

3.2 INFORMATION TECHNOLOGY AUDIT OF THE LOW TENSION BILLING SYSTEM IN KERALA STATE ELECTRICITY BOARD

Highlights

As the agreement for the development of software was executed after installation of the software, the Board could not ensure that Pricewaterhouse Coopers (PwC) delivered all the components of the software and provided system support during implementation

(Paragraph 3.2.46)

There were repeated invoice corrections without supporting documents which made the system unreliable.

(Paragraph 3.2.10)

Failure to demand Additional Cash Deposit (ACD), led to short recovery of ACD to the tune of Rs 13.37 crore in six Sections covered in audit.

(Paragraph 3.2.124)

Supervising officers failed to check account daily cash collections (manual receipts) made during the period IT Systems were not working through manual receipts into the system leading to temporary misappropriation of collection.

(Paragraph 3.2.146)

There was no built in control over tariff classification appropriate to the purpose of use of connection.

(Paragraph 3.2.18)

As all non-traced consumers are classified as dismantled consumers, genuine consumers escaping billing cannot be ruled out.

(Paragraph 3.2.235)

Several gaps in the system generated primary key fields like Customer ID, Invoice ID and Receipt ID, due to back end deletion of records, affecting the integrity of the database.

(Paragraphs 3.2.246)

Though the Board had formulated a policy regarding security of IT assets, lack of awareness among staff about the System security rendered the system vulnerable to unauthorised access and data manipulation.

(Paragraph 3.2.268)

The Electrical Sections failed to follow the instructions relating to regular external back up of data and offsite storage of back up involving risk of disruption of continuity of service.

(Paragraph 3.2.28)

Internal Audit was ineffective due to absence of training to the staff in conducting audit in the computerized environment.

(Paragraph 3.2.29)

Introduction

3.2.1 Kerala State Electricity Board (Board) is responsible for generating, transmitting and distributing electricity power in the State of Kerala. The Board has introduced computerizationcomputerisation in the areas of High Tension Billing, Low Tension Billing, Pay Roll, Accounting and Inventory Management.

In terms of an MoU signed (August 2001) between the Ministry of Power, Government of India and the Government of Kerala to reform Power Sector, reforms, KSEB was to undertake computerizationcomputerisation of accounting and billing in towns by March 2002 for effective energy audit. An Indigenously Developed System (IDS) for Billing developed in Visual Foxpro platform was introduced during 2001 in eight Distribution Sections. In 2003 the Board decided to develop separate software using RDBMS* platform SQL Server with Windows 2000 Server as Operating System. The software for LT Billing, called “Jyothi” developed in association with Pricewaterhouse Coopers (PwC), was introduced in 177 out of 561 Distribution Sections during 2003-2005. The objective of computerisation of billing was to automate key revenue billing and collection activities in the section offices of the Board and to improve customer satisfaction. Between 2000 and 2006 (up to February), the Board spent Rs. 8.69 crore on the on purchase of servers, personal computers and connected accessories (Rs. 7.62 crore), licensed software (Rs.1.07 crore) for the implementation of LT Billing System.

Sale of power (SOP) in respect of all LT consumers is done through the 561 Electrical Sections. Invoices relating to sale of power to LT consumers are issued from the Section and payment collected at the Electrical Sections. KSEB at present follows two types of billing system viz., Monthly Billing System and Bi-monthly Billing System. All industrial consumers and consumers with connected load exceeding 10KW are billed monthly and the rest bi-monthly. The scoping document for the development of LT Billing System proposed the installation of an application software in Sections along with Personal Digital Analyser (PDA) appropriately programmed to automate the key revenue billing and collection activities. The process from new consumer registration to, billing, collection and reporting were to be covered by the system. Under the system, consumer data for area- wise spot billing was to be extracted to PDA and meter reading data based on which spot bills are printed, are uploaded to the system. It was proposed to enhance cash collection timings through double shift for better consumer satisfaction. Ten Data Centres were proposed to be set up across the state to have database redundancy and to facilitate common collection centres.

* Relational Database Management System

Organisational set-up

3.2.2 The IT needs of the Board are overseen by the Management Information System (MIS) department, which functions under the Member (Accounts). MIS Department is headed by Director (MIS) and has two Regional offices one each at Kochi and Kozhikode.

Scope and Methodology of Audit

3.2.3 IT audit was conducted to evaluate the IT general controls and application controls specific to computerised LT Billing system. The data pertaining to the period April 2004 to May 2006 made available to Audit in MS Access format was analysed using Computer Assisted Audit Techniques (CAAT) for checking of data completeness, regularity and consistency. In addition to the MIS department, Thiruvananthapuram, seven^{*#} Electrical Sections where the software “Jyothi” is installed were covered in audit. As the same software is installed at 177 locations, only seven sections, five urban and two rural located in the southern, central and northern region of the state were selected to assess the general controls and operational issues.

Audit objectives

3.2.4 The Information Technology Audit of LT Billing System in the Board was conducted to ascertain whether:

- the LT Billing System was generating monthly/bi-monthly demands as per the tariff rate appropriate to the tariff classifications;
- the collection of demands was accounted correctly and the personal ledgers updated automatically;
- the system was generating accurately the reports required for day to day function of the Sections; and
- access to the System was restricted to authorised users.

Audit criteria

3.2.5 The audit criteria were as follows:

- business rules of the Board relating to preparation of demands and notifications relating to tariff revision;
- registers prescribed by the Board for recording amendments in billing parameters; and

3.2.3 electronic data through data extraction and queries to assess the data integrity, accuracy and completeness. The data pertaining to the period April 2004 to May 2006 made available to audit in MS Access

* Vellayambalam, Fort, Alappuzha North, Chottanikkara, Kaloore, Thiruvalla and West Hill

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Audit findings

The findings of audit are discussed in the succeeding paragraphs.

Software development

Non-fulfillment of contractual obligation by Delay in executing agreement with Pricewaterhouse Coopers (PwC)

3.2.43.2.6 The Board decided during (January 2003) to select SQL Server as the database and Windows 2000 server as the Operating System (OS). This was in consideration of the offer of Microsoft to develop the required software through PwC, free of cost. Though the Board accorded sanction (January 2003) for signing a tripartite agreement among the Board, Microsoft and Pricewaterhouse Coopers (PwC), the agreement was executed only on 25 February 2004.

Agreement with PwC was executed after developing software

Preparation of System Requirement Specification (SRS), development and customization of program acceptance testing and training were the responsibility of PwC. There was, however, no indication of the involvement of PwC or Microsoft after signing the agreement in February 2004. As the LT Billing System was introduced in Vellayambalam Section during December 2003 and the software required for introduction of the System in 80 sections was procured as early as in March 2003, there was no justification for signing an agreement with PwC during February 2004. As the agreement was signed after the development of software and no time frame was prescribed, audit could not ascertain whether PwC delivered all the components of the software in time and provided system support during implementation. The Board did not get any benefit out of the agreement signed after installing the software. Moreover it could not ensure that PwC delivered all components of the software and provided system support during implementation. Hence many deficiencies in the software remained to be rectified leading to defective billing as described in the succeeding paragraphs.

The Management stated (August 2006) that the software development started immediately after the Board's decision and PwC had associated with the Board, IT team all through the System Development Life Cycle and the delay in actual signing of MoU was due to the delay in getting draft MoU vetted by the Law Department of the Board and the other two firms.

It was, however, observed in audit that many deficiencies in the software remained to be rectified leading to defective billing as described in the succeeding paragraphs. This was evidently due to the absence of involvement of PwC for enhancement/customization of program.

Absence of provisions in the LT Billing System

3.2.53.2.7 Though Jyothi 1.0 was introduced in December 2003 and was modified thrice, thereafter, the following essential provisions were still lacking in the system: three more versions were brought out after the introduction of Jyothi 1.0 the system lacked the following essential provisions:

The system did not have provision for Energy Audit

- Provision to capture the parameters relating to Energy Audit.
- Provision to capture the data relating to installation of capacitors by Industrial consumers.
- Facility to generate reports of revenue such as Monthly Report of Revenue required to be forwarded to the Division.
- Provision to store Meter reading exception Report, Consumption comparison report, invoice comparison report in respect of spot bills etc generated by the system for scrutiny during audit.
- Audit module to generate queries or reports for various audit purposes by the Internal Auditors and External Auditors.

The Management stated (August 2006) that Energy Audit Module would be included after Feeder Meter, Boundary Meter etc are installed for the purpose; Sales Revenue Data Module would be operationalised shortly and most of the additional reports required would be included in the next version. It further stated that an Audit Module would be incorporated in the next version.

System implementation

Delay in computerisation of the distribution sections

3.2.63.2.8 A Memorandum of Understanding (MoU) was signed on the 20 August 2001 between the Ministry of Power, Government of India and the Government of Kerala to reform the power sector in Kerala under the Accelerated Power Development Reforms Programme (APDRP). As per the MoU, the Government of Kerala had to undertake computerisation of accounting and billing in towns by March 2002. As per the Memorandum of Agreement (MoA) signed (October 2002) between the Secretary, Ministry of Power and the Chairman, KSEB, the process of setting up the computerised billing centers was to be completed by March 2004 in three phases.

Even though computerizationcomputerisation of 80 sections was scheduled to be completed by March 2003 in the first phase and supply order was placed on 24 March 2003, the application software was ready only by December 2003. Against 200 Sections scheduled in the 2nd phase, supply order for purchase of hardware was placed only for 97 Sections during December 2003. Moreover, computerisation of the third phase of 280 sections scheduled to be completed by March, 2004, and the remaining 103 Sections in the second phase was commencedhas not started (June, 2006). As the implementation of computerisation had not been extended to the remaining Sections, one of the objectives of APDRP scheme viz. to enable the Board to conduct effective Energy Audit, could not be achieved so far (July 2006).

The Management stated (July 2006) that the delay in implementation of computerizationcomputerisation was due to time taken for various procedures connected with the procurement.

Delay in introduction of Personal Digital Analyzer for LT Billing

3.2.73.2.9 The Project Proposal submitted by Microsoft contemplated the use of Pocket PCs suitable for roaming user to help the meter reader to generate accurate bills at the door step of the consumer. The Scoping Document and User Manual also contemplated uploading of spot Bill data from Personal Digital Analyzer (PDA) a hand-held billing device to download data from the system, print demand and upload demand details into the system. electronically from meter without human intervention. The Board introduced two PDAs on trial basis at Vellayambalam Section to facilitate calculation of Energy charges and printing of invoices on the spot in order to reduce human intervention and avoid error due to data entry. The PDA was, however, not being used in the Section. There was no documented reason for discontinuing the use of PDA.

Bills of 95 per cent of consumers were prepared manually

It was noticed that computer generated bills were served to only less than five *per cent* of the consumers who were billed monthly and who accounted for 45 *per cent* of LT revenue in each Section. In these cases, meter reading was fed into the computer and demands were generated by the system. In respect of 95 *per cent* of consumers, who were mostly domestic consumers covered by bi-monthly billing, the details of meter reading based on which manual bills were prepared by the Meter Readers and the details of demand were subsequently fed into the system. This involved additional manpower for data entry, causing two to three days delay in data entry to facilitate cash collection, thereby reducing the seven7 days' time limit given to consumers for such remittance. Moreover manual input by the meter reader and subsequent data entry by the Senior Assistant increases the risk of data entry error and data manipulation.

While selecting the Microsoft product for LT Billing System, Government desired the device integration at Meter Reader level. However, in the absence of PDA, LT Billing System was reduced as a tool for compilation of collection. If the Board had taken steps to introduce PDA in all the computerized Sections, there would have been a saving in man power to the tune of two Senior Assistants per Section. In cost terms the savings would be have been Rs. 2.40 lakh per Section per annum against the on investment of Rs 2.50 lakh per Section towards PDA.

The Management stated (August 2006) that the Computer System was fully equipped to implement PDA billing and the field trial at Vellayambalam was successful. It was also stated that full implementation can be carried out once the Board takes a Policy decision in the matter. The reply is not tenable as a A Policy decision in this respect should have been taken immediately after successful trial run for effective implementation of computerizationcomputerisation.

Application control

3.2.83.2.10 Any IT System should have Application controls to ensure the proper authorization, completeness, accuracy, and validity of transaction. This comprises of Input control and Process Controls. Analysis of data relating to six Sections using Computer Assisted Audit Technique revealed the lack of Input control and Process control as elucidated below:

Input control

Input controls are essential to ensure that the data received for processing are genuine, complete, accurate and properly authorized so as to prevent incorrect or fraudulent data entry. If input of consumer details, billing parameters such as meter reading, tariff category are not proper, it would adversely affect the reliability of data. Deficiencies noticed in audit with reference to due to absence of input control are discussed below:

Reduction in demand through Invoice correction

3.2.93.2.11 The demands generated by the system are revised using the provision for Bill correction based on complaints or otherwise. A scrutiny of the data relating to bill correction revealed that there was substantial reduction in demand in all the Sections covered in audit. As the fields such as calculated amount, billed amount and payable amount are replaced by the corrected value in the database and the consumption or meter reading based on which such invoice amount was altered was not entered in the database, there was no audit trail to verify the corrections. Though the corrections made were to be written in “Invoice Correction Register” there was no documentary evidence in support of such invoice correction. In the absence of such a documentary evidence the corrections made could not be vouchsafed in audit.

Reduction of demands to the tune of Rs 70.71 crore in six Sections

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Test check in audit of a few invoices revealed that Tthe Bill corrections register from January 2006 onwards maintained in West Hill Section did not indicate whether the corrections had been authorized by Senior Superintendent or Assistant Engineer. Out of 4407 invoice corrections, energy charge was reduced to zero in 1097 cases without authority. For example It was noticed in audit that in the case of a consumer, the meter was not readable and hence the system generated a bill for Rs 1,96,659 based on average consumption. The bill was, however, reduced to Rs 1805 charging only fixed charge and meter rent. No amount was realised towards energy charge. There was also no report as to whether the Assistant Engineer had conducted field verification and confirmed that there was no

consumption. Non-collection of energy charges based on average consumption lacked authority.

Generation of highly inflated demands based on abnormal consumption was one of the factors contributing to substantial reduction in demand. This was due to absence of proper control over recording of meter reading or calculation of consumption and as a result the consumption based on which energy charges were calculated exceeded the maximum possible consumption with reference to connected load. In West Hill Section such abnormal demands were noticed in 948 invoices relating to industrial/commercial consumers.

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Repeated Invoice correction due to failure to rectify System data

3.2.103.2.12 It was observed in audit that invoice correction in the Distribution Section, West Hill, Kozhikode involved reduction in demand to the tune of Rs .20.73 crore. A scrutiny of the database revealed that invoices of the same consumers were repeatedly corrected. Out of 6141 invoice corrections in respect of 3429 consumers carried out during the last two years, invoices were corrected on five to 28 occasions in the case of 180 consumers. It was also noticed that repeated correction on 28 occasions indicated that 5 (on 28 occasions) were made in respect of the on all the invoices issued to a particular consumer. were corrected.

Invoices of 180 consumers corrected five to 28 times in last two years.

The system did not have proper control over recording of meter reading or calculation of consumption and as a result the consumption based on which energy charges were calculated exceeded the maximum possible consumption with reference to connected load in a large number of cases. Generation of demands based on abnormal consumption led to distribution of highly inflated bills to consumers and revision of bills later on.

An analysis of the causes of correction in respect of selected consumers revealed that the repeated correction became necessary due to the failure to modify master tables relating to Multiplication Factor, Meter Status and Meter Reading. This was evidently due to the absence of proper training to staff especially at Assistant Engineer/Senior Superintendent level, who were expected to analyse the cause of correction and ensure timely rectification of the defects so that such mistakes did not recur. .

The Management stated (August 2006) that the errors should have been rectified in the first occasion itself. It was also stated that Human Resource Development wing had been requested to arrange further training to staff and a circular was being issued to impose more control.

Incorrect data capture in respect of Cash Deposit

Amount of CD in the System did not tally with Register in 292 cases

3.2.113.2.13 The consumers seeking Electricity connections are required to remit Cash Deposit (CD). A test check of the details of CD amounts in respect of LT IV (Industrial) consumers in the Electrical Sections of Kaloor, West Hill, Chottanikkara and Thiruvalla in the System with the manual CD register revealed that the amounts in the system did not tally with the corresponding entries in the Manual CD register in 292 out of 1217 cases checked involving excess accounting of Rs .7.66 lakh in two Sections and short accounting of Rs .2.52 lakh in the other two Sections.

Supervising Officers failed to validate data entry

As per the instructions governing back data entry issued by the Board, Senior Superintendent/Asst Engineer(AE) was required to validate data entry and forward a Compact Disc containing back data along with a certificate to the effect that the data was verified and found to be correct. In view of the discrepancies noticed in large number of cases test checked it is evident that Supervising Officers failed to discharge their duties and hence the data in the system is not reliable for the purpose of additional CD collection or crediting of interest on the deposits to the Consumers account.

The Management stated (August 2006) that the responsibility for maintaining accuracy of data was with the Data Manager viz. AE of the Section.

Short collection of Cash Deposit-Rs 13.37 crore

Matrix identity: **H 3**
Matrix Weightage : **0.15**
Period : **2001-06**
Money value: **Rs.13.37 crore**
Weighted money value: **Rs.2.21 crore**

3.2.123.2.14 As per clause 13(4) of Kerala Electricity Supply Code, Cash Deposit should be not less than three times the monthly current charges for bi-monthly billed consumers and two times the monthly current charges for monthly billed consumers. Wherever there was shortfall in CD, the Sections were required to raise demands for Additional Cash Deposit (ACD). Analysis of data relating to CD/ACD collection in Vellayambalam, Fort, Alappuzha, Thiruvalla and West hHill, Kozhikode Sections revealed that CD was zero in certain cases. It also included nominal entries like one rupee, ten10 rupee much less the monthly minimum of Rs 85 payable by LT II consumers. Though there exists provision in the package for Mass Additional Cash Deposit calculation based on 12 months moving average of invoice, none of the Sections covered in audit raised ACD demand using the facility. As a result there was was the Assistant Engineers in six Sections covered in audit, failed to recover additional CD resulting in a short recovery of CD to the tune of Rs 13.37 crore in six Sections..

Short demand of CD amounting to Rs 13.37 crore in six sections

The Management stated (August 2006) that CD details of very old consumers and those migrated to other sections were not available and ACD demand would be issued as per rules.

Irregular marking of bills as disputed

Treatment of Bills as disputed lacked authority

3.2.133.2.15 As per the User Manual bills can become disputed vide court orders or as mutually accepted between the Board and the consumer. In case of dispute about metering equipment the meter should be replaced and the old meter sent for Technical Examination. On receipt of the Report the bills issued during the period of dispute would be examined and revised, if necessary. Audit scrutiny revealed that the report of litigation cases (Disputed Bills)

Matrix identity: **G 3**
Matrix Weightage : **0.20**
Period : **2001-06**
Money value: **Rs.0.41 crore**
Weighted money value: **Rs.0.09 crore**

under category LT VIIA generated through the system in Kaloor section contained 83 invoices involving Rs.9.07 lakh, but none of these related to 'court case' or 'awaiting technical examination report'. Moreover the bills marked as disputed were seldom followed up and released. It was also noticed that in West Hill Section 747 invoices were treated as disputed. No register of disputes was, however, maintained to watch the progress and to revoke the invoices intended for collection. In majority of the cases the reasons recorded in the system fell under the category "Wrong Bill". The practice followed by the Section in keeping invoices under disputes without proper authority was irregular and leads to delay in collection of dues to Board. . Due to irregular marking of demands as disputed and failure to revoke the demand, an amount of Rs. 41.32 lakh was The amount pending collection from Industrial consumers alone. was Rs 41.32 lakh.

The Management stated (July 2006) that the procedure followed by the Sections was incorrect and such weaknesses in internal control would be addressed.

Lack of supervisory control over collection through manual receipts

3.2.143.2.16 As per User Guidelines, cash collection shall be done manually by issuing the manual receipts in the event of a system failure. As soon as the System is restored, all the collection taken manually should be entered in the system by the cashier and all corresponding reports taken. Audit scrutiny of the manual receipts issued by the cashier revealed glaring systemic deficiencies serious irregularities such as failure to account certain receipts, delay in accounting of receipts and use of manual receipts even on the dates on which there was no disruption due to System failure. as perThe details indicated are given in **Annexure 14**.

It is evident that the Senior Superintendent responsible for checking daily cash collection and accounting for the same failed to discharge their duty leading to temporary misappropriation of collection.

Absence of validation controls in data entry relating to demands

3.2.153.2.17 Invoice date, Invoice due date and Invoice disconnection due date are important parameters which affect calculation of fine, interest, disconnection etc. Audit scrutiny revealed that disconnection due date was on future date like 2008 in 20 cases and on much earlier dates in some 102 cases (31 12 December October 1900899) in West Hill Section; Invoice date was found to be later than Invoice due date in 130 records in five sections. This indicated that the due dates were not taken from the Billing cycle table and the system permitted arbitrary input of due dates.

Invoice date was after Invoice due date in 130 cases

Process control

Incorrect generation of report on Sale of Power (SOP)

3.2.163.2.18 There is a provision in the system for generating tariff category-wise summary of demand, collection and balance Report (SOP 14) of

Failure to include OB in the DCB report leading to negative balance

all consumers in the Section. It was, however, noticed in audit that the report generation relating to balance was incorrect as the system failed to include previous months CB as arrears in the report of the next month. Hence the balance pending collection in Thiruvalla Section was displayed as negative. The DCB Statement for the month of April 2006 generated from the system in the West Hill Section did not contain the figures for the opening balance, total demand and the balance. The number of consumers (14000) in the report was also largely understated (550). The figures of consumption also included abnormal consumption ignored for computation of energy charges.

As against an amount of Rs. 1.86.43 lakh crore pending at the end of April 2006 in Alappuzha North Section as per SOP 14 report, the sum of outstanding invoices pending collection was Rs 44.63 lakh. Thus, the reports generated by the System did not reflect the correct position of balance pending collection.

The Management stated (August 2006) that the tariff-wise break-up of arrears of non-domestic consumers could not be correctly worked out from manual records to include arrears. The reply is not tenable in view of the fact that As all the pre-system bills pending collection as on the specified date for switchover to computerization, were required to be entered into the System, but the it is evident that the Sections failed to comply with the instructions.

Failure to demand tariff minimum charge from domestic consumers

**Short demand from domestic consumers
Rs 2.67 lakh**

3.2.173.2.19 Notification relating to tariff rate for LT consumers issued in October 2002 stipulated the payment of tariff minimum charge of Rs .30 for single phase domestic consumers and Rs .170 for three phase consumers. It was noticed in audit that the system failed to generate the minimum tariff charge of Rs .405 in respect of bi-monthly bills of several Phase 3 domestic consumers and Rs .85 of from phase one domestic consumers leading to short demand of Rs .2.67 lakh in five Sections.

Failure to link tariff classification to purpose of use

No proper linkage between tariff and purpose of use

3.2.183.2.20 Electricity Tariff rate applicable to individual consumers is based on their tariff categorization according to purpose of use. Consumer category table contains a field to indicate the purpose for which power supply is used and another field stores corresponding tariff category in which the particular consumer is included.

Audit scrutiny of the Consumer category table in West Hill Section revealed that the tariff category assigned and the purpose of usage had no proper linkage as shown below:

- Consumers categorized as domestic included consumers who had taken connection for industrial, agriculture and commercial purposes, Government Offices, educational institutions etc.

- Among 275 categorized under tariff for Industrial consumers, there were three consumers who had taken connection for commercial purpose and one for domestic purpose.
- Thirty four consumers categorized under tariff rate applicable for Agriculture connections included consumers who had taken connection for domestic and commercial purposes and Educational Institutions.
- Same type of Institutions has been grouped under different categories.

Similar misclassification of tariff was noticed in other Sections. Wrong categorization of consumers leads to loss of revenue to the Board/Government due to application of lower rate for energy charge, fixed charge and electricity duty. Notwithstanding the absence of a built-in provision to assign tariff code with reference to purpose type code and reassign tariff as and when purpose code is changed, the Assistant Engineers should have taken special care in assigning tariff code.

The Management stated (August 2006) that the consumers have been assigned appropriate tariff category but there was omission to update the purpose type code whenever there was change in purpose of use. It was also stated that the properties “purpose”, “tariff”, “user” and “consumer category” would be linked to prevent such mismatches in the database.

Non reckoning of unit of connected load for billing

3.2.193.2.21 Connected load is the basis of levy of Fixed charge from non-domestic and industrial consumers. The total connected load of the consumer is stored in Customer Connected load table with the unit of connected load recorded in Watt or KW. Audit scrutiny revealed that in majority of the cases the load was shown according to the wattage of connection with the unit shown as KW. It was further noticed in audit that if a consumer had a connected load of five KW, then in the system it would be shown as 5000 KW. As a result the total connected load of all consumers in a Section itself exceeded the total generating capacity of the Board, an obvious impossibility.

Lack of control over calculation of consumption

3.2.203.2.22 The system has provision to capture closing reading and opening reading, meter condition and bill cycle during monthly/bi-monthly billing. Closing reading of previous month becomes opening reading of next month and the opening reading is printed in the spot bill. In the case of Door Lock both opening and closing reading will be the same. In the case of Meter exchange initial reading of the new meter and final reading of the old meter are to be captured in Consumer Meter table. Audit scrutiny of the table in West Hill Section revealed the following:

- Calculation of consumption was not equal to previous reading minus present reading in 27,682 records. These included 3,777 door locked cases where both readings should be equal, and 18,253 cases categorized as “Available and accepted”. As the processing logic should be consistent for all cases, the exceptions indicate that

authorized but invalid or unauthorized changes made into the system cannot be ruled out.

- Calculation logic was based on actual consumption in 2,10,507 records, based on average consumption in 7,782 records and blank in 4,973 records. Moreover out of the cases where consumption was recorded as based on average, meter condition was depicted as OK in 6,954 records. Out of 4,933 where calculation logic was blank, in 4,903 cases meter condition was also shown as OK. Thus, clearly when the meter was OK, the system generated bills on average consumption only and should be rectified.

Similar discrepancies were noticed in audit in all the Sections covered. This indicated that the system lacked control over calculation of consumption.

3.2.2/Incorrect generation of disconnections list:

Incorrect generation of disconnection list

3.2.23 The Disconnections list generated from the System at West Hill as on 15 May 2006 showed that 196 consumers were due for disconnection for non payment of arrears. Audit scrutiny revealed that the list contained many duplications and that only 37 consumers were actually due for disconnection. These included eight consumers with arrears of Rs.3,14,136 who had defaulted for more than six months. As a result, the consumers appeared in both the ‘Disconnection List’ and the list of ‘Consumers Defaulted for more than six month’.

The Management stated (August 2006) that the disconnection list generated by the system was not believable and hence the Section relied on manual Consumer Personal Ledger for disconnection.

Deficiencies in consumer data

Incomplete data relating to consumers

Connected consumers were shown as not billable

3.2.223.2.24 Customers’ table contains the details of consumers in the Section. A scrutiny of the database revealed that some of the connected consumers were shown as not billable though as per user manual, all connected consumers would become billable automatically on first meter reading entry.

It was also noticed that some of the dismantled consumers and consumers who had closed their account were also shown as billable. Thus, the system did not have control to ensure that all connected consumers were billed without fail.

Customer name and address blank in several records

The database contained several records where the name of consumer was blank. Due to absence of input validation junk characters were also seen entered against the name. The database also included several records where consumer’s permanent/temporary address was blank. Section --wise position is indicated in **Annexure 15**.

Due to improper maintenance of database, the number of consumers actually connected and their name and address could not be correctly ascertained from the system thus seriously limiting the data's usefulness as MIS.

Improper grouping of not-traced consumers as Dismantled consumers

Data of dismantled consumers were not verified and brought to billing

3.2.233.2.25 As per instructions issued at the time of switch over to computerizationcomputerisation, all 'not traced connections' were to be included under dismantled category. Consumers are dismantled on specific request or if disconnected for six months due to failure to remit dues. As the date of the dismantling field was zero in most of the records, it is evident that proper verification was not conducted at the time of switch over to the computerized system or thereafter. As the list included known consumers like Government Offices, High Schools etc., the possibility of genuine consumers having escaped escaping billing cannot be ruled out.

The Management stated (August 2006) that the dismantled consumers included those transferred to nearby Sections on forming new Sections. Such consumers should have been verified and excluded from the database at the initial stage of computerizationcomputerisation.

Lack of integrity of customer data

Several gaps in Customer ID indicating deletion of records

3.2.243.2.26 Customer ID is a unique field generated by the System to identify a consumer. These codes are to be protected against modification and deletion to ensure the integrity of the database. Audit scrutiny, however, revealed that there were several gaps in the Customer ID in the Customers table and the customer related table as per details given in **Annexure 16**.

Several missing invoices in the database

Invoice No is another unique number generated by the System to identify the invoice of a consumer. A s Scrutiny of the database relating to demands revealed that there were several gaps in Invoice Number involving 7218 missing invoices in five Sections.

Continuity of invoice numbers and validation of due dates are important parameters for billing. Missing numbers indicate possible back end deletion of records of demand without authority compromising IT security and integrity of database.

The Management stated (August 2006) that there was provision for deletion of records at the early stages on cancellation of Reconnection Fee and Surcharge Bills, but the provision was removed later. The reply is not tenable as it was noticed that the facility still existed in the front-end in respect of ex-system bills and pre-system bills. Facility for deletion of records which obliterates the audit trail was not conducive to data security.

Several Missing receipts indicating misappropriation

In view of the varying number of records and missing unique ID the information generated out of the System was not reliable. Deletion of records of receipt indicated could be a result of misappropriation of collection. Though as per User manual, access to database is denied to users in the Section, the

integrity of the system appears to have been compromised through unauthorised back end correction.

Discrepancies between manually prepared and system generated reports

3.2.253.2.27 The Section office is required to prepare a number of statements like Demand Collection Balance (DCB) statement, Monthly report of revenue collected, disconnection list, Government Building arrears, etc., for onward transmission to the Divisional office. Even though some of the reports could be generated from the System, the West Hill Section was relying only on manually prepared reports. A comparison of the manually prepared reports and the system-generated reports revealed the following discrepancies.

Government Building Consumer Arrears Statement:

- The total arrears as per the computer generated report in West Hill Section as on 15 May 2006 was Rs.4,63,861 (in respect of 17 consumers) but the manual report showed the arrears as Rs.2,95,059 (in respect of four consumers). Thus, 13 consumers included in the System did not find a place in the manually-prepared list.
- Further, the Report generated in the Electrical Section, Alappuzha (North) on 2 May 2006 indicated that only Rs 1,578/- was due from the Kerala Water Authority (KWA). It was noticed that as per the Statement 'Current charge arrears from Government Departments and Public Sector Undertakings' of March 2006 prepared by the Section for onward transmission to the Divisional Office, the dues from the KWA amounted to Rs.11,44,04,478. Audit scrutiny revealed that the consumers were wrongly categorized as "Ordinary Consumer" instead of KWA consumer and hence the arrears of these consumers did not reflect as arrears due from KWA

Wrong categorization of Government consumers led to incorrect generation of GB arrear report

DCB Statement:

- Figures in respect of Demand for the month of April 2006 (Rs.85,32,400.21) and the Total Demand generated (Rs.83,43,048) from the System at West Hill Section also differed from the figures prepared manually. Similarly, against the total collection of Rs.79,04,801 for the month of April 2006 as per the manual DCB, the collection as per the System generated DCB was Rs.89,38,525.98.

Figures of Demand and collection in Figures of Demand and collection in Manual report did not tally with System generated report.

Thus, the Board failed to ensure that the output generated, was complete and accurate.

General IT controls

Inadequate IT Security

3.2.263.2.28 The Board has an IT Security Policy for the security of IT Assets, including data. The following lapses were noticed in audit:

There was no documented Password Policy

Password of SS was shared by others for unauthorized access

- Absence of a well defined and documented Password Policy leading to sharing of password of the Senior Superintendent (SS) by the Senior Assistants and Daily wage staff.
- Failure to disable the access right of the retired/transferred employee facilitating unauthorized access to the System

Thus, inadequate access control rendered the system vulnerable to unauthorised access and data manipulation.

The Management stated (July 2006) that a comprehensive training programme covering all aspects of IT Security was scheduled to begin shortly and after training the security environment would improve. It was also stated that a comprehensive password Policy would be formulated and circulated shortly.

Absence of segregation of duties among IT staff

Role of DBA in Sections is not specifically assigned to a person

3.2.273.2.29 It was noticed in audit that no officers were separately entrusted with the duty of System Development Manager, Librarians, Security Administrator and Network Manager. Though no user in the Section Office has right to access database, Audit scrutiny revealed several back end corrections in data were noticed during audit. The person responsible for back-end correction could not be identified as the role of Database Administrator (DBA) in respect of Sections has not been specifically assigned to any person.

Failure to adhere to stipulated backup procedure

No external back up taken for several months

3.2.283.2.30 Audit scrutiny revealed that no external backups were being taken during the last several months in the Alappuzha North Section, as the tape drive was defective and there was no CD drive. There was no Back up Register at the Vellayambalam Section.

The absence of regular back up enhances the risk of inability to provide continuous computing services and increase the risk of unauthorized changes to the backup database.

The Management stated (August 2006) that a circular was being issued to all Assistant Engineers reminding them on the importance of back up.

Ineffective Internal Audit

Internal audit failed to adopt computer based auditing technique

3.2.293.2.31 Regional Audit Offices under the Chief Internal Auditor are responsible for the audit of revenue collection in the Distribution Sections of the Board. Consequent upon the introduction of computerization and the discontinuance of manual records, the Internal Audit wing could not conduct audit effectively as the staff were not trained in the use of LT Billing System and there was no audit module in the software. Though the Auditors Manual prescribed certain procedure/checks to be followed/conducted in computerized Sections, it was noticed in audit that such checks were not carried out.

As such the comments in Internal Audit Reports were confined to short recovery of FC due to failure to instal capacitors and non installation of

separate light meter, etc., based on manual ledgers. Though short collection of energy charges due to wrong application of tariff etc could have been detected by adopting Computer Assisted Audit Technique, no such step was taken. As the inaccuracies in the Billing parameter entries and tariff categorisation would result in repeated incorrect bill generation and the existing rules did not permit raising of additional demand in respect of past cases, the Board has lost substantial revenue due to delay in conducting internal audit in the computerized Sections. It was also noticed that there was also no machinery to monitor user logs to detect unauthorised modification of data, making the system vulnerable to misuse.

The Management stated (August 2006) that additional reports suitable for audit would be incorporated.

The above matters were reported to Government in August 2006; their replies are awaited (September 2006).

Conclusion

The Board, though it was envisaged computerization of that all distribution Sections would be computerised by March 2004, only 33thirty three *per cent* of Sections have been computerised. Moreover, due to failure to introduce Personal Digital Analyser for generating invoice at the door step of the consumer, 95 *per cent* of bills were being generated manually and were subsequently fed into computers increasing the risk of data entry errors and data manipulation. The system was not generating bills as per business rules, as controls over input of data were poor and processing was erroneous in many cases leading to continuing revenue loss to the Board. Lack of awareness among staff about the system security rendered the system vulnerable to unauthorized access and loss of data integrity.

Recommendations

The Board should urgently initiate steps to:

- *Set up Data Centres with facility for centralised processing of data, minimizing scope for data manipulation and enforcing rigidity in data input to avoid process errors.*
- *Introduce PDA to fully automate the billing process and reduce manual work.*
- *Scrutinise thoroughly all manual collections from March 2004 onwards at all computerized Sections to assess the quantum of receipts that have escaped escaping accounting in the system.*
- *Revalidate back data relating to customer CD, connected load, etc., and update the database to make the system reliable.*
- *Rectify inaccuracies in report generation and include additional reports suitable for day to day use of the Section and for MIS*

purpose with facility to upload the reports to Accounting software at Division level and MIS at Circle level.

- *Scrutinise thoroughly the list of dismantled consumers to identify live consumers escaping assessment*
- *Strengthen Internal audit by imparting training in Computer Assisted Audit Technique and develop effective Audit Modules suitable to Internal Auditors and External Auditors.*

Develop effective Audit Modules suitable to Internal Auditors and External Auditors

- *Strengthen System Security and Business Continuity Planning by imparting properimparting proper user awareness training.*