

## CHAPTER II

### WATER RESOURCES DEPARTMENT

#### Audit of Computerised Billing and Revenue Collection System in Kerala Water Authority

#### *Highlights*

*Kerala Water Authority (KWA) introduced Computerised Billing and Revenue Collection System to generate timely and accurate bills and enforce collection, but this could not be achieved as it failed to utilise computer generated reports relating to defaulters, meter faulty cases, etc. Its failure to quickly replace faulty meters also caused recurring annual losses. The problem was further aggravated by many irregularities in the reports generated by the System.*

- **There was delay in development of Centralised Billing and Collection System.**

*(Paragraph 2.4.1)*

- **Computer hardware costing Rs 2.16 crore procured under Rajiv Gandhi National Drinking Water Mission remained idle for want of software.**

*(Paragraphs 2.4.2)*

- **Despite computerisation, there was steady increase in consumer dues.**

*(Paragraph 2.5.1)*

- **Delayed replacement of faulty meters caused recurring annual loss of Rs 14.09 crore.**

*(Paragraphs 2.5.2)*

- **Water charges of Rs 5.23 crore were not realised from consumers, due to unauthorised grouping of consumers as ‘unidentified’ consumers.**

*(Paragraph 2.6.2)*

- **There were inconsistencies in generating ‘Demand Collection and Balance’ (DCB) statements and there were differences to the tune of Rs 6.41 crore between manual and electronic DCB statements.**

*(Paragraphs 2.7.1 to 2.7.6)*

- **General IT controls to prevent unauthorised access to systems were inadequate.**

*(Paragraphs 2.8.1 to 2.8.7)*

#### **2.1 Introduction**

Kerala Water Authority is responsible for the development and regulation of water supply, besides waste water collection and its disposal. Its main sources of operative income are water charges and sewerage charges. KWA decided (1994) to computerise billing and revenue collection, mainly to increase revenue through better collection. National Informatics Centre (NIC) developed the Computerised Consumer Billing and Revenue Collection

System in Oracle. Initially introduced in PH Division, Thiruvananthapuram (1995), the System was extended to Kochi and Kozhikode (1999) and is presently functional at 28 locations in 24 sub-divisions out of 93 sub divisions dealing with revenue, covering 60 *per cent* of consumers. KWA had spent Rs 4.16 crore on computerisation (till March 2005). Kerala Water Authority serves 1029250 consumers (domestic 951269, non-domestic 77090, industrial 891), including 5.18 lakh consumers covered under the computerised sections, and collects around Rs 116 crore per year as water charges.

The executive functions of the Authority are vested in the Managing Director, who is assisted by Accounts Member and Technical Member. The organizational structure comprises Head Office at Thiruvananthapuram, three Regional Offices under the charge of Chief Engineers, 10 Circle Offices under Superintending Engineers, 44 Division Offices under Executive Engineers, 125 Sub Division Offices under Assistant Executive Engineers and 298 Section Offices under Assistant Engineers.

## **2.2 Objective of computerisation**

The objectives of computerisation were to generate timely and accurate bills; prepare reports on billing and collection; enable defaulter identification and analysis of collection pattern; reduce queuing time at counters through prompt display of accounts and automatic printing of receipts; facilitate on-line updation of Consumer Ledger Account; enable enforcement of collection by preparation of disconnection notice and to provide the consumers the facility to make payment at any of the counters in the network.

## **2.3 Audit objective, scope and methodology**

As the billing system is computerised, its accuracy and reliability directly affects a majority of consumers all over the State; Information Technology (IT) Audit of the System was conducted to ascertain the accuracy of the demands as well as other reports generated and the adequacy of general and application controls.

The IT Audit of computerised Billing and Revenue Collection System was conducted during January-July 2005 and updated in June 2006, covering the Head Office, two Regional offices\*, two Circle offices#, three Division offices\$, and 11 Sections in 8 Sub-divisions\*. Data analysis was conducted through the system using Structured Query Language (SQL) and generation of reports.

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\* Southern region at Thiruvananthapuram and Northern region at Kozhikode

# PH Circles, Thiruvananthapuram and Kozhikode

\$ PH Divisions, Thiruvananthapuram, Ernakulam and Kozhikode

\* North, East and Central Sub Divisions at Thiruvananthapuram, Kaloor, Kalamassery, Aluva and Kozhikode No.I and No. II

## Audit findings

### 2.4 Software Development

#### 2.4.1 *Delay in development of advanced billing system*

**NIC did not deliver the software even after 4 years**

KWA decided (2002) to develop a Centralised Computer Billing and Collection System, by interconnecting all revenue collection centres in Thiruvananthapuram with links to FRIENDS<sup>♦</sup> centre, computerised banks and State Data Centre to facilitate easy payment of water charges by consumers at any of the counters in the network. NIC was entrusted the job of developing the software (ABACUS)<sup>♥</sup> at a cost of Rs 10 lakh, within eight months from the placement of order (January 2002). The delivery schedule was extended (November 2003) to 30 April 2004, due to NIC's failure in delivering the software as agreed. No proper control was exercised on the development of the software, which did not pass the System Requirement Specification (SRS) stage. NIC also attributed the substantial delay to constraints like the software being compatible only with sections where bi-monthly spot billing was introduced. But it was observed that the decision to introduce bi-monthly billing system<sup>\*</sup>/spot billing<sup>°</sup> was taken after the expiry of delivery period/extended delivery period. Moreover, the required Wide Area Network connecting the computerised sections with the Data Centre was also not set up as of August 2006.

Government stated (November 2005) that the delay in the development of ABACUS was due to the introduction of bi-monthly billing system in October 2002 and the introduction of spot billing system during December 2004, which necessitated modification of SRS. It was also stated that ABACUS was temporarily delayed to integrate it with other Management Information System (MIS) modules being developed and also due to the decision to drop the proposal to set up a separate Data Centre for KWA and instead utilize the State Information Infrastructure (SII). Though Government stated that ABACUS would be launched in March 2006, the system had not yet been developed. It is evident from the reply that KWA did not have a definite IT strategy at the time of awarding the contract (January 2002) and the functional requirement of the proposed system had not been finalised even after four years.

#### 2.4.2 *Delay in development of MIS*

GOI sanctioned Rs 2.54 crore and released Rs 2.32<sup>Ω</sup> crore between March 1996 and February 2001 under Rajiv Gandhi National Drinking Water Mission (RGNDWM). It covered the development of computerised MIS for effective planning, monitoring and implementation of various activities in Water Supply and Sanitation Sector in the State. Audit noticed that in the

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<sup>♦</sup> A common facility centre set up by IT Department where public can remit any tax/bills/fees due to Government Departments/Authorities. The daily collection will be credited to the treasury/bank account of the concerned Authorities.

<sup>♥</sup> Advanced Billing Accounting Collection & Utility Services

<sup>\*</sup> The System under which Meter Reader takes reading once in two months, the demands for which will be served while taking the next meter reading.

<sup>°</sup> System where the Meter Reader issues bills based on actual consumption at the time of meter reading and the daily data of demands raised at spot are fed into the computer to facilitate accounting of collection.

<sup>Ω</sup> Excluding State share of Rs 0.22 crore.

absence of application software, the computer hardware costing Rs 2.16 crore purchased (March 1999 to March 2003) could not be put to use (June 2006).

Consequently, in the absence of MIS software, IT enabled outputs of the 28 computerised sections/sub divisions were not made use of at higher levels.

Government stated (November 2005) that the RGNDWM did not supply software and in terms of the revised guidelines, KWA decided to develop three modules of MIS, through M/s CMC, in the first phase. It was also stated that IT Master Plan approved during February 2005 envisaged total MIS after networking of KWA using State Information Infrastructure within three years.

In view of the fast obsolescence in the field of Information Technology, the hardware procured during 1999-2003 would be of limited use by the time software for MIS and network are ready. The work for the development of Project Monitoring System (PMS) was awarded only during May 2006 and is still under design stage. KWA did not take any steps to develop appropriate software to utilise the hardware procured.

### **2.5 Non-utilisation of the existing data in the system as a tool of MIS**

An automated system not only ensures transparent processing of transactions but also enables generation of timely MIS reports for effective decision making. However, it was seen that this was not made use of. The findings are given below:

#### **2.5.1 Steady increase in arrears**

One of the objectives of computerisation in KWA was timely generation of periodical reports to enable the higher authorities to watch the collection of water charges and take remedial measures to reduce arrears. At the time of computerisation it was expected that KWA would yield a saving of interest @14.5 per cent by early collection of arrears. Under the manual system, there was considerable delay in the identification of defaulters as well as the collection of dues from consumers often resulting in revenue loss. Test check of the records in the 11 sub-divisions/sections by Audit, however, showed that even after computerisation there was a steady rise in the amounts of arrears due from the consumers; the arrears increased from Rs 88.71 crore (March 2003) to Rs 98.66 crore as of March 2005.

Though the list of consumers in arrears was readily available in the system, no action was initiated at the sub-division/section level to collect the dues. Instructions relating to the monitoring of progress of collection are based on the projected readings with respect to the number of connections. Even the procedural orders issued (May 2005) by the Managing Director do not stress monthly collection with respect to arrear figures in the system. The delay in collection of arrears had resulted in the loss of interest to the tune of Rs 11.88 crore during 2004-05 @14.5 per cent per annum on the arrears of Rs 81.91 crore<sup>Ω</sup> as on 31 March 2004.

**Defaulters list was not utilised to monitor collection**

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<sup>Ω</sup> Reduction in arrears during 2003 was mainly due to the short accounting of the balance to the tune of Rs 14.82 crore in Kowdiar section during September 2003 without any reason

Government stated (November 2005) that a Committee consisting of Liaison Officers from all Revenue Divisions and Accounts Member closely monitor revenue collection and realisation of arrears. It was also stated that the Senior Management would be able to closely monitor revenue collection once the centralised system was implemented.

### 2.5.2 *Failure to replace faulty meters*

**Nearly 25 per cent of meters were faulty**

The system provides for recording meters as faulty, raising of further demands based on previous reading, recording of details of replacement, etc. It was seen that the percentage of the number of faulty meters to the total number of consumers was very high. In the 11 divisions/sub-divisions test checked, the number of faulty meters was 58742 (25 per cent of the total number of consumers) but the provision for the levy of surcharge was not invoked.

**Loss of Rs 14.09 crore annually due to delay in replacement of faulty meters**

Delay in replacement of defective meters could result in huge revenue loss, since any heavy consumption of water after identifying the meter as faulty would not be reckoned for the purpose of billing. While introducing the Computerised Billing System, it was envisaged that prompt replacement of faulty meters would not only facilitate better water conservation but also yield additional revenue to the tune of Rs 200 per month per meter. Thus adopting the criteria laid down by the authority it is losing more than Rs 14.09 crore annually due to its failure in replacing 58742 faulty meters in 11 divisions/sub-divisions.

Government stated (November 2005) that action was to be initiated by the Sub Division Officers to replace the same through proper and timely monitoring and action would be taken by Revenue Monitoring Cell (RMC) to collect status report on faulty meters on a monthly basis. Though there was no provision for levy of surcharge in the System, it was stated that necessary provision had been included in the Spot Billing System introduced during December 2004.

## 2.6 **Application controls**

Application controls are those built in checks in the software, which ensure that transactions are processed according to the rules and regulations governing them. These are absolutely essential to ensure that the data is accurate and reliable. Audit observed a number of deficiencies in the application controls, which are given below:

### 2.6.1 *Incomplete details of consumers with pending dues*

Audit observed that in Kowdiar Section<sup>u</sup>, 520 consumers had been labelled as 'not turned up consumers'. Audit analysis, however, revealed that the details of 41 items had names of consumers like 'T', 'X', 'TTT', '12121212121' etc., possibly due to retention of test data or erroneous data entry. No action had been taken by KWA to remove these items from the database, if after due verification, it is confirmed that these are test data. If on the other hand, these are not test data, it is not clear how the Authority plans to proceed for recovery in these cases in the absence of an important identifier like the name of the

<sup>u</sup> Under Thiruvananthapuram Division

consumer. This would also result in defective output for MIS purposes if required.

Government stated (November 2005) that the test data had since been deleted. But it was found that the database at Kowdiar section still contained test data (June 2006).

### **2.6.2 Unauthorised grouping of consumers as unidentified consumers**

According to the guidelines for the effective implementation of the bi-monthly billing system, all consumers in a sub-division would be assigned a unique group number (40 consumers) in the walking sequence, which would facilitate group billing. These groups of consumers were termed as 'Routes'. A test check revealed that in most places, in addition to the routes allotted to the Meter Readers, some additional routes have been created to account for missing/unidentified consumers.

**2198 consumers in two Sections against whom Rs 5.23 crore was outstanding were grouped as missed consumers**

In Kowdiar and Pongummoodu sections, 2198 consumers were included under the 'route missed consumers'/'unidentified consumers'/'not traced consumers'. A total of Rs 5.23 crore was outstanding collection against these missing consumers.

Categorisation of a certain number of consumers as unidentified/missed consumers lacked authority and would permanently keep them out of billing process. Such consumers who were not traceable or were disconnected should have been removed from the database after proper field verification. Surprisingly, Government offices, hospitals, shops and establishments also figure in the list of consumers categorised as 'unidentified', the possibility of identifiable consumers being included in this group to prevent further billing cannot be ruled out.

Government stated (November 2005) that identification of consumers should have been completed within two months from the introduction of bi-monthly billing system and that instructions had been given to identify such consumers and include them in billing cycle, and where necessary, sanction would be issued to remove them from billing. It was also stated that, if required, a house to house survey would be conducted to ensure actual connection.

The reply is inconsequential as proper steps had not been taken even after eight years of computerisation to bring identifiable institutions like Government schools, hospitals, shops and establishments under the billing cycle. Moreover the identifiable consumers like MCH/131\* for which regular demands were raised through the system from March 1998 to May 2003 and against which Rs 1.26 crore was pending as of June 2006, was included in the missed consumers group leading to non-generation of demand from June 2003 onwards.

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\* (the Warden , Men's Hostel II, Medical College, Thiruvananthapuram)

**Provision for withdrawal of credit facilities in respect of cheques dishonoured were inadequate**

### **2.6.3 *Improper accounting of dishonoured cheques***

The system accepts collection either by cash or by cheques and receipt of cheques was treated at par with receipt of cash and the receipts printed by the system. Audit noticed that when a cheque got dishonored in March 2005, the Assistant Executive Engineer, Central Sub Division, Thiruvananthapuram, waived the related demand instead of using the provision for subsequent cancellation of dishonored cheques and withdrawal of credits. No record was available to show that any action had been taken against the consumer under the Negotiable Instruments Act. As the section did not use the appropriate module, it resulted in non reflection of the pending demand in the arrears when the next bill was generated causing the amount to escape collection. Though it was a one off instance noticed in audit it showed that the intended procedure in the software could be bypassed in similar cases causing loss to the Authority.

Government admitted (November 2005) that it was a case of wrong procedure and that strict instructions had been issued to follow correct procedure. All past cases of dishonoured cheques need to be reviewed to ensure that corresponding collection was reduced and demand correctly restored.

**Demands to the tune of Rs 0.45 crore waived by two sub divisions**

### **2.6.4 *Unauthorised waiver of demand***

During audit it was found that the post-computerisation scenario gave rise to large-scale modification of demands but these were not reflected in the Demand Collection and Balance (DCB) statements where six-monthly billing system was installed. After introduction of bi-monthly billing system the total amount adjusted in a month was shown under the head "Change in OB". Between September 2003 and May 2005 the distribution sub-divisions No.I and No.II at Kozhikode waived demands to the tune of Rs 0.29 crore and Rs 0.16 crore respectively though KWA had not delegated any financial powers for this action.

Government stated that the power to waive demand using 'waiving module' was given to Assistant Executive Engineers to rectify inconsistencies at the time of introduction of the system. The reply was not acceptable as the changes in demand were noticed from September 2003 to May 2005 and not confined to the initial stages (April 2000) of computerisation.

### **2.6.5 *Unadjusted waived demand***

Amounts generated in demand bills were sometimes partly waived by the officers concerned due to reasons such as adjustment against the objections of consumers. In such cases though the amounts waived were entered into the system through the Section Functions Module, the Consumer Ledger and demand bills were generated without considering the amount waived. The processing error in the module leads to inflation of demand despite adjustment.

### **2.6.6 *Incorrect declaration of working meters as faulty***

Audit noticed that as per the complaints log book maintained by the section, the Reading Status Screen showed the meters as faulty in 29 cases though they displayed readings which were entered into the system. As the meters had already been recorded as faulty, the system would ignore these actual readings

and consider the earlier reading when the meter is functioning normally and raise demand for water charges irrespective of the consumption. This shows the absence of proper validation controls leading to incorrect billing.

Government stated (November 2005) that once a meter was declared as faulty, further meter reading entry was not possible and billing would be based on the last working average. The contention of the Government that the system did not allow further entry in the case of faulty meter was not correct as revealed from the screen prints of Consumer Personal Ledger (CPL) displaying subsequent meter readings.

#### **2.6.7 Unauthorised billing of consumers under ‘Observation Reading’**

**Unauthorised  
demand of water  
charge at higher rate**

Audit observed that the bi-monthly billing system had a provision whereby the system automatically changed the status of a water meter to ‘Observation Reading’ when the amount of water consumed suddenly falls by more than 25 per cent from the previous month. In such cases, until the status of the meter was changed, the consumer would be billed at the higher rate charged before the status was changed to ‘Observation Reading’ ignoring the actual consumption based on meter reading. It led to excess billing on 3066 consumers (17 per cent) in the distribution sub division I at Kozhikode and 2361 consumers (16 per cent) in the distribution sub division II at Kozhikode, treating them under ‘Observation Reading’. There was no authority under which this provision was made in the software.

Moreover, there was no provision in the software to enforce the release of the status after a fixed number of observation readings. In most cases, the ‘Observation Reading’ status was changed and reduced rates based on actual reading enforced only when the consumers contacted the sub division/section with complaints.

It was also seen that in PH division, Thiruvananthapuram the Executive Engineer, directed (July 2004) the Assistant Executive Engineers to change the ‘Observation Reading’ status and prepare water bills based on the actual consumption after two bi-monthly readings. But this direction to prevent irregular excess collection of water charges from consumers was yet to be implemented (February 2005).

Government stated (November 2005) that the provision was introduced to facilitate verification of consumption in doubtful cases. Observation status was to be released immediately on verification without waiting for the consumer to complain. Government added that strict instructions had been issued to release observation status before issue of the next bill.

#### **2.6.8 Erratic results generated by the software**

Audit noticed instances where the system generated erratic results such as system not taking into account the recurring water charges in case of meter not working resulting in short billing, failure of the system to exhibit details of consumers, etc. For example the system did not take into account the recurring water charges of Rs 75,206 per month to be included in the demand of Women and Children’s Hospital, Thiruvananthapuram under Palayam Section, whose meter was not working and only included the arrears and fines in the demand generated. This led to short billing of the consumer by Rs 24.06 lakh for the period from November 2002 to June 2005.



Government stated (November 2005) that the consumer status was 'disconnected' till June 2005 and the demand was as per the data available at the time of billing. The reply that water connection to the Hospital was severed for 32 months is not convincing as the Government in reply *ibid* stated that water supply was inevitable to life sustainability and supply to Government hospitals, etc., could not be disconnected due to non-payment alone. Moreover, the screen prints of the CPL taken at the time of audit showed the disconnection status as 'N' indicating 'not disconnected' and meter status as 'not working' which required levy of water charge based on average consumption. Other examples are given in Appendix II.

These inconsistencies, reported to be due to procedural error, are evidently due to inadequate training to staff and absence of data in mandatory fields due to inadequate data validation controls.

## **2.7 Analytical review of data: data management problems**

### **2.7.1 Deficiencies in Demand Collection and Balance (DCB) statements**

DCB statements are supposed to serve as inputs for generation of financial statements as well as tools for MIS as they reflect the position of arrears (demand pending collection) and figures of demand generated and remittances. However, audit noticed that there were a number of serious deficiencies in the DCB statements and they could not be relied upon completely.

#### **2.7.2 Defects in system generated DCB**

Following discrepancies noticed in the system generated DCB were not reported to Head Office for rectification:

- In sub-division I, Kozhikode, though the DCB for May 2005 showed the balance pending collection from consumers as Rs 7.73 crore, the sum of ledger balances of individual consumers generated from the database using SQL was only Rs 3.07 crore. Similarly, in sub-division II, while the DCB showed the demands pending collection as Rs 2.50 crore for May 2005, the sum of individual balances as per database was only Rs 1.21 crore.
- The figures of monthly collection included in the monthly collection summary generated by the system did not tally with corresponding figure in the DCB statement for the same month.
- Computer generated DCB recorded abnormal variations in opening balance and closing balance during certain months. For example, in sub-division I, Kozhikode, the closing balance at the end of January 2003 was Rs 6.90 crore, but the opening balance for February 2003 was taken as Rs 13.77 crore. Further, while the closing balance of February 2003 was Rs 14.09 crore, the opening balance for March 2003 showed it as Rs 7.07 crore. Similar differences of Rs 3.81 crore and Rs 3.91 crore were noticed during November 2004 and December 2004. This indicated that the report generation module was not thoroughly tested and the reports were susceptible to alteration.

**OB for February  
2003 was twice the  
CB for January 2003**

- Existing regulations provide that domestic consumers were liable for a fine of Rs 5 per month for delay in payment. Though the demands were generated correctly including appropriate fine wherever applicable, the DCB statements generated for the period April 2003 to June 2003 revealed that the gross penalty demanded from domestic consumers exceeded the gross demand for water charges. Though such erroneous demand generation in the DCB contributed to inflated balance, the inaccuracies in balance amount were not corrected while installing the modified version after rectifying the program for report generation.

### **2.7.3 Non-inclusion of demands of industrial consumers in DCB**

It was observed that from August 2003, out of the four industrial consumers in Pattoor section, the demand of only one consumer was reckoned in the DCB statement. The demands of three other consumers, prepared manually did not figure in the DCB statement. But the remittances of these consumers were accounted for in DCB statements. Hence the closing balance for industrial consumers displayed a negative balance and the balance was understated to the tune of Rs 1.38 crore from August 2003 to May 2005.

### **2.7.4 Miscellaneous receipts accounted as collection**

Though the collection details in the computerised DCB statement sent by the sections rightly excluded the miscellaneous receipts from daily collection, the sub-division takes the miscellaneous receipts also as collection, leading to inclusion of amounts not demanded, thereby decreasing the amount of water charges pending collection. The reason attributed for this improper accounting was that the water charges remitted by the sections daily to the sub-division included miscellaneous charges and the daily printout given by the section did not show the amount separately. Though the Monthly Collection Summary sent along with the DCB statement by the section showed the miscellaneous receipts separately it was not put to use as the daily miscellaneous receipts had already been included as water charges collected.

Government stated (November 2005) that sub division charges were not a demanded one and hence it is not reflected in the present system. Absence of provision in the section module to segregate the demand collection and sub division collection as well as the failure of sub division to correctly account collection with reference to computer generated DCB, led to this inconsistency.

### **2.7.5 Huge difference between manual and computer generated DCB**

In the distribution sub-division No1, Kozhikode, a difference of Rs 5.78 crore was noticed between the balance demand as per manual DCB (Rs 1.95 crore) and computer generated DCB (Rs 7.73 crore) as on 31 May 2005. Similarly, in distribution sub-division No.II, Kozhikode, there was a difference of Rs 0.63 crore between the balance demand as per manual DCB (Rs 3.13 crore) and computer generated DCB (Rs 2.50 crore) as on 31 May 2005. But the sub divisions did not attempt to reconcile the balances as per manual DCB and computer generated DCB. An analysis of the reasons for the differences in above sub-divisions, revealed the following:

**Difference of Rs 6.41 crore between manual and electronic DCB**

**Short accounting of Rs 5.90 crore in manual DCB**

- Monthly demand under the manual system was stated to be included based on average rate of consumption without considering the actual demand generated through the system. As a result, there was a short accounting of demand amounting to Rs 5.90 crore, between April 2000 and March 2005.

**OB at the time of switch over was in excess by Rs 0.71 crore**

- The pending demand (OB for April 2000) entered into the system at the time of switch over to the computerised system (Rs 1.22 crore) was more than the balance as per manual DCB (Rs 0.51 crore). This was carried over to the subsequent months.
- While compiling manual DCB the entire amount collected by the FRIENDS centre was included as collection, without ensuring that the amount was credited to the individual consumers in the computerised system. Necessary adjustment relating to consumers not belonging to this sub-division was not made in the collection.
- Against fines and penalties of Rs 6.86 crore, included in the computerised DCB between April 2000 and March 2005, the amount included in the manual DCB was only Rs 0.62 crore.
- Reduction made in demand (adjustment on OB) between October 2003 and March 2005 amounting to Rs 0.29 crore was not considered in the manual DCB.
- Meter rent and service charges included in the demand were not included in the manual DCB, but included in collection, resulting in omission in demand of Rs 0.19 crore (service charge and rent) during April 2000 to March 2005.

**Pending demand of Rs 0.49 crore not brought to the system**

Similarly, in sub-division II, pending demand (OB for April 2000) amounting to Rs 0.49 crore was not reflected in the computerised DCB and there was an excess accounting of demand amounting to Rs 0.35 crore.

Government stated (November 2005) that since computer generated the true figures in the initial DCB, it would not tally with the balance under DCB statement furnished under the manual system. Admittedly the balance of water charges pending collection as per the manual DCB was not the sum total of the individual ledger balances even in respect of computerised sections and no attempt was made to incorporate one time correction in the manual DCB to reconcile with the true figures. There was no justification for further variations and failure to adopt true figures of demand and collection generated by the system after switch over to computerised system.

### **2.7.6 Discrepancies in consolidation of DCB statements at division level**

Every month, the DCB statements prepared by each sub-division were being forwarded to the divisions for consolidation and review. However, it was seen that the details of demands under each category of consumers, supplied by the sections were not reckoned for consolidation and onward transmission to division. Instead the sub-division supplied its own figure as demand, which was found to be constant from May 2003 onwards in Thiruvananthapuram east sub-division.

Audit observed that the consolidation of DCB statements in the PH division, Thiruvananthapuram, which had 5 revenue sub-divisions under it, was also faulty. While preparing the consolidated DCB, the division reckoned only the demand and collection figures furnished by the sub-divisions. The division had its own closing balance (Rs 60.70 crore), which did not tally with the sum of the closing balances (Rs 83.97 crore) of the DCB received from the sub-divisions. In view of the fact that manual data also did not reveal the correct position of demand, the source of the figure finally adopted in the accounts (Rs 58.41 crore) of the Authority was inexplicable.

Government stated (November 2005) that as only 28 revenue offices had been computerised, the Authority had to rely on individual reports for consolidation and that the introduction of a centralised system would generate all the required MIS reports. As the sum total of balance demand pending collection at different sub divisions is included as current asset in the annual accounts, there was no justification for not adopting the true figures generated by the system even in respect of computerised sections for the purpose. Moreover, a mere switchover to the centralised system would not solve the existing discrepancies, unless the inconsistencies in the data are rectified and the inaccuracies in report generation in the present package are removed, as impurities in the present database would be carried forward to the new system on migration, making it unreliable.

## **2.8 Audit findings on general IT controls**

General controls are the policies and procedures, which govern the environment in which Information Technology is used in an organization. The deficiencies noticed by audit are given below:

### **2.8.1 Lack of documented IT policy**

**Only 60 per cent of consumers covered by computerisation**

Though computerisation was decided upon in mid nineties no definite IT strategy was formulated to clearly spell out the time frame and integration of various systems for efficient sharing of data and information.

Absence of IT strategy impaired effective monitoring of the implementation of computerisation. This was evidenced by the fact that even after 11 years computerisation could be done only in 24 of the 93 sub-divisions dealing with revenue collection, covering only 60 per cent of the consumers. Further, Revenue Divisions having both computerised and manual billing systems could not ensure uniformity in consolidation of DCB at Division/Head Office level as discussed in paragraph 2.7.6.

Government stated (November 2005) that the extension of the system to other revenue sites was scheduled in the IT Plan approved by KWA in February 2005. Apparently, computerisation was introduced in 1995 without a proper IT strategy.

### **2.8.2 Lack of personnel policy**

Though IT training was given to 2000 personnel during the last 8 years, with specific training to 60 personnel in Billing and Collection System, trained staff were not posted to computerised sections. Further, need based training was not given to supervisory staff, with defined roles, in the IT environment resulting in generation of incorrect reports affecting data integrity and security. For

instance, sections followed incorrect procedure to record cases involving faulty meters and disconnection.

Government stated (November 2005) that KWA could not retain trained staff in the respective sites as common transfer policy affected them also. It was stated that training in the Billing and Collection System would be provided to all employees.

It was observed in audit that the System Administrator role was assigned to casual staff posing immense risk to the operations as illustrated by the following example in the PH sub-division, Aluva:

**Daily collection misappropriated by altering cash scroll**

In 2004 a hand-receipt employee (casual employees engaged through contractors) conducting the function of cash collection, misappropriated Rs 45636 by altering the daily cash scroll (a record of daily cash transactions) and the Consumer's Personal Ledger by reducing the amount collected. Later, her services were terminated after recovering the misappropriated amount. Audit observed the following systemic lapses for the misappropriation:

- Assistant Executive Engineer entrusted the transactions to casual staff, though User Manual provided that only authorised persons should do these.
- As the system generated two copies of receipts - one copy to the consumer and the other retained by the sub-division, mere comparison of the daily cash scroll with the system generated receipts would have revealed the fraud; this process was found lacking.
- As three terminals were faulty the casual employee acting as Cashier was reported to be using the server for cash collection. It is evident that the hand-receipt staff who was assigned the role of System Administrator had access even to the database, a procedure detrimental to the security of the computerised function.

Though the amount involved was small and it was recovered and the casual employee terminated the matter should have been referred to higher authorities for re-examination of the policy of employment of casual employees for sensitive functions like cash handling, a practice which is still continuing in other divisions.

**Unauthorised alteration of data to cover up fraud**

Audit also observed that later, in the database, the amount misappropriated was seen credited to the accounts of the consumers, who were short credited in the CPL, on the same date on which the misappropriation occurred. Thus the collection details have been altered by making backdated entries. This action was irregular as the procedure adopted for recording additional amount against the same receipt number on the original dates of receipt was not a permissible operation as per the User Manual.

Moreover, as the system did not permit posting from Bank/FRIENDS after 30 days, it was not clear how additional collection against the same receipt number was permitted after five months in the database. The system, which permits manipulation of daily cash collection and obliterates audit trail poses an unacceptable risk to the integrity of the database.

Government stated (November 2005) that a detailed report had been called for from the Assistant Executive Engineer to understand the reasons for the error.

No IT security policy  
had been framed

### **2.8.3 IT security policy**

There was no IT security policy, though substantial investment was made on IT. Hence, safety and security of IT assets were affected, with consequent impact on the collection of revenue, through computerised billing system. For example, with the introduction of computerised billing system, maintenance of consumer ledgers and other registers had been dispensed with. These were replaced by operation and file control, with in-built transaction and user logs<sup>o</sup>, which were to be monitored to exercise proper control. However, neither the DBA\* nor any other designated officer monitored the transaction logs to observe deviations from unauthorised modification of data, thus weakening the internal controls. This would not only affect overall effectiveness and security of operation but also involve the risk of misuse and disruption.

In the absence of a documented IT security policy and its distribution to staff, users were not aware of their role and responsibility in safeguarding IT assets. The billing system was in operation at 28 locations but none was designated with the responsibility of ensuring IT security.

Government admitted (November 2005) that KWA had not framed written policy relating to IT security and stated that till the implementation of a centralised system, the supervisory control was being entrusted to a responsible person in the site.

### **2.8.4 Deficient physical access and environmental controls.**

The organisation did not have proper physical access controls to prevent unauthorised access to IT systems and environmental controls to protect the computer hardware and software from damage due to humidity, fire, dirt, power failures and other environmental hazards.

In Pongummoodu and Pattoor sections, entry into the server room was not restricted. Consumers who approach the section for lodging complaints were directed into the server room. While in Pattoor section the server room did not have temperature control facility, in Kaloor sub-division, the server, UPS and batteries were kept in a small room wherein inflammables and old files were stacked.

Government attributed this to transfer of trained staff and ignorance of new comers and assured that strict instructions would be issued to keep the server room damp and dust free.

### **2.8.5 Inadequate logical access controls**

Logical access controls refer to a system of measures and procedures, both within an organisation and in the software products used, aimed at protecting computer resources (data, programs and terminals) against unauthorised access attempts.

The billing system has inbuilt controls for three levels-at operating system level, at database level and at application level<sup>#</sup>. At the application level, all user personnel had been identified and specific roles had been assigned

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<sup>o</sup> System record of transactions effected and persons responsible for the same

\* Database Administrator

<sup>#</sup> The three levels of protection available in the software environment

keeping in view their functions. However, staff in 11 sub-divisions/sections did not know of these controls and no instructions were given to them to regularly change passwords.

Similarly, in certain sub-divisions<sup>▼</sup>, the database showed the status of transferred staff as 'active' thus posing risks to system like security breach and unauthorised modifications.

**Unrestricted access to database**

Though only the authorised personnel should have access to the database, in Kalamassery sub-division, every staff with system access had database access too, making the data vulnerable to manipulation.

Government stated (November 2005) that a password policy was being drafted and communicated to officers. But no such policy had been framed till date (June 2006).

### **2.8.6 Lack of program amendment control**

It is imperative that only authorised and fully tested software is implemented in any organisation and any further changes to the software should be properly authorised, tested, documented and implemented.

Three versions of the Billing System, *viz.*, six-monthly billing system, bi-monthly billing system and spot billing system were in operation and a fourth version-ABACUS was under development. A comparison of the display of Menus in the systems installed with reference to User Manual revealed several modifications to the system, but these were not documented.

Instructions in the User Manual required that all sections should maintain Register of Error Reports to be attended to by DBA during visit.

Though DBA and ADBA<sup>▲</sup> periodically visit sections, tour reports of DBA/ADBA indicating the type of complaints and the modifications carried out were not submitted. Thus, no documentation existed for changes made in source code and uniformity ensured in all 28 locations. Even version control was missing in many centres. As there were 28 computerised Revenue Centres, it was not possible for one DBA to visit all locations even once in a month. Hence problems such as incomplete generation of demand and incorrect generation of DCB were not solved for a long time.

Government stated (November 2005) that all modifications after implementation were documented and kept by NIC. The reply is, however, silent about the modifications carried out by DBA during field visit.

### **2.8.7 Lack of Business Continuity Plan**

The organisation did not have any back up and Business Continuity Plan. In the absence of such a plan, its documentation and circulation, continued use of the computerised billing system will be adversely affected in emergent situations.

**No control over storage of back up**

Provision existed in the Manuals, to take back up of Operating System, Database, Application Software and Data. But audit observed that in Kowdiar

<sup>▼</sup> Kalamassery, Kozhikode I, Kozhikode II, Pongumoodu and Kowdiar

<sup>▲</sup> Assistant Database Administrator

section though daily data back up was being taken in tapes these were usually kept in the server room itself and there was no procedure for off site storage of the backed up data. It was informed that back ups were also taken during the visits of DBA, ADBA from the Head office. But no library procedures existed for back up taken in the sub-divisions and Headquarters Computer Cell.

In the sub-divisions/sections test checked there was no fire fighting equipment and generators to prevent disruption of billing and water charges collection in the event of power failure. In Aluva sub-division, though all the terminals were damaged due to lightning and were rendered inoperative (August-October 2004) lightning arrester to protect electric distribution system had not yet been installed.

Government admitted the absence of documented back up policy and stated that action would be taken to log the back up details at the site itself.

### **2.9 Ineffective internal audit and monitoring**

Internal audit staff was neither trained in the computerised billing system nor did they conduct any audit on demand and collection of revenue in spite of the fact that the Billing System introduced in 1994 was extended to 24 sub-divisions covering 28 collection centres.

Government stated (November 2005) that internal audit staff was being equipped to conduct audit in a computerised environment. But no computerised section was subjected to internal audit so far (June 2006).

Though more than 10 years have elapsed since the introduction of the system, KWA had not reviewed its functioning to ascertain the effectiveness with reference to drawbacks identified.

### **2.10 Conclusion**

Computerised Billing and Revenue Collection System was introduced in KWA from 1994 without formulating an IT policy or IT strategy. Due to defective implementation, KWA could not derive the intended benefit, by defaulter identification/faulty meter replacement/enforcement of collection, of increased revenue collection and reduced arrears. Moreover, incorrect demand/report generation and absence of controls plagued the system. Failure to conduct timely review of computerisation has resulted in numerous inaccuracies, inadequacies and inconsistencies; no attempt was made to remove the drawbacks leading to these inconsistencies. Use of the system as MIS was found lacking. These are serious shortcomings in a system which directly affects a large number of consumers in the State.

Government stated that the deficiencies in the system had been taken note of and timely steps would be taken to strengthen the technology and educate the users to correct procedural errors. Government also stated that revenue collection had steadily increased from Rs 41 crore in 1994 to Rs 116 crore by 2004-05 due to computerisation. Audit scrutiny, however, revealed that the increase in revenue collection during the ten year period was also due to increase in number of consumers and 50 *per cent* increase in tariff rate. It is also pertinent to note that against the pending demand of Rs 44.10 crore (March 1999) for the entire State at the time of introduction of computerised billing system, the pending demand as of March 2005 for the 11 computerised



sections covered in audit alone stood at Rs 98.66 crore, clearly indicating that computer generated reports such as defaulters list, faulty meter list, disconnection notice, etc., were not effectively used as a tool for early collection of demands.

### **2.11 Recommendations**

KWA should:

- rectify the errors in demand /report generation;
- set up technical support team for error handling and timely installation of modified version at all locations;
- expedite development of MIS software and utilise the existing hardware;
- frame an effective IT security plan on priority basis;
- ensure that regular staff is posted for sensitive work, utilize the trained manpower for IT related functions and also periodically train the functional officers to effectively use systems; and
- evolve a plan for ensuring physical security of IT assets and data.

Government accepted the recommendations in toto and agreed to comply with them during the development of Centralised Billing System and its implementation.

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The

**(JAYANTA CHATTERJEE)**  
Principal Accountant General (Audit), Kerala

Countersigned

New Delhi,  
The

**(VIJAYENDRA N. KAUL)**  
Comptroller and Auditor General of India