION AND MANAGEMENT PROJECT (TN-IAMWARM) - IMPLEMENTATION SUPPORT MISSION (FEBRUARY 1 -10, 2011)

Project Data		Current Ratings and Flag		
<i>Board Approval Date</i>	<i>01/23/2007</i>	<i>Summary Ratings</i>	<i>Last</i>	<i>Now</i>
<i>Effectiveness Date</i>	<i>04/09/2007</i>	<i>Development Objectives</i>	<i>MS</i>	<i>S</i>
<i>Closing Date</i>	<i>03/31/2013</i>	<i>Implementation Progress</i>	<i>MS</i>	<i>MS</i>
<i>MTR date- Actual</i>	<i>03/05/2010</i>	<i>Project flags</i>	<i>None</i>	<i>None</i>
<i>Original Loan Amount</i>	<i>US\$485 million</i>			
<i>Amount Disbursed¹</i>	<i>US\$180.93 million</i>			

I- Introduction

1. A World Bank team² undertook an implementation support mission for the TN-IAMWARM project during February 1 to 10, 2011. Following two full missions in February/March 2010 for the Mid Term Review (MTR) and September 2010, it was agreed with the Project that this mission would be of an interim nature and focus on providing the new Task Team Leader from the Bank ample exposure to Project activity in the field. As the mission was somewhat reduced in size, specialists for some line departments were not present. These areas will be covered more intensively during the next implementation support mission, which is tentatively scheduled for May/June. The mission would like to thank all Government of Tamil Nadu (GoTN) officers and staff of all implementing agencies and of the Multi-Disciplinary Project Unit (MDPU) for their hospitality, collaboration and for facilitating the extensive field visits that were carried out. The wrap-up meeting was held in on February 10, 2011, and was chaired by the Secretary, Finance. A draft copy of the Aide memoire was discussed during the wrap-up meeting.

II- Overview of Main Issues

2. The Project continues to function well where existing institutional capacity is strong and less so where institutional capacity building is required. The mission does note, however, actions taken to strengthen Component C, Institutional Modernization of Irrigated Agriculture, as well as steps taken since the last mission to ensure adherence to necessary quality standards under Component A, Irrigation Systems Modernization. This, in combination with continued gains in momentum under Component B, Agricultural Intensification and Diversification, lead the mission to raise the Development Objectives rating of the Project from Moderately Satisfactory to Satisfactory. Going forward it will be important to consolidate these gains, in particular through demonstrating successful models for Water User Association (WUA) operation and effective water management at the village level, demonstrating scaled-up supervision of construction quality with the assistance of the recently hired Third Party Quality consultant, and developing the operational plan for the State Water Resources Management Agency (SWARMA).

3. The mission was encouraged to see the adoption of improved methods and quality control practices with respect to the tank bund work. The ability to monitor quality, and to identify and address cases of

¹ See Section VI- Financial management & Disbursement for more details on disbursement figures.

² The Team consisted of Edward Cook (TTL), Anju Gaur (Water Resources Management Specialist), Ranu Sinha (Operations Analyst), Mohan Gopalakrishnan (Senior Financial Management Specialist), Dharendra Kumar (Senior Procurement Specialist), R.K. Malhotra (Construction Quality Specialist), and Benjamin O'Brien (Agricultural Specialist).

deficiencies in construction will be bolstered by the hiring of the Third Party Construction Quality consultant, which has occurred subsequent to the mission's departure. The mission also observed continued progress in conducting of demonstration activities under Component B of the Project and the expansion of impact area resulting from those demos. Reported yield increases, and increases in farmers' income, are substantial. For appropriate documentation of these benefits, as well as the related Project Development Indicators, work of the Monitoring & Evaluation Consultant will play an important role both through the household survey work and through putting in place the Project Monitoring Information System. Activities under Component C remain relatively weak, though draft contract signing with the Support Organizations (SOs) for WUA capacity building, which was concluded soon after the mission's departure, will be an important step forward. During the mission agreement was reached with the Project on a more elaborated strategy for improving water management at the local level that will draw upon the work of the SOs along with capacity building of WRO and other Government staff to address observed inefficiencies in WUA functioning and engrained obstacles at the local level to achieving the critical Project goal of improved efficiency and sustainability of water use. Little progress has been made under Component D, Water Resources Management. At this point the situation calls into question WRO's commitment to the water resource management improvement measures at the sub-basin and higher levels that were agreed to an appraisal and included in the Project design. Due to the interim nature of this mission, needed attention could not be devoted to this issue, but it will be a focus issue leading up to the next implementation support mission. As a basic step, submission of the work plan for the SWARMA for review is required. This has long been delayed and during the previous mission was agreed to be provided by November 15, 2010.

4. With respect to the pace of Project implementation, the mission was able to clear some important pending procurement documents. These included the revised bidding documents for the 55 packages for Phase III in Madurai region that have been subject to rebidding. Virtually all pending Detailed Project Reports for Phase IV were cleared by the conclusion of the mission. It is hoped that the process of Government sanction can now be expedited to allow Project implementation to make up for ground lost during the past year.

5. The mission received a number of proposals for additional project activities to be financed out of the accumulated Project savings of roughly Rs 200 cr. Comments have been provided on some, while others will require additional elaboration. Furthermore, the Government is considering the possibility of identifying additional eligible sub-basins for inclusion in the Project. Given the amount of time remaining until Project closing, the possibility of realistically including new activities is becoming increasingly dubious. Any substantial new areas of investment will need to be raised and vetted by May, 2011.

6. Based on demonstrated progress in Components A and B, and agreement on next steps for implementation of Component C, the mission has raised the Development Objective rating of the Project to Satisfactory. The Implementation Rating can be increased to Satisfactory once disbursement under the Phase III contracts picks up pace.

7. **Key agreed actions** are as follows:

S.No	Actions	Date by	Responsibility
1	Contract signing for the Third Party Construction Quality consultancy. (done)	Feb. 15, 2011	WRO, MDPU
2	Contract signing for 10 Support Organizations. (done)	Feb. 15, 2011	WRO, MDPU
3	Revised target for implementation of Micro Irrigation System. (pending)	Feb. 20, 2011	AED, MDPU
4	Finalize SWARMA work plan and send to Bank for clearance (pending)	Feb. 28, 2011	WRO, MDPU
5	Workplan for SO capacity building for first year.	March 20, 2011	MDPU

III. Component Assessments

Component A: Irrigation Systems Modernization in a Sub-basin Framework

8. All 76 packages under Phase I sub basins have been awarded, 73 have been completed, and 3 are under implementation. The overall completion level is about 92 % (88 % last mission). As of December 31, 2010, an expenditure of Rs. 413 crores is reported to have been incurred on phase I packages against a total agreed value of about Rs. 450 crores. Region wise progress for phase I civil works on December 31, 2010, is about 78 % in Chennai Region (66 % last mission), 96 % in Pollachi Region, 89 % in Trichy Region (85 % last mission) and 93 % in Madurai Region (92 % last mission).

9. There is also good progress on the execution of Phase II packages. All 43 packages worth Rs. 189 crores have been awarded, with 29 packages completed and 14 packages under implementation. As of December 31, 2010, the region wise progress for Phase II civil works is about 77 % in Chennai Region, 72 % in Trichy Region, and 87 % in Madurai Region. The overall financial completion level is reported to be 77 % (67 % last mission).

10. In respect of 30 Phase III sub basins comprising 136 packages estimated to cost about Rs 400 crores, bids for 88 packages worth Rs. 229 crores were received and contracts awarded for 78 packages and TAC clearance is awaited for 10 packages. Bids for the balance 48 packages are still to be invited. It is satisfying to note that out of the awarded 78 packages, works have since commenced in 31 packages and are expected to commence in the balance 47 packages by February 28, 2011. As for the said 48 bids to be invited, 11 packages come under prior review, which the Bank has cleared in the current mission.

11. The proposed 5 DPRs for Phase IV sub basins, costing about Rs .167 crores, presented by the project were examined by the current mission and cleared.

12. *Construction Quality Control / Quality Assurance and Quality Management System.* The mission made field visits to selected ongoing packages in Phase III sub basins and some completed / nearing completion packages in Phase I and Phase II sub basins in Chennai and Madurai regions. It was encouraging to observe that correct construction procedures conforming to technical guidelines and quality control requirements were being followed on the execution of rehabilitation works relating to strengthening of tank bunds, re-construction of irrigation sluices, repairs to body walls of masonry weirs / anicuts through reinforced concrete skin wall treatment, concrete bed bars in supply channels, and appurtenant works.

13. In respect of tank bunds, it was satisfying to note that in most of the tanks the earthen embankment section had been raised and strengthened to specified density through deployment of power rollers / vibratory power rollers with the earth fill on slopes also adequately compacted by hydraulic excavators incorporating steel plate fixture to their booms. In isolated tanks, improvements were needed to address the grey areas associated with loose earth fill on side slopes and occurrence of cracks in some reaches. In one such tank in Chennai region, WRO engineers are reported to have initiated immediate action to rectify these deficiencies. In the other such tank in Madurai region, it was assured by WRO engineers that the needed rectifications would be undertaken promptly. Regional Chief Engineer informed the mission next day that the rectification works had been initiated and would be completed within a week. The mission was pleased to observe that, in response to the broad guidance provided by the September 20-28, 2010 mission, the construction agency had arranged and deployed a state-of-art vibratory power roller (capable of working on slopes) for speedy and quality compaction of earth fill on side slopes of L.Venkateswarapuram tank bund in Madurai region. Proper compaction of earth fill being of paramount importance, such commendable intervention in combination with standard power rollers and rig mounted plate compactors should be adopted across all Phase III packages. In respect of the tank bunds strengthened in Phase I and Phase II sub basins, the respective regional Chief Engineers should arrange to carry out comprehensive inspections to identify all such tanks as were associated

with loose side slopes, cracks and gullies etc and, thereafter, undertake needed remedial measures promptly to address these deficiencies.

14. The mission observed the quality management system to be functioning well. Awareness on construction quality was very much evident to the mission during interaction with WRO engineers, construction agencies, and WUAs. The O.K.Card system in Tamil language involving the contractors, engineers, as well as WUAs is now firmly established and is proving effective in promoting construction quality and providing accountability as well. Procurement of testing equipment and training of construction and quality control engineers has greatly helped in the expeditious conducting of quality control tests in-house by them. However, more testing equipment would be needed to cope with the Phase III works load. Strengthening of tank bunds, being a major item of work in Phase III and IV packages, expediting actions for commissioning of the available 4 nuclear density testers the soonest possible would prove to be highly useful for very rapid on-site density testing of compacted layers of earth fill.

15. It was agreed that the contract for the Third Party Construction Quality Supervision Consultancy will be signed by Feb. 15, 2011. This will provide necessary support to the quality management system. Other agreed actions are as follows:

Sl. No.	Actions	Date by	Responsibility
1	Procurement of balance core cutters, speedy moisture meters and weighing balances for handling quality control testing in Phase III & Phase IV Rehabilitation works in Madurai and Chennai Region be completed	March 31, 2011	WRD
2	Regional Chief Engineers to arrange comprehensive inspections of the reportedly completed Phase I and Phase II packages and identify all such tanks as were associated with loose earth fill on side slopes and deep erosion gullies or any other deficiencies and undertake prompt corrective measures to address the deficiencies	April 30, 2011	WRD
3	Engineer-in-Chief to expedite requisite actions and ensure commissioning of the available 4 Nuclear Density Testers for deployment on the strengthening of tank bunds in Phase III and Phase IV rehabilitation works	March 31, 2011	WRD

16. **Modernization of PAP operation system.** The team reviewed the PAP canal system to understand the application of automation. Over the years, the irrigation system has been through several modifications in terms of canal operation and command area. Now it serves double the designed command area and the canals run substantially below the designed capacity. The command area has been divided into four zones with alternate canal system where water is supplied based on a fixed rotation basis. The rotation ensures water supply for a season during alternate years to a particular zone. Accordingly, the regulation system is set for a season (135 days) and is operated on a fixed rotation with a target to supply the water to a field for 7 times in a season. The offtakes, i.e. branch/distributaries, also run continuously or on a fixed rotation for four zones with allocated discharge (50% below design discharge). As such the scope for automated regulations is limited excepting to adjust the offtake gates during fluctuations in upstream level. If some mechanism was worked out to stabilize the levels in upstream reaches, there will be hardly any scope to regulate off-takes.

17. Since the system is operating differently than it was designed for, **it would be worthwhile to revisit the entire system, redesign the regulators to stabilize the water levels and explore other opportunities to modernize the system operation.** Here modernization does not mean lining the system or re-sectioning the

system, but modernizing the information system, and modernizing the operation and regulation system. It would require some expert/s to look at the system holistically and determine the opportunities for improvement without altering the canal section and satisfying social norms for operation. The modernization may include automated head and cross regulators to stabilize the flow and deliver the constant discharge from offtakes irrespective of minor fluctuations in levels. The outlets may also be rationalized to reduce the losses from the main canals. Several outlets in the main canal and branch canal carry very low discharge (1-2 cusec) and serve below 100 ha command. These outlets may be combined with the upstream outlets. Similarly, there may be more opportunities to operate the canal and its offtakes by simulating the hydraulics of channel in a model that would guide sequencing the opening and closing of offtakes to minimize the variation in levels.

18. This is a new field and would require some internationally experienced expert to design the canal with modern techniques and devices. The department has been relying on department engineers who have had exposure to modern technology in developed countries. They have good understanding of the application of an automated system, but require hands on experience to design the system using modern techniques. Under the guidance of an expert, they would learn and provide support in designing such a system. The department shared the concern that it may take longer to go through the process of engaging a consultant. If norms permit, the individual consultant procedure may be explored, which is quicker. To make best use of the consultant, it would require to have all the information ready and easy to process. Currently, the information is not available in the computerized format that can be processed for required design.

19. As suggested in last Aid Memoire, a stepwise approach for **modernization of PAP system** may be adopted. The following action plan was agreed with the department:

- a. **Step 1: Prepare bid document for monitoring:** The department agreed that it would be useful to introduce real time flow monitoring system that would provide a platform for transparency (between the farmers and the engineers) in the system and also serve as a base to plan for the regulating structures to be automated. The bid document for monitoring system up to minor level will be prepared. The telemetry system can also be used to operate the proposed regulation system.
- b. **Pilot monitoring in reservoirs of the system:** In order to get the exposure to various monitoring devices, the reservoir monitoring and other key locations on main canal may be implemented on pilot scale.
- c. **Step 2: Prepare for Modernization**
 - i. **Modernize the information:** The available information including maps, canal features and historical discharge data will be compiled with the help of Hydrology Data Center and/or Institute of Water studies. In order to design the modernized system and to fulfill requirements listed above, it would require conducting a topo survey, L-section and cross section of canals. If the latest survey is already available, it can be computerized or an additional survey may be conducted to fill the gap. The department should use this opportunity to modernize the information system. The topo survey will help in rationalizing the outlets and introduce on farm management practices which have been major cause of losses from the system. The L-section and cross-section would help to design regulation system including cross regulators, head regulators and gates for offtakes. The same would be useful to simulate hydraulics of the system in computer model to maintain steady state flow in the system. *The WRO may like to collaborate with a reputed institute to model hydraulics of the system.*
 - ii. **Redesign the Modernized system:** With the help of expert, the system will be redesigned primarily focusing on modernization of regulation system and operation of the system. More opportunities may also be explored to make system efficient.

- iii. **Prepare bid document/s for proposed works/structures in the modernized system:** Based on the design report, the bid documents will be prepared for suggested interventions.

20. **Decision Support System (DSS):** Procurement of a consultancy for Decision support system for Integrated Water Resources Management in four sub-basins is under progress. Institute of Water studies is the responsible agency. The progress in this activity has been very slow. The draft TOR was prepared more than a year ago but the department is still in the process of short listing the firms for release of RFP. It has taken more than three months to review the short list of firms after REOI. *The IWS team should also start preparing for DSS and compile the data.* They should collaborate with Hydrology data center where the DSS is being developed for water management and planning for other three sub-basins.

Action	Responsible Agency	Target Date
Modernize the information for PAP	WRO, Hydrology data center	April 2011
Prepare bid document of implementation of real time monitoring	WRO	March 2011
Survey and Design Consultancy	WRO	June 2011
Decision Support System for water management	IWS	Sep 2011
Implementation of Pipe conveyance system	AED	May 2011

Component B: Agriculture Intensification and Diversification

21. **Department of Agriculture, Department of Horticulture and Tamil Nadu Agriculture University (TNAU).** The three implementing agencies report approximately 91,000 ha of demonstrations/expansion in area has been achieved to date (66,661 ha last mission) with more than 257,000 ha of impact area adopting promoted technologies. The increase in productivity needs to be calculated and monitored, and, as recommended at mid-term, baseline productivity data for crops needs to be determined, and the gap area brought under production needs to be determined. As requested during the mission budgets for the crops promoted by the project should be prepared so that the Monitoring and Evaluation consultants can use the productivity data to determine project performance against the outcome indicator of increase in value of crop production.

22. During the Mission visits were made to Varahanadhi, Ongur, Poiney, Kavundinyanadhi, Pennaiyar up to Krishnagari, Therkar, Giridhamal, Arjunanadhi, Senkottaiyar, Kanalodai and Sindapalliuppodai Sub Basins where demonstrations, impact and expansion areas were observed on SRI, floriculture, maize, vegetables, ragi, tissue culture bananas, vericompost, pulses, groundnuts, and sapota. Many thanks to our counterparts for organizing the field visits.

23. The financial performance of the DoA, DoH and TNAU is at about 32% (see table below). The reason for the low expenditure is largely due to savings from DoA and TNAU when demonstration subsidies were reduced earlier in the project, and because the largest amount of expenditure will be incurred in the Phase III sub-basins. All implementing agencies are on target as per DPR estimations and sanctioned budgets. Additional activities have been proposed by DoA and TNAU to account for savings.

Financial Status (Rs. Crore)

Implementing Agency	PAD	Sanctioned amount*	Expenditure^	Expenditure against PAD
Agriculture Department	98.0	24.3	23.3	24%
Horticulture Department	73.0	60.0	30.0	41%
TNAU	88.9	51.2	29.3	33%
Total	259.9	135.5	82.5	32%

* up to 31/3/11

^ up to 31/12/10

24. Good progress has been made under the project in encouraging adoption of technologies by farmers through the setting of 'impact' area targets. The greater impact of the project would be realized if this were to be institutionalized by the line departments, and this might require formalizing the approach, i.e. selection of demonstration and impact farmers at the initiation of the demo, fixed number of field trainings for each crop, field day at harvest time, use of a control plot etc. Other innovations introduced under the project are being reported to have been taken up by departments or included in some of the national schemes, such as inclusion of vegetables under the NHM. Also smaller innovations, such as the demonstration register, where records are kept of field activities, including yield are now being adopted by the line departments. Wherever possible these need to be qualified as project impact.

25. Visits to the field were generally very encouraging however the following deserves attention. A number of the demonstration sites visited appeared to be on the fields of more affluent farmers, it is important that the interventions are equitably distributed among small and marginal, and female farmers, and that this is recorded in line with the social safeguards. The large number of demonstrations is creating competition, to the extent that demonstrations are in very close proximity, and in some cases paddy is being promoted to the farmers at the expense of higher value vegetable crops. Lastly, and this is not a new observation, there still appears to be challenges to achieving wider adoption of SRI, as it is hard to observe any organic adoption (i.e. without subsidies or motivation from the project). It is recognized that initiative such as the training of laborers for transplanting, the customization of conoweeder, the development of the mechanical weeder and the transplanting machine are all addressing adoption issues, and further innovation in this area is encouraged.

26. We continue to observe good convergence in the field; this should be further promoted wherever possible through field days with involvement of several implementing agencies as appropriate.

27. ***The Department of Agriculture*** has continued to roll out large areas of demonstration (38340 ha to date) and the associated impact area (187000 ha). That yields have been recorded and continue to show positive results is worthy of commendation.

28. During the previous two missions a number of additional activities were proposed to accommodate the considerable savings being realized. In November 2010 additional activities of approximately Rs 200 million for focused demonstrations, seed villages, vermin compost, small agricultural equipments, and yield analysis were approved. This did not account for the full amount of savings and further activities were proposed, these were reviewed during this mission, as follows; (i) an innovative approach to the introduction of pulses, (ii) farm waste composting, (iii) capacity building activities and (iv) crop competition were given technical clearance. Activities relating to seed supply chain for groundnut and pulses were not however agreed to as it was felt that these activities are covered under the seed village's proposal. These secondary additional activities amount to approximately Rs 100 million, which leaves approximately Rs 70 million of savings unaccounted for. At this stage of the project further proposals would have to have very strong justification if they were to be included. Increases were requested to subsidies for pulse crop demonstrations

(also requested at the midterm, and not agreed to) due to the increase in seed prices, it is felt that if the subsidy is raised for the additional activities then it would have to be raised across all pulse demonstrations. The mission is of the view that the project should encourage more contribution from farmers toward these demonstrations, and would also agree to reduce the fertilizer subsidy in favor of seeds in the garden land pulse demonstrations. It was also recommended that the farm waste composting include farmer contribution, of at least 50%, toward the cost of purchase of farm waste and labor.

29. The additional activities are now including a very large number of composting units, on top of those already included in the DPRs. It is imperative that these be linked to a demonstration where the benefit of reduction of chemical fertilizer requirement can be shown. The benefits from the composting are likely to be more visible on vegetable crops, where it should be used as a priority. An attempt should be made to estimate the amount of compost production and the area covered as a result of the project, as this is related to the intermediate outcome indicator, increase in area covered by Integrated Nutrient Management.

30. **The Department of Horticulture** reports to have achieved 23,000 ha of expansion area, and the mission observed that the quality of the interventions was generally high, and the department should be commended on its achievement. The DoH is now also including some focus on impact areas, and was able to show some farmers who were adopting technologies used in the expansion areas. This is a very good innovation and it is important that this impact be captured through keeping records of these areas.

31. The mission visited one tissue culture banana plantation under the project that was established in heavy soils and had suffered from flooding, and it was evident that this field was unlikely to reach its full yield potential. As mentioned in the previous Aide Memoire, establishment of horticultural crops in heavy flood prone soils should either be avoided, or backed up by strong agronomic mitigation measures, such as very high raised beds.

32. The Department is reporting good progress in achieving expenditure against the DPR amounts. However there is a wide discrepancy between expenditure and the sanctioned amount (Table 1). Reasons for this are given as a late approval of the sanctioned amount for 9/10 Phase III sub basin DPRs resulting in no progress for that year, this accounts for 9 crore, approximately 2 crore additional amount above DPR estimates sanctioned for 07/08 Phase 1 Sub basins and approximately 14 crore outstanding that is reported to be accounted for before the year end. The remainder is tied up in incremental amounts unspent over the last 4 years.

33. **The Tamil Nadu Agricultural University** has also achieved solid progress, reporting over 30,000 and 70,000 ha of demonstration and impact areas respectively. The continued high quality of the demonstrations, is also worthy of commendation.

34. **TNAU** made 13 proposals for additional activities last February; these were reviewed in November and reduced to 9 with the suggestion that TNAU should come up with additional research topics to be covered under the project. The nine proposals were reviewed, some minor additions were suggested and comments were given. Based on the replies to these, technical clearance is given. A work and procurement plan for each of these activities has to be finalized before the end of February. No proposals were provided for the additional research topics, however some suggestions were given. If these are to be conducted under the project, clear proposals need to be provided so they can be approved and included in the current round of procurement, i.e. before the end of February. Phase IV DPRs were reviewed and given technical clearance.

35. Additional activities include (i) Upscaling of E-Velanmai, (ii) Introduction of Furrow Irrigated Raised Bed (FIRB) in transplanted rice, (iii) Implementation of Sustainable Sugarcane Initiative (SSI) in sub basins, (iv) Pilot of Conservation Agriculture, (v) Demonstration of SRI concept in Direct Wet Seeding of rice, (vi) Installation of Agro - Advisory through Touch Screen, (vii) Identification and Upscaling of GHG emission

reduction technologies in SRI for carbon trading, (viii) Statistical investigation of the inter and intra variability in yield data and (ix) Development of farm level optimal cropping pattern (Scientific Farm Advisories) to maximize the farm income. These are budgeted at approximately Rs 8.5 million.

36. The additional activities will now need to be undertaken at an accelerated rate if they are to be completed successfully in the project timeframe. This is particularly the case for the Carbon/GHG study and the conservation agriculture pilot.

37. Pending DPRs were reviewed and some minor comments were given and these were given technical clearance.

38. **Department of Agricultural Engineering (AED)** The activities assigned to AED include installation of 40,000 ha Micro Irrigation System (MIS), piped conveyance systems, and water harvesting structures such as farm ponds, all with the ultimate aim of improving irrigation efficiency. In addition, AED provides machinery to WUAs. During the MTR, AED has been allocated INR 1622 million. Overall AED has been able to disburse only INR 240 million. A total of 9102 ha of MIS have been installed, while applications for 1083 ha are under progress and beneficiaries have been identified for 6300 ha. A total of 1208 farm ponds (59% of target) have been constructed, 636 machineries have been distributed to WUAs and 124 machineries procured during 2010-11 are yet to be distributed.

39. **Micro Irrigation System:** The progress in implementation of MIS has picked up during this year following several revisions in approach and procurement procedures. Thirty percent of total progress has been achieved during this year. The target for this year was 24,607 ha. The installations have completed in 3856 ha and work orders have been issued for 4700 ha. In Phase 3, where government interim procedure has also been allowed, the progress has picked up and is expected to cover 1000 ha out of a total 3505 ha. The farmers acknowledge the benefits in terms of increase in yield by 20-30%, saving in water and reduction in labor cost when compared with flood irrigation. Yet the adoption rate under IAMWARM is limited. More efforts are needed to disseminate the technology using site specific extension modes. *In order to further enhance the progress of MIS, the Agricultural Production Commissioner offered to involve Horticulture Department. Interim target among the departments should be set as soon as possible so that more progress can be achieved during current cropping season.*

40. **Water Harvesting Structures:** The water harvesting structures have been proposed in various sub-basins. As agreed during previous missions, the structures should be proposed based on technical analysis so that there is no interaction with the downstream structures in terms of water availability and investments. The emphasis should be given to water surplus subbasins, so that there are no implications with the existing downstream structures such as tanks where the investment are already in progress under the project. The major indicator of surplus water in a catchment can be interpreted with the pattern of spillover from the tank/s. If the tank situated downstream of proposed structures has spilled over at least twice in the past five years, the appropriate water harvesting structure may be considered. Further, the location should be decided based on source of water, site specific geology of the region and benefitted area. Currently the department is using macro level geology to decide the location of structures with no consideration to water availability status at basin scale. AED has been advised to engage a consultant to guide them in designing the system scientifically. It was told that the Empowered Committee had declined the proposal and instructed to use in-house facility. The mission does not see any improvement in approach and thinking and would like to reiterate that the proposal may be reconsidered so that some modern tools may be introduced to design the system. It was also informed that the Hydrology Data Center has conducted such study and have provided a detailed report for site specific structures for different scheme. AED may like to investigate whether Hydrology Data center would be able to do scientific analysis for sites proposed by them.

41. Piped Conveyance system: AED is ready to implement piped conveyance systems in two canal irrigated outlets and one in tank command. The design has been ready for two outlets in Veruvendampalayam distributary since last mission (Sep 2010), but the implementation has been delayed due to administration sanction. AED plans to implement the water management initiative “commutation water for water” in these two outlets (50 Ha) in Veruvendampalayam distributary that would allow reallocation of water saving among each other. This would result in three times water use efficiency and substantial energy saving (63000 KWatt hr or INR 12000/ha per year) due to reduction in groundwater pumping.

42. Farm Machinery: It was reported during the last mission that the usage of farm machinery given to WUAs was not effective. The primary reasons were no power (tractor) equipment available with the WUA and mismatch between requirement and supply. AED has done reassessment to match the demand with the supply. The AED is also advised to introduce innovative farm machinery which has been found useful but requires promotion. AED also proposed to supplement central scheme where the implements are provided to the farmers at prescribed subsidy norms. The procurement procedure for such packages will be worked out and conveyed later to the MDPU.

43. **Department of Agricultural Marketing and Agribusiness.** During field visits the mission was able to visit one functioning Agri-Business Center (ABC) from phase I, and an ABC in the process of development in a phase II location. The interest of the associated commodity groups in the marketing and market-related services was evident. To ensure the financial sustainability of the ABCs, it will be critical to have their operations assessed by a professional business consultant and a business plan developed for each of these entities. *It was agreed that draft TORs for this consultancy assignment will be provided to the Bank by February 15.* The mission is now in discussion with the Department concerning how to take this assignment forward.

44. The Department submitted a proposal to the mission for the establishment of an additional 20 ABCs, on top of the 28 already included in the Project. The estimated cost of this additional investment is Rs. 30 cr. The mission supports the general idea of scaling up the marketing elements of the Project, but is of the view that scaling up should be conditional upon completion of the business assessment of the existing ABCs noted above.

45. During the September mission agreement was reached on a number of new activities to be undertaken by the Agriculture Marketing and ABDF elements of the Project (Annex 2 of the September 2010 mission Aide Memoire). With respect to setting up the Agribusiness Development cell, the Department provided to the mission a proposal for this which includes the hiring of two agribusiness professionals who will be responsible for assisting in formation of producer companies on the basis of existing commodity groups, providing guidance and training to district and sub-basin level marketing staff and producer company members, assisting in value chain development, assisting linkages between commodity groups and traders, etc. The mission is supportive of this proposal and will be providing feedback on it within the next week. Likewise, the Department provided a DPR for this proposal which was discussed on the last day of the mission. The Bank team has agreed to provide comments on this also within the next week. With respect to value chain development, the Department is proposing undertaking a study for two crops as a first step in identifying specific proposals for value chain development. The Bank team will be in contact with the Department in elaborating on this idea. Likewise, the Bank team will be following up on the draft proposals for the Information, Education and Communication activity and the Development market place activity within the next week.

46. The Department also provided a rough proposal on establishment of a Tamil Nadu Agri Marketing Company (TANMAC). This is a substantial new proposal with total estimated cost of Rs. 200 cr., of which Rs. 50 cr. is being requested from the Bank. A proposal of this magnitude will require substantial further

elaboration. The mission was able to discuss this issue only on the last day of its visit and will be following up with the Department on its further elaboration.

Component C – Institutional Modernization for Irrigated Agriculture

47. The mission held discussions with six water users associations (WUA) in the districts of Villupuram, Vellore, Tiruvellore, Virudhunagar, and Tutukudi. In each of the discussions, WUA general body members, TC members and Presidents were present along with local village Panchayat leaders and members of Self Help Groups. The Mission observed that a majority of these WUAs, which have become operational within the last one to two years, are weak and have little capacity to operate as self-sufficient and sustainable WUAs. Very few WUAs had the awareness of their capacity to carry out operation, maintenance, and management works on their own in order to improve water delivery to all ayacut members of the command area. The Mission observed that a majority of the head and tail farmers in the villages are in conflict over water distribution among each other, almost all command areas are suffering from issues of water theft, encroachments, lack of funds to maintain their systems, and generally poor understanding of the core functions of a WUA and their roles and responsibilities as WUA members. Overall WUA members cited requirements for training of both management and general body members in such activities as operation and maintenance, conflict and dispute resolution, bookkeeping, budgeting, water management, etc.

48. The mission visited two villages, in Villupuram and Tiruvellore districts, where interventions had begun on Community Collaborative Water Management (CCWM) by the Center for Excellence in Change Management (CEC) and their partner organizations. The mission was pleased to learn that these interventions had resulted in an increased awareness among all village members of the need to create a village-wide water budget, to develop a long-term water vision for the community, and to change agriculture and household practices to conserve water. In these villages, farmers appeared to be more confident in their ability to improve water management practices in the command area using the WUA as the key institution to carry out such activities. Based on these findings, the mission recommends streamlining training on water budgeting and water visioning with WUA capacity building initiatives to be taken up by the Support Organizations (SOs) for the project.

49. The mission was informed that the ten SO packages for phase 1 sub-basins had been cleared by the Empowered Committee and the contracts with the minutes of the negotiations were forwarded to the Bank for No Objection. Bank procurement clearance and No Objection for the minutes of negotiations and revised draft contracts was received by the MDPU Procurement cell during the mission for all ten packages including those packages that required prior review by the Bank. Immediately following the mission's departure, the WRO Tender Awards Committee (TAC) approved the ten packages. Bank clearance was then given to the draft negotiated contracts.

50. The mission in conjunction with MDPU staff discussed the roll out of the SO capacity building program across the ten package areas. In phase 1 sub-basins, ten SOs are to cover approximately 1300 WUAs across 25 sub-basins of the project. Each Support Organization will be responsible for building the capacity of 100 to 200 WUAs within their coverage area. Each SO is required to set up a team that consists of one team leader, two community organizers and about 18-20 para workers. According to the SO contract, each para worker is to be responsible for up to seven WUAs. Each WUA usually consists of more than 200 members.

51. The mission suggested a set of approaches to ensure increased effectiveness of the SO interventions to the MDPU team. The mission recommended phasing the capacity building initiatives of the SOs during the thirty months of the contract. Instead of focusing on all of the 100-200 WUAs in each sub-basin right away, the mission recommends that the SOs focus training and capacity building interventions on a core group of 15-20 WUAs for the first year or so. This will enable more focused attention to be given to a smaller

selection of WUAs and prevent the SOs and specifically the para workers from overstressing their capacities. This process can facilitate the development of points of excellence in each basin area which can serve as best practice models for subsequent WUA development.

52. Prior to beginning work with WUAs, the mission recommends that SO teams undergo a series of intensive orientation workshops and field trainings. The mission recommends that this training be provided by consultants with significant expertise in CCWM and WUA/PIM development. The Irrigation Management Training Institute (IMTI) as the nodal training agency for TNIAMWARM will manage this training activity. Based on observations in the field, the mission supports the position that CEC, supplemented with relevant external experts in WUA capacity building, be recruited to orient the SOs. This will increase the ability of the SO teams to engage effectively at the local level in building more transparent and effective WUAs. Simultaneously, a series of orientation programs and trainings on WUA/PIM development and CCWM should be provided to all responsible competent authority engineers of the WRO who will be working with partner SOs across the 25 sub-basins for the next thirty months and will continue to support these activities once SOs have completed their contracts. Based on these discussions, agreement was reached that IMTI submit a formal proposal to the Project for the SO capacity building training, including delineation of the CEC team and the supporting WUA/PIM experts, complete budget details, and proposed timing of the work. Secondly, the mission recommends that the WRO PIM Cell develop a detailed work plan for implementation of the SO capacity building interventions for the phase 1 and 2 packages and submit to the Bank task team for review. This work plan should include the details of the training modules to be used, reporting and assessment structure, requirements for conducting of baseline assessments, timeline, budget needs, and specific steps for effective roll out of SO activities across the ten packages. *Both the proposal for SO capacity training and the longer-term work plan should be submitted to the Bank for review by March 20.*

53. The mission in conjunction with MDPU staff held a preliminary information session with the prospective SOs of each of the ten packages to introduce them to the contours of the WUA capacity building program as envisioned by the MDPU team.

54. The mission was unable to meet with the Director and key staff of IMTI to review the detailed proposal for strengthening of that institution. During the wrap-up meeting the Principal Secretary PWD noted that strengthening IMTI to become a world class training institute for Integrated Water Resources Management (IWRM) is a priority for the Government of Tamil Nadu. To achieve this as well as its mandate for training in other irrigation related topics such as Participatory Irrigation Management and WUA capacity building, IMTI needs to strengthen its capacity. Towards this end, the mission recommends that IMTI submit a detailed proposal for financing a program of long-term support for strengthening IMTI to the Bank for review.

55. The mission recommends that the plan to construct small building- cum information kiosk- for each WUA should be reconsidered as the criteria for awarding the building to two hundred WUAs has yet to be finalized. In addition, based on a review of the suggested criteria, the mission felt that it would be difficult for 200 WUAs in their current state in the project area to fulfill enough conditions to qualify for a building. Alternative proposals were discussed by the MDPU that included providing matching grants to WUAs that are able to raise sufficient funds from their members for key activities. The mission recommends that MDPU may revise the proposal for building construction to include alternative suggestions and submit a final proposal to the Bank for review and clearance.

Component D –Water Resources Management

56. *SWaRMA*. There has been little discernable progress on establishment of SWaRMA since the last mission. The work plan that was to have been provided to the Bank by Nov. 15, 2010 has still not been provided. Establishment of SWaRMA has been a long pending issue that has seen little progress to date and happens to be a legal covenant under the project.

Component E – Project Management Support

57. *M&E Consultancy*. The mission received an update from the M&E Consultancy Firm on the status of its work. The Baseline Survey of households is completed and the tank/village formats are to be completed before the end of this month. There have been some delays in software development. Base data uploading and software testing initiation is scheduled for March 31, 2011. Web-hosting of the software by all line departments is scheduled to be completed by March 15, 2011. The Mid-Term Review, which was scheduled for March 2011 is now being proposed for June 2011.

IV- Financial Management & Disbursement

Disbursements: The disbursement under the project is as under:

Financing from	IDA	IBRD	Total
Allocation	156.88	335.00	491.88
Disbursed *	119.91	51.70	171.61
In pipeline with project **	8.29	1.03	9.32
Total Disbursement	128.20	52.73	180.93
% Disb.	81.72%	15.74%	36.78%

* includes SA-Advance of USD 8.00 million under IDA and USD 17.00 million under IBRD

** Claims in pipeline with the project (relating to the quarter ended December 31, 2010)

The project has been timely in the submission of the quarterly IUFRRs and disbursements have been made for expenditures reported till quarter ended September 2010

Financial Management:

58. **Budget & Funds Flow:** The revised budget for the financial year 2010-11 has been reduced to Rs 2795 from the original estimate of Rs 4632 million which adequate for the current year. The budget for 2011-12 is Rs 4101 million. There have been no constraints in funds availability (including issue of LOCs to WRO) with various line departments / agencies.

59. **Accounting, Financial Reporting and Internal Control:** Since the previous mission the project has (a) submitted the internal audit reports VI, VII and report on Joint sitting with internal auditors and line departments to resolve/ address audit findings; (b) submitted the IUFRR for the quarter ended Sept 30, 2010 and audit reports for 2009-10 for both the main project and TNAU. During the mission contract wise expenditure of all WRO contracts was shared with the mission. The MDPU is receiving monthly expenditures

reports from all the line departments/ sub basins and has also received the expenditure as recorded in the books of the AG for the 6 month period ended Sept 30, 2010. A comparison of the two however indicates differences between the figures reported by the Dept and the AG, especially in case of WRO, Agriculture Dept and AED. One of the possible reason for the variance seems to be non reporting by all Phase III sub basins into which the project has expanded in 2010-11 and non reporting of new sub basin expenditures by AG in respect of WRO. MDPU needs to follow up on the reasons for such differences and make adjustments, as appropriate, while finalizing the December 2010 IUFR. The MDPU has identified that certain additional advances had been released to district collectors for conduct of WUA elections in FY 2008-09 and 2009-10 (approx Rs 15.00 million) by WRO which were not reported as advances earlier. It was agreed that the IUFR for December would reflect this additional advance. In addition WRO and Animal Husbandry have been unable to settle long pending advances related to WUA elections and procurement of drugs & training respectively aggregating to approx Rs 65 million despite regular follow up by MDPU. WRO has indicated that there are unspent balances and now that head of account for refund of the advance has been obtained from the government the same would be settled by March 3, 2011.

60. External Audit: the project has submitted the external audit reports for the year ended March 31 2010, for both the main project and TNAU component. All audit observations of the previous year's have been settled by the AG, based on (i) documentation provided by the project and (ii) actions taken by way of adjustment in subsequent IUFRs in respect of items identified as in-eligible. It is suggested that the FY 2010-11 project financial statements should include a schedule of retention money on completed contracts (sub basin wise).

61. Internal Audit: There are no significant observations in the internal audit reports No V, VI and VII that have been shared since the previous mission. The repeated issues that are being highlighted by the auditors include: (a) non deduction of TDS and delays in filing of TDS returns; (b) insurance for insufficient period of sum by the contractors; MDPU has also initiated tripartite meetings to resolve audit findings in respect of AH, Horticulture, Fishery, Agriculture and WRO. It was agreed that a copy of the tripartite report/ resolutions will be shared with the Bank. The current contract of the internal auditors is expiring in Nov 2011. Based on experience of the last 2 years it is suggested that (i) the revised scope may focus on large spending departments i.e WRO, Agriculture, Horticulture, TNAU and if necessary AED. Also based on the performance the project could consider extension, re-appointment of the existing firm.

62. The eligibility for reimbursement by the Bank of an institutional fee payable to TNAU was raised by the Project including the alternatives to either (i) consider this as part of counterpart funding by GoTN or (ii) reimburse certain common infrastructure and project incentives to staff. The reimbursement of institutional fees comes under the ineligible category, however the Bank will revert on the alternatives proposed by the Project.

Agreed FM related Actions

S.No	Actions	Date by	Responsibility
1	Review and identify reasons for variances between expenditure reported by line departments and AG for the period ended Sept 30, 2010 (pending)	February 28, 2011	MDPU
2	Internal Audit: <ul style="list-style-type: none"> • Report of tripartite meeting between Internal Auditors, MDPU and Line Dept to resolve issues relating to expenditure reported by IA as compared to the figures reported to MDPU and those by the AG. • Submit proposal for selection of internal auditors along with revised TOR and coverage for approval. 	May 31, 2011 March 31, 2011	MDPU MDPU
3	Advances: <ul style="list-style-type: none"> • Make adjustments in December 2010 IUFR for additional advances provided to Districts for conduct of WUA elections which was not reported by WRO to MDPU.(approx Rs 15 million) • Follow up on settlement / refund of unspent balances of advances for WUA Elections (WRO) & to TNMSC/ TNLDC. 	February 28, 2010 March 31, 2011	MDPU WRO & AH Dept

V- Procurement

63. At present, the procurement plans are being prepared by the implementing agencies for each financial year and sent to the Bank for no objection. It has been observed that some of the agencies are sending the procurement plans in piece-meal, i. e. some agencies have more than one procurement plan for the same financial year. A meeting was held with the implementing agencies on February 07, 2010 with a view to understand the difficulties, if any, in having one annual procurement plan for each agency. During discussions it came to light that this may be possible for agencies other than WRD because WRD has 10 Chief Engineers (out of which 7 are doing procurement under the project). MDPU forwards the procurement plans to the Bank for no objection as and when these are received from the Chief Engineer's offices through Engineer-in-Chief office. After discussion with Head Procurement MDPU and the discussions in the meeting, it was decided that the procurement plans for the next financial year shall be sent to the Bank in consolidated form, i. e. one procurement plan for WRD Works, one for Environment Works and one for WRD Goods and one for WRD Consultancies. In case there is delay in approval of the DPRs, another procurement plan will become necessary. It was confirmed by the Head Procurement that for all other agencies efforts will be made to ensure that each agency has only one procurement plan for one year. This proposed arrangement was also discussed with Mr. R. Venkatasubramaniam Supdtg Engineer (E-in-C office) and agreed. Any minor changes in the procurement plans e. g dates or estimated cost may be incorporated in the row "Revised" and the revised plan shall be reviewed in subsequent mission.

64. Discussions were held with the Department of Agriculture. One of the specific problems they face is in the procurement of Fertilizers as the price of Fertilizers is controlled by the Government and they get no bids against their NCB tenders. It was agreed that all such procurement, where prices are controlled by the Government may be procured by following shopping procedure.
65. The project envisages to extend the existing contract on M/S Padmanabhan Ramani and Ramanujam for “Internal Audit consultancy” for Phase III and IV. on single source basis. This was discussed by Mr. Raman with the Bank team (Mohan and Dharendra Kumar). The project was advised to send the complete proposal for Bank’s review.
66. There have been some savings and AED wants to procure agriculture equipment for the farmers by adopting Government system, i. e. in this system the individual farmer can select the supplier from the list of suppliers approved by the Government of India. The price is to be quoted by the supplier on the basis of market rate. It is unclear how the market rate and the price of the equipment will be determined between the individual farmer and the supplier. It was therefore suggested that the equipment be purchased by the department as per Bank procedure and given either to the WUAs or the individual farmers. However, the project may send a detailed proposal for review by the Bank.
67. Animal Husbandry Department (AHD) discussed about procurement of “SMART” mineral mixture and mentioned that such district specific mineral mixtures for improving the fertility of livestock have been developed by TANVAS (Tamil Nadu Veterinary & Animal Sciences University). AHD wants to procure such district specific mineral mixtures from TANVAS. The project was advised to send the proposal with complete justification for procurement on direct contract basis from a Govt. agency and why the item cannot be procured through competitive bidding.
68. TNAU (Tamilnadu Agriculture University) discussed about the shifting of areas from one sub-basin to the other sub basin and allotment of additional area of 22 ha of sugarcane to Upper Gundar, 50 ha sugarcane to Manimutthar, 50 ha of sugarcane to Kottakaraiyar (transferred from Alliyar sub basin). The proposal in this regard is being sent to the Bank. After the bank provides no objection to the proposal, necessary changes in the procurement plan may be incorporated. The revisions of procurement plans shall be reviewed by the bank during the supervision missions.
69. The Superintending Engineer Designs Irrigation discussed about the contract for Third Party Quality Control Supervision. Bank has already provided no objection to the draft contract but the project wants to incorporate changes while signing the contract, e. g. the completion period to be 25 months instead of 30 months (as the project is closing after 25 months) and proportionate reduction in cost. No changes should usually be done in a draft contract after obtaining no objection of the Bank. It was advised that the contract may be signed in accordance with the draft contract (for which Bank has provided no objection) with the rider that the expenditure incurred up to the closing date of the contract will be reimbursed by the Bank and the remaining expenditure shall be borne by the Government.
70. The revised draft bidding document for Madurai region Gridhumal sub basin Package 02 was reviewed and no objection was provided. The bidding documents for the remaining 9 packages for Madurai region may be prepared on the basis of this bidding document and one copy of each sent to MDPU for review and onward transmission to the bank for information and record. The procurement process may continue after the bidding documents for the remaining packages are found acceptable MDPU.
71. The Procurement Plan containing one consultancy package of Institute for Water Studies for DSS was reviewed and no objection provided.

72. No objection was provided for Kambainallur sub basin packages 01, 02 & 03 2nd extension of validity of bids. The Project must ensure award of contract within the extended bid validity.

73. The Procurement Plan of Agricultural Engineering Department for the year 2010-11 (for Farm Ponds, Farm Machinery and Water Harvesting Structures) was reviewed and no objection with minor comments provided.

74. The proposal of AHD for combining three years requirements of Frozen Semen Straws was reviewed and comments provided.

75. The Project discussed about the minutes of negotiation meetings in 10 cases of Consultancy for support organizations (packages 1 to 10), because there have been changes in the TORs and commensurate revision of prices during negotiation meetings. It was clarified that it is not necessary to obtain prior no objection of the Bank for minutes of negotiation meetings. However, in this case it has been ascertained that the relevance of technical evaluation does not change due to changes in the TORs. The Project should go ahead for preparation of initialed draft negotiated contracts and send the same to the Bank for review along with the minutes of negotiation meetings and combined evaluation reports.

VI - Next Mission

The next implementation support mission is tentatively scheduled for latter May/first half of June. In addition, individual members of the Bank task team will be requesting short visits to the Project between missions to follow up on specific activities as agreed with the MDPU.

ANNEX 1

Tamil Nadu Irrigated Agriculture Modernization and Water-bodies Restoration and Management Project

Component A: Irrigation Systems Modernization in a Sub-basin Framework.

A. Field Visits to Irrigation Infrastructure Rehabilitation Works.

The mission made field visits to selected packages in Phase I, Phase II and Phase III sub-basins in Chennai and Madurai regions. Mission observations / comments and suggestions, package-wise, are outlined below:

1. Package No.09 /IAMWARM /WRD/ONR/Works/III/2009-2010. NEIKUPPI TANK (Rs. 19.38 lakhs). “Rehabilitation and Modernization of Anicuts, Flood Banks, Supply Channels and all Tanks covered under Ongur Sub-Basin in Olakur Block in Tindivanam Taluk of Villupuram District”.

This Phase III package was awarded on 03 September, 2010 with the scheduled date of completion of 02 March, 2012. As of January 31, 2011, the rehabilitation works on the Neikuppi Tank have achieved a completion level of about 31 %. It was satisfying to observe that the earth fill on the inner and outer slopes of the tank bund was being compacted through deployment of “hydraulic excavator with steel plate attachment to its boom”. This methodology of addressing the issue of effective consolidation / compaction of earth fill on the slopes should be continued till completion of the work of strengthening of tank bund.

Quality Control / Quality Assurance Test Data / Record. It was satisfying to note that the requisite quality control tests on soil, compaction parameters (OMC; MDBD), in-place field density tests on compacted layers, water, sand, coarse aggregates and concrete had been conducted and documented. The O.K. Card system has also been well maintained. Importantly, WUAs have also been involved in construction quality through the o.k. card system. The mission interacted with the WUA president at the work site who confirmed that he made regular visits to the works under execution and that he perused the o.k. cards and signed the same. It was observed that the O.K.Cards did not have the sub-activities printed in Tamil language. As earlier recommended, it was again impressed upon the field engineers that the O.K.cards printed in Tamil language be introduced without any further delay in order to make the involvement of WUAs in the construction quality more effective.

2. Package No. 11 (d) /IAMWARM/VNSB/WRO/LPBD/NCB/2006-2007. VIKKIRAVANDI TANK (Rs. 9.99 Lakhs / Rs. 12.07 Lakhs). “Rehabilitation and modernization of Anicuts, Flood Banks, Supply Channels and all Tanks covered under Varahanadhi Sub Basin in Kanai, Koliyanur and Vikkiravandi Blocks of Villupuram Taluk & District”.

This Phase I work relating to the rehabilitation of Vikkiravandi Tank is reported to have been completed during October, 2010. Reconstruction of one sluice was observed to have been done to satisfactory workmanship. In respect of the strengthening of 2000 m long tank bund, it was observed that adequate consolidation of earth fill on the inner & outer slopes at some locations was still needed to be carried out. The concerned field engineers assured the mission

that the need full would be got done through deployment of a hydraulic excavator fitted with steel plate attachment. The mission observed conspicuous existence of considerable amount of dead wood buried in the top layer of earth fill at some locations of the tank bund. This is not a desirable feature and the dead wood be removed and the earth fill so displaced be properly re-laid.

3. Package No. 10/IAMWARM/VNSB/WRO/LPBD/NCB/2006-2007. PIDAGAM BIG TANK (Rs. 14.51 Lakhs). “Rehabilitation and Modernization of Anicuts, Flood Banks, Supply Channels and all Tanks covered under Varahanadhi Sub Basin in Mugaiyur, Kanai, Koliyanur, Vikkiravandi Block, Viluppuram Taluk & District.

The Phase I rehabilitation works in this package commenced after handing over of the site on 09 October, 2009 with stipulated date of completion on 08 April, 2011. As of January 31, 2011, an expenditure of Rs. 9.0 lakhs is reported to have been incurred marking a completion level of about 65 %.

The mission visited the rehabilitated Tank Bund and observed the existence of long longitudinal as well as transverse cracks in the embankment almost throughout its length. Such cracks are a cause of concern. The cracks near the edges are indication of “separation cracks”.. The occurrence of wide ranging net work of cracks in the embankment observed by the mission could be due to differential settlement between adjacent lengths of embankment / due to non uniform compaction or lack of adequate compaction of successive layers of earth fill to the full width of embankment or due to use of swelling soil in the strengthening of tank bund. The “separation cracks” could cause slippages of earth fill during rains. The transverse cracks could create “paths” through the embankment for the passage of seepages upon filling of tanks.

In the context of the position observed and explained above, the depth of cracks be determined through digging small trenches and, thereafter, immediate rectification work be taken up through removal of earth fill to appropriate depth and re-doing the same in all such reaches as are associated with the cracks. Classification of “borrow area soil” to be used in the rectification work should be got done well in advance to ensure that proper soil is used. It is also suggested that in case of predominantly clayey borrow area soils, appropriate ‘blending’ of such soil with sand / gravel may be done to have the soils of requisitely needed engineering parameters. Such blended soil may then be used for the earth fill placement in layers and each layer to be compacted to specified density. The mission was apprised by WRO engineers on 9 February, 2010 that the suggested rectification works including consolidation of side slopes with rig-mounted plate compactor had been taken up the very next day of the mission visit and the rectification work would be completed in totality within the next 3 couple of days. Photographs showing the rectification works in progress were also given to the mission. Chief Engineer also apprised the mission on 10 February that the needed rectification work was nearing completion.

**4. Package No: II/IAMWARM/WRO/POY/Works/PHAS II/2008-09.
AMMANANTHANGAL TANK. (Rs. 13.18 Lakhs). “Rehabilitation and Modernization of
Kondams and Supply Channels and Tanks in South Main Channel and East Main Channel
in Walaja & Shollinghur Blocks of Walaja Taluk of Vellore District.**

This Phase II work has been completed. The mission visited the rehabilitated surplus weir, reconstructed irrigation sluice and the strengthened earthen embankment of the tank bund. The body wall of surplus weir has been provided with M20 concrete skin wall. Perusal of the drawing and the photographic record of construction indicated that the drawing & construction of skin wall conformed to the technical guideline and that the workmanship was also of acceptable quality standard.

The strengthened tank bund did not show evidence of any cracks and, visually, seemed to be well compacted. This was confirmed by the documented in place density tests of compacted earth fill layers.

In respect of the re-constructed irrigation sluice, interaction with both the construction and quality control engineers indicated that correct construction procedures conforming to technical guidelines had been adopted incorporating cut opening of embankment to 4 (horizontal): 1 (vertical) slope on either side of the barrel and full compaction of earth fill layers with particular reference to effective compaction of earth fill adjoining the new barrel (constructed after removal of earlier damaged barrel) with rammers.

The mission observed that O.K.Card system had been adopted and that o.k. cards had been maintained for all the above mentioned items of work. The mission also interacted with the WUA representative who expressed his satisfaction with the rehabilitated works. Perusal of O.K.Cards indicated that WUA representative had also signed these cards. The mission noted that the requisite quality control tests had been conducted and documented and, that, the quality control engineer was conversant with the testing procedures.

**5. Package No: 01/POY/IAMWARM/WRO/Works/II/2008-09:
KODUKANTHANGAL TANK (Rs. 14.43 Lakhs). “Rehabilitation and Modernization of
Head Works, Supply Channels and Tanks in West Main Channel in Sholinghur Walajah
and Katpadi Block of Katpadi & Walajah Taluk in Vellore District.”**

This Phase II package was awarded on 20 September, 2009 and is reportedly completed.

The mission observed the earth fill on slopes of the strengthened tank bund to be in loose state in some reaches. It was, however, satisfying to observe that the contractor had deployed one hydraulic excavator with “steel plate attachment” fitted to its boom for compaction of the loose earth fill on rear slope of the tank bund. He assured that all such reaches as are associated with loose earth fill on the inner and outer slopes of tank bund would be fully consolidated by working this rig during a period of about 10 days. Chief Engineer assured that he would monitor the progress of contractor.

Visually, the irrigation sluice No. 3 (@ LS 300 m) seemed to be well re-constructed with the downstream irrigation channel properly excavated which would be lined in the initial reach. The leading channel to this sluice was also observed to be properly excavated. It is suggested that the Chief Engineer in consultation with E.I.C. and MDPU should examine the provision of appropriate lining in a short reach of the leading channel in various tanks as warranted by the site conditions.

The head wall of the existing irrigation sluice No. 2 @ LS 150 m needs to be suitably raised to prevent falling of earth fill from the slope of tank bund into the irrigation channel.

The requisite quality control tests on borrow soil, compacted earth fill layers (in place density tests), sand & coarse aggregate, and concrete were noted to have been conducted and documented. These tests indicated fulfillment of the "acceptance criteria". The mission observed the presence of a "vibratory power roller" (of 10 T static weights capable of compactive effort/capacity of about 18 T) at the site. This roller was reported to have been deployed on the compaction of earth fill on the tank bund. Deployment of such a roller for compaction was a step in right direction and is appreciated. O.K.Card system had also been maintained.

6. Package No: 02/IAMWARM/WRO/KDN/Works/II/ 2008-2009. KARNAMPATTU TANK (Rs 31.79 Lakhs). "Rehabilitation and Modernization of Supply Channels and all Tanks in Koundanyanadhi Sub Basin in K.V.Kuppam Block in Katpadi Taluk of Vellore District."

This Phase II package is reported to have been completed on 30 August, 2010. The mission visited the following items of works;

(i) Concrete Bed Bar / Model Section in the Supply Channel at about LS 1000m. It was observed to have been nicely constructed with good workmanship.

(ii) Concrete Retaining Walls on the sides of Supply Channel at about LS 1000m. The workmanship, line, grade and concrete finish of these 2 retaining walls were observed to be of good standard. Perusal of the quality control test record indicated that the 28-day compressive strength of M10 concrete (using coarse aggregate of maximum nominal size of 20 mm) confirmed to the 'acceptance criteria'. Rather, the test results indicated 28-day strength to be in the range of 20 to 22 N/mm² compared to the required designed strength of 10 N/mm² of M10 concrete mix. In this context, it is suggested that in future works it would be more economical to use coarse aggregate of maximum nominal size of 40 mm (down graded to IS grading) in plain concrete in thick retaining walls / concrete members of thickness more than 20 cm, particularly in M10 & M15 concrete mixes.

(iii) Surplus Weir. The concrete apron, 106 m long, exhibited satisfactory workmanship and, as per the documented test data, the 28 day compressive strength of concrete confirmed to the 'acceptance criteria'. It was observed that the requisitely needed "anchoring" of masonry on the upstream left end of the weir was needed to be done through provision of "binder walls" both on the water and rear sides of the masonry envelope for its long-term durability. Chief Engineer assured that the needful would be done.

(iv) Tank Bund. The rehabilitated / strengthened tank bund was observed to be in good shape. Perusal of the photographic record of construction, documented in place density test data and interaction with the concerned quality control engineer indicated that power roller was deployed for compaction of earth fill placed in 3 layers and that compaction efficiency ranged from 95 % to 99 % of Proctor density against the specified density of 95 %. It was noted that “soil classification” of ‘borrow area soil’ was done and its compaction parameters had been determined and properly documented.

O.K. Card System. It was satisfying to peruse the O.K.Cards which had been properly filled and maintained. WUA representative expressed their satisfaction about the quality of execution of all items of rehabilitation works. The quality control engineer was fully conversant of the testing procedures and the needed quality control requirements.

7. Package No: 02/IAMWARM/WRO/KDN/Works/II/2008-2009. LATHERI TANK (Rs. 26.08 Lakhs). “ Rehabilitation and Modernization of Supply Channels and all Tanks in Koundanya Nadhi Sub Basin in K.V. Kuppam Block in Katpadi Taluk in Vellore District.”

The mission observed in this Phase II package, reportedly completed, that where as the central portion of the strengthened tank bund appeared to be in fairly compacted shape (as also confirmed by the documented in place density tests record), the side slopes exhibited loose earth fill at several locations and significant jungle growth as well. The contractor had deployed labour for clearance of bushes and jungle growth. He assured the mission that he would soon deploy one hydraulic excavator fitted with “steel attachment” to its boom for consolidation / compaction of side slopes of the bund in all such reaches of the bund as are associated with loose earth fill on slopes. Chief Engineer also assured that he would strictly monitor the progress of compaction of earth fill on slopes to its satisfactory completion. It is suggested that the field engineers should personally supervise the working of hydraulic excavator (with steel plate attachment) promised to be deployed by the contractor and ensure that the side slopes where ever loose are fully compacted.

8. Package No: 01/IAMWARM/WRO/KDN/Works/II/2008-2009. KAVANUR TANK (Rs. 27.40 Lakhs). “Rehabilitation and Modernization of Supply Channels and all Tanks in Koundanya Nadhi Sub Basin in Gudiyattam and K.V.Kuppam Block in Gudiyattam and Katpadi Taluk in Vellore District.”

This Phase II package was awarded on 31 October, 2008 and reportedly completed on 30 April, 2010. The mission visited the following items of work in Kavanur Tank:

(i) Surplus Weir. ”The body wall of weir has been treated through provision of M20 concrete “skin wall” and the downstream apron has been repaired with M10 concrete. Perusal of photographic record and interaction with construction and quality control engineers indicated that the skin wall construction conformed to the technical guidelines and quality control requirements. The test results on the 28 days compressive strengths of concrete cubes of both the M10 & M20 concrete fulfill the IS ‘acceptance criteria’.

(ii) Tank Bund. Perusal of the documented in place density test data indicated that the earth fill placement for strengthening of tank bund was done in 5 layers and some 16 density tests were conducted in each layer. The compaction efficiency achieved was in the range of 95 % to 99 % in terms of Proctor density against the specified density of 95 %. The soil classification of 'borrow area soil' was also done as well as OMC & MDBD determined. And documented. The earth fill placed on the shoulders / edges of the bund was observed to be loose at several locations which need to be adequately consolidated to avoid formation of gullies and cuts during rains. Chief Engineer assured that he would direct the contractor to deploy one hydraulic excavator fitted with 'steel plate attachment' for consolidation of side slopes at all such locations as were associated with loose fill on slopes and that the bund top would also be properly graded.

It was satisfying to note that O.K.Card system had been maintained and the requisite quality control tests had been conducted and documented.

**9. Package No: 01/WRD/IAMWARM/WRO/PNK/NCB/Works/II/2008-2009.
KODIYALAM ANICUT (Rs. 88.86 Lakhs) “ Rehabilitation of Anicuts, Tanks and its Supply Channels from Pennaiyar and Supply Channels from Kelavarapalli Reservoir of Pennaiyar up to Krishnagiri Reservoir Sub Basin in Hosur Block of Hosur Taluk in Krishnagiri District.**

This Phase II work was taken up in November 2008 and reported to have been completed on 28 October, 2010. The mission visited the following works:

(i) Anicut: The 216 m long damaged apron of the Anicut was repaired through placement of M20 reinforced concrete mat over 60 cm thick stone / rubble base. The workmanship was observed to be of acceptable standard.

Quality Control Aspects: The requisite quality control tests on sand, aggregate and concrete were conducted and had been recorded. 28 days compressive strength of concrete cubes had also been determined and documented which fulfilled the 'acceptance criteria.' O.K. Card system had been maintained and the O.K. Cards have been properly filled. It was satisfying to note through perusal of O.K. Cards that the fine-tuning and improvements suggested by the September 20 -28, 2010 mission had been carried out in the o.k. cards. It was nice to note that the Chief Engineer had perused the O.K. card and signed during his visit on 29 March, 2009. WUA Chairman had also signed the O.K. cards. During inter action with him at the work site; he confirmed that he had signed the card and that he was happy with the rehabilitated anicut work.

SUGGESTION: As suggested earlier, it is again re-iterated that the concerned Executive engineers and Superintending Engineers during their inspection of works should peruse the O.K. Cards and put their remarks on the cards indicating the areas / activities needing improvements or mention o.k. against the activity in progress in case it conformed to technical specifications / correct construction procedure. Implementation of this suggestion shall prove to be highly result-oriented in promoting construction quality.

(ii) Right Main Canal (RMC): RMC is 3210 m in length and is of discharging capacity of 0.30 cumec (10 cusec). This canal was visited up to about 2500 m length. Selective RR Masonry lining in vertical walls has been provided in vulnerable reaches and also in some high cutting reaches. Construction of masonry walls is of acceptable workmanship and quality standard. The mission observed installation of unauthorized pumps by farmers at some 2 locations. This is not a desirable feature and the department should look into unauthorized drawl of water from the canal which deprives the tail Enders of their share.

During the mission walk-through, some farmers expressed the necessity of provision of vertical masonry walls in more reaches of the canal. In this context, it is suggested that the concerned field engineers may undertake detailed inspection and, there after, in consultation with Superintending Engineer / Chief Engineer, consider provision of walls in such additional reaches as were considered highly vulnerable.

**10. Package No: 01/WRD/IAMWARM/WRO/PNK/NCB/Works/2008-09.
KELAVARAPALLI Reservoir Project (LMC & RMC and Branches) Rs. 206.28 Lakhs.**

This Package provides for the construction of masonry retaining walls in 4000 m length in selective reaches of 25.5 km long Left Main Canal and, like wise, in 1033 m length on selective basis in the 22.5 km long Right Main Canal in lieu of damaged lining. In addition, it provides for sloped masonry lining in 900 m reach.

The mission observed the construction of masonry walls to be of acceptable workmanship and quality. The stipulated works in this package are reported to have been completed at a total expenditure of Rs. 203.82 Lakhs.

Some farmers complained that water in the branch canals does not reach the tail on account of silt deposits and heavy jungle growth inside the canal prism. The mission accompanied by the Chief Engineer and MDPU Consultant & engineers visited some portion of Branch canal no. 4 (BC 4). There was jungle growth near the top of canal prism but silt deposits in the canal were not evident in the reach visited. It was brought out by MDPU Consultant / engineers and C.E. that the responsibility of maintaining the branch canals rested with the WUAs and, accordingly, the jungle growth needed to be removed by them. This issue be examined by the Department. It was apprised by the Chief Engineer on 10 February that the need full was got done by him and that water had now reached the tail.

The mission observed that, presently, there were no measuring devices to measure the discharge passing through the main and branch canals. Construction of suitable measuring devices being essential, provision of such devices (cut-throat flumes) at the head of both LMC & RMC and also at the off-takes of branch canals from the main canals be made.

**11. Package No: 02/TAMWARM/WRD/VMR/Works/III/2009-2010, L.
VENKATESWARAPURAM TANK (Rs 29.95 Lakhs). "Rehabilitation and
Modernization of Non System Tanks in Vembar Sub Basin in Vilathikulam Taluk of
Thoothukudi District.**

This Phase III package was awarded on July 07, 2010 with scheduled date of completion as July 11, 2011.

Strengthening of Tank Bund: The mission was pleased to observe that the construction agency had deployed one “state-of-art” vibratory power roller capable of moving up & down the slope, there-by speeding up the compaction of earth fill on the slopes of tank bund. The September 20-28, 2010 mission had illustrated such type of equipment and it is commendable that such equipment has been mobilized by the contractor. This versatile equipment has helped in achieving effective and speedy compaction of earth fill on the slopes of this tank bund. Other contractors should be encouraged to see the performance of this equipment for mobilizing such power rollers on earth fill compaction in their packages.

Repairs to Weir: Perusal of drawing, photographic record, and interaction with quality control engineers indicated that correct construction procedures were adopted on the construction of RCC skin wall.

Quality Control /Quality Assurance Aspects: It was noted through perusal of test record that ‘classification’ of borrow area soil was duly done and the compaction parameters (OMC & MDBD) also got determined and documented. CI type of soil was used for earth fill placement, which is O.K. In place density tests of every compacted layer were conducted and recorded, which confirmed to the acceptance criteria. O.K. Card system in Tamil language was also observed to have been maintained for the works and that the cards were being properly filled and signed by the construction and quality control engineers. In addition, WUA representative was also signing the cards. The mission was happy to note that the Regional Chief Engineer and the Special Chief Engineer, during their inspection of works had also perused the O.K. Cards and signed the same.

Gravel Layer at Bund Top: In view of the earth fill being of ‘predominately clayey’ type (B.C. Soil), it may be better to provide about 23 cm / 30 cm thick gravel layer, duly compacted, at the top of tank bund to avoid formation of slushy conditions during rains and also making it jeep worthy for moving on the bund for inspection and maintenance. Wherever such like B.C. Soils / predominantly clayey soils have been used on the strengthening of tank bunds as could cause slushy conditions during rains, placement of gravel layer at the top may be considered, which must then be compacted by a power roller. Necessity or other wise of providing the gravel layer would depend upon the type of soil used in the various tank bunds and this provision should not be made just in a routine or a general manner. In this context, DRCS and quality control organization be involved for deciding the tank bunds where gravel layer is proposed to be placed on the bund top.

Quality Control Testing: To examine the competency of construction engineers (JEs /AEs and AEEs) on conducting the quality control tests themselves, the mission got one ‘in-place density test’ of compacted layer done by Mr. S. Antony Raj in its presence. He successfully conducted the test. This is appreciated and is indicative of the effectiveness of quality control training provided to both the construction and quality control engineers.

Detailed interaction with another construction engineer, Mr. P. Rajendran, confirmed that he was also fully conversant with the quality control tests and had acquired competency in conducting the routine quality control tests.

**12. Package No: 03/IAMWRM/NBN/Works/II/2008-2009.
VEERAPURAKKIRAMANKULAM TANK (Rs. 36.60 Lakhs).**

This Phase II work commenced on 16 October and was reportedly completed in May, 2010. Strengthening of 2900 m long tank bund comprised the main activity costing about Rs. 26 lakhs. Repairs to sluices, weirs, and providing shutter constituted other items of work.

The mission observed occurrence of longitudinal and crisscross cracks in fairly long reaches on the tank bund. Also, separation cracks along the edges of bund existed at various locations. The earth fill on slopes of bund exhibited loose appearance in significantly long stretches. What is needed is to find the depth of longitudinal and crisscross cracks and undertake rectification measures promptly. These measures would include removal of earth fill to the crack depth and placement of new earth fill afresh duly moistening and compacting it to the specified 95 % Proctor density. Suitability of new earth fill should be got determined through 'soil classification'. If needed, blending of the available borrow area soil with sand/gravel may be done to have the soil of requisitely needed parameters. Rig mounted plate compactor (plate attached to the boom of hydraulic excavator) should be deployed for consolidation of loose earth fill on side slopes of tank bund. It is essential that the rectification work should be carried out under the direct supervision of quality control engineers. Regional Chief Engineer accompanied the mission and assured prompt action.

The mission was apprised next day by both the Regional Chief Engineer and Special Chief Engineer that one hydraulic excavator had since been pressed in service for removing the earth fill in the reaches associated with cracking and all rectification work would be completed within one week or so including compaction of loose earth fill on side slopes of bund. Quality of rectification work should be strictly monitored by Special Chief Engineer.

**13. Package No: 02/IAMWARM/WRO/NBN/Works/II/2008-2009.
SANGANAPERI ANICUT (Rs. 10.65 Lakhs).**

This Phase II work was awarded on 07 July, 2009 and is reported to have been completed during June 2010. Repairs to the Anicut and provision of steel shutters constitute the rehabilitation items of work.

The mission observed the repaired anicut to be of acceptable workmanship. Perusal of photographic record, O.K. cards, and interaction with the construction & quality control engineers indicated that correct construction procedures were adopted in the execution of the work of construction of reinforced skin wall against the existing anicut body wall. Requisite quality control tests had also been conducted and documented and O.K.cards well maintained.

14. Therkar Sub Basin. Package No. 3. SEMPATTI TANK (Rs 8.89 Lakhs). Phase II Work.

Improvements to 860 m long tank bund and repairs to the weir comprise the items of rehabilitation. The improvements to tank bund were reported to have been completed during June 2009 and the rehabilitated tank was observed to be in a good condition. No cracking was observed any where on the tank bund.

O.K. Card system had been well maintained. It was satisfying to note through perusal of O.K. cards of the earth fill placement that the cards were filled activity wise on day to day basis and also layer wise. WUA representative had also signed these cards. During interaction with the WUA president, he confirmed having signed the O.K.Cards after periodic visits to the works in progress and that power roller was deployed for compaction of earth fill. It was satisfying to note that the requisite quality control tests had been conducted and recorded.

15. Package No: 01/IAMWARM/WRO/UGR/Works/II/2008-2009. VANDAPULI ANICUT (Rs. 75.20 Lakhs)

This Phase II package was awarded on 9 September, 2009 and reportedly completed on 28 February, 2010. Repairs to 53 m long anicut and installation of 2 new shutters constitute the items of rehabilitation.

The rehabilitated anicut was observed to be of satisfactory workmanship. O.K.Card System and quality control tests record have been well maintained. The construction and quality control engineers were observed to be fully conversant with the quality control tests and their testing procedures.

B. Technical Session. A technical session was organized at Madurai on 8 February, 2010 in the afternoon. This was attended by the Regional Chief Engineer, Special Chief Engineer, quality control engineers, and field engineers of Madurai region. Job specific construction procedures and quality control / quality assurance requirements for execution of rehabilitation works were comprehensively explained and it was emphasized that the implementation should conform to the technical guidelines and quality control requirements.