

CHAPTER III

AUDIT REPORTS ON WATER ISSUES

4.2.7 Unfruitful expenditure on a protected water supply scheme in Nellore District, Andhra Pradesh

Improper planning in the implementation of a Comprehensive Protected Water Supply scheme by the Executive Engineer, RWS, Nellore, resulted in failure to provide protected water to the targeted habitations besides unfruitful expenditure of Rs 8 crore.

Government sanctioned (March 2003) a comprehensive protected water supply scheme under Pradhana Mantri Gramodaya Yojana (PMGY) to provide water to 85 habitations in Nellore District. The work is to be carried out by the Executive Engineer, Rural Water Supply, Nellore (EE) in three phases.

Government initially sanctioned Phase I of the scheme in March 2003 to cover 13 habitations (estimated cost: Rs 4 crore). Phase II of the scheme was sanctioned in March 2005 to cover 47 habitations (estimated cost: Rs 5 crore). Proposal for Phase III of the scheme to cover remaining 25 habitations submitted in September 2006 (estimated cost: Rs 5 crore) was awaiting the Government's approval (July 2007).

It was observed (February 2007) that though the work under Phase I was completed (expenditure: Rs 4 crore) way back in April 2005, the scheme had not been commissioned mainly due to the delay in the acquisition of land for construction of approach road to the intake well required for carrying heavy vertical turbine pump sets. Finally, the physical possession of the land was taken over by the RWS division pending alienation of land and the approach road was laid in May 2006. The pump sets were erected only in July 2006. Under Phase II also, even after completion (October 2006) of the works (expenditure: Rs 3.99 crore) the commissioning of the scheme was held up for want of power till February 2007. As of July 2007 both the phases had not been commissioned to cover the targeted habitations even after four years of sanction of the scheme and water was released only to seven out of 60 habitations in the two phases. Government attributed (August 2007) the delay in commissioning of the scheme to the delay in release of high tension (HT) load for energisation.

Thus, due to improper planning by the EE, and lack of coordination firstly with the Revenue authorities and APTRANSCO authorities, the social objective of supplying protected drinking water to the specified habitations remains unachieved after incurring an expenditure of Rs 8 crore so far.

4.2.8 Delay in completion of check dams in Nellore District, Andhra Pradesh

The Executive Engineer, PR, Gudur, failed to complete check dams even after five to seven years, after incurring an expenditure of Rs 3.86 crore resulting in non-creation of envisaged irrigation potential besides denial of the provision of drinking water facility to the people of 15 villages.

Government sanctioned (November 1998) construction of four check dams across the creeks of Pulicat Lake (Nellore District) for creation of fresh water reservoir at an estimated cost of Rs 2.80 crore. This was to irrigate 7280 acres of ayacut lands and provide drinking water to 15 villages in Chittamur and D.V. Satram mandals by recharging ground water sources. The estimated cost was revised to Rs 5.24 crore in April 2002 with some additional provisions and deviations. The works were entrusted to Ayacutdar Committees in October 1999 (two works), July 2001 (one work) and October 2002 (one work) with a stipulation to complete the works in all respects by July 2002 (three dams) and October 2003 (one dam). This was extended from time to time, the latest being June 2006.

It was however observed (March 2006) from the records of the Executive Engineer, Panchayati Raj, Gudur that none of the check dams had been completed even 5 to 7 years after their entrustment. The works were stopped after incurring an expenditure of Rs.3.86 crore on the four check dams. The percentage of work completed was between 62 to 83 per cent as shown in the table below:

Sl no	Check dam across the stream at	Estimated cost	Expenditure	Due for completion	Percent of work completed	Work stopped from
1	Buradagali Kothapalem	1.69	1.87	July 2002	83	November 2001
2	Karikadu	0.68	0.46	July 2002	62	March 2006
3	Velukadu	0.60	0.37	July 2002	80	December 2002
4	Meezur	1.88	1.16	October 2003	71	December 2003
	Total	4.85	3.86			

The EE stated (January 2007) that the works were stopped mainly due to lack of funds and attributed (April 2007) the inordinate delay in completion of the check dams to cyclones and heavy rains and entrustment of work to ayacutdars without any skill and experience in the execution of the works. As of March 2007, water was made available for irrigation of only 4460 acres as against the 7280 targeted. The proposals submitted (March 2007) by the District Collector, Nellore, for sanction of Rs.1.66 crore (as per SSR 2006-07) to complete the incomplete works were still awaiting government's approval as of July 2007.

Thus, failure of the EE to complete the check dams even after five to seven years and after incurring an expenditure of Rs.3.86 crore, has resulted in the objective of creating irrigation potential as envisaged not being achieved, besides denial of drinking water facility to people of 15 villages.

The matter was reported to the government in February 2007; their reply has not been received (August 2007).

*Performance Audit of Godavari Water Utilisation Authority in Andhra Pradesh**Highlights*

Godavari Water Utilisation Authority was constituted (April 1999) to plan, promote and operationalise schemes/projects for expeditious utilisation of allocated water of river Godavari. Government prioritised (August 2004) six projects on the river under a concept called “Jalayagnam” to complete them in two to five years for providing water to 16.32 lakh acres in Telangana region and drinking water to the habitations enroute by lifting 135.68 tmc water from river Godavari. A review of these projects disclosed that the progress of these projects was hampered mainly due to delay in land acquisition and approval of designs. The consultants were not made responsible for any deviations in quantities, designs and drawings during execution. There was no suitable provision in the agreements to safeguard the Government interest, resulting in reduction of substantial quantity of material with the benefit passing on to the contractor. In many cases, the quality and quantity of materials required was wrongly projected, estimates were unrealistic, advance payments were made contrary to agreement, etc. resulting in contractors enjoying huge unintended and undue benefits.

3.2.1. Introduction

Godavari Water Disputes Tribunal allocated (July 1980) 1172.78 tmc water to Andhra Pradesh from river Godavari. Government planned to utilize 1010.31 tmc water at 75 per cent dependability including regeneration. Government constituted (April 1999) Godavari Water Utilisation Authority (GWUA) under the chairmanship of the Chief Minister. The main objectives of GWUA were to plan, promote and operationalise schemes/projects for the expeditious utilization of allocated waters of river Godavari to provide irrigation to the backward areas of the State.

Of the projects under the control of GWUA, the following six projects were prioritized (August 2004) and proposed to be taken up as part of ‘Jalayagnam’¹.

1. J. Chokkarao Devadula Lift Irrigation Scheme (JCRDLIS)
2. Sripadasagar Project (SSP)
3. Alisagar Lift Irrigation Scheme (ALIS)
4. Arugula Rajaram Guthpa Lift Irrigation Scheme (ARGLIS) (v) Lendi Project and
5. Dummugudem Project consisting of Rajeev Sagar and Indira Sagar Lift Irrigation Schemes

3.2.2. Organisational setup

¹ Jalayagnam’ is a concept propagated by the Government to bring more ayacut under cultivation by completing irrigation projects in a record time
 Engineer-in-Chief (Overall administrative control and Lendi Project); Commissioner, Planning and Development of Godavari Basin (Alisagar and Guthpa LI schemes); Chief Engineer, Godavari Lift Irrigation Scheme, Warangal (Devadula and Dummugudem LI Schemes) and Chief Engineer, SSP-FFC Karimnagar (SSP)

The implementation of the projects was to be overseen by the Principal Secretary to Government and Secretary to Government (Telangana Region) in Irrigation and Command Area Development (I&CAD) Department at Secretariat level. Implementation and Tendering Committee would oversee the process of tendering, evaluation and award of contracts. Planning, budgeting, programming, implementation, execution and monitoring of the six projects were distributed among four Heads of Departments (HOD) supported by Superintending Engineers (SEs) at circle level and Executive Engineers (EEs) at divisional level.

3.2.3 Audit objectives

The broad audit objectives of this performance audit were to ascertain whether:

- project formulation and planning were comprehensive, detailed and accurate;
- financial management was effective in the implementation of the projects;
- the execution of the projects was as envisaged; and
- the monitoring and evaluation was effective so as to achieve the objectives of the project.

3.2.4 Audit criteria

The audit criteria used for performance audit covered the following aspects of the schemes:

- Detailed Project Reports (DPRs), approvals by Government and Internal Bench Mark
- (IBM) estimates;
- Government of India and State Government orders relating to land acquisition and rehabilitation and resettlement packages; and
- Monitoring, evaluation and quality control as required under the extant orders.

3.2.5 Scope and methodology of audit

A test-check of the records at Secretariat, four HODs, four Circles and nine out of 13 divisions was conducted between January and April 2007 covering an expenditure of Rs 2463.24 crore (76 per cent of total expenditure of Rs 3230.10 crore) in 12 out of 27 packages in respect of four (out of six) projects under the control of GWUA.

An entry conference was held in January 2007 with Secretary to Government (Telangana Region), I&CAD and all the HODs and the objectives of the performance audit were explained to them. Physical evidences were obtained in the shape of replies to audit queries, copies of documents, photographs, maps, etc. The audit observations were also discussed with Secretary to Government and CEs in the exit conference held in August 2007. The results of the review are presented in the succeeding paragraphs.

Audit findings

3.2.6 Project formulation

In order to overcome time and cost over runs of the projects and to develop the irrigation potential without delay for the targeted population, Government decided (August 2004) to take up the irrigation projects on a turn key basis i.e. awarding of all works on Engineering,

Procurement, Construction (EPC) system to one agency. Under this, the agency to whom the work is awarded, SSP Division-1, Ramagundam; SSP Division-3, LMD Colony, Karimnagar; SSP Division-4, Mancherial; JCRDLIS Division-1, 2, 3 and 4, Chintagattu, Warangal; NSLI Division-1 and 2, Nizamabad would investigate, survey, design and construct the project on a turn key basis and then hand over to the Government. The advantage of this arrangement was supposedly that there would not be any scope for deviation of quantities, revision of estimates etc, as the agency was to complete the work at its quoted contract amount. Government approved (August 2004) empanelment of contractors for participation in the procurement of priority irrigation projects under EPC system.

Accordingly, Government decided to complete all the six projects in two to five years and provide water to 16.32 lakh acres of ayacut in Telangana region by lifting 135.68 tmc water from river Godavari. It would also provide drinking water to the habitations enroute. This required preparation of estimates as accurate as possible so that deviations from estimates are bare minimum. This increases the role of consultants to a great extent in devising a suitable mechanism so that once designs are firmed up by department, no changes are made or if any, it is minimum. Simultaneously, suitable provisions in the agreement should be made to safeguard the Government interest, wherein the deviations are more than the prescribed limit. A brief description of each project is given in Appendix 3.5. The deficiencies noticed in the role of consultant, planning, land acquisition, rehabilitation, etc. are discussed below:

3.2.6.1 Role of consultants

As the projects were implemented on turnkey basis, the estimates were to be as accurate as possible. Thus the role of consultant was pivotal in contributing to correct estimates to facilitate timely completion of the projects.

Preparation of detailed project reports (DPRs) comprising detailed investigation, designs, drawings, preparation of estimates and obtaining clearances required for the projects from Central Water Commission (CWC), Government of India etc, in respect of five projects was entrusted between February 2002 and April 2005 to two consultants for a total agreement value of Rs 7.76 crore. An amount of Rs. 7.09 crore has been paid to the consultants as of March 2007. However, a scrutiny of the terms of reference of the consultants, estimates, designs and drawings prepared by them disclosed the following:

- The tenders in respect of three projects (JCRDLIS, SSP and Dummugudem) were floated based on different IBM estimates than those prepared by the consultants.
- Survey, investigation, preparation of estimates, designs and drawings, etc, which were entrusted to the consultants were again included in the scope of work put to tender for construction of the projects under EPC turnkey system.
- There were no provisions in the agreement of consultants and contractors so as to deal with the deviations between the estimates drawn up by the consultants and the actual execution of work by the contractors to safeguard the Government interest.
- The contractors to whom the works were entrusted under EPC turnkey basis were allowed to execute the works as per their own designs and drawings approved by the Chief Engineer, Central Designs Organisation (CE, CDO) with little relevance to those prepared by the consultants, though the same were approved by CE, CDO before calling the tender.

- All the clearances in respect of JCRDLIS and SSP have not yet (July 2007) been obtained by the consultants although they have been paid their fees.

Thus, the estimates prepared by the consultants, finally approved and works actually executed with reference to those designs were at variance with each other. Despite this, the consultants were not made responsible for any deviations in quantities, designs and drawings during execution.

3.2.6.2 Source and adequacy of water

The Department initially proposed to lift 36.25 tmc water in all three phases of JCRDLIS. After making provision of 1.92 tmc water for drinking and 2.96 tmc water towards evaporation losses, water available would be 31.37 tmc for irrigation of 6.47 lakh acres.

Government, with a view to bringing more land under irrigation, decided (December 2006) to implement drip and sprinkler irrigation at micro level under all the major Lift Irrigation (LI) schemes so as to irrigate 15000 acres per one tmc water.

Subsequently, the department proposed to irrigate 4.08 lakh acres under Phase-I and II of JCRDLIS which would require 27.20 tmc water at 15000 acre per one tmc water. Contrary to the above norms, the Department proposed to lift 12.43 tmc water only as against 27.20 tmc. Thus, the water proposed to be lifted (12.43 tmc) would not be sufficient to irrigate the proposed ayacut of 4.08 lakh acres. Department however, stated (June 2007) that the shortages would be covered under Phase-III of the project. Phase III works have yet to be commenced as of August 2007. The mis-match between the proposed lifting of water and ayacut contemplated is due to faulty formulation of policy and Government would not be able to meet the targets under LI Schemes.

3.2.6.3 Non-availability of assured power supply

One of the functions of GWUA was to provide for dedicated power supply for the proposed lift irrigation schemes on river Godavari. However, no power project has so far been contemplated on the river for this purpose. The power requirement for five LI schemes was assessed at 891.98 MW. The CWC has expressed (January 2005) doubt about the availability of sufficient power in respect of JCRDLIS as the department had not made any firm proposal for meeting their requirement of power. On the request and at the cost of the department, APTRANSCO has been executing the electrical works such as extension of HT lines, construction of separate sub-stations and fixing transformers. So far an amount of Rs 307.02 crore has been paid by the Irrigation Department to APTRANSCO for execution of electrical works under JCRDLIS, ALIS and ARGLIS projects. However, no memorandum of understanding/agreement has been concluded with APTRANSCO. As such, the successful operation of LI schemes, in the absence of the assured power supply, is doubtful. The Secretary to Government, I&CAD Department, accepting the audit observation in the exit conference stated that steps were being taken for commissioning a Hydro- electric project on river Godavari.

3.2.6.4 Overlapping of ayacut

CWC cleared the flood flow canal (FFC) of Sriram Sagar Project (SRSP) in 1996 with an ayacut of 2.20 lakh acres in Karimnagar, Warangal and Nalgonda Districts. Phase-II of

JCRDLIS was taken up in April 2005 with an ayacut of 2.85 lakh acres in the same districts. It was, however, observed that the ayacut contemplated under phase-II of JCRDLIS overlapped the ayacut contemplated under FFC to the extent of 60000 acres in Warangal and Nalgonda Districts. Thus, it is evident that even the ayacut was not finalized by the CE, JCRDLIS before concluding the agreements for Phase-II works. The SE, JCRDLIS Circle, Warangal stated (June 2007) that it was proposed to transfer the overlapping ayacut from FFC to JCRDLIS. However, no clearance for the changed ayacut has been obtained from the CWC as of August 2007.

3.2.9.2 Alisagar Lift Irrigation Scheme (ALIS)

The IBM estimate for ALIS was technically sanctioned (August 2004) for Rs 172 crore and entrusted (March 2005) to a contractor for an agreement value of Rs 163.98 crore at 3.91 per cent discount on the ECV of Rs 170.65 crore. The scope of the work provided for fabrication and laying of four rows MS pipeline with 1.80 m dia for a length of 5.60 km and 1.60 m dia for a length of 1.53 km. Steel required for fabrication of pipes as per the estimate was 12358.37 MT. The basic parameters of the project given in the agreement were to be strictly adhered to by the bidders, unless otherwise specified during detailed survey, investigation, engineering and execution of the project. The bidders were required to review the same and incorporate modifications/ improvements wherever required for optimising benefits without any deviations from the basic parameters of the project.

During the execution, the number of rows was reduced to two and the alignment length was also reduced to 6.21 km as per revised designs submitted by the contractor for pressure pipeline (i.e., two rows of 2.2 m dia for 5.335 km and 1.8 m dia for 0.875 km). The revised designs were also accepted (June 2005) by the CE, CDO. The contractor accordingly fabricated and laid the pressure main for a length of 6.21 km by procuring a total quantity of 8455 MT of MS coil as against 12358.37 MT provided in the estimate. Thus, IBM estimate prepared by the consultant and approved by the department was unrealistic and resulted in undue benefit of Rs 20.54 crore being the cost of excess steel (3903.12 MT) at the rate of Rs 54768 per MT provided in the estimate duly deducting tender discount.

Similarly, as per the basic parameters stipulated in the agreement, the length of pressure pipeline was 7.13 km. As per the price breakup given in the IBM estimate for excavation, refilling, sand bed and CC block for laying of pipes was Rs 6.07 crore. However, as per the designs furnished by the contractor and actual execution, the length of pipe line was reduced to 6.21 km. Had the length of the pipe line been correctly assessed at the time of preparing IBM estimates, the saving of Rs 75 lakh would have accrued to the department. The contractor was thus unduly benefited to that extent.

Government replied (September 2007) that as the contract price was a firm lump sum on a single source responsibility and the short utilisation of steel was due to change of designs and drawings, the cost was not recovered from the contractor. The reply is not acceptable as the bidder offered his rate, based on the project appraisal appended to the agreement and the contractor was required to design, fabricate and lay four rows of 1.8 m and 1.6 m dia with 10 mm thick steel plate. Changing the scope of work with two rows of pressure pipeline of 2.2 m and 1.8 m dia was an alternative design and not a modification. The adoption and execution

of the alternative and economic design, resulted in savings to the extent of Rs. 21.29 crore which would have accrued to Government had there been a suitable provision in the agreements.

3.2.9.3 Arugula Rajaram Guthpa Lift Irrigation Scheme (ARGLIS)

The construction of ARGLIS was entrusted (February 2005) to a contractor under EPC turnkey system for an agreement value of Rs 145.80 crore. The scope of work, inter-alia, included manufacture, supply and laying of 2200 mm, 2000 mm and 1600 mm dia pressure main for a total length of 27895 Running Metres (RMT). As per the agreement conditions, the work was required to be executed according to the relevant IS codes. IS 1916-1989 stipulates the inner lining thickness of 25 mm for 450 mm to 3000 mm dia pipes. An experts committee constituted to discuss the details of IS codes pertaining to laying of steel pipes for schemes already undertaken and the CE, CDO recommended for 25 mm thickness for inner lining as per IS 1916-1989. However, the contractor manufactured and delivered the pressure mains with 15 mm thickness inner lining as per IS 3589-2001, which is applicable for seamless and welded carbon steel pipes. The Principal Secretary to Government, I&CAD Department, based on another recommendation given (August 2005) by the Committee, approved (November 2005) the pipeline with inner lining thickness of 12.5 mm to 15 mm to overcome contractual obligations. As the contractor would have quoted his rates with 25 mm thickness inner lining, the acceptance of the pressure mains with 15 mm thick inner lining resulted in unintended benefit of Rs 32.47 lakh up to executed and paid quantity of 25496 RMT.

Government replied (September 2007) that the instructions to adopt 12.5 mm to 15 mm thick inner lining were issued based on the recommendations of the committee. They further stated that there was no unintended benefit to the contractor as the contract price was a firm lump sum and on a single source responsibility.

The reply does not explain the reasons for incorporating in the agreement a condition for executing as per IS code 1916-1989. Thus the decision of Government in accepting the lesser thickness of inner lining during execution was contrary to the agreement conditions and resulted in unintended benefit to the contractor.

3.2.9.4 Boosting up of IBM estimates: Sripadasagar Project (SSP)

The IBM estimate for stage-II phase I works of SSP was originally sanctioned for Rs 1757.18 crore. The work was entrusted (April 2005) to a contractor for an agreement value of Rs 1737 crore at 0.666 per cent excess over the estimate contract value (ECV) of Rs 1725.50 crore. During execution, the estimate was revised to Rs 1688.86 crore for which the Administrative and Technical approvals were accorded in August 2005 and March 2006 respectively. Consequent to the revision of estimate, the ECV works out to Rs 1657.18 crore enhancing the tender premium to 4.81 per cent, which is just below the permissible ceiling of five per cent.

A review (February 2007) of the estimates disclosed that even the revised estimate had been inflated by Rs.349.85 crore extending unintended benefit to the contractor as detailed below. Had the revised estimate been properly prepared, the contractor would not have qualified as the tender premium would have exceeded five per cent.

- The requirement of MS steel plate for fabrication of pressure pipeline was assessed as 165735 MT in the approved (March 2006) estimate. However, based on the diameter of the pipes and thickness of steel plates as approved by the CE, CDO, the actual quantity of steel requirement was worked out by the SE, SSP Circle, Mancherial as 135255 MT with the extra loading of steel quantity in the approved estimate working out to 30480 MT. The cost of the extra steel loaded in the estimate at the rate of Rs 54837.70 per MT adopted in the estimate was Rs 167.15 crore. There was a provision of Rs 68.90 crore in the estimate towards cost of excavation of gravity canals for inter-connecting the tanks. However, the consultant agency had worked out the cost of these items including the excavation of approach channels at Rs 25.16 crore. Thus, the extra loading into the estimate works out to Rs 43.74 crore.
- A provision of Rs 368.50 crore was made in the sanctioned (March 2006) estimate towards Electro Mechanical (EM) works of SSP at the rate of Rs 2.75 crore per MW for 134 MW of power required. In respect of another estimate sanctioned later in January 2007 for Indira Sagar LIS (Dummugudem project), a rate of Rs 2 crore per MW was approved by the IBM Committee. Thus, the rate adopted at Rs 2.75 crore per MW was unjustified and resulted in excess provision of Rs 100.50 crore at the differential rate of Rs 0.75 crore per MW for 134 MW.
- A rate of Rs 72 crore per tmc was adopted in the estimate for strengthening and improvement of 14 old tanks and formation of two new tanks. It was noticed from another estimate sanctioned (January 2007) for Indira Sagar LIS that a rate of Rs 40 crore per tmc was adopted for formation of new tanks as approved by IBM Committee. Thus, there was excess provision of Rs 38.46 crore for 1.202 tmc for all the 16 tanks.
- Similarly, in the estimate for Stage-I phase II works of SSP (supply of 8.5 tmc water to NTPC), a provision of Rs 29.15 crore was included towards EM works at a rate of Rs 2.92 crore per MW for 10 MW. However, a rate of Rs 2 crore per MW was adopted for EM works in Indira Sagar LIS as approved by the IBM Committee as most economical and workable. Thus, the excess rate of Rs 0.92 crore per MW resulted in excess provision of Rs 9.15 crore per 10 MW in the estimate.

3.2.12 Conclusions

There were serious deficiencies in the efficient, economic and effective implementation of the projects undertaken under GWUA. The schemes were undertaken without proper care in finalizing the ayacut, source and availability of assured power supply. There was delay in acquisition of land and implementation of R&R packages, which hampered the progress of works severely. The projects prioritised for completion before March 2007 were not completed and consequently, the objectives of utilizing allocated water of river Godavari and creating irrigation potential were not achieved. The agreements were one sided in favour of the contractors and suitable provisions were not incorporated to protect Government interest. The consultants were not made responsible for any deviations in quantities, designs and drawings during execution. The contractors enjoyed huge undue benefits due to incorrect projection of materials required, preparation of unrealistic estimates, etc. Despite being monitored at all levels, the rate of progress in the works under SSP and JCRDLIS is not as per the milestones fixed.

3.2.13 Recommendations

- Delay in acquisition of land, implementation of R&R packages, approval of designs and getting clearances is to be avoided to complete the ongoing schemes/projects expeditiously so that the allocated waters of river Godavari can be utilized to provide irrigation and drinking water to the backward areas of the State.
- For the successful operation of LI schemes, arrangements for assured power supply should be quickly finalized.
- It is essential that future IBM estimates are prepared as accurately as possible regarding basic parameters of the project, designs and drawings etc., to avoid unintended benefits to the contractors.
- All conditions/clauses in tender schedules and agreements should be examined in consultation with Law Department and suitable changes/ provisions may be made to safeguard the Government interest in EPC system of contract.
- Amount to the extent of liquidated damages due from contractor should not be released to him.

The above points were reported to Government in July 2007; their reply had not been received (August 2007). The recommendations were accepted in the exit conference held in August 2007.

Performance Audit of Drinking Water Supply Schemes, Arunachal Pradesh

Highlights

The Public Health Engineering Department (PHED) is responsible for providing adequate safe drinking water to the rural and urban population of the State. A review of the Rural Drinking Water Supply Schemes revealed that there was shortfall in coverage of 'Not Covered' (NC) and 'Partially Covered' (PC) habitations despite having sufficient funds. Number of slipped back and quality affected habitations increased between 2002 and 2007. Irregularities were noticed in other rural and urban water supply programmes such as inadequate expenditure on water quality, monitoring and surveillance, un-productive and wasteful expenditure, irregular expenditure, and non-execution of work as per approved specification. Despite poor completion rates and increase in number of ongoing schemes, new schemes were taken up every year which is indicative of poor planning.

3.2.1 Introduction

In order to provide adequate safe drinking water facilities to the rural and urban population, the following Central and State sector programmes were implemented in the State:

- Accelerated Rural Water Supply Programme (ARWSP) in Central sector;
- Accelerated Urban Water Supply Programme (AUWSP), in Central sector;
- Rural Piped Water Supply Programme (RPWSP) under MNP in State sector;
- Prime Minister's Gramodaya Yojana (PMGY) in State sector;
- Urban Water Supply Projects (UWSP) funded under NLCPR/DONER.

The ARWSP was introduced by GOI in 1972-73 with 100 per cent grants-in-aid to assist the State to tackle water supply problems in identified problem villages¹⁰. With the introduction of the Minimum Needs Programme (MNP) under State sector, the ARWSP was withdrawn in 1974-75 but re-introduced in 1977-78 to accelerate the pace of coverage of problem villages. In 1986 the programme was given a mission approach with the introduction of National Drinking Water Mission (NDWM), which was renamed as the Rajiv Gandhi National Drinking Water Mission (RGNDWM) in 1991. The RGNDWM covered ARWSP, sector reforms programme, sub-mission projects and support services. The sector reforms programme, which was launched by GOI on a pilot basis during 1999-2000, was modified and launched as Swajaldhara on 25 December 2002. In 2000-01, a new scheme in rural sector under the PMGY was launched by the GOI for taking up projects /schemes on sustainable basis.

The Centrally sponsored AUWSP was launched to provide safe and adequate water supply facilities to towns having population less than 20,000 (as per 1991 census) and to improve the environment and the quality of life for better socio-economic condition of the country within a fixed time frame.

MNP is a State sector scheme launched in 1974-75 with the objective of providing water supply to any habitation regardless of its size/population/number of households. RPWSP and PMGY programmes under State sector are also implemented in the State.

3.2.3 Scope of Audit

Performance review of various water supply programmes (under CSS and State Plan) covering the period 2002–07 was conducted during April to June 2007. Records of the office of the CE, PHED and six¹² out of 16 divisions in six out of 15 districts were test checked in audit. The divisions and districts were selected on the basis of simple random sampling covering an expenditure of Rs.54.49 crore which is 38 per cent of the total expenditure of Rs.142.34 crore during 2002-07.

3.2.4 Audit objectives

The objectives of the review were to ascertain whether:

- Survey of habitations was conducted effectively for authentic and reliable data;
- Planning for implementation was adequate and the schemes/projects were properly executed;
- Financial management was adequate and effective;
- The mechanism for monitoring was adequate and effective;
- The objectives of the programmes were achieved in an economical, efficient and effective manner.

3.2.5 Audit criteria

Audit findings were benchmarked against the following criteria:

- Guidelines of the GOI for implementation of the schemes;
- Project reports, estimates and sanction letters of individual schemes and projects;
- Quality assurance mechanism prescribed by GOI;
- Prescribed monitoring mechanism.

3.2.6 Audit Methodology

The performance audit commenced with an entry conference in April 2007 with the CE and Additional CE, PHED wherein the audit objectives, criteria and scope of the review and audit procedures were explained to the Department. An exit conference was held in November 2007 with the Secretary/Chief Engineer PHED and replies of the Government/Department have been incorporated in the review at appropriate places.

3.2.7 Audit findings

The review revealed improper planning, unproductive and wasteful expenditure, and non-execution of work as per approved specifications, lack of IEC/HRD and water quality monitoring activities, improper utilisation of funds etc.

3.2.10 Implementation

3.2.10.1 Targets and achievement

The targets for coverage of habitations/schools under ARWSP and MNP/PMGY and achievement there against during 2002-03 to 2006-07 were as under:

Source: Information furnished by the Department.

Year	Habitation target		Achievement		schools	
	NC/PC to FC	Population	NC/PC habitation	population	Target	achievement
2002-03	86	25,458	92	24,197	113	117
2003-04	169	19,736	152	17,778	143	146
2004-05	155	19,526	247	31,455	135	300
2005-06	379	50,322	329	45,713	257	347
2006-07	193	39,831	231	41,249	315	403

There was excess achievement of habitation coverage by seven and 25 per cent as compared to targets fixed under ARWSP and MNP respectively. Achievement of coverage of schools was also 36 and 16 per cent higher although there were unspent balances in almost all the years as indicated in paragraph 3.2.9.3. This indicates that targets had not been set realistically taking into account availability of funds.

3.2.11 Accelerated Rural Water Supply Programme

3.2.11.1 Poor completion rate of works

During 2002-2007, the Department took up 4,607 schemes under ARWSP for execution, of which 2,443 schemes (53 per cent) were completed as of March 2007 and 2,164 schemes were in progress (March 2007). Total expenditure incurred upto March 2007 was Rs.326.23 crore. Test check of six divisions¹⁷ revealed that out of 1,986 schemes taken up for execution under ARWSP during 2002-07, 1,866 schemes were due for completion by March 2007. Against these, only 1,000 schemes (54 per cent) including three schemes which were not due for completion during 2006-07 were completed at the end of March 2007. The work on 557

schemes was in progress whereas 429 schemes were yet to be taken up (March 2007) as detailed in Appendix-3.2.1. Reasons for failure in completion of the 869 schemes were not on record. The Department however, stated (November 2007) that poor completion rate of works was mainly due to shortfall in State share. This is not factually correct as ARWSP schemes are fully funded by GOI.

Thus, due to poor completion rate of water supply schemes, the beneficiaries were deprived of getting the benefit of drinking water.

3.2.11.2 Unauthorised expenditure

- In two districts¹⁸ the State Government, during 2002-03 to 2005-06, sanctioned 10 WSS at an estimated cost of Rs.87 lakh without obtaining technical clearance of the SLSCC. Out of these, seven schemes were completed between 2004-05 and 2006-07 at a cost of Rs.70 lakh. Work on the remaining three schemes against which an expenditure of Rs.8 lakh had been incurred was in progress (March 2007). Thus, expenditure of Rs.78 lakh was unauthorized in the absence of the technical sanction of the SLSCC.
- Between 2001-2006, 12 WSS at an estimated cost of Rs.2.21 crore were sanctioned and taken up for execution in six districts. The schemes covered two public sector undertakings, seven Government establishments, one Army camp and two tea estates. As of March 2007, seven schemes were completed; two in progress and works of three schemes were yet to be commenced. As of March 2007, total expenditure incurred was Rs.70 lakh. As no rural habitation was covered under the scheme, providing water supply facilities to the above entities was not within the scope of ARWSP. Thus, the expenditure of Rs.70 lakh incurred against seven completed schemes and five incomplete schemes till March 2007 was unauthorized (Appendix-3.2.2).

3.2.11.3 Doubtful expenditure

In five divisions¹⁹ 17 schemes sanctioned between 2002-06 covering 17 habitations were stated to have been completed at a cost of Rs.2.35 crore during 2004-07. But the villages where the schemes were recorded to have been executed were either uninhabited or non-existent as per 2001 census.

Thus the entire expenditure of Rs.2.35 crore appeared doubtful (Appendix-3.2.3).

3.2.11.4 Excess expenditure over approved cost

According to ARWSP guidelines, funds released under ARWSP should not be utilised/adjusted against any cost escalation of schemes. The guidelines also laid down that any expenditure incurred over and above the approved cost was to be met by the State Government from its own resources. Test check, however, revealed that six divisions took up 22 water supply schemes at an estimated cost of Rs.2.85 crore during 1990-2003 and completed them between 2002-07 after a delay ranging from two to 12 years at a cost of Rs.3.44 crore resulting in cost overrun of Rs.59 lakh (Appendix-3.2.4). The Department stated (November 2007) that the excess expenditure was within permissible limit of five per cent. The contention of the Department is not acceptable as the ARWSP guidelines do not allow any excess expenditure over approved cost.

3.2.11.5 Overlapping of scheme in same habitation

In Lower Subansiri, the State Government sanctioned (2003-04) one scheme (WSS at Byara village), for Rs.12 lakh which was completed in 2004-05 at a cost of Rs.12 lakh. The Department again took up WSS scheme for the same habitation in 2006-07 which was completed during 2006-07 itself at a cost of Rs.14 lakh. The Department stated (November 2007) that there were two habitations with the same name of Byara as per CAP 99. The contention of the Department is not acceptable as, as per census of 2001 Byara is one village with a population of 92 only.

3.2.11.8 Sub-Mission projects

Sub Mission projects under ARWSP are to be taken up by the State for providing safe drinking water to rural habitations facing water quality problems and for ensuring source sustainability through rain water harvesting, artificial recharge etc. As per guidelines, an annual action plan for coverage of habitations with quality related problems is to be formulated and sent to Central Government for fund allocation and monitoring. Scrutiny revealed that no annual action plan was formulated by the Department. The Department however stated (November 2007) that in December 2005 it forwarded an action plan to GOI under “Bharat Nirman programme”. Further development was awaited (November 2007).

According to a report of the North Eastern Regional Institute of Water and Land Management for 2006, turbidity in water above permissible limit (> 5 NTU₂₁) was found in eight²² districts (23 locations) of the State. For arresting turbidity and bacteriological problem, construction of slow sand filtration tank, pre-sedimentation tank, provision of chlorine dozer and alum dozer were required to be provided in the estimates for execution of WSS. Test check of records of four divisions (Yupia, Pasigaht, Along and Changlang) revealed that between 2003-06, 12 WSS were sanctioned by GOI and completed by the Department at a cost of Rs.1.52 crore in water quality problem areas. But the estimates of these schemes neither included the items of works required for arresting turbidity and bacteriological problems nor any measure was taken for arresting the turbidity of water. Water testing reports (2003-07) of these divisions showed that turbidity of water in these areas ranged from 11 to 35 NTU.

Thus, non adoption of adequate measures for arresting quality problem of water in the areas exposed the inhabitants of those areas to potential health risks.

3.2.12 Support services

3.2.12.1 Water quality monitoring

The Department established (2001-02) 13 district level water testing laboratories at a cost of Rs.24 lakh with the Central assistance of Rs.48 lakh released between October 1997 and February 2001. Utilisation of balance Rs.24 lakh was not on record. Test check of six districts²³ revealed that no technical persons were appointed till May 2007 and water testing was carried out by the Sub Divisional Officer/Sectional Officer of the division with the help of field kits. In June 2006, the Department signed an MoU with Defence Research Laboratory, Tezpur to act as State Referral Institute (SRI) for community based National rural drinking water quality, monitoring and surveillance programme. But there was no documentary evidence indicating involvement and activity undertaken by SRI. In February 2006, GOI released Rs.22 lakh for IEC and HRD activities and water quality monitoring and surveillance activities, out of which the Department utilized Rs.14 lakh towards procurement of field kits and arranging workshops till March 2007. Balance of Rs.8 lakh remained unutilised. Thus, water quality monitoring and surveillance activities of the Department under ARWSP were inadequate.

3.2.13 Sector reform/Swajaldhara

The main thrust of the programme was to institutionalize rural community participation through enhancement of awareness for generating resources for meeting a part of the capital cost of the project. The beneficiaries were to be properly trained, to plan, implement, operate, maintain and manage the water supply schemes of their choice.

Under Sector Reforms, GOI approved 181 schemes in two districts (West Siang: 102, Lohit: 79) at a cost of Rs.16 crore and released (February 2000 and February 2004) Rs.6.81 crore. In addition, the State Government realized Rs.60 lakh as beneficiaries' contribution and received bank interest of Rs.43 lakh. The Department incurred an expenditure of Rs.7.23 crore and completed 69 schemes till March 2005. The balance 112 schemes along with the balance fund of Rs.61 lakh were transferred (May 2005) to Swajaldhara.

3.2.13.1 Incomplete schemes

Under Swajaldhara, planning and scheme formulation is to be done by District Water Sanitation Committee (DWSC). Schemes technically cleared by DWSC are required to be approved by the State Water and Sanitation Mission (SWSM). In February 2004, GOI released Rs.2.24 crore out of the total allocation of Rs.4.47 crore. The DWSCs, on the basis of availability of funds, sanctioned 90 schemes which were to be completed by March 2007. Out of this, only 35 schemes (39 per cent) were completed till March 2007 at a cost of Rs.3.03 crore. Poor rate of completion was on account of non availability of funds. The balance fund of Rs.2.23 crore was released by GOI only in February 2007. Out of 35 completed schemes, only six schemes (Papumpare district) were handed over to the Village Committee as required under the scheme guidelines.

3.2.15 Water supply programme under Non-lapsable Central Pool of Resource (NLCPR) and AUWSP

3.2.15.1 Slow progress of works

Out of 13 water supply projects (12 projects under NLCPR/DONER and 1 project under AUWSP) taken up during 2000-01 and 2006-07, seven projects were due for completion between March 2003 and March 2007. Out of these, only one project (water supply at Along) was recorded as completed and others remained incomplete (March 2007).

Delay in completion of the schemes was due to lack of proper work plan and poor financial management as discussed below:

3.2.15.2 Incomplete Water Supply Scheme at Hapoli (Ziro) township

Under AUWSP, GOI approved (February 2004) construction of 1.56 MLD capacity Water Treatment plant (WTP) at Hapoli at an estimated cost of Rs.4.97 crore on 50:50 share basis (Central Government 50 per cent and State Government 50 per cent including five per cent community contribution). The project was to be completed by September 2006. The division increased the capacity of WTP from 1.56 MLD to 2.06 MLD without obtaining approval of the Centre and a revised estimate was prepared for Rs.7.38 crore which was sanctioned by the State Government in March 2006. The division incurred an expenditure of Rs.4.91 crore and 95 per cent of the civil works viz construction of treatment plant, sedimentation tank, intake, service reservoir, etc. were completed till March 2007. Although, the Department sought additional funds of Rs.2.34 crore from the State Government in October 2006, no funds were released till March 2007. The scheme remains incomplete after a lapse of more than three years from the date of approval. This led to not only idle investment of Rs.4.91 crore on the WSS but the beneficiaries were also deprived of safe drinking water.

3.2.15.3 Augmentation of Water Supply at Along-Idle expenditure

The work “Augmentation of Water Supply” at Along in West Siang district was administratively approved by the State Government in March 1996 at an estimated cost of Rs.3.54 crore under the State Plan scheme. The work was to be completed by March 1998. In March 2001, the Department revised the estimated cost to Rs.5.77 crore which was technically cleared by the GOI in August 2000, with the target of completion by March 2003. The Department in March 2002 awarded the construction work to a local contractor at Rs.2.09 crore (excluding materials) with the stipulation to complete the work by March 2004. Test check however, revealed that the estimate was again revised (June 2005) to Rs.8.15 crore with a provision of extra work viz laying of DI pipes, construction of clear water reservoir and anchor block etc, which was not technically cleared by GOI till March 2007 and expenditure sanction was also not accorded by the State Government. Though, the division incurred an expenditure of Rs.6.10 crore between March 1996 and March 2007, the project remained incomplete as of March 2007.

Thus, expenditure of Rs.6.10 crore was idle and the objectives of taking up the project were frustrated as the targeted population could not be provided with adequate safe drinking water in time.

3.2.15.4 Incomplete Water supply scheme in Bomdila Township - Locking up of funds

The Union Ministry of Urban Development & Poverty Alleviation in May 2004 technically approved a scheme for construction of a water treatment plant for Bomdila township at an

estimated cost of Rs.17.98 crore. The division incurred an expenditure of Rs.12.44 crore towards procurement of DI pipes and partial execution of head work and construction of water treatment plant till March 2007. However, the land allotted by the district authority in January 2005 for the scheme belonged to the Army who disallowed construction and laying of pipelines through their land. In March 2007, the Executive Engineer selected an alternative alignment for laying pipelines.

Thus wrong selection of work site resulted in delay in completion which led to locking up of funds of Rs.12.44 crore.

3.2.15.5 Augmentation of water supply at Naharlagun-Nirjuli township

• Extra expenditure

The GOI in May 2002 technically approved the augmentation of water supply at Naharlagun - Nirjuli township at an estimated cost of Rs.11.78 crore under NLCPR. The State Government after a delay of two years accorded administrative approval and expenditure sanction in March 2004. The civil work was awarded to a contractor in May 2004 at tender value of Rs.4.27 crore with the stipulation to complete the work by December 2006. The division incurred an expenditure of Rs.14.62 crore (including cost of civil work) till March 2007. Thus delay of more than two years in granting approval and consequent delay in completion of work resulted in extra expenditure of Rs.2.84 crore with further liability of Rs.28 lakh required for completion of the project apart from time overrun.

3.2.17 Conclusion

The process of selection and approval of schemes under ARWSP/Swajaldhara was not transparent. Due to lack of vision and financial plan, there was piling up of incomplete schemes. Poor planning and lack of prioritisation resulted in spreading out resources thinly thereby leaving a majority of schemes incomplete and non-accrual of envisaged benefits. Delay in completion/ taking up of execution of WSS resulted in cost overrun and idle investment. The State Government failed to utilise the available funds depriving people of safe drinking water. The funds were diverted from one scheme to another when diversions were not permitted. Schemes for sustainability of sources and water quality improvement were not taken up in the State. Objectives of the programmes were thus not achieved.

3.2.18 Recommendations

- The Department should prepare proper work plan before taking up execution of schemes so that timely completion of schemes can be ensured to avoid cost overrun and idle investment;
- The Department should ensure that sufficient funds are allotted for completion of ongoing schemes/projects before taking up new schemes;
- Fund provision under RPWSP, MNP and PMGY should be made as per funds released by the GOI under ARWSP;
- The State Government and the Nodal Department should evolve effective monitoring system for completion of the schemes/projects as scheduled.

The Department assured (November 2007) compliance with the recommendations at all levels.

Performance of Accelerated Rural Water Supply Programme (ARWSP), Chhattisgarh*Highlights*

The Government of India (GOI) introduced (1972-73) Accelerated Rural Water Supply Programme (ARWSP) to provide safe and potable drinking water at 40 litres per capita per day (lpcd) to all rural habitations. The GOI provided Rs 239.63 crore during 2002-07, of which State Government could not utilize Rs 58.78 crore. During new survey (2003), 17,968 new habitations emerged out of which 14,471 habitations were uncovered and 3,507 habitations remained for coverage as of February 2007. Allocation by the State for operation and maintenance, source sustainability and quality remained low. There were instances of incorrect reporting of figures. Some important findings of the performance audit are given below:

Introduction

GOI introduced ARWSP in 1972-1973 with 100 per cent grants-in-aid to the states. It was discontinued after introduction of Minimum Needs Programme

(MNP) during fifth five year plan in 1974-75 and was revived in 1977-1978. The programme was given a mission approach¹ under National Drinking Water Mission introduced in 1986. A Comprehensive Action Plan was launched in 1999 under which Not Covered (NC) and Partially Covered (PC) habitations were identified.

3.3.1 Programme Objectives

- To ensure coverage of all rural habitations especially to reach the un-reached with access to safe drinking water.
- To ensure sustainability of the system and sources.
- To preserve quality of water by institutionalizing water quality monitoring and surveillance through a catchment area approach.

Coverage Norms

- 40 Litres per capita per day (lpcd) of drinking water for human beings and
- One hand pump or stand post for every 250 persons.

*Criteria for identification of problem habitation**(i) NC/NSS (No Safe Source) habitation.*

- Drinking water source/point does not exist within 1.6 km of habitations in plains and 100 metres elevation in hilly areas;
- Habitations having a water source but are affected with quality problems and,
- Habitations where quantum of availability of safe water from any source is not enough to meet drinking and cooking needs (less than eight lpcd).

(ii) Partial Covered (PC) Habitations-which have a safe drinking water source (either private or public) within 1.6 km in plains and 100 metres in hilly areas but capacity of the system ranges between 10 lpcd to 40 lpcd.

(iii) Fully Covered (FC) Habitations- all the remaining habitations

Under the programme priority was to be accorded for coverage of no safe source habitations. Among them priority was to be given to those inhabited exclusively by SC/ST, quality affected habitations with acute toxicity, upgradation of source level of safe source habitations having less than 40 lpcd water to the level of 40 lpcd and coverage of schools and Anganwadis without safe drinking water source.

The mission approach implied the provision of low cost solutions to identify problems associated with the supply of safe drinking water through the application of scientific and technological inputs.

Under ARWSP, funds for coverage of NC/PC was to be allocated in the ratio of 2:1.

3.3.2 Organisational Structure

In Chhattisgarh the Public Health Engineering Department (PHED), headed by the Engineer-in-Chief is the nodal agency executing the programme. Under him there are two zones each headed by CE with their headquarters at Raipur and Bilaspur. There is a mechanical formation headed by the C.E. at Raipur. There are 25 Divisions (16 Civil, five Mechanical, three Project and one Water recharge) in the state.

3.3.3 Audit Objectives

The main objective of the performance audit were to-

- ascertain whether planning for implementation of ARWSP was effective;
- assess the adequacy and effectiveness of financial control;
- assess whether schemes were properly prioritized and efficiently executed;
- assess whether priority was accorded to Operation and Maintenance (O & M) of existing water supply sources, and
- ascertain the adequacy and effectiveness of the mechanism to monitor water quality and sustainability.

3.3.4 Scope of Audit

Information was collected from the E-in-C office and records relating to the scheme for the period 2002-03 to 2006-07 were scrutinized in seven² out of 25 divisions selected through random sampling.

3.3.5 Audit Criteria

The criteria used for the performance audit were taken from the rules, regulations and provisions in:

- (i) Guidelines for Implementation of Rural Water Supply Programme (August 2000);
- (ii) Guidelines on Swajaldhara (June 2003);
- (iii) Guidelines on Survey of Drinking Water Supply Status in Rural Habitations (February 2003);
- (iv) Guidelines for National Rural Drinking Water Quality Monitoring and Surveillance Programmed (January 2006);
- (v) National Water Policy (April 2002); and
- (vi) Draft Project Report and Project Implementation Plan for individual schemes.

Audit Findings

3.3.14 Water quality

Sub mission projects on water quality are undertaken by the states for providing safe water to the rural habitations facing water quality problems but no action in this regard was initiated.

3.3.14.1 Water testing labs

Water testing labs exist in Jagdalpur, Ambikapur, Korba and the newly constructed district lab at Raipur is being used as a guest house.

No annual targets were fixed by the E-in-C for testing of water samples and the number of samples taken for testing from the existing and the new sources in Jagdalpur, Korba and Ambikapur remained very low.

As per ARWSP guidelines, 15 per cent of the allocation of ARWSP funds was to be earmarked for taking up sub mission projects to supply safe drinking water to rural habitations facing water quality problems like fluorosis, brackishness and presence of arsenic/iron etc. It was observed in audit that the State Government allocated Rs 85 lakh on this sub-mission (0.13 percentage of ARWSP and MNP allocation). The required institutional set up for testing the quality of water was not set up from the State to the block level as per guidelines and no IEC activities were taken up to spread awareness about water born diseases and quality of water in the test checked districts. In Jagdalpur district, it was seen that there were 3,090 quality affected habitations with excess iron (above eight parts per million) in 2002-03. The number of such habitations increased to 4,478 in 2006. This slip back would have been avoided by taking up adequate sub-mission projects.

As per ARWSP guidelines, in the coverage of no source habitations, priority was to be given for coverage of quality affected habitations with acute toxicity.

3.3.14.2 Field testing kits

Objective of field testing kit is to monitor quality of all drinking water sources at Gram Panchayat (GP) level. According to National Rural Drinking Water Quality and Surveillance Programme, one field test kit shall be provided for each GP. GOI released (February 2006) Rs 59.77 lakh for procuring such kits. It was however, observed that kits were not procured up to March 2007 in Raipur, Jagdalpur and Ambikapur districts while 40 field testing kits purchased during 2006-07 in Korba were yet to be distributed. The E-in-C, PHED stated (August 2007) that the program is taken up in the current financial year to achieve the goal. The reply proves that field testing kits were not procured up to March 2007.

3.3.15 Drinking water in rural schools

The position of number of schools without drinking water facilities, targets for coverage and achievement is given below:

Field testing kits not procured up to March 2007.

Year	Numbers of schools without drinking water facility	Target	Achievement	Closing balance of Schools without drinking	Difference between opening and closing of previous year
2002-03	11,592	1,448	1,137	10,455	N.A.
2003-04	15,356	5,928	4,569	10,787	4,901
2004-05	11,046	4,500	3,511	7,535	259
2005-06	6,596	6,596	3,996	2,600	(-) 939
2006-07	2,600	3,798	3,301	(-)701	No difference

Incorrect reports sent to GOI regarding drinking water in rural schools

The tabulation shows wide variation between the closing balance (CB) of one year and the opening balance (OB) of the subsequent years, except during 2006-07. In the last year, against 2,600 uncovered schools in 2006-07 the achievement was shown as 3,301 which was not possible.

Similarly, test check of records in Ambikapur revealed that the number of schools without drinking water facility were 1,679 in 2004-05, out of which 388 were covered during the year. However the number of uncovered schools was shown to be 99 in 2005-06 and against 68 number of uncovered schools in 2006-07 the achievement during the year was shown as 243. In Korba against 101 uncovered schools during 2006-07 the achievement was shown as 253.

Thus the figures appeared to be inaccurate and exact status of drinking water in schools could not be verified.

The figures of achievement reported in progress reports were unreliable.

3.3.16 Monitoring

Vigilance and Monitoring Committees were to be formed at the State level and district level. It was observed that such committees were not formed at the State level as well as four test checked districts. No evaluation study was carried out on the implementation of the rural water supply programme in the state during the last five years.

It was noticed from the records of PHE (E/M) division, Jagdalpur that during 2002-03 to 2006-07 total targets for drilling of tube wells were 1,725 against which achievement was shown as 1,752 tube wells. The PHE civil Dn. Jagdalpur during consolidation of progress reports, however, changed the targets and achievements as 1,746 and 1,531. Similarly PHE (E/M) division, Ambikapur drilled 266 tubewells during the year 2006-07 and during consolidation of progress report it was changed as 155 by the PHE (Civil) division Ambikapur.

On being pointed out in audit E.E., PHE, Jagdalpur and Korba did not furnish specific reply in regard to reduction in figures.

During the years 2005-06 and 2006-07, 256 dry tube wells (206 in Korba and 50 in Ambikapur) in rural NC/PC area were converted to successful tube wells through hydro fracturing process. Installation of hand pumps and allied civil works were also done. But the successful tube wells were not shown in the progress report during above period.

On being pointed out in audit, EE, PHE division, Korba stated (June 2007) that the targets will be revised, while EE, PHE division, Ambikapur stated that action would be taken. These cases indicated that the progress was not being reported accurately by these divisions and monitoring of actual situation using progress reports would be difficult.

3.3.17 Rig Management

Out of 48,609 tubewells drilled, 16,504 tube wells were drilled by the departmental machines (mechanical divisions) while 32,105 tubewells were drilled by the civil divisions through contractors. It is observed that the department was not able to fully utilize the departmental rigs as there was a shortfall of 10.8 to 21.17 per cent against the targets during 2005-06 and 2006-07.

3.3.18. Swajaldhara

As of March 2007 only 210 Swajaldhara was launched in December 2002. It involved a participatory and swajaldhara demand driven approach and guidelines provided upto 20 per cent allocation of funds under ARWSP. It was seen that the allocation of GOI ranged from completed. No scheme was proposed during 2004-07.. The State Government did not enter into MOU with the GOI as mandated in the guidelines. Neither were the communication and capacity development units set up at the district levels. During the year 2002-03 to 2006-07, 312 schemes were sanctioned in the State out of which 210 schemes have been completed as of March 2007. Out of total available funds of Rs 5.28 crore (GOI-Rs 4.74 crore and Rs 53.99 lakh-community share) for 312 schemes, 33 per cent of the funds remained unutilized as of March 2007. No swajaldhara scheme was proposed during 2004 to 2007.

Test check of records of 83 sanctioned schemes in four10 districts revealed the following deficiencies:

- In 19 out of 28 schemes in Korba, the community contribution was less than 10 per cent.
- Accounts were not audited by the Chartered Accountants in three out of four districts upto March 2007.
- In three out of four districts (Raipur, Jagdalpur and Korba) the unutilized amount was not returned to GOI upto March 2007 despite instructions in August 2006.
- In Korba, electrification work in 22 out of 24 Piped Water Supply Scheme remained incomplete since 2003-04.
- Water quality test, rain water harvesting and ground water recharge system were not executed in all 83 schemes.

On being pointed out in audit EE, PHE, Ambikapur stated (June 2007) that the accounts would be audited by July 2007 and EE, PHE, Korba stated (June 2007) audit would be done. EE, PHE, Raipur did not furnish specific reply regarding audit.

3.3.19 Conclusion

Implementation of ARWSP in the state suffered from deficiencies. The annual action plans did not prioritize coverage of habitations as per guidelines. There was huge increase in the number of problem habitations in the survey of 2003 and slip back in fully covered

habitations. There was savings in the central share of the funds while allocations by the state for O&M, source sustainability and quality remained low. Piped water supply schemes were executed inefficiently and there were instances of extra cost, non adherence to mix design and delays. Field testing kits had not been procured and the monitoring committees had not been formed. There was incorrect reporting of figures by divisions and discrepancies existed in the data furnished to GOI.

3.3.20 Recommendation

- Annual action plans should be prepared in accordance with the scheme guidelines for prioritizing the works efficiently.
- Coverage of NC habitations should be given priority in accordance with scheme guidelines.
- District level targets should be fixed to monitor quality of water and field testing kits be provided to the functionaries.
- Works should be executed as per approved specification so as to avoid cost escalation.

Audit of Water Management System in Delhi

Delhi Jal Board (DJB) constituted under Delhi Jal Board Act 1998, is responsible for supply and distribution of potable water to the inhabitants of National Capital Territory (NCT) of Delhi. DJB receives raw water, mainly from Yamuna river, Bhakhra - Beas storage and upper Ganga canal. Such raw water is received at the water treatment plants (WTPs) of DJB situated at Chandrawal, Wazirabad, Bhagirathi, Haiderpur, Nangloi, Sonia Vihar and Bawana (not in operation). The capacity of the water treatment plants is 710 million gallon per day (MGD). The performance audit of the water management system in Delhi covers the period from 2002-03 to 2006-07.

Summary of recommendations

- In view of the serious problem of water shortage in Delhi, DJB may ensure that various plan projects for augmentation of water production and supply are progressed and completed on time through effective planning and implementation.
- The projects related to rationalization of water distribution may be executed promptly for ensuring equitable distribution of available water.
- The system of plugging leakages may be strengthened with a view to minimizing wastages and loss of revenue on account of non-revenue water. The specialized leak detection equipment may be procured early.
- Effective steps may be taken to improve the quality of drinking water by adopting better quality control methods and sustained monitoring in order to ensure that water being supplied is potable and conforms to the standards prescribed by the Government. DJB may take effective steps to

minimize the number of unmetered connections to facilitate billing and revenue collection on actual water consumption basis. The revenue collection machinery may be revamped and efforts may be made to reduce the arrears of outstanding water charges.

3.1 Introduction

Delhi Jal Board (DJB) constituted under Delhi Jal Board Act 1998 is responsible for the supply and distribution of potable water to the inhabitants of National Capital Territory (NCT) of Delhi. The Water Treatment Plants (WTPs) situated at Chandrawal, Wazirabad, Bhagirathi, Haiderpur, Nangloi, Bawana and Sonia Vihar with installed capacity of 710 MGD receive raw water mainly from Yamuna river, Bhakhra - Beas storage and Upper Ganga canal. In addition, 100 MGD of ground water is lifted through various ranney wells and tube wells. DJB provides 780 MGD against the requirement of 1050 MGD of water due to shortage of raw water.

DJB supplies water in bulk to New Delhi Municipal Council (NDMC) and Delhi Cantonment Board (DCB). These agencies look after the distribution and supply of water to inhabitants residing within their areas. There were 16 lakh water connections in MCD area of Delhi as of March 2007.

The main functions of the Board pertaining to water management were to:

- (i) Treat, supply and distribute water for household consumption or other purposes to those parts of Delhi where there are houses, whether through pipes or by other means;
- (ii) Regulate and manage the exploitation of ground water in Delhi in consultation with Central Ground Water Authority;
- (iii) Promote measures for conservation, recycling and re-use of water; and
- (iv) Make provisions for un-filtered water supply.

3.2 Organizational set up

DJB functions under the Chairpersonship of the Chief Minister of the State and is assisted by a Vice Chairperson who is nominated by the Speaker of the Legislature and 16 other members consisting of 10 political and ex-officio members and six administrative/executive members. Member (Water) heads the Engineering wing for water activities which is under the overall control of Chief Executive Officer (CEO). He is assisted by Chief Engineers/Superintending Engineers/Executive Engineers.

3.3 Scope of audit

The performance audit was conducted between April and August 2007, covering the period 2002-03 to 2006-07, through scrutiny of records at DJB Headquarters, WTPs/Booster Pumping Stations, water construction/maintenance divisions and Zonal Revenue Officers. The performance audit examined inter alia the progress of various plan schemes undertaken by the Government of NCT of Delhi to improve the water supply situation in Delhi, initiatives taken to conserve water as well as to improve the quality of water and the system of assessment and collection of revenue.

3.4 Audit methodology

The audit methodology included:

- Selection of 27 out of 53 construction/maintenance divisions, 13 Zonal Revenue Officers (ZROs) out of 25 and all nine water treatment plants. The selection was done by picking up the units which were listed at even numbers from the list of offices.
- Ascertaining public perception regarding the functioning of DJB by circulating a questionnaire to 487 number of Residential Welfare Associations (RWAs) chosen at random out of 1100 number of RWAs registered with „Bhagidari Cell” Government of NCT of Delhi.
- Seeking views of the DJB on the preliminary audit findings.
- Formulation of observations and make recommendations on the basis of the views and comments of the DJB.

3.5 Audit objectives

The objectives of the audit were to verify whether:

- DJB ensured adequate supply of water to different parts of the city as per norms prescribed by the Ministry of Urban Development, Government of India in terms of per capita supply.
- Various schemes undertaken to augment water supply were being implemented in a planned and efficient manner.
- There was equitable distribution of water to different areas and the ancillary projects planned to rationalise the water supply have been implemented timely.
- The leakage detection and its management was efficient and ensured prompt repair of transmission and distribution network to minimise the loss of water.
- Effective action is taken to minimise loss of revenue on account of unmetered connections, defective meters and theft of water etc.
- The quality of potable water at treatment plants, reservoirs and that being supplied to households was as per norms; and
- Prompt action was taken to address the problems of the customers for ensuring better customer satisfaction.

3.6 Audit criteria

The audit criteria used in the performance audit included:

- strategic goals and objectives, the targets to be achieved by the DJB for capacity building to ensure sustainable water supply services;
- provision contained in the DJB Act, 1998 and plan documents;
- quality of water as per prescribed standards; and
- system of assessment and collection of revenue.

Audit Findings

Water is a prime national resource, a basic human need and a precious national asset. High rate of urbanization and population growth in metropolitan cities in India including Delhi have laid tremendous stress on drinking water supply systems. Growth process and expansion of economic activities inevitably led to increasing demands for water for diverse purposes; domestic, industrial, agricultural, recreation etc. The nation’s capital is perpetually in the grip of a water crisis due to increasing gap between demand and supply.

To provide potable water supply at reasonable economic price to the satisfaction of the habitants of NCT of Delhi is the mission of DJB. A memorandum was signed each year between the Board and Government of NCT of Delhi with assurance of reduction in non-revenue water, reduction of operating losses, replacement of defective meters, metering of un-metered connections, augmentation of water supply by constructing various underground reservoirs and construction, completion and commissioning of Sonia Vihar WTP with all ancillary works on due date. Improvement of collection efficiency was a matter of utmost concern. DJB failed in many of these areas as reflected in succeeding paragraphs.

3.7 Consultative Mechanism

As per Section 8 of DJB Act, 1998, the Government may constitute a Water Consultative Council with the object:

- to advise the Board on policy matters and formulation of annual and five years plans;
- to give expert advice on administrative, financial and technical matters;
- advise the Board on matter pertaining to the interest of consumers and issues affecting the environment ; and
- to advise the Board on any matter on which the Board seeks its advice.
- The Council was constituted in August 1998 but no meeting was ever held as of August 2007. This defeated the very purpose for which the Council was set up.

3.8 Water requirement, production and shortfall

The production capacity of water in Delhi during Tenth Plan period was 780 million gallon per day (MGD) against the requirement of 1050 MGD (based on a norm of 60 gallon per capita per day as per Ministry of Urban Development, Government of India norms prescribed in the Master Plan of Delhi 2001), thus, leaving a wide demand-supply gap of 270 MGD. The trends in the projected requirement, actual production and shortfall in supply of water during Seventh to Tenth five year Plan were as given in the table below:

Table 3.1: Requirement viz-a-viz production of water

Five year plan	Population in lakh	Requirement* of water in MGD	Production of water in MGD	Shortfall	Percentage shortfall
7th (1985-90)	94	658	437**	221	33.59
8th (1992-97)	110	770	580	190	24.68
9th (1997-02)	138	966	650	316	32.71
10th (2002-07)	176	1050	780	270	25.71

Due to increasing urbanisation and population growth in Delhi, requirement of potable water increased significantly from 658 MGD in Seventh Plan to 1050 MGD in Tenth Plan registering a growth of 60 per cent.

DJB has not been able to keep pace with the rapid urbanization of the city. The water supply infrastructure has failed to match the demand. Despite Government efforts to improve production of potable water, the demand and supply gap persists in the range of about 25 to 34 per cent. Against the requirement of producing additional quantity of 400 MGD during Tenth Plan to fully meet the projected requirement, DJB could increase production by only 130 MGD of water during this period. The percentage shortfall came down by seven per cent during Tenth Plan mainly on account of increase in the production capacity (130 MGD) and downward revision in water supply norms from 70 gallon per capita daily in Ninth Plan to 60 gallon per capita daily in Tenth Plan. Persisting shortfalls in production of potable water led to significantly reduced supply of water to the residents of national capital at an average rate of 44 gallon per capita per day against the reduced norm of 60 gallon per capita per day. As per Government's own admission, per capita water supply in different parts of the city is not uniform indicating that certain areas of Delhi are severely affected by water supply shortage and are getting supply much below the average rate of 44 gallon per capita per day.

3.9 Projects for augmenting water production and supply

DJB planned various schemes to increase production and improve supply of potable drinking water to the inhabitants of Delhi. The major schemes identified for implementation during the Tenth five year Plan were:

- Construction of 140 MGD WTP at Sonia Vihar for augmentation of water in Delhi;
- Recycling of waste water at Wazirabad, Chandrawal, Haiderpur and Bhagirathi for producing 45 MGD of safe potable water;
- Construction of Under Ground Reservoirs (UGRs) and Booster Pumping Stations (BPSs) all over Delhi for rationalization and better distribution of water; and
- Renovation of Chandrawal water works.

An audit appraisal revealed that huge demand and supply gap persisted during Tenth Plan due to delay in operationalisation of the Sonia Vihar WTP, non-completion of allied works of this plant, delay in construction of re-cycling plants, delay in construction of UGRs and BPSs, lack of planning to regulate and manage the exploration of ground water, and improper management of leakages. The details of slippages in implementation of these projects are discussed in the succeeding paragraphs.

3.9.1 Sonia Vihar Water Treatment Plant

DJB constructed a 140 MGD WTP at Sonia Vihar in December 2004 at a cost of Rs. 188.80 crore to cater to the water requirement of the Trans Yamuna area as well as South Delhi. Twenty three UGRs were also required to be constructed at an estimated cost of Rs. 194 crore for the distribution of potable water that came out of the WTP. Out of 140 MGD, 90 MGD water was to be allocated to South Delhi, 35 MGD to Tahirpur and 15 MGD to Shastri Park.

Audit scrutiny of the records revealed the following:

(i) The Sonia Vihar WTP was to become fully operational by December 2003. Though the construction of the treatment plant was completed in December 2004, the plant could not be made fully functional due to non-availability of raw water from Tehri Dam. The plant started functioning only in June 2007 after the Government of Uttar Pradesh released 140 MGD raw water for the plant. Thus, the projected augmentation of 140 MGD through Sonia Vihar treatment plant could not be achieved during Tenth Plan due to delayed operationalisation of the plant.

(ii) Though the plant has since become fully operational in June 2007, the plant is not functioning at its full capacity due to non-construction of reservoirs and peripheral lines. Out of 28 UGRs, only 10 UGRs have so far been commissioned as of August 2007. Due to non-completion of the UGRs, the plant is treating only 112 to 119 MGD of water.

Thus, water supply to the residents of South Delhi, Tahirpur and Shastri Park was affected due to delayed operationalisation of the plant and delay in completion of ancillary and peripheral works.

Department stated (November 2007) that full supply of raw water from Tehri to plant was available only during Monsoon Season and could utilize about 120 MGD. The reply of the Department confirms the audit observation that the plant is not operating to its full capacity even after four years of the original scheduled date of completion.

3.9.2 Recycling of waste water

During the course of treatment of raw water at WTPs, 8-10 per cent water goes waste due to back wash of filters and the clarifloculators. In view of the scarcity of raw water, DJB proposed to recycle waste water of existing WTPs of Haiderpur, Wazirabad, Bhagirathi and Chandrawal to produce 45 MGD potable water. The status of creation of facilities for recycling in these plants was as under:

Name of recycling plant	Date of resolution passed by the Board	Date of award of work	Tendered amount (Rs. in crore)	Stipulated date of completion	Latest position
Bhagirath(10 MGD)	27.07.99 at Rs. 6.18 crore	09.08.2005	13.34	14.10.2006	Work-in-progress
Wazirabad (11 MGD)	03.06.1999 Rs. 6.86 crore	December 2005	2780	14.04.2007	Only 40 per cent completed
Haiderpur (16 MGD)	24.09.1999 Rs. 10.44 Crore	23.09.2005	26.59	06.04.2007	Not yet commissioned
Chandrawal (8 MGD)	28.01.2005 Rs.14.66 crore	28.02.2007	12.86	28.06.2008	Work-in-progress

Despite the need for establishing recycling facilities being felt and accepted as early as 1999, the DJB took six years in awarding the work for construction of these facilities at Bhagirathi, Wazirabad and Haiderpur which led to enhancement in the project cost of first three plants from Rs. 23.48 crore to Rs.67.73 crore (188 per cent). The Board also failed to ensure completion of work on the three recycling WTPs by the stipulated dates. On account of these delays, residents of Delhi were deprived of additional quantity of 37 MGD of water.

Department stated (November 2007) that there was a delay of three-four years in finalizing the appropriate technical design and obtaining the views of evaluation committee.

The reply of the Department is not acceptable, as the entire project was to be implemented during Tenth Plan to meet serious water shortages in Delhi and, therefore, technical design should have been finalized and evaluated in a time bound manner.

3.9.3 Rationalization of water distribution and construction of more UGRs/BPSs

There is inequitable supply of water in different parts of city, as a result, some parts of Delhi for example the Northern Zone receives far more water supply than the South Zone. Since there was also significant mismatch between demand and supply of water, rational distribution of the water that was available, was one of the priorities of the DJB to minimize imbalance and improve customer satisfaction in affected areas. DJB engaged a consultant to recommend the most appropriate arrangement required for rationalization of water distribution. The study recommended construction of additional reservoirs and booster pumping stations in West, North-West and South-West Delhi. On the basis of study conducted by the consultant, DJB passed a resolution in July 2004 for the construction of 14 UGRs and BPS at different locations in Delhi at an estimated cost of Rs. 263 crore.

Audit analysed the progress achieved in construction of UGRs and observed that the work at most of the locations has still not commenced. The status of construction of the reservoirs is indicated in the table below:

Sl. No	Name of the UGR's	Proposed Capacity (in million litres)	Date of award of work	Tendered amount Rs. in crore)	Stipulated date of completion	Position of construction UGRs as of August 2007
1.	Nangloi (Nilothi)	52.5	24.08.2006	43.00	10.03.2008	Work in progress (physical progress 70% and financial progress)
2.	Kirti Nagar	20.9	15.02.2006	10.76	15.05.2007	Work in progress (physical progress 65% and financial progress)

3.	Pitampura	21.4	Work yet to be awarded (Tender opened on 17.08.2007)	-	-	Work not yet started
4.	Awantika	20.0	-	Work not yet awarded	-	Work not yet started.
5.	Qutub garh	7.8	Letter of intent to be issued	-	-	Work not yet awarded
6.	Janakpuri	15.5	-do-	-	-	Work not yet awarded
7.	Daulatpur	5.2	25.06.2007	5.31	24.09.2008	Work in progress
8.	Rohini, Sector -7	20.5	Work not yet awarded	-	-	Land has been allotted by DDA. Work of construction yet to commence
9.	Karala	24.3	Work not yet	-	-	The land is yet to be
10.	Sultanpur Dabas	5.0	02.03.2006	4.21	01.03.2007	Work in progress (Physical progress 25% and financial progress)
11.	Bawana	27.1	17.07.2007	15.00	16.01.2009	Work yet to be started.
12.	Shakur Basti	23.6	Work not yet	-	-	Land yet to be allotted by DDA
13.	MBR at Palla	48.9	Yet to be tendered	-	-	Work yet to commence.
14.	Narela	5.8	Yet to be tendered			Work yet to commence.

After three years of passing of resolution by the Board to construct 14 UGRs, work had not commenced on 10 UGRs as of August 2007. In two cases of construction of UGRs at Kirti Nagar and Sultanpur Dabas, the work was to be completed by March 2007 and May 2007 respectively. However, the progress of work at these locations was extremely slow and so far only 25 per cent and 65 per cent physical progress had been achieved respectively. In the remaining two cases of UGRs at Nangloi and Daulatpur, the works are scheduled to be completed in 2008. Thus, there were significant delays in commencement and completion of UGRs at different locations in Delhi which delayed the rationalization of water distribution in different parts of Delhi.

Department stated (November 2007) that there was no delay in the construction of the UGRs as no specific time line was given for the construction. The Department added that these UGRs were not required to be built immediately as their construction was to be synchronized with the availability of water. The reply is not acceptable as (i) two works planned for completion by May 2007 are far behind schedule, and (ii) timely commencement and completion of other UGRs would have facilitated rationalized distribution of water already available.

3.9.4 Renovation of Chandrawal water treatment plant

The erstwhile Delhi Water Supplies and Sewerage Disposal Undertaking had approved a scheme of renovation of Chandrawal water works in February 1988 at a cost of Rs. 1.85 crore. Subsequently, an estimate of Rs. 3.80 crore was also approved in August 2000 for renovation of 20 old patersons and 10 Jessop make filters at Chandrawal water works. The CEO, DJB decided to club both the estimates into a single scheme in March 2002. The tenders were invited in August, 2005. Audit examination, however, disclosed that the tenders were yet to be finalized as of August 2007. One of the reasons that was holding up finalization of the tenders was non- review of the estimates which were framed in 1988. Despite approval of the renovation work as early as 1988, the actual award and execution of work has been delayed for about 20 years. Delay in carrying out necessary renovation and replacement of filters would affect cost-effectiveness and efficiency of operations of the plant.

Executive Engineer (E&M) stated in September 2007 that delay in finalisation of renovation work has led to deterioration of the condition of the plant to such an extent that no repair was possible except for its complete replacement. EE further stated that DJB was incurring substantial expenditure on maintenance of old filter media and the efficiency of the units had drastically reduced. To maintain the supply, extra labour was required. If the implementation was delayed further, the units might totally collapse leading to reduction in filtering capacity and, thus, the production.

The reply of the EE supports the audit contention that the Department has not shown any urgency in carrying out necessary renovation and repair work at the plant.

Recommendations

- (i) Given the serious problem of water shortage in Delhi, the Board should ensure that various plan projects for augmentation of water production and supply are progressed and completed on time through effective planning, designing, tendering, execution and monitoring.
- (ii) The projects identified and undertaken for rationalisation of water distribution may be executed promptly for equitable distribution of available water.

3.10 Replacement of old distribution lines

The water distribution system in Delhi is more than a century old. Since some of the mains are very old, replacement work of 797 km of water mains was carried out in the Ninth Plan.

Government of NCT of Delhi proposed a target of 1500 km replacement of old distribution lines during the Tenth Plan. The Department fixed annual targets and achievements.

Audit scrutiny revealed that against the target of replacement of 1500 km old distribution lines in the Tenth Plan, DJB fixed a target of 1147 km only (76 per cent). DJB could replace only 1125 km of the distribution line against this target. However, it seen in the context of the overall target of the Tenth Plan (1500 km), the shortfall in achievement of target was 25 per cent.

Further, while DJB's performance was lagging during the first three years of the Tenth Plan, it over shot the target during the next two years of the Plan period, indicating that the annual targets in the Tenth Plan were not set rationally.

3.11 Leak detection management

Leak detection and its management is very vital for any water utility as it results in substantial saving of water that would have otherwise gone waste. It also helps ensuring supply of quality water to the end users by controlling contamination in the distribution system. The distribution net work of DJB is divided into different operating zones, each headed by an officer of the rank of the Executive Engineer. Leakages are detected through patrolling/surveying of trunk transmission mains and distribution networks by the Departmental staff of Leak Detection Cell and various maintenance divisions (operating Zones). The maintenance divisions are required to undertake repair work as soon as the leak is detected. DJB has also set up central control room to receive complaints from the public regarding water leakages. Appropriate follow up action is required to be taken by the operating zones on receipt of such complaints.

An audit appraisal of leak management in DJB revealed the following:

3.11.1 Loss due to leakages and theft

As per Economic Survey of Delhi of 2005-06, the total distribution losses, which include leakage in pipes and theft of water through unauthorized connections, was of the order of 40 per cent of the total water supply. This was abnormally high not only in comparison to the acceptable norm of 15 per cent prescribed by the Ministry of Urban Development but also quite high as compared to 10 to 20 per cent level of distribution losses in developing countries. Efficient leak management can help address the problem of water shortage in Delhi to a significant extent. 3.11.2 Lack of monitoring Leak Detection Cell of DJB conducts surveys of transmission and distribution lines for detection of leaks and reports the leakages to the zones concerned for immediate repair/corrective action. The Report of the Comptroller and Auditor General of India for the year ended March 1997 had pointed out lack of feed back mechanism in DJB for monitoring action taken by the respective zones for prompt plugging of leaks after being reported by the Cell. Superintendent Engineer (P) Water confirmed (March 2007) that the Cell did not get action taken reports from respective operating zones on regular basis indicating that no significant improvement had taken place in detection and management of leak, its control and follow up despite being pointed out by Audit. Department stated (November 2007) that instructions have been issued to the staff for submission of timely action taken reports in leak cases.

3.11.3 Delays in plugging leakages

The number of leakages detected by Leak Detection Cell during 2002-07 varied between 233 and 973. The number of leakages detected during 2006-07 was 822. Audit analysis of delay in plugging leaks for the selected year of 2006-07 disclosed that:

(a) 101 leaks (12 per cent) remained unplugged as of March 2007. The period of pendency of these leaks ranged between eight to 268 days. The Department in their reply (November 2007) stated that leaks were plugged timely but due to delay in receipt of feed back from the concerned divisions regarding repairing these leakages, the number of leakages non attended appeared to be high. After being pointed out in audit, Department issued instructions for timely submission of action taken reports (ATR) in leak cases. The reply of the Department confirms the audit observation that no regular monitoring of leak cases is carried out to ensure

that zones concerned have taken timely action to repair the transmission and distribution lines.

(b) Out of 721 leaks which were plugged in 2006-07, there were significant delays in 131 cases (18 per cent) ranging upto 120 days or more as is shown in the table below:

Sl. No.	Number of leaks	Delay in plugging leaks (beyond seven days)
1.	64	Upto 30 days
2.	39	30 to 90 days
3.	13	90 to 120 days
4.	15	Above 120 days

Delay in repairing of leakages resulted in estimated loss of 84 million gallon of water valuing Rs.21.79 lakh for the year 2006-07.

3.11.4 Obsolete equipment

Efficient detection and management of leakage especially in underground water pipes would require proper equipment for timely detection of leaks. Audit scrutiny of equipment inventory of Leak Detection Cell of DJB disclosed that out of 92 leak detection equipment procured during 1987-2000, only 12 equipment (13 per cent) were functional as of August 2007. Non-availability of proper equipment with the Cell is bound to affect its capability to detect leaks promptly in underground transmission network.

Audit examination further revealed that tenders were invited in June 2005 for the purchase of 41 leak detection equipment on the basis of report of a consultant submitted to the Board in February 2005. The board awarded the work for the supply of specialized equipment at a cost of Rs. 47.24 lakh in October 2006. The equipment required to be supplied by the firm by August 2007 were awaited as of November 2007.

3.11.5 Delay in finalization of scheme for prevention of water wastage

The Board approved a scheme in October 1999 for study of unaccounted flow and prevention of water wastage in Delhi at a cost of Rs.1.97 crore. It was after seven years that the Board invited expression of interest in October 2006 and awarded work in July 2007 at a cost of Rs.1.11 crore plus service tax and education cess. Thus, there was a delay of more than seven years in initiating concrete action on the scheme for prevention of water wastages in Delhi which highlights inefficiency of the leakage management system.

Recommendations

(i) Board may put in place an efficient computerized leakages monitoring system to ensure that leakages in the transmission and distribution system are repaired by the respective zones promptly within the time norms prescribed by the Board to minimize wastage of water and loss of revenue.

(ii) The leakage detection infrastructure may be modernized and strengthened for quick detection of leaks with the help of specialized equipment.

3.12 Quality control mechanism

3.12.1 Testing of alum used in treatment of water

Alum-Ferric (alum)/Poly-Aluminum Chloride (PAC), which are chemical coagulant, are used in the treatment process of water in WTPs. DJB purchases alum and PAC centrally through open tender for utilization at all WTPs. As per provision of the contract agreement, the Department was required to get the samples of alum/PAC picked up at random and tested at the National Physical Laboratory (NPL), New Delhi once in a month in the presence of the officials of Director General Supplies and Disposal (DGS&D), firm's representatives and DJB. Audit scrutiny revealed that only 13 samples were lifted during 2004-07 of which, seven samples (54 per cent) did not conform to I.S. specification. By the time the test results were received from NPL, the substandard alum/PAC had already been utilized during the course of treatment process of potable water. Thus, there was no mechanism which assured DJB about the purity and effectiveness of the chemicals before they were actually used in water treatment. Use of untested chemicals for treatment of water may seriously compromise the quality standards of water supplied to the residents of Delhi. Audit also observed that DJB did not test alum/PAC in its own laboratories stationed at various water works, which were equipped with required 14 instruments and chemicals for testing alum and PAC. Department in their reply has confirmed that in cases where the samples tested by N.P.L. fails the test, the material cannot be traced as it gets mixed with other supplies and consumed at the plant. The Department further stated that to avoid the controversy between Department and DGS & D, the system of third party test was introduced and testing by DJB was suspended.

3.12.2 Inadequate monitoring of water quality

DJB is expected to ensure that water supplied to the residents of NCT of Delhi is potable and conforms to the standards prescribed by Bureau of Indian Standards, Government of India. DJB has set up six water testing laboratories all over Delhi to check the quality of drinking water being supplied. If the water samples are found unfit for drinking, reasons of contamination are required to be investigated and the zonal maintenance staff has the responsibility to rectify the problem immediately.

Audit examination disclosed that the number of samples found unsatisfactory has increased considerably during last four years from 0.73 per cent in 2002-03 to 2.85 per cent in 2005-06 and 1.88 per cent in 2006-07. Details of samples tested and found unsatisfactory during 2002-07 are in the table below:

Table 3.6: Samples found unsatisfactory

Year	No. of samples taken	Samples found unsatisfactory	% of samples found unsatisfactory
2002-03	103797	757	0.73
2003-04	103842	776	0.74
2004-05	113384	3201	2.82
2005-06			2.85
2006-07			1.88

2005-06	104532	2982	2
			.
			8
2006-07	110928	2090	1
			.

The data is furnished by Director, Quality Control, DJB.

Scrutiny of records in the office of Director, Quality Control indicated that out of 2090 unsatisfactory samples reported during 2006-07, no ATRs were received in the Directorate in respect of 1874 (90 per cent) unsatisfactory samples as of March 2007.

The Department stated (November 2007) that wherever unsatisfactory reports were received, corrective action was taken within 24 hours but sometimes delays occurred due to communication gap between the field officers and quality control.

Recommendations

- (i) Appropriate mechanism should be put in place to ensure that adequate numbers of samples are taken from all supplies received, for testing at NPL/departmental labs. DJB should ensure that chemicals that have not been quality tested should not be used for purification of water in its treatment plants.
- (ii) DJB may take effective steps to improve quality of drinking water supplied to the residents of Delhi by adopting better quality control procedures and mechanism at treatment plants and in the transmission and distribution network.

3.13 Distribution of water

Supply of water from WTPs is shared among NDMC, DCB and MCD areas. It was noticed that there was no metering system in MCD area to ascertain actual bulk supply of water to each zone for distribution to consumers. Availability of water was assessed on capacity of water lines. Besides, there was no co-ordination between distribution zones and their zonal revenue officers to compare the quantity of water billed with quantity of water supplied. Hence, audit was unable to ascertain zone-wise distribution losses. The Department stated (November 2007) that DJB was planning to install the bulk meters in distribution system and execution was expected by October 2008.

Recommendation

- Necessary steps may be taken for zone-wise metering of water distribution and collection of revenue for effective monitoring of water losses and detection of revenue leakages.

3.16 Management of ground water

DJB, being the nodal agency for supply of water in Delhi, is expected to have comprehensive data on the ground water potential and a plan/policy to regulate exploitation of ground water in Delhi. Audit observed that as of November 2007, there was no policy in place to manage ground water or regulate its exploitation. The Board was not aware of the quantity of ground water being explored authorisedly and unauthorisedly. This indicates Board's failure to keep watch over the exploration of ground water in Delhi.

DJB approved “Delhi Water Board Amendment Act, 2002” vide a resolution in May 2002 to control, regulate and manage ground water. Later on, “Delhi Water Board Amendment Bill 2006”, to regulate and control the use of ground water in NCT Delhi, was put up for approval of Board incorporating salient features of model bill circulated by Government of India in 2005. No legislation has been introduced or approved till date. The Department stated (November 2007) that the bill has been approved by Delhi Cabinet and proposed to be placed before Assembly shortly.

3.16.1 Rain water Harvesting

Rain water harvesting is a simple economical and eco-friendly technique of preserving water. It is also an effective way of recharging ground water. Delhi Government approved a scheme for “Setting up of Water Mission and use of new technologies for conservation, harvesting and recycling of water” for implementation during Tenth five year Plan. Under the scheme, financial assistance is given to Resident Welfare Associations/Group Housing Societies/Schools etc., to a maximum of Rs.50,000 or 50 per cent of the cost of rain water harvesting system, whichever is less. The maximum limit was increased to Rs. One lakh with effect from 02 February 2007. DJB has given financial assistance of Rs. 51.19 lakh in 108 cases during February 2003 to March 2007. As per terms and conditions of agreement, the party receiving the financial assistance was required to submit a report with regard to maintenance of rain water harvesting system every six months—one before the onset of monsoon and one after the monsoon was over. Further, the officials of DJB were required to carry out random inspection of the rain water harvesting system to ensure that the system was properly maintained. In case of default in the maintenance of the system, the entire amount paid as assistance was to be recovered from the institution/party.

Audit scrutiny revealed that Department did not enforce the conditions of the agreement. Consequently, during 2002-07, in 97 out of 108 cases (90 per cent) no maintenance reports were received from the parties concerned. Only seven inspections (six per cent) were carried out by the Department. In all the seven cases, the Department found the system either muddy, silted or only partially functional. Agreeing with the Audit view, Department proposed (November 2007) 100 per cent inspection of beneficiaries of rain water harvesting assistance instead of present 25 per cent checking of beneficiaries for the proper maintenance of the system.

Recommendation

- DJB may formulate a comprehensive policy/ plan for regulating ground water exploitation in Delhi by authorized and unauthorized sources. Department may carry out periodical inspection of the Rain Water Harvesting Systems where the financial assistance has been granted to different beneficiaries/organizations.

3.17 Public perception regarding water supplied by DJB

To ascertain the level of public satisfaction on the quality of services provided by DJB, Audit obtained a list of RWAs from the Government of NCT of Delhi maintained under the Bhagidari Scheme. A detailed questionnaire was sent to randomly selected 485 RWAs out of about 1100 registered RWAs in Delhi. The questions sought information on the number of hours water was available, sufficiency of water, adequacy of pressure and whether it could

reach upper floor without assistance of a pump, quality of water supplied, the complaint redressal mechanism and public awareness regarding execution of work done by the DJB. Response was received from 113 RWAs which is tabulated as under:

Table 3.13: Public perception

Audit Questions	RWAs response
Availability of water	40 per cent stated that they received water supply for less than 2 hours in a day 48 per cent received water for two to four hours a day 12 per cent received water for more than five hours a day
Sufficiency of water	37 per cent respondents stated that they received sufficient water 63 per cent did not have sufficient water
Quality of waters	67 per cent respondents found the water worthy for drinking 33 per cent respondents found it unfit for drinking
Complaints	44 per cent respondents were satisfied with the complaint redressal mechanism 41 per cent were not satisfied with the redressal of complaints and 15 per cent did not comment.

The responses received from RWAs indicated high level of dis-satisfaction both in terms of sufficiency and quality of water supplied. The complaint redressal was also poor and the duration of water supply in different parts of Delhi was highly skewed.

Recommendation

- The Board may strengthen the existing mechanism for settlement of complaints through computerized registration and effective monitoring for timely redressal of grievances in a satisfactory manner.

3.18 Follow up action on previous Audit Report

A performance appraisal on “Water Supply System in MCD” featured in the Report of the Comptroller and Auditor General of India for the year ended March 1997. The report had pointed out the shortage of 20 gallons per capita demand daily, poor quality of water, losses on account of free water supply to large category of consumers, unmetered water supply, supply of water to consumers with defective meters, very high distribution losses largely on account of absence of metering system and large uncollected water charges.

While forwarding the Action Taken Note, the Department assured (November 2005) to reduce the arrear of water charges by fixing targets for collection of arrears in every zone, setting up site recovery camps and arranging additional cash counters for collection of revenue. DJB also mentioned that it had now permitted the consumers to purchase and install their own meters in replacement of defective meters and bulk water meters were being installed at WTPs in Haiderpur and Gokulpuri for measurement of water being issued for distribution.

The current performance audit findings, however, indicate that no effective action has been taken on the previous recommendations contained in the Audit Report for the year ended March 1997.

3.19 Conclusion

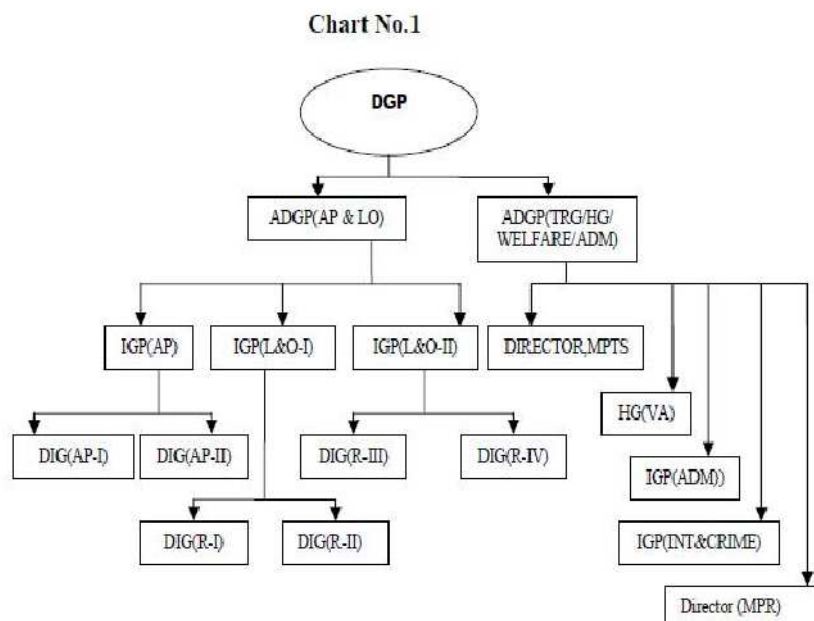
DJB has been struggling to cope with the increasing demand for water supply. Most of its projects for augmentation of water production capacity and rationalization of water distribution in different parts of Delhi have fallen behind schedule compounding the problem of water shortage in the National Capital. The leak detection management system is inefficient and results in loss of substantial water from the transmission and distribution network. More than 50 per cent of the water supplied does not fetch any revenue for the Government and the satisfaction level of Resident Welfare Associations about the quantity and quality of water supplied is very low. DJB has not formulated any comprehensive policy or plan for regulating exploitation of ground water in Delhi. The projects for recycling of waste water have also not been commissioned as planned. We would encourage the management to address these core issues in the coming years.

Performance Audit of Imphal water supply scheme, Manipur

Highlights

The state government failed to formulate its state Water Policy as envisaged in the National Water Policy, 2002 leading to an absence of policy initiatives and directives. Baseline survey for assessing actual requirement of potable water and preservation of water resources had never been conducted. Contamination of water was prevalent due to inadequate and ineffective water treatment, leakages and unauthorized diversions. Improvement and augmentation works could not be executed in a timely manner. Non-revision of water tariff and laxity in revenue collection led to revenue realized and O&M costs. Supply of quality drinking water could not be ensured due to lack of effective quality control mechanism.

3.2.1 Introduction



The Public Health Engineering Department (PHED) is responsible for ensuring sufficient supply of clean and safe drinking water to all consumers of the Imphal city and nine other districts of the State. This primarily involves developing strategies for meeting the

demand of the ever-increasing population, planning and implementation of new water supply schemes by adopting scientific techniques, proper maintenance of the existing water supply system, besides timely revision of water tariff and generation of revenue with effective mechanism of collection. The Imphal Water Supply Scheme (IWSS) consists of mainly two components – augmentation of water supply to the city and improvement of the existing system.

3.2.2 Organizational set up

The Commissioner (PHED) is the administrative head of the Department and the Chief Engineer (CE), PHED, is the executive and technical head. The responsibility for all the activities relating to IWSS vests with the CE who is assisted by an Additional Chief Engineer, two Superintending Engineers (SEs) and five Executive Engineers (EEs) as shown in the adjoining.

3.2.3 Scope of audit

Performance review of the IWSS was carried out during April to June 2007 and covered the offices of the CE and four EEs for the period 2002-07.

3.2.4 Audit Objectives

The objectives of the performance review were to assess whether:

- the scheme achieved the objective of providing sufficient quantity of safe drinking water to the targeted population;
- the financial management of the implementation of the scheme was efficient;
- planning and implementation of the scheme including policy formulation were done as required under the scheme;
- operation and maintenance of water supply was effective;
- quality of water supplied was of acceptable standard; and
- there was effective monitoring and evaluation system in place.

3.2.5 Audit criteria

The criteria benchmarked for achieving the audit objectives were:

- Targets and milestones set in the policy pronouncements;
- Scale of water requirement per consumer;
- Treatment norms for ensuring quality; and
- Codal provisions for execution of works.

3.2.6 Audit methodology

Audit methodology included holding of an entry conference (April 2007) with the Officers of the Department, checking of records, documents of the selected Divisions and analysis of data

and documentary evidence on the basis of audit criteria to arrive at audit findings, conclusions and recommendations. Audit also carried out a consumer survey to gauge the extent of provision of potable drinking water to the people.

Audit findings were discussed with the Departmental authorities in an exit conference (September 2007). The replies of the Department have been incorporated in the review at appropriate places.

Audit findings

The important points noticed during the course of review are discussed in the succeeding paragraphs:

3.2.7 Policy and planning

The National Water Policy *inter alia* envisaged (September 1987) formulation of a State Water Policy (SWP) backed by an operational action plan to achieve the desired objective of providing safe drinking water to the entire population of the State. However, the State Government had neither formulated a SWP nor worked out any long term perspective plan for capacity building to meet the ever increasing demand. Besides, no base line survey was ever conducted to assess the present and future requirements of water despite population growth and expansion of urban conglomerates.

The Department did not evolve any perspective plan and annual plan. Accordingly, there was no operational plan to achieve various milestones. In the absence of long term perspective plan and operational action plan, the Department did not fix annual targets for completing various works (new construction, upgradation, improvement and maintenance).

Even the broad based targets including institutional reforms, preparation of master plan, outstanding revenue collection, improvement of water testing laboratory, strengthening of monitoring and evaluation as mentioned in the Manipur Annual Plan documents were not achieved as of June 2007.

As per Administrative reports of the Department, the projected population, water requirement and installed capacity of treatment plants in respect of Imphal city and adjoining area were as shown below:

Table No.1

Parameters/Year	2002-03	2003-04	2004-05	2005-06	2006-07
Population (in lakh)	5.65	Data not available	7.13	7.16	7.16
Water requirement	109	-do-	107	97	97
Installed capacity (MLD)	83.03	-do-	83.03	80.82	80.82
Short fall (MLD)	25.97	-do-	23.97	16.18	16.18

Source: Departmental records

It may be observed from the above table that the Department had no scientific annual plan as population and water requirement data are not in consonance with each other. It is also observed that according to administrative report of the Department, the estimated population increased from 5.65 lakh (2002-03) to 7.16 lakh (2006-07) in the last five years but water requirement decreased from 109 MLD to 97 MLD. The projected population data according to the Department's administrative report is also not credible as there is zero *per cent* growth in the population from 2005-07. Since there was no effort to enhance the installed capacity, instead of increasing, the installed capacity decreased by 2.21 MLD during these years. Thus, due to faulty planning, the Department failed to synchronise the water requirement against the population growth in advance.

3.2.9 Implementation of Improvement works

Improvement of existing water distribution system and augmentation of old treatment plants are the two most essential areas of focus for the Department for ensuring safe drinking water facility for the increasing population of the city. In the course of scrutiny of these works the following points were noticed:

The improvement of Imphal water supply consisted of the following three components:

- Improvement of existing distribution system in selected areas of Imphal city (EC: Rs.71.11 lakh)
- Upgradation of old treatment plant at Chinga (EC : Rs.86.56 lakh), and
- Improvement of Ningthempukhri water supply scheme (WSS) (EC: Rs.93.28 lakh).

The first component had been completed in March 2004. But the remaining two components were lingering behind schedule as discussed below:

3.2.9.1 Upgradation of old treatment plant at Chinga

The GOI sanctioned (August 2002) Rs.86.56 lakh for upgradation of the old treatment plant at Chinga and released Rs.38.95 lakh (50 *per cent*) against its share of Rs.77.91 lakh. The project was stipulated to be implemented within a period of two years and the balance share was to be released during 2003-04 on receipt of utilization certificate. However, the Department awarded nine works for upgradation only between September 2004 to March 2007 (*Appendix 3.3*). The delay in award of works ranged from more than one year to five years from the date of sanction. Of the nine works, four had been completed (October 2006) and two are in progress (September 2007). The remaining three works had not been started (July 2007). The GOI had not released its balance share (July 2007) as the progress of works was not satisfactory.

As per DPR (May 2002), the Project was to be constructed at Chinga hillock and its vicinity. But due to non-availability of suitable site, this had later been shifted to Moirangkhom Bazar (August 2003). The Department attributed the delay in completion to non-finalisation of proper site and non-release of adequate funds. The reply of the Department is not tenable considering that there were huge unspent balances at the end of each year and considerable quantum of the funds released by the GOI had been retained by the State Government each

year during this period. The delay in finalization of suitable site indicates inadequate planning for upgradation of the Chinga treatment plant.

The scheme was implemented with a view to provide potable water to 3,000 people. Due to non-completion of the work, the intended benefit could not be provided to the targeted people.

3.2.9.2 Improvement of Ningthempukhri WSS

The GOI sanctioned (August 2002) Rs.93.28 lakh for “Improvement of Ningthempukhri water supply scheme” to provide drinking water to 33,000 people and released (August 2002) Rs.41.97 lakh (50 *per cent*) of its share of Rs.83.95 lakh with the stipulation to complete the work within two years, the balance share was to be released during 2002-03 on receipt of utilization certificate. Scrutiny of records revealed that the Department awarded seven components of the work only in January to May 2004 (*Appendix 3.4*). The delay in award of these items ranged from 16 to 20 months from the date of sanction. Out of seven works, five had been completed (March 2005). The remaining two works relating to the improvement of the schemes had been completed up to 30 to 90 *per cent*.

It was seen that the Department had paid (February 2004) Rs.17.59 lakh, being the cost of 1,500 RM of 200 mm pipe to its Stores Division for use in this WSS but the pipes were yet to be received (July 2007). No action was taken for expediting delivery of the pipes from the Stores Division as of July 2007.

Despite an expenditure of Rs.89.17 lakh incurred as of July 2007 on various items of work of the scheme, drinking water could not be provided to the targeted people.

3.2.10 Implementation of augmentation works

The augmentation of Imphal Water Supply consisted of the following works:

- Augmentation from Singda dam by 9.08 MLD (EC : Rs.9.75 crore)
- Replacement of old hume pipes by new ductile iron pipes from
- Leimakhong to Iroisemba (EC: Rs.11 crore).
- Augmentation from Iril river by constructing a treatment plant of 6.81 MLD at Irilbung
- (EC: Rs.8.17 crore)
- Tapping ground water from Potsangbam and Sekmai areas–Phase-II (6.81 MLD) (EC: Rs.6.73 crore), and
- Utilization of Leisangkhong moat at Canchipur as a pre-settling tank for storing the water to be pumped from the confluence point of Imphal and Iril rivers at Lilong (6.81 MLD) (EC: Rs.7.64 crore)

The first three works had been commissioned in September 2001, November 2003 and July 2007 respectively. Progress on the remaining projects is as under:

3.2.10.1 Scheme for tapping ground water from Potshangbam and Sekmai area, Phase II

The GOI sanctioned the scheme for tapping of ground water from Potshangbam and Sekmai area, Phase – II to provide drinking water to 50,000 inhabitants and released (June 2005) an amount of Rs.3.78 crore. The work was targeted to be completed by December 2006 which

was subsequently revised to March 2007. It was observed that out of 19 items of work, only six items had been completed (February 2007), six partially completed (60 to 95 *per cent*) and works on seven items were yet to be started (details shown in *Appendix 3.5*). Against a projected cost of Rs.6.73 crore, a sum of Rs.7.24 crore had so far been spent (July 2007) leading to a cost over-run of Rs.51 lakh. The Department could not furnish any reasons for the delay and cost over-run. Due to non-completion of the Scheme, the problem of drinking water in Imphal city could not be alleviated.

3.2.10.2 Scheme for utilization of Leishangkhong moat

The GOI sanctioned (March 1999) the scheme for utilization of Leishangkhong moat and released (January 2003) an amount of Rs.5 crore being the first instalment. Ten items of works were awarded (October 2003 to March 2006) after a delay ranging from nine months to more than three years from the date of sanction (details shown in *Appendix 3.6*). The entire work was projected to be completed by December 2005 which was subsequently revised to March 2006 and then to March 2007. However, only seven items of work were completed within the stipulated period. Two items were completed (November 2006) with a delay ranging from 4 months to 30 months. The work of design and construction of treatment plant consisting of clarifloculator, rapid sand filter, chemical dosing chambers *etc.*, which was awarded (August 2004) at a tendered cost of Rs.1.93 crore for completion by June 2005 was still incomplete as on July 2007.

Scrutiny of records revealed that the Department had initially (July 1998) contemplated utilizing a part of the Leishangkhong moat (which was extending from Lilong to Canchipur) as a pre-settling tank where the water pumped from the confluence point of Iril and Imphal rivers was to be stored. From there the water was to be sent to the treatment plant to be constructed at Canchipur and then to be sent to a ground sump of six lakh gallons capacity for pumping into the distribution pipelines.

Subsequently (October 2003), the Department abandoned the idea of using the moat due to encroachment problems at the site and changed it to laying of 350 mm pipes for 3,643 metres from the confluence point of Iril and Imphal rivers to the treatment plant. Also, the plan of constructing a ground sump of six lakh gallon capacities had been replaced by construction of two sumps each of three lakh gallon capacity – one of them on a hillock. However, the changed design was not technically cleared subsequently and the Department proceeded without technical sanction.

The DPR, which was finalized in July 1998 did not even provide for soil testing for the treatment plant. This item was added (December 2004) by the Department after a gap of six years. The investigation was completed in January 2005. Thus, the DPR prepared by the Department was deficient and it did not take into account all the possible eventualities.

The planning and project formulation process was thus deficient and suffered from adhocism. Thus, even after spending Rs.6.90 crore (90 *per cent*) against the projected cost of Rs.7.63 crore, the project was yet to be completed (July 2007). The Department stated that the project could not be completed by the target date due to prevailing law and order situation and inadequate release of funds by the State Government. Had the scheme been completed in time, 50,000 people could have been provided potable water.

IWSS Phase-I thus envisaged a capacity creation of 25.38 MLD for catering to water requirement of 1.88 lakh people. It was observed that only one treatment plant with a capacity of 6.81 MLD could be completed as of July 2007 and four treatment plants under Phase-I with a capacity of 18.57 MLD could not be completed as discussed in the preceding paragraphs, depriving 1.38 lakh people of their drinking water requirement.

Thus, a majority of the people targeted to be covered by the scheme were deprived of clean drinking water and the problem is unlikely to be alleviated in the near future.

3.2.12 Quality control

The Department is to ensure distribution of safe drinking water to the consumers of the city. The quality of the drinking water should be free from contamination, ensured through treatment plants. Periodical monitoring should be done by the authorities to ensure that drinking water supplied to the consumers is of acceptable quality and that no health hazards are caused by the water supplied to the people.

Several deficiencies in assurance of water quality were highlighted in the Audit Report of the Comptroller and Auditor General of India for the year 2005-06 (Paragraph 5.1.18). However, the Department did not take proper steps to improve the water quality and the situation worsened further as discussed below.

3.2.12.1 Analysis of water treatment

The raw water should be analysed for physical, chemical and bacteriological parameters and suitable treatment and disinfection should be ensured before supply. Leak detection survey and repairs to control underground leakages in the system are regular exercises that should be undertaken as part of maintenance.

The Department recorded that it was maintaining its water quality as per WHO standards by regularly collecting water samples and testing them for physical, chemical and bacteriological analysis. But this contention is not evidenced by the records, which revealed that the Department did not carry out analysis of raw water regularly by collecting adequate water samples from different water sources. During 2002-07, only 528 water samples were collected from the four test-checked treatment plants serving a population of 1,70,000 against 2,040 samples required to be collected as per Manual of water supply and treatment. The shortfall varied from 70 to 76 *per cent* as shown in the table below:

Tests of water were conducted at the only existing State Laboratory, Imphal which was not provided with adequate and trained technical staff and up to-date calibrated equipment. There was also no evidence on record to show the Departmental efforts in strengthening the existing laboratory and to establish another laboratory, if the existing laboratory was not enough to handle the required number of samples.

It was further observed that the annual requirements of chemicals for the years 2002-2003 to 2006-07 were assessed at the same rate (Lime: 521.62 MT; Ferric alum: 1107.01 MT; Chlorine: 237.33 MT). This reveals that the requirements were computed based on the installed capacity of the treatment plants and not on actual requirement to be arrived at after testing the turbidity and quality of water from time to time.

Examination of eighty water analysis reports pertaining to various water supply schemes revealed that the turbidity of treated water was beyond the acceptable limit in 43 cases which is 54 *per cent* of total reports scrutinised. Total dissolved solids in treated water increased in comparison to raw water indicating that excess quantities of alum and chlorine had been used in the treatment. In fact the presence of total dissolved solids was within limits in raw water. Hardness of water increased after treatment in respect of 67 samples due to use of disproportionate quantity of chemicals in some samples. Lime (Calcium carbonate) was also added more than the requirement as was indicated by high level of total alkalinity in five reports. Chloride content had also increased in treated water in 60 samples which indicates use of more chlorine than required. This was substantiated by the results of a test check conducted on Chinga Water Supply Scheme. During the last four years (2003-07) against the annual requirements of 8.5 MT of Chlorine, the Department used 11 to 15 MT.

It was also observed that these reports did not contain any reference to any biological tests being performed to ascertain total Coliforms and E. coli. These tests should be conducted on a routine basis, especially for the surface water samples.

Thus, as the quality of the drinking water supplied to the city had not been checked, the possibility of health hazard to consumers through consumption of such water cannot be ruled out.

3.2.12.2 Water contamination and prevalence of water borne diseases

Scrutiny of records revealed that the Department had not made any effort to conduct any survey of underground leakage, un-authorised tapping and en-route contamination of water as of July 2007. However, there were indications that the water at the consumer's end was contaminated as most of the consumers surveyed stated that they had to boil water before use. Also, the incidence of water borne disease was very high as disclosed by the information furnished by the Medical Department. It stated that during the last five years (2002-2006) there were 8,633 cases of water borne diseases such as acute gastro enteritis, enteric fever, ineffective hepatitis and dysentery. Details are shown in the following Table:

Table No. 8

Type of disease	Name of medical institute	Year Number of cases					Total
		2002	2003	2004	2005	2006	
Enteric fever	RIMS	71	64	35	60	45	275
	JNH			206	267	135	608
Acute Gastroenteritis	RIMS	430	327	188	255	328	1528
	JNH			3,186	285	1784	5255
Ineffective Hepatitis (A.E)	RIMS	24	18	18	30	44	134
	JNH			104	160	234	498
Viral	RIMS	5	15	3	4	2	29

Hepatitis	JNH			124	85	97	306
Total		530	424	3,864	1,146	2,669	8,633

Source: Departmental records. RIMS: Regional Institute of Medical Sciences. JNH: Jawaharlal Nehru Hospital.

The table discloses that as many as 8,633 persons suffered from water borne diseases during the period 2002-06. Of these, the number of persons suffering from acute gastroenteritis was the highest with 6,783 persons suffering from it. The number of persons suffering from water borne diseases has increased from 530 cases in 2002 to 2,669 cases in the year 2006 which is an increase of more than 400 *per cent*. This clearly indicates that the drinking water supplied by the Department was not free from harmful bacteria. Thus, the Department failed to ensure supply of quality potable water free from microbes which has serious implications for public health.

3.2.14 Results of consumer survey

The Department furnished a list of 22,074 consumers to whom it was supplying water as of March 2007 (the list was not updated). The supply was to be made at the rate of 135 litres per capita daily (lpcd) and frequency of supply being once or twice a day either in the morning or in the evening or both.

3.2.14.1 Objective of survey: Audit conducted a postal survey of consumers of Imphal area to elicit their opinion regarding effectiveness of water supply schemes and thereby to ascertain whether the supply was regular, adequate in quantity and the water was safe for drinking and whether water bills were being raised and issued regularly. The scope and sample size, survey methodology and model of the questionnaire of the survey are given in *Appendix .7*. The postal survey consisted of issuing a simple questionnaire to 818 consumers during June – August 2007.

3.2.14.2 Survey response: 802 consumers (98 *per cent*) returned the questionnaires with their responses. Two *per cent* of the questionnaires were returned by the Postal Department with the comments “incorrect address/addressee not found”. This is indicative of the fact that some of the addresses of the consumers with the Department were not correct or were incomplete.

3.2.14.3 Survey findings: Analysis of the responses disclosed the following facts:

Forty seven *per cent* of the respondents stated that they did not receive the supply regularly whereas 57 *per cent* of respondents stated that the delivery was less than the norm of 135 lpcd. Thirteen *per cent* of surveyed consumers received less than 50 litres, 15 *per cent* less than 100 litres and only 24 *per cent* of them received more than 100 litres of water.

Forty nine *per cent* of the respondents stated that water was not clean and was smelly and 88 *per cent* of the respondents stated that water was required to be boiled before drinking as the quality of water supplied by the Department was not safe.

Thirty three *per cent* of them stated that water bills were not served regularly which goes to prove that the Department is not very keen to collect the water charges from its consumers.

Some of the general comments offered by the consumers were (i) non-supply of water for a long time (ii) unauthorised drawing of water from distribution pipe line by electrical pumps