Conclusion

- There were abnormal delays in execution of projects due to deficient planning and project management with consequent time and cost overruns.
- There were cases of non-levy/ short levy of liquidated damages.
- As GENCO could not complete the projects as planned in DPRs, DISCOMs purchased expensive power from open market to tide over shortages.

Recommendations

- ***Possibility of entrusting major works like boiler, turbine and generator to more than one agency by calling ICBs be explored;***
- ***Land acquisition, all statutory clearances from forest and mining; ensuring availability of raw water, timely development of captive coal blocks should be done well before awarding contracts for supply and erection of plant and machinery to avoid delays and escalation of costs as well as timely completion of projects as planned;.***
- ***Put in place a mechanism for effective, efficient and timely completion of projects to avoid cost and time overrun.***

Southern Power Distribution Company of Andhra Pradesh Limited & Eastern Power Distribution Company of Andhra Pradesh Limited

4.7 Information Technology Audit on High Tension billing systems

4.7.1 Introduction

Electricity consumers are divided into two categories i.e. Low Tension[74](LT) consumers and High Tension[75](HT) consumers. Majority of HT consumers represent industries and commercial establishments. HT consumers are classified into various categories[76] as per the provisions of the Tariff Orders issued by Andhra Pradesh Electricity Regulatory Commission (APERC) from time to time and are being billed through computerised billing applications. In view of the significance of the HT revenue in overall finances (comprising 50 *per cent*) of the distribution companies (DISCOMs) and complexity involved in the HT billing, IT audit of HT billing was taken up. As the two DISCOMs viz., Central Power Distribution Company of Andhra Pradesh Limited (APCPDCL) and Northern Power Distribution Company of Andhra Pradesh Limited (APNPDCL) were already covered by audit and results included in the Audit Report for the year ended 31 March 2007, IT audit of HT billing in

[74] Low Tension consumer means a consumer who is supplied electricity at a voltage up to 440 volts;
[75] High Tension consumer means a consumer who is supplied electricity at a voltage higher than 440 volts but not exceeding 33000 volts
[76]Category IA (Industry-general), IB (Ferro Alloys), II (Others),III (Aviation Activity at Airports), IV A (Government lift irrigation schemes), IV B (Agricultural), IV C (Composite Water Supply schemes), V (railway traction) and VI (Townships and residential colonies), VII (Green Power), VIII (RESCOs) and IX (Temporary).

the remaining two DISCOMs viz., Southern Power Distribution Company of Andhra Pradesh Limited (APSPDCL[77]) and Eastern Power Distribution Company of Andhra Pradesh Limited (APEPDCL[78]), have been taken up.

The HT revenue as percentage of total revenue during the last five years ranged from 38.11 *per cent* to 45.88 *per cent* in APSPSDCL and from 55.70 *per cent* to 60.73 *per cent* in APEPDCL.

4.7.2 IT Organisational set up

General Manager (IT), who heads IT Organisation, directly reports to the Chairman & Managing Director in APSPDCL while in APEPDCL, reports to Chief General Manager (Operations). The Senior Accounts Officer (assisted by Junior Accounts Officers) at each circle office is responsible for billing the HT consumers in both the DISCOMs.

Apart from HT Billing, both the DISCOMs have implemented SAP ±ERP with Finance & Controlling (FICO), Material Management (MM), Human Resources (HR) and Asset Management (AM) modules.

4.7.3 HT billing applications

HT billing was developed by erstwhile APSEB on SunOS (renamed later as Solaris) with Oracle 7.3 at the backend, SQL*Forms 3 at the front end and Pro*C as programming language.

APSPDCL

The DISCOM continued using the same legacy system for generation of bills of HT consumers. APSPDCL has opted (2009) to implement MBC (Metering, Billing, Collection) application offered by IT Implementing Agency (ITIA) selected by Ministry of Power for implementation of R-APDRP programme in Andhra Pradesh. The R-APDRP program plans to covers 32 towns which consist of 26 percent of the total HT consumers billed by the DISCOM. Thus remaining 74 *per cent* HT consumers will continue to be billed using legacy system. The MBC application is still under implementation.

APEPDCL

The DISCOM had switched over (March 2010) to a new billing application (Revenue Assurance System -RAS) offered by an IT Solutions firm (firm) for both HT and LT billing. An agreement was entered into with the firm for implementation of RAS application RQ D≥ 6RWZDUHDV D6HUYLFH¥ 6DD6 model under which ` 0.32 per service connection (i.e. per consumer ± both LT & HT consumers) per billing month was payable for a period of three years from March 2010 to the firm by APEDCL.

The RAS application is a Web based open architecture running on RED HAT Linux Enterprise version 5.2 Operating System with Jboss 4.2.2 application using Oracle 11g RAC environment as Database.

[77]Chittoor, Nellore, Kadapa, Guntur, Ongole and Krishna Circles
[78]Vishakhapatnam, Vizianagaram, Srikakulam, East Godavari and West Godavari Circles

RAS system consists of Metering, Billing, Collections, remittances and accounting activities pertaining to both LT and HT billing. HT billing module was an application with centralised processing at corporate office and decentralised data feeding at Circles offices. LT Billing module was a fully decentralised application with both data feeding and processing located at the numerous Electricity Revenue Offices (ERO) across the DISCOM.

4.7.4 Scope of Audit, Audit objectives, Audit Criteria and Audit Methodology

Billing data pertaining to the period from 2008-09 to 2012-13 for both DISCOMs were examined in audit during October 2012 to June 2013.

The HT billing databases of APSPDCL and of APEPDCL were analysed using CAATs[79]. The results of queries on the databases were cross verified with physical records at Circle offices, to evaluate the adequacy of IT controls, to identify loss/leakage of revenue and to examine comprehensiveness of the System.

The objectives of Audit were to:

- Examine whether proper checks and controls were adhered to during acquisition and development of applications;
- Verify whether adequate operational controls exist at various stages of the System, to ensure Confidentiality, Integrity and Availability of information to all stakeholders;
- Examine whether business rules were properly mapped and all required functionalities provided in the billing applications, to ensure correct billing.

The audit criteria adopted for ensuring the achievement of audit objectives were:

- Provisions of Electricity Act, 2003;
- Retail Supply Tariff Orders, Regulations and Directives issued by APERC from time to time;
- General Terms and Conditions of Supply (GTCS) of Distribution and Retail Supply Licensees approved by APERC; and
- Comparison with other DISCOMs in the State.

The methodology adopted for attaining the audit objectives with reference to the audit criteria were:

- Examination of documents i.e. System Development, Agreement with the Contractor at APEPDCL;
- Test check of network vulnerabilities using utilities like NS Auditor in APSPDCL.

The audit findings were reported to the Management and the Government in

[79]Computer Assisted Audit Techniques.

September 2013 and the replies of the Government were received in December 2013.

4.7.5 Audit Findings

The audit findings of the two DISCOMs with relevance to each of the audit objectives are discussed in the succeeding paragraphs. The findings of similar nature across the two DISCOMs are combined wherever feasible.

Acquisition and Development

An IT policy/ strategy is desirable for guidance in acquisition and development of new software and their integration with other existing software for improved decision-making.

4.7.5.1 Lack of formulated and documented IT policy

Both DISCOMs are utilising automated applications like HT billing, LT billing, SAP ERP etc. However, they are yet to formulate and document a formal IT policy and long/ medium-term IT strategy incorporating the time frame, key performance indicators and cost benefit analysis for developing and integrating these applications.

Both the DISCOMs replied that formulation of an IT policy / strategy is under process.

Design Issues

4.7.5.2 Duplication of work due to lack of integration between SAP and HT billing system

In APEPDCL, HT consumer accounts are maintained in both HT Billing system and the SAP ERP. Interface for transferring monthly demand data from HT billing system to SAP was created. However, interface was not created in APSPDCL between HT Billing system and SAP to transfer payments received from the consumers and journal entries (JEs) thereof and the same is being fed into the HT billing system and SAP ERP separately leading to duplication of work and wastage of several man-hours while leaving scope for variations in the data, thus affecting the integrity of the databases.

Management/ Government replied (December 2013) that proper integration/ interface between SAP and billing applications would be provided during development of a new billing application that has been proposed.

4.7.5.3 Undue advantage to an IT Solutions firm

The Board of Directors of APEPDCL decided (22 June 2011) to continue with RAS application till the finalization of MBC application under R-APDRP[80]. Subsequently when MBC application was ready for implementation APEPDCL decided (30 March 2012) to continue with RAS instead of opting for the MBC solution. It was further decided to change the existing distributed

[80]Restructured Accelerated Power Development and Reforms Programme under which funds (grant/loan) were provided to DISCOMs for implementing IT applications.

architecture of LT billing module of RAS to a centralized architecture.

Accordingly, a quote was obtained from the same firm, which was operating the RAS, for outright purchase and implementation of RAS on a centralized architecture. The firm after negotiations quoted ` 3.45 crore for software, ` 0.90 crore for implementation and AMC of 18 *per cent* on software cost.

The Board, however, decided (29 September 2012) to go for tender for implementing a new billing application. The only quote received was from the existing firm and agreement for implementation of the new billing system was entered with the firm for an amount of ` 8.30 crore on 23 January 2013 and the same is under implementation (September 2013).

In this regard, audit observed the following:

- In the tender document, the Company did not inform prospective bidders about the availability of Source code of the existing RAS application with the Company.
- The original offer of the firm was ` 4.35 crore which included ` 3.45 crore towards software cost. The DISCOM, however, already owned the software as per the agreement of March 2010. Thus DISCOM under this arrangement was required to only bear the additional cost of ` 0.90 crore towards its implementation.
- By entering into fresh agreement with the same firm for the same software DISCOM ended up incurring additional cost of ` 7.40 crore (i.e., ` 8.30 crore ± ` 0.90 crore).

Management / Government replied (December 2013) that APEPDCL is not the owner of RAS HT application.

However, DISCOM had source code, for exclusive and unlimited use, provided by the firm as per the agreement of March 2010.

General Controls

Proper general controls ensure the integrity of the programs, data files and computer operations.

4.7.5.4 Data Integrity Issues

Change in tariff of HT consumers requires changes in master data table containing tariffs and changes in categories require changes to the HT Billing application. These changes are required to be documented, adequately tested and properly controlled to ensure the correctness and accuracy of billing.

4.7.5.5 Deficiencies in Master Data Changes

In APSPDCL, modifications made to both master data and the application to accommodate the changes in business rules were not documented. Further, a formal policy for authorising such changes and for testing their accuracy does not exist.

Management/ Government replied (December 2013) that sample bills are

verified by revenue wing before issue and that necessary modifications are done in co-ordination with HT revenue wing at Corporate Office.

Audit noted that though the changes were verified by IT wing using test data, the accuracy of the same was not ensured in the absence of concurrence from the Finance Wing/ Circles.

4.7.5.6 Categorisation of a consumer under different categories for regular billing and R&C penalties simultaneously

A HT consumer in APEPDCL was categorized as Category II for regular billing while the same consumer was categorized as Category I A for levy of R&C[81] penalties during the billing month of February 2013, indicating maintenance of duplicate master data which may give scope for incorrect billing.

Management/ Government did not furnish reply.

4.7.5.7 Master Data quality issues

Queries on the data dump pertaining to October 2012 provided by APSPDCL revealed that the database contained invalid or inconsistent data pointing towards lack of validation checks and input controls as evident from the following:

- Contracted Maximum Demand (CMD) of a consumer, which is an essential element for the purpose of billing, was blank in one case resulting in excess levy of ` 0.90 lakh. This indicates inadequate control over completeness of master data.
- In [illegible] cases 'Date of commencement of supply' was prior to 'Agreement date' ranging from [illegible] day to [illegible] years 7 months and 19 days which is inconsistent ;
- In respect of 36 HT consumers, address details were not available in the master table;
- In respect of 30 HT consumers, subdivision code was not filled in the master table;
- In the master table in respect of [illegible] SCs 'specified KV' was not filled in;
- In 541 SCs, specified KV did not match with Actual KV in the master table;
- Date of commencement of supply and date of agreement in respect of 73 SCs and 1402 SCs is respectively left blank in the master table;
- Likewise, analysis of data for the period April 2008 to September 2012 revealed that in 1,043 cases relating to 733 consumers, the Power Factor was recorded more than maximum possible Unity i.e., 1 and ranged from 1.01 to 20565.00;

[81] Restriction & Control measures impose restriction on power consumption by HT consumers. If consumption exceeds allowed limit, penalties ranging from two to six times of normal tariff are leviable.

- The fields "billissuedate" and "billduedate" in the monthly bills were left blank in respect of 37,249 records.

Further, it was noticed that though the date of changes were being recorded the time was not being indicated.

Management/ Government replied (December 2013) that necessary action would be taken to incorporate validation checks and input controls in the proposed new software.

4.7.5.8 Lack of Backup Policy

It was noticed that both DISCOMs did not have an approved backup policy.

Management/ Government replied (December 2013) that backup strategy would, henceforth, be followed scrupulously.

4.7.5.9 Lack of 'Business Continuity and Disaster Recovery Plan'

While APEPDCL had prepared a business continuity plan as part of ISO certification, it did not have a disaster recovery plan outlining identities of personnel and their roles/ responsibilities, plan/procedure to support such a critical IT system in the event of a failure. APSPDCL, however, neither had a business continuity nor a disaster recovery plan (BCDRP).

Management/ Government replied (December 2013) that steps would be taken to implement and document the disaster recovery plan.

Logical Access Controls

4.7.5.10 Outsourcing of critical activities

APEPDCL entrusted critical activities like system administration and database administration to contract personnel without defining and documenting roles and responsibilities and screening the third party personnel in violation of provisions of its Security Manual. Assignment of important tasks like System administration and Database Administration of critical business application, like RAS-HT to contract personnel, in the absence of adequate recording and monitoring of logs of System Administrator / DBA access makes RAS vulnerable to unauthorised changes.

Management/ Government replied (December 2013) that as activities of System administration and Database administration require special skills, DISCOM assigned the facility management services to third party agencies.

However, appropriate checks in terms of confidentiality agreement, generation and periodic review of access logs and onsite access control are to be built up.

4.7.5.11 Lack of maintenance of Audit Trails

DISCOMs did not enable any audit trails and logging of critical activities like changes to master data and transaction data thereby leaving no scope for verification of changes made or authorisation thereof. Risk is enhanced in APEPDCL where the system is outsourced.

Management/ Government replied (December 2013) that audit trails and activity logs will be maintained in the proposed HT billing system.

4.7.5.12 Weak User authentication

Passwords are used as a mechanism for user identification, authentication and non-repudiation. It was noticed that APSPDCL neither has password policy approved by competent authority nor has it imposed restrictions on password usage by users/ administrators. Therefore, there was a risk of unauthorized access and data modification that could not be traced. Further, there is no option in APSPDCL to change the password allotted to a user, thus forcing the user to use perpetually same password allotted by the administrator. In the event of a violation of security policy under a user ID, it would be difficult to fix responsibility. The same could have been avoided by requiring the user to change his password compulsorily, after logging in for the first time.

Management/ Government replied (December 2013) that password policy would be framed and enforced and password change option would be provided to users.

4.7.5.13 Lack of Confidentiality - Usage of single User ID by more than one person

It was noticed in APSPDCL that user IDs allotted to Senior Accounts Officers of Circles are being shared by section staff of the Circle concerned for various activities like feeding of meter readings, generation of bills etc. Sharing of privileges and perpetuation of same passwords increases the risk of unauthorised change and would lead to difficulty in locating it.

Management/ Government replied (December 2013) that additional user IDs are being created for miscellaneous transactions.

SOD violations

4.7.5.14 Lack of segregation of duties between Database Administrator and System Administrator

A clear Segregation of Duties (SoD) between a **Database administrator (DBA) and System administrator** is very important. Further, activities of these users must be logged and the log files must be preserved permanently to ensure confidentiality, integrity and availability of database. However, it was noticed that both responsibilities of System Administrator and DBA are being performed by a single official along with access to the Oracle super-user 'SYS' thus giving complete access to the Database from back-end. This coupled with non-maintenance of logs and audit trail rendered the system vulnerable to unauthorized changes.

Management/ Government replied (December 2013) that the guidelines would be followed during the development of the new system.

Security Controls

Proper security controls are necessary to minimise security risks relating to IT Assets.

4.7.5.15 Network Security Issues

APSPDCL is still using TELNET protocol to connect to the server, which is not a secure protocol, thus providing scope for interception of the data including passwords.

Management/ Government replied (December 2013) that SSH protocol would be adopted by using open source terminal emulator application (PuTTY client).

4.7.5.16 Open ports-Risk of susceptibility to malware

$ VFDQQHU/ $ 1 R[$ 363' &/ XVLQJ DVRIWZDUH≥) UHH,3 VFDQQHU HYDOG that vulnerable ports were open on the computers connected to the network, exposing the system to attacks of malware like viruses and worms and intrusion by hackers. These vulnerabilities coupled with unencrypted transfer of data by TELNET protocol exposed the entire system and data residing in the server at risk.

Management/ Government replied (December 2013) that action would be taken to close/ hide all unused ports both on end user systems and server, based on the recommendations of the IT Security consultants of APSPDCL.

4.7.5.17 Improper configuration of Access Control List

It was noticed that APSPDCL instead of configuring an Access Control List (ACL) of its Router and Firewall to restrict access to the server to the IP addresses allotted to the authorised users, had allowed access from any of the IP addresses on their Local Area Network (LAN). This coupled with unencrypted data transfer of the TELNET protocol, makes the system vulnerable to unauthorized access.

Management/ Government replied (December 2013) that ACL was modified to permit access to only circle level users. It was also replied that SSH protocol was adopted in place of TELNET.

Application Controls

Application controls ensure that input data is valid (input controls/ validation checks) and data is processed correctly (processing controls), calculations are accurate; process errors are logged and corrected in timely manner; and that sufficient audit trails were in place.

Non Mapping of Business rules

4.7.5.18 Failure to compare kWh and kVAh readings to ensure application of business rules

APSPDCL started billing its HT Consumers (3533 nos.) on kVAh basis since 2011-12. As per the norms, kVAh[82] consumption should not be less than

[82]Kilo Volt Ampere Hour. Kwh = kVAh * PF. kVAh and kWh are equal when Power Factor =1. As PF reduces, consumption in kWh units also reduce thus resulting in lower realization to DISCOMs. Under kVAh tariff, DISCOMs get full amount irrespective of PF. The burden will be on the consumer to improve PF at his premises. kVAh represents the amount of power supplied while kWh represents the amount of power actually used by the Consumer.

kWh[83]consumption. An analysis of the data dump for the month of October 2012 revealed that the kWh consumption was more than the kVAh consumption in case of 676 records of 476 HT consumers during the period from May 2011 to August 2012 indicating lack of proper input controls/ validation checks. Failure of the system to ensure that the kWh readings are not more than kVAh readings resulted in short billing of ` 35.32 crore.

Management/ Government replied (December 2013) that consumption data of above cases is referred to field for verification and correction. Action will be initiated once the verification is completed.

4.7.5.19 Incorrect levy of low Power Factor surcharge

APERC provided for levy of low Power Factor (LPF) surcharge for consumers with PF less than 0.95 so as to ensure that the PF does not fall below threshold level. However, this rule was found to be incorrectly mapped leading to instances of wrong levy of LPF surcharge.

LPF surcharge of ` 0.53 lakh during the period 2009-10 and 2010-11 was short-levied by APEPDCL due to such mapping of rule.

Management/ Government replied (December 2013) that the shortfall will be collected from the consumers

4.7.5.20 Short levy of LPF surcharge

As per the provisions of tariff order 2008-09, LPF surcharge had to be levied on the actual energy consumed or on the minimum energy billed for that month, whichever is higher. However, failure to levy LPF surcharge on minimum billed energy in cases where actual energy consumed is less than the minimum energy billed, had resulted in short levy of ` 77.62 lakh in APEPDCL.

Management/ Government replied (December 2013) that the billing was carried out as per the clarification issued (15 November 1999) by APTRANSCO. However clarification was issued prior to APERC tariff order. The billing should have been carried out as per the tariff order.

4.7.5.21 Failure to levy LPF Surcharge and Customer Charges on RESCO consumer

APSPDCL started billing its HT Consumers on kVAh basis since 2011-12. However, RESCOs were continued to be billed under Kwh basis for which low power factor (LPF) surcharge was applicable. LPF surcharge was not levied on RESCO, Kuppam in APSPDCL as per the Tariff Order resulting in shortfall of ` 36.42 lakh for the period from December 2011 to February 2013.

Though RESCOs were classified as Consumers under a new HT Category ± VIII from the year 2012-13, the customer charges were not levied on RESCO, Kuppam resulting in a shortfall of ` 0.14 lakh for the period April 2012 to March 2013. This indicated incorrect mapping of categories for levy of customer charges in the system.

[83]Kilo Watt Hour.

Management/ Government replied (December 2013) that the demand has been raised for the shortfall.

4.7.5.22 Non adherence to APERC provisions in HT Billing system in APSPDCL

As per Regulation 5 of 2004 of APERC, Payments received from consumers have to be adjusted in order of priority of previous year arrears, Current year arrears, Current month bill respectively. In APSPDCL payments made by the consumers are not being adjusted in the order of priority.

Management/ Government replied (December 2013) that action is being taken to incorporate the same in new software being developed.

4.7.5.23 Incorrect billing of Ferro Alloy consumers

Tariff Order for the year 2009-10 stipulated that in the event of non-segregation of lights and fan loads in the factory premises by a HT category I (B) consumer i.e. Ferro Alloy Units, 15 *per cent* of the total energy consumption shall be billed at 440 paise per unit and the balance units shall be charged at the corresponding energy tariff under HT Category I (A). However, in two cases, the balance units were not billed at HT ± IA category resulting in short billing of ` 20.17 lakh.

Management/ Government replied (December 2013) that demand has been raised for shortfall for the balance units.

4.7.5.24 Deficiencies in the criteria for computing LF Incentive

The DISCOMs, with the approval of APERC, introduced a scheme (2001-02) of allowing incentive (discount on tariff) for HT-I (A) consumers with Load Factor (LF) above a stipulated threshold limit which was 50 *per cent* for the tariff years 2006-07 to 2009-10. The incentive scheme was withdrawn from the tariff year 2010-11.

An analysis of incentives allowed to consumers during the period from April 2008 to March 2010 revealed the following discrepancies:

A scrutiny of database, in APSPDCL, revealed that contrary to the scheme, incentive amounting to ` 4.77 lakh (August 2010) was allowed to one consumer other than HT Category I-A, who was otherwise not eligible for such incentives.

Management/ Government replied (December 2013) that the incentive allowed to ineligible consumers will be recovered.

In APSPDCL, it was noticed that there were 2 cases from April 2008 to March 2010 where incentives amounting to ` 0.91 lakh were allowed to consumers even though their LF was lesser than the threshold limit of 50 *per cent* (applicable during the period).

Management/ Government replied (December 2013) that the audit comment is accepted and action will be initiated after detailed study.

4.7.5.25 Failure to segregate Aviation and Non-Aviation loads

As per the provisions of Tariff Order for the year 2012-13, in case of non-segregation of airport loads into aviation and non-aviation related activities by the end of July 2012, entire load shall be billed under HT Category II (others) from 01 August 2012 till date of such segregation. It was noted that changes were not made to map this business rule in the application that had impact on revenue / billing.

Two service connections catering to airport loads were under APSPDCL. In one case though segregation was not done, energy was not billed under HT category II while in another case, though segregation was done, non-aviation loads were billed under LT category IB instead of HT category II resulting in a total short billing of ` 4.79 lakh. These indicate lack of implementation of business rules/ provisions of tariff orders in the HT billing software.

Management / Government replied (December 2013) that a demand of ` 3.44 lakh was raised towards shortfall on the ground of non-segregation.

Processing Controls

Lack of Functionalities

It was observed that certain components of HT billing were excluded from the HT billing application due to which manual operations were depended upon.

4.7.5.26 Lack of functionality to raise demand for excess drawing of energy by RESCOs

No subsidy is available for the power drawn by the RESCOs, in excess of the quantum approved by the APERC. The DISCOMs would bear the loss of revenue, if any, for the excess quantum of power drawn. Thus, to protect its financial interests, APSPDCL has to watch the drawal of power by the RESCO and address RESCO if it was likely to exceed the allotted quantum. Any excess drawal beyond that quota should be billed at a rate derived from 5(6&2∂ VDG\WRQDOVDOHVZHJKWHGDYHUDJHUHYHQXHUDOVRQ

In this context, it was observed that:

- The system did not generate any warning or prompt even though RESCO had exceeded its quota by 26.43 MU during the tariff years 2008-09 to 2011-12; and
- The software also does not provide for billing the excess power drawn at an enhanced rate as per the methodology approved by APERC.

Management / Government replied (December 2013) that the functionality will be included in the new billing software being developed.

4.7.5.27 Lack of functionality resulting in manual intervention

Audit noticed that certain HT billing components were excluded from the software necessitating manual calculations/ interference, thereby affecting the

integrity of the system and completeness of the database as detailed below:

Component excluded	Reply
In APSPDCL, temporary HT service connections are being billed manually till they are regularised and not routed through the HT billing application resulting in lack of completeness of the database.	The management of both companies stated (April 2013 & June 2013) that action would be taken to include the said functionality in the proposed new software.
In case of APEPDCL, billing of temporary HT connections is being carried out through the system. However, users cannot differentiate between a temporary service and a regular service as there is neither an indication on the bill nor reports generated due to which billing of a temporary connection at normal tariff cannot be identified, thus making the system vulnerable to fraud.	
The HT billing system in APSPDCL does not provide for billing of HT services on proportionate basis where the number of days to be billed is less than a complete month. **Bills for new consumers for the first month from the date of supply are being prepared manually or incorrectly prepared through the HT billing system. In one case an excess demand of ` 4.25 lakh was raised.**	The system is not configured to issue demand for a part of month and that action would be taken to include the said functionalities in the proposed new software.
APSPDCL did not automate the process of calculation of banking charges of banked energy[84] but is doing it manually.	Will be incorporated in the new HT billing software being developed.
APSPDCL did not provide any functionality in the HT billing system to pursue the receipt of the SD demanded and to automatically levy surcharge in the event of default. **This resulted in dependence on manual calculations thereby leading to non-adherence to the instructions in vogue, undue favour to the consumers, postponement of surcharge of ` 84.65 lakh for the year 2012-13 and an incomplete database.**	Will be incorporated in the new HT billing software being developed.
Non-provision of functionality to generate demand for minimum agreement period in spite of disconnection led to belated raising of demand of ` 51.63 lakh (March 2013) for the period from March 2012 to March 2013, resulting in loss of interest of ` 4.65 lakh	Will be incorporated in the new HT billing software being developed.

Further, the following functionalities/ features are not provided in the HT billing systems of both the DISCOMs:

- provision for billing of malpractice or theft cases;
- provision to capture billing data pertaining to short-billed units, change in CMD etc. As a result, data generated for calculation of Fuel Surcharge Adjustment (FSA) and Additional Consumption Deposit is incomplete;
- provision for maintaining consumer history i.e., changes in load, contracted demand, multiplying factor, meter changes etc.

The above changes are being recorded by way of posting a Rectification Journal Entry (RJ) due to lack of required functionality. The revised billing particulars are not incorporated in the original data/tables. The database

[84]Banking means keeping in reserve, the delivered energy supplied to the Company by a scheduled generator, in any billing month(s), in excess of the energy required to be wheeled by the Company to the scheduled consumers in that month, with the purpose of wheeling such excess energy in any succeeding month(s) to the scheduled consumers.

continues to depict the old and incorrect data and do not show the revised billing particulars. In the absence of non incorporation of changes in the database, the reports generated will be incorrect and the database continues to carry the incorrect data.

Management/ Government replied (December 2013) that manual mode is used for calculations, which are then fed into the system to prepare a complete bill to the consumer and that action would be taken to incorporate above features in the proposed software.

As manual processing results in lesser transparency and may lead to errors, action should be taken to automate the above processes in the billing system covering all HT services of APSPDCL.

Manual Interventions

Audit observed that the data processed through the applications are being modified manually thereby affecting the integrity of database as observed below:

4.7.5.28 Manual withdrawal of DPS

Delayed Payment Surcharge (DPS) of ` 2.02 crore on a consumer of Tirupati Circle of APSPDCL, for the period from April 2010 to February 2013, though correctly levied by the system, was subsequently withdrawn from the billing application every month at Circle with the approval of Corporate office. As against this, an amount of ` 44.20 lakh was raised subsequently (November 2011) leaving balance of ` 1.58 crore (February 2013).

Management/ Government replied (December 2013) that the notice to the consumer had been issued for payment of surcharge due.

4.7.5.29 Lack of restrictions on manual entry of data

Though users of the RAS were authorised to enter metering data manually, restrictions on usage of the same continuously for several months for a consumer were not built-in in the system leading to leakage of revenue as illustrated in case of a Ferro Alloys consumer of APEPDCL where the lights and fans meter was malfunctioning for more than five years. However, the system allowed feeding of average meter reading of 446000 units per month for the above period in spite of instructions in GTCS to recalibrate the HT meters once a year.

Management/ Government replied (December 2013) that defective meter was replaced on 20 May 2013.

Conclusion

- Lack of interface between the billing systems and SAP ERP led to duplication of work in both DISCOMs;
- APEPDCL did not ensure the implementation of provisions of the agreement with the software provider;

- Both DISCOMs have neither adequate backup policy nor a disaster recovery plan;
- The billing systems had poor general information technology controls especially regarding the security features such as access controls, network protocol, passwords and audit trails etc. Thus the system was vulnerable to unauthorised access and data manipulation;
- Excess rights to the administrators and lack of segregation of duties exposed the system of APSPDCL to unauthorised data manipulation;
- The application of APSPDCL contained various design deficiencies and a number of billing components were not automated but continued manually leading to incomplete and inaccurate database;
- The application of APSPDCL lacked input controls resulting in inconsistent and meaningless data residing in the database affecting the quality of master data;
- Some business rules framed by APERC were either not incorporated or improperly incorporated into the billing applications of both DISCOMs. This led to incorrect billing of the consumers, especially in cases of changes in the consumer parameters leading to financial loss to the Company.

Recommendations

DISCOMs should

- ***Formulate and document an information technology and backup policy;***
- ***Document all amendments made to the software and bring all aspects of HT billing into the application;***
- ***Maintain activity logs and audit trails;***
- ***Address the security vulnerabilities and implement access controls keeping in view "Segregation of Duties" requirements;***
- ***Formulate and implement a comprehensive Business Continuity Plan.***

STATUTORY CORPORATION

Andhra Pradesh State Road Transport Corporation

4.8 Commuter Amenity Centers/ Bus Terminal Complexes constructed under JnNURM Scheme

4.8.1 Introduction

Government of India (GoI), Ministry of Urban Development (MoUD) launched Jawaharlal Nehru National Urban Renewal Mission (JnNURM) scheme, in December 2005 for planned development of urban infrastructure, which includes Urban transport projects in the mission cities. Hyderabad, Visakhapatnam and Vijayawada cities in Andhra Pradesh qualify for financial assistance under JnNURM. Andhra Pradesh State Road Transport Corporation (Corporation) initially formulated proposal for Hyderabad city.