

Final Report

Project on
Energy Auditing, Management And Efficiency
At
CWA Pumping Stations

Phase I: Desktop Study

Research Assistants: **Mr. D. Gungabison & Mr. G.R. Pudaruth**

Research Supervisor: **Mr. R.T.F. Ah King**

January 2005

Table of Contents

Acknowledgement	iii
Summary	iv
Introduction	1
Statement of Objectives	2
Methods Employed	2
Impact of Project	3
Project Justification	3
Project Description	4
Phase 1: Methodology	5
Analysis I:	7
Electrical Cost of Production of water per cubic meter	
Analysis II:	11
Detailed Analysis of the Electrical Cost of Production of water per cubic meter for all pumping stations	
Table 2.1: Actual v/s Average Production Cost	11
Table 2.2: Production Cost Year 2001	13
Table 2.3: Production Cost Year 2002	15
Table 2.4: Production Cost Year 2003	17
Analysis III:	19
Classification of the Average Production Cost	
Table 3.1: Production Range	19
Chart 3.1: Production Range - North	19
Chart 3.2: Production Range - South	20
Chart 3.3: Production Range – North & South	20
Analysis IV:	21
General Observation and Comments	
Analysis V:	23
Individual Analysis of sites with comparatively high production cost.	
Analysis A: Baie du Cap (Choisy) 776	23
Analysis B: Camp Fouquereaux (St Antoine) 727	25
Analysis C: Chamarel 796	26
Analysis D: Palmyre 827	27
Analysis E: Balaclava	28
Analysis F: Belle Rose Clemencia	29

Quantification of Energy Wastage*Energy wastage due to excess KVA and Demand KVA Charges**Energy wastage due to inappropriate CEB tariff**Energy wastage due to oversized pumpsets*

Table 6.1: Amount Paid for excess KVA and Demand KVA	30
Table 6.2: Estimated Energy Saving by Tariff Change	31
Table 6.3: Estimation of Energy wastage due to oversized pumpsets	33
Summary of Energy Wastage	33
Conclusion/Recommendation	34

Appendix A: CEB Tariffs**Appendix B:** Electricity bills from CEB for Chamarel 796 pumping station**Appendix C:** Electricity bills from CEB for Baie du Cap (Choisy) 776 BH**Appendix D:** Excess KVA Charges as extracted from CEB Bills**Appendix E:** Estimated Savings in KVA Demand Charges**Appendix F:** Electricity bills from CEB for Northern pumping stations Year 2001**Appendix G:** Electricity bills from CEB for Northern pumping stations Year 2002**Appendix H:** Electricity bills from CEB for Northern pumping stations Year 2003**Appendix I:** Electricity bills from CEB for Southern pumping stations Year 2001**Appendix J:** Electricity bills from CEB for Southern pumping stations Year 2002**Appendix K:** Electricity bills from CEB for Southern pumping stations Year 2003**Appendix L:** Borehole and Pump Information (North & South) Year 2001-2003

Acknowledgements

First, I would like to thank all the Organisations, which have shown interest and collaborated directly or indirectly in this project for the CWA namely the Ministry of Public Utilities (MPU), the Central Electricity Board (CEB), the Water Resources Unit (WRU), the University of Mauritius (UoM) and the Mauritius Research Council (MRC) for accepting to finance Phase 1 of this Project.

I also wish to thank all the committee members who have volunteered to provide assistance in case of need.

My especial thanks go to Mr D. Gungadeen of CWA & Mrs Ramjeawon of MRC who acted as facilitators, Mr P. Sookram for defining the different phases of this project with distinct objectives at the CWA and Mr Y. Hurdowar of the CEB for promptly providing billing data at request.

I am grateful to Mr G.R. Pudaruth, ex- Research Assistant in this project for his timely acquisition of all relevant data and presenting of an initial report.

Last but not least, I hereby express my sincere sense of gratitude to my Research Supervisor, Mr. R.T.F Ah King, Lecturer at the UoM, for his guidance and supervision in this project work.

Devendra Gungabison

January 2005

Summary

This project on ‘Energy Auditing, Management and Efficiency at CWA Pumping Stations’ has been put forward in order to identify energy conservation opportunities aiming to have an optimised pumping system. It is divided into four distinct phases. Phase 1 includes gathering of data for computing the production cost at borehole pumping stations and estimate the energy wastage from a desktop study.

The average production cost was based on years 2001, 2002 and 2003. The production figure amounts to approximately Rs 0.65 / m³ of water. The average production cost for southern pumping stations is Rs 0.55 / m³ compared to Rs 0.78 / m³ for northern pumping stations. 84% of all borehole-pumping stations have a production figure lying between Rs 0.25 and Rs 1.25

The energy wastage as per this report amounts to Rs 3.6 million / year approximately, representing about 6% of the average annual electricity charges for borehole pumping stations of around Rs 60 million. Phase 2 of this project i.e calculation of the hydraulic capacity of pumps shall provide a much better approximation as to how much energy can be saved and it is projected to be around 10%.

Introduction

Energy audits play an important role in identifying energy conservation opportunities in the industrial and domestic sector. While they do not provide the final answer to the problem, they do help to identify the existing potential for energy conservation, and induces the companies to concentrate their efforts in this area in a focused manner.

This research study has been produced as the first phase of the research project aiming to develop a strategy for having a highly efficient and cost effective pumping system. Phase 1 aim at carrying out an audit of the pumping stations of the Central Water Authority. The research project has as objective a thorough investigation and auditing of the energy consumption at all operational borehole pumping stations. The proposed project is aimed at monitoring the cost of electricity consumption at all pumping sites over the island and to seek probable causes for variations, if any, in these values.

The Central Water Authority (CWA) is the sole supplier of potable water in Mauritius. It operates more than 115 Pumping Stations and 6 treatment plants. It has more than 300,000 registered domestic and industrial customers.

Statement of Objectives

The objectives are:

- To review the pump hydraulic characteristics and electrical ratings of all operational pumps and verify that they match the operational requirements.
- To submit proposals for a better energy management strategy and derive maximum efficiency of all installed M&E equipment.
- To design an optimal and highly efficient pumping system covering the whole island.
- To seek causes and propose remedial actions for optimization of the energy cost per meter cube of water being pumped at all pumping sites.

Methods employed

This project will involve energy auditing, analysis and recommendations in view of improving the energy efficiency of pumping plants within the CWA.

The methodology adopted has been to include the compilation of the actual site data.

These include the complete auditing of:

- All operational borehole characteristics with emphasis on the safe pumping yield data and the actual pumping rates during both the normal and dry seasons.
- The installed and operational equipment with due consideration to hydraulic and electric ratings, age and average cost of maintenance on an annual basis.
- The CEB tariff being used for billing purposes.
- The installation of any energy cost reduction equipment such as power factor correctors, motor starters and associated equipment.
- The pumping hours with an aim of an efficient and undisrupted water distribution system.

Impact of Project

Upon completion, this project shall produce a highly efficient and cost effective pumping system all over the island, which shall lead to the reduction of the associated energy costs as well as maintenance costs.

Project Justification

The annual electricity bill for the entire CWA averages to more than Rs 80 million. In year 2003 it was more than Rs 88 million, out of which 98% is for water production. The cost of water extraction from boreholes averages to more than Rs 60 million per year.

Considering that the CWA is a non-profit making undertaker and the sole operator for the provision of potable water in Mauritius, potential savings in the energy costs resulting from better energy efficiency shall benefit both the CWA and the end users at national level.

This project shall involve the survey of the electrical load data at each pumping site with an aim of optimizing the total connected load such that the efficiency of the pumping system is improved.

The aspects for considerations of above, shall involve the means for energy savings and the review of the design of certain M&E equipment with due considerations to cabling works, controls, energy saving devices etc.

Project Description

The project has four distinct phases, with each phase having the distinct objectives as follows:

Phase 1: Desktop Study

- i). To carry out site auditing on existing pump data
- ii). To compile the annual energy costs and water production at each pumping site
- iii). To compile the electrical production cost in terms of Rs/m³
- iv). To investigate the probable causes for poor pumping performance at certain sites

Phase 2: Design Data

- i). To calculate the hydraulic duty point for pumps at each site with respect to borehole and distribution network characteristics.
- ii). To compare installed pump data with respect to design data

Phase 4: Implementation Strategy

- i). To carry out a re-shuffling of existing equipment to increase the energy efficiency
- ii). To devise an equipment renewal strategy as and where applicable
- iii). To compute the payback period of each installed equipment with due consideration to the running costs and efficiency
- iv). To prepare an implementation programme of works for a maximum period of 3 years.

Phase 1: Methodology

In the course of the research work, it should be said that information about the boreholes were mostly acquired at the Central Water Authority (CWA) Headquarters at St. Paul, Phoenix. Data about the respective boreholes and their code name were obtained from the ‘Borehole and Pump Information’ document at St. Paul.

Data concerning borehole diameter, casing diameter, borehole depth, tested original yield, originally tested static water level (SWL) and dynamic water level (DWL) as well as the relative ground level from sea level had been established by the Water Resources Unit (WRU). These data were made available again through the above-mentioned ‘Borehole and Pump Information’ document.

Information about the CEB account numbers of each pumping station were obtained from the finance section at CWA St. Paul, by looking up the electricity bills for each pumping station. Any confusion was cleared by looking at the declared load and in some cases, the associated account numbers were linked with their respective stations by asking for the particular data to the CEB branches concerned.

In order to obtain the information about the particular pumping stations, it was necessary to dig into the files and Inspection and Condition Monitoring (ICM) sheets at both Pailles water treatment station (Northern boreholes) and at Holyrood (Southern boreholes). Hence, the distribution system associated with each borehole was obtained from the technical officers. The recorded dynamic water level (DWL) variation was obtained by browsing the ICM sheets for all three years. The annual flow in m^3 for each pumping station was calculated based upon the meter readings

Energy Auditing, Management and Efficiency at CWA Pumping Stations – Phase I

recorded in the files archives, and estimated in the case where the meter reading was not accessible, from the number of hours run and its usual flow. Also the data concerning the pump history of each station as installed and up-to-date, as well as each pump's capacity for all three years were obtained by browsing through the file history of each pumping station at Pailles and Holyrood. Note was also made of stations operating on timer, and flow calculated accordingly to the hours run by these particular stations.

Before compiling the report, it was necessary to once again determine and confirm each account number in respect with its associated pumping station, contact the Central Electricity Board for the monthly electricity bills. This was followed by the compilation of monthly charges for energy consumption in kWh, the demand charges and excess kVA charges and annual charges for each and every CWA Pumping Stations in the North and South. From the data obtained, the database was built up on Microsoft Excel and hence, the electrical cost of production per cubic meter of water for each pumping station was determined.

Analysis I

Electrical Cost of Production of water per cubic meter for years 2001, 2002 and 2003

Analysis I involved calculation of the actual and average production cost of water in Rs/m³ for years 2001, 2002 and 2003. Data related to the total volume of water pumped and the total electricity bill was compiled for all pumping stations and presented at Analysis II. The actual and the average production cost as calculated are given below.

Considering all active CWA Pumping Stations:

$$\text{Total Flow for all 3 years} = 280,497,247 \text{ m}^3$$

$$\text{Total Electrical Cost for 3 years} = \text{Rs } 180,969,916.3$$

Average Electrical Cost of Production of water for years 2001, 2002 and 2003

$$= \underline{\text{Rs } 0.6451 / \text{m}^3}$$

$$\approx \underline{\text{Rs } 0.65 / \text{m}^3}$$

$$\text{Annual Average Production Cost of Water} = \underline{\text{Rs } 0.6455 / \text{m}^3}$$

$$\approx \underline{\text{Rs } 0.65 / \text{m}^3}$$

Considering CWA Pumping Stations in the North only:

Total Flow for all 3 years = 114,100,904 m³

Total Electrical Cost for 3 years = Rs 88,682,639.30

Average Electrical Cost of Production of water for years 2001, 2002 and 2003

= Rs 0.7772 / m³

≈ Rs 0.78 / m³

Annual Average Production Cost of water = Rs 0.7781 / m³

≈ Rs 0.78 / m³

Considering CWA Pumping Stations in the South only:

Total Flow for all 3 years = 166,396,343 m³

Total Electrical Cost for 3 years = Rs 92,287,277

Average Electrical Cost of Production of water for years 2001, 2002 and 2003

= Rs 0.5546 / m³

≈ Rs 0.55 / m³

Annual Average Production Cost of water = Rs 0.5552 / m³

≈ Rs 0.55 /m³

Energy Auditing, Management and Efficiency at CWA Pumping Stations – Phase I

Electrical Cost of Production of water per cubic meter for years 2001, 2002 and 2003.

Table 1.1: Summary Table

Year	North			South			North&South		
	Total Electricity Cost (Rs)	Annual Flow (m ³)	Electrical Cost of Production (Rs/m ³)	Total Electricity Cost (Rs)	Annual Flow (m ³)	Electrical Cost of Production (Rs/m ³)	Total Electricity Cost (Rs)	Annual Flow (m ³)	Electrical Cost of Production (Rs/m ³)
2001	31,167,777.30	40,911,705	0.76	28,816,406.00	50,560,814	0.57	59,984,183.30	91,472,519	0.66
2002	29,051,863.00	35,958,382	0.81	30,172,102.00	55,169,571	0.55	59,223,965.00	91,127,953	0.65
2003	28,462,999.00	37,230,817	0.76	33,298,769.00	60,665,958	0.55	61,761,768.00	97,896,775	0.63
All 3 years	88,682,639.30	114,100,904	0.78	92,287,277	166,396,343	0.55	180,969,916.30	280,497,247	0.65

Analysis – Northern Pumping Stations

Electrical Cost of Production of water per cubic meter for year 2001 = Rs 0.76 / m³.

Electrical Cost of Production of water per cubic meter for year 2002 = Rs 0.81 / m³.

Electrical Cost of Production of water per cubic meter for year 2003 = Rs 0.76 / m³.

Analysis – Southern Pumping Stations

Electrical Cost of Production of water per cubic meter for year 2001 = Rs 0.57 / m³.

Electrical Cost of Production of water per cubic meter for year 2002 = Rs 0.55 / m³.

Electrical Cost of Production of water per cubic meter for year 2003 = Rs 0.55 / m³.

Analysis – Northern and Southern Pumping Stations

Electrical Cost of Production of water per cubic meter for year 2001 = Rs 0.66 / m³.

Electrical Cost of Production of water per cubic meter for year 2002 = Rs 0.65 / m³.

Electrical Cost of Production of water per cubic meter for year 2003 = Rs 0.63 / m³.

Analysis II

Detailed Analysis of the Production Cost for each Pumping Station

Table 2.1: Average v/s Annual Average Production Cost for each Pumping Station

S.N	CWA Pumping Station	Account Number	Total Volume Pumped in 3 Years (m ³)	Total Energy Cost for 3 years (Rs)	Actual Production Cost for 3 years (Rs/m ³)	Average Production Cost / Year (Rs/m ³)	Remarks
1	B. Vue Mauricia	6C1527	1,905,102	1,439,153	0.76	0.77	
2	B.Rose Clemencia	4C2896	4,887,352	7,517,940	1.54	1.58	
3	Baie du Cap (Choisy) New	6020000073 (3) Tariff 315	135,384	350,754	2.59	2.61	
4	Balaclava	6C6107	195,024	265,653	1.36	2.91	
5	Bambou (Eau Bonne)	3C4041	3,856,559	4,957,057	1.29	1.30	
6	Bananes	5C6764	2,327,040	979,735	0.42	0.42	
7	Barkly (BH) /SP	3C5878 / 3C3223	5,683,632	5,428,121	0.96	0.95	
8	Bassin 432	7C3894	8,387,880	4,573,788	0.55	1.21	
9	Bassin 435/717	7C3798	8,010,738	4,807,075	0.60	0.65	
10	Bassin Loulou (Robinson)	6C6108	175,998	232,726	1.32	1.32	2 yrs
11	Beard	4C6761	7,423,724	4,696,675	0.63	0.63	
12	Beau Bois b.h	3C7476	565,548	N/A	N/A	N/A	
13	Beau Bois New	3C7872	N/A	N/A	N/A	N/A	
14	Beau Plateau	2C7103	1,713,574	1,826,436	1.07	1.07	
15	Beau Songes	7C7212	3,349,661	3,672,373	1.10	1.10	
16	Bel Etang	4C4910	879,450	705,590	0.80	0.89	
17	Bois Mangues (Old P.de Papayes)	6C1528	2,129,521	1,239,251	0.58	0.62	
18	Bonne Mere	2C3357	7,562,840	4,076,628	0.54	0.54	
19	Bonne Veine	6C5410	3,024,908	1,490,566	0.49	0.50	
20	Cafe	5C6275	1,457,380	882,062	0.61	0.61	
21	Calebasses	6C2997	577,607	658,086	1.14	1.00	2yrs
22	Camp Fouquereaux (new)	4C7355	640,450	1,010,201	1.58	1.61	
23	Camp Fouquereaux old	7C4923	269,597	174,687	0.65	0.65	
24	Camp Ithier	2C7848	1,374,523	1,523,688	1.11	1.12	
25	Camp La Boue	6C6109	2,355,487	398,735	0.17	0.23	
26	Camp Thorel	6C7201	3,826,699	5,139,459	1.34	1.35	
27	Caroline	2C1937	11,746,972	6,197,758	0.53	0.54	
28	Chamarel	7090003261 (5) Tariff 215	104,880	299,216	2.85	2.85	1yr
29	Clairfonds	4C1520	6,493,425	1,790,515	0.28	0.28	
30	Cluny	5C3152	26,648,640	13,871,132	0.52	0.52	
31	Constance	2C4420	10,534,806	5,522,464	0.52	0.54	
32	Cottage (New)	2C6371	1,795,254	1,494,712	0.83	0.83	
33	Cottage- Poonith	2C4693	1,928,446	1,680,299	0.87	0.95	
34	Ebene	7C4864	3,021,096	765,073	0.25	0.26	
35	F. Du Sac- Choisy	6C2562	4,080,801	4,173,312	1.02	1.04	
36	F. Du Sac- Forbach	6C7464	5,398,585	4,152,536	0.77	0.77	
37	Gebert	5C5964	3,039,984	2,470,415	0.81	0.86	
38	Haute Rive	2C2854	1,502,699	1,193,155	0.79	0.80	
39	Highlands	7C3694	2,082,384	930,072	0.45	0.45	
40	Holyrood	7C1530	17,371,048	7,794,368	0.45	0.45	
41	La Clemence	2C6258	604,632	623,585	1.03	1.01	
42	La Louisa	6C7117	4,370,803	2,914,504	0.67	0.65	
43	Labourdonnais	2C5741	688,146	846,805	1.23	1.24	
44	Laventure	2C6091	355,560	435,893	1.23	1.34	
45	Le Bosquet	3C6475	180,465	132,706	0.74	0.81	2yrs
46	M.D.M.T - Plaisance	5C6067	1,530,360	482,200	0.32	0.35	
47	Mapou	6C7196	886,141	1,059,750	1.20	1.25	
48	Melrose BH	6C6683	521,983	500,057	0.96	0.98	
49	Mon Loisir	2C6703	1,440,884	1,742,673	1.21	1.22	
50	Montee du Fil	4C3082	8,018,088	1,513,101	0.19	0.21	
51	MSA BH 117	6C3521	859,845	709,755	0.83	0.83	

Energy Auditing, Management and Efficiency at CWA Pumping Stations – Phase I

52	MSA BH 309	6C3523	353,310	279,784	0.79	1.03	
53	N. France (new)	5C6940	4,837,474	4,919,602	1.02	1.02	
54	P. Bon Espoir	2C7420	5,245,462	5,245,584	1.00	1.00	
55	P. D'Or (New)	2C7137	3,854,743	2,737,282	0.71	0.71	2yrs
56	P. D'Or No.1	2M0382	1,604,986	880,816	0.55	0.56	
57	P. D'Or No.2	2C4592	793,517	510,956	0.64	0.64	
58	P. D'Or No.3	2C2308	3,380,920	1,469,913	0.43	0.44	
59	P. D'Or No.4	2C4281	3,549,408	1,654,881	0.47	0.47	
60	Palma	7C1831	784,248	758,107	0.97	0.99	
61	Palmyre 419	7130001303 (6) (Tariff 315)	1,451,206	987,381	0.68	0.68	
62	Palmyre 26B	7C4198 (Tariff 315)	1,477,911	1,271,216	0.86	0.87	
63	Palmyre (new) BH827	7C7469 (Tariff 315)	1,035,185	2,006,545	1.94	1.94	
64	Petite Retraite	2C2849	6,505,756	5,508,498	0.85	0.85	
65	Petite Riviere	1C4072	563,165	560,539	1.00	1.07	
66	Pierrefonds	7C7172	2,847,967	2,498,866	0.88	0.92	
67	Pont Fer (petit camp)	7C1545	3,088,862	1,582,580	0.51	0.57	
68	Powder Mills	6C1556	665,060	307,657	0.46	0.48	
69	Riche Terre	6C4986	1,079,014	848,836	0.79	0.79	
70	Schoenfeld New	2C4322	3,216,350	2,084,597	0.65	0.67	
71	Solférino BH	7C6567	890,361	1,015,941	1.14	1.14	
72	Solférino Candos	7C1970	5,137,348	809,996	0.16	0.17	
73	Solférino Dookun	7C1529	7,190,211	2,372,639	0.33	0.33	
74	Solitude	6C7044	973,448	988,279	1.02	1.08	
75	St Jean	7C3626	1,015,200	719,830	0.71	0.71	
76	St Martin	3C5942	2,169,410	1,490,395	0.69	0.70	
77	St Paul	4C1120	3,747,360	953,651	0.25	0.28	
78	Telfair	3C3811	2,861,332	1,784,910	0.62	0.62	
79	Trianon	7C7418	5,338,538	3,092,264	0.58	0.58	
80	Trois Boutiques	5C3165	7,023,360	3,099,608	0.44	0.44	
81	Valentina (Lower Phoenix)	7C4896	2,211,840	592,611	0.27	0.27	1yr
82	Valentina (new)	7C7352	1,229,184	1,072,688	0.87	0.89	
83	Yemen	7C5296	4,081,766	3,054,162	0.75	0.76	
84	Yemen New	7C8312	1,215,216	1,661,715	1.37	1.27	2yrs

Table 2.2: Production Cost for each Pumping Station for Year 2001

S.N	CWA Pumping Station	Account Number	Total Volume Pumped (m ³)	Total Energy Consumption (Rs)	Production Cost (Rs/m ³)
1	Camp La Boue	6C6109	1,129,509	110,997	0.10
2	Ebene	7C4864	1,167,408	239,207	0.20
3	Solferino Candos	7C1970	1,141,348	303,976	0.27
4	Clairfonds	4C1520	1,739,400	529,875	0.30
5	St Paul	4C1120	883,200	283,746	0.32
6	Montee du Fil	4C3082	1,632,960	535,269	0.33
7	Solferino Dookun	7C1529	2,290,428	833,432	0.36
8	Powder Mills	6C1556	279,447	115,098	0.41
9	Bananes	5C6764	1,140,480	494,205	0.43
10	Caroline	2C1937	4,416,960	1,936,925	0.44
11	Highlands	7C3694	709,056	311,480	0.44
12	Bois Mangues (Old P.de Papayes)	6C1528	1,039,683	461,620	0.44
13	Telfair	3C3811	924,768	412,037	0.45
14	Trois Boutiques	5C3165	2,259,840	1,014,684	0.45
15	P. D'Or No.3	2C2308	977,348	448,925	0.46
16	Holyrood	7C1530	5,335,200	2,463,685	0.46
17	Bassin 432	7C3894	4,108,752	1,911,944	0.47
18	P. D'Or No.1	2M0382	659,474	317,983	0.48
19	Cluny	5C3152	9,110,880	4,576,706	0.50
20	P. D'Or No.4	2C4281	1,017,274	519,215	0.51
21	Bonne Veine	6C5410	1,012,172	542,616	0.54
22	Bonne Mere	2C3357	2,508,329	1,346,745	0.54
23	Trianon	7C7418	1,833,840	1,010,494	0.55
24	Schoenfeld New	2C4322	1,291,963	739,261	0.57
25	M.D.M.T - Plaisance	5C6067	333,720	191,771	0.57
26	Beard	4C6761	2,432,160	1,469,113	0.60
27	Café	5C6275	474,100	286,529	0.60
28	Constance	2C4420	2,968,085	1,831,089	0.62
29	Haute Rive	2C2854	555,038	342,982	0.62
30	MSA BH 309	6C3523	248,040	153,690	0.62
31	Palmyre 419	7130001303 (6) Tariff 315	458,784	290,093	0.63
32	B. Vue Mauricia	6C1527	763,707	491,716	0.64
33	Le Bosquet	3C6475	138,953	92,804	0.67
34	P. D'Or No.2	2C4592	252,665	170,794	0.68
35	St Jean	7C3626	347,328	235,734	0.68
36	Bel Etang	4C4910	461,933	321,170	0.70
37	P. D'Or (New)	2C7137	1,866,453	1,302,777	0.70
38	Bassin 435/717	7C3798	1,760,876	1,240,954	0.70
39	F. Du Sac- Forbach	6C7464	1,958,792	1,387,864	0.71
40	La Louisa	6C7117	1,690,138	1,202,623	0.71
41	Camp Fouquereaux old	7C4923	109,901	81,046	0.74
42	St Martin	3C5942	727,390	550,168	0.76
43	MSA BH 117	6C3521	294,595	229,043	0.78
44	Valentina (new)	7C7352	435,456	345,699	0.79

Energy Auditing, Management and Efficiency at CWA Pumping Stations – Phase I

45	Yemen	7C5296	1,227,901	975,539	0.79
46	Palma	7C1831	351,648	279,964	0.80
47	Barkly (BH)	3C5878	953,856	774,709	0.81
48	F. Du Sac- Choisy	6C2562	1,583,735	1,295,295	0.82
49	Palmyre 26B	7C4198 (Tariff 315)	497,664	411,578	0.83
50	Petite Retraite	2C2849	2,346,958	1,942,883	0.83
51	Riche Terre	6C4986	340,125	288,286	0.85
52	Petite Riviere	1C4072	233,164	202,127	0.87
53	Solitude	6C7044	431,082	379,476	0.88
54	Cottage (New)	2C6371	613,200	558,901	0.91
55	Camp Ithier	2C7848	526,502	485,661	0.92
56	Pont Fer (petit camp)	7C1545	727,960	678,514	0.93
57	Barkly (Swimming Pool)	3C3223	614,304	574,191	0.93
58	Nouvelle France new	5C6940	1,589,760	1,487,402	0.94
59	Melrose BH	6C6683	207,138	197,139	0.95
60	Beau Plateau	2C7103	572,981	551,969	0.96
61	Solferino BH	7C6567	300,090	289,504	0.96
62	Calebasses	6C2997	292,607	293,230	1.00
63	P. Bon Espoir	2C7420	1,667,306	1,671,788	1.00
64	Gebert	5C5964	725,760	744,244	1.03
65	Laventure	2C6091	176,187	188,313	1.07
66	La Clemence	2C6258	253,739	282,577	1.11
67	Labourdonnais	2C5741	264,195	295,599	1.12
68	Mapou	6C7196	343,957	385,160	1.12
69	Mon Loisir	2C6703	405,856	508,748	1.25
70	Pierrefonds	7C7172	734,993	934,357	1.27
71	Bassin Loulou (Robinson)	6C6108	100,441	134,314	1.34
72	Cottage- Poonith	2C4693	363,540	486,786	1.34
73	Balaclava	6C6107	106,600	143,130	1.34
74	Bambou (Eau Bonne)	3C4041	1,286,483	1,742,055	1.35
75	Beau Songs	7C7212	1,153,805	1,582,582	1.37
76	Camp Fouquereaux (new)	4C7355	251,794	354,153	1.41
77	Camp Thorel	6C7201	1,180,218	1,664,812	1.41
78	B.Rose Clemencia	4C2896	1,767,600	2,621,156	1.48
79	Palmyre (new) - BH827	7C7469 (Tariff 315)	341,760	774,080	2.26
80	Baie du Cap (Choisy) New	6020000073 (3) Tariff 315	49,777	126,178	2.53
81	Beau Bois b.h	3C7476	170,141	N/A.	-
82	Beau Bois New	3C7872	Operational in 2003		
83	Chamarel	7090003261 (5) Tariff 215	Operational in 2003		
84	Valentina (Lower Phoenix)	7C4896	N/A.	545,277	-
85	Yemen New	7C8312	Operational in 2002		

Table 2.3: Production Cost for each Pumping Station for Year 2002

S.N	CWA Pumping Station	Account Number	Total Volume Pumped (m ³)	Total Energy Consumption (Rs)	Production Cost (Rs/m ³)
1	Solferino Candos	7C1970	1,948,320	268,255	0.14
2	Camp La Boue	6C6109	884,865	146,423	0.17
3	Montee du Fil	4C3082	2,998,080	553,751	0.18
4	Clairfonds	4C1520	2,390,592	551,432	0.23
5	M.D.M.T - Plaisance	5C6067	656,640	152,068	0.23
6	Ebene	7C4864	984,442	271,403	0.28
7	Solferino Dookun	7C1529	2,485,113	773,559	0.31
8	St Paul	4C1120	959,040	333,505	0.35
9	Bonne Veine	6C5410	1,127,808	401,819	0.36
10	Bananes	5C6764	698,400	263,812	0.38
11	Highlands	7C3694	679,320	268,187	0.39
12	P. D'Or No.4	2C4281	1,332,364	566,965	0.43
13	Pont Fer (petit camp)	7C1545	1,123,462	480,768	0.43
14	Holyrood	7C1530	5,819,761	2,496,018	0.43
15	P. D'Or No.3	2C2308	1,222,450	524,490	0.43
16	Trois Boutiques	5C3165	2,263,680	1,051,005	0.46
17	Bassin 432	7C3894	4,195,440	1,996,317	0.48
18	Bonne Mere	2C3357	2,739,510	1,323,645	0.48
19	Cluny	5C3152	8,936,640	4,612,411	0.52
20	Camp Fouquereaux old	7C4923	94,176	49,493	0.53
21	Constance	2C4420	3,335,313	1,849,399	0.55
22	St Martin	3C5942	916,340	543,866	0.59
23	P. D'Or No.1	2M0382	516,476	307,905	0.60
24	Schoenfeld New	2C4322	1,101,740	665,272	0.60
25	Pierrefonds	7C7172	1,042,695	630,140	0.60
26	Trianon	7C7418	1,728,000	1,052,809	0.61
27	Powder Mills	6C1556	170,678	104,520	0.61
28	Café	5C6275	488,640	299,345	0.61
29	Caroline	2C1937	3,382,852	2,113,458	0.62
30	P. D'Or No.2	2C4592	268,228	173,099	0.65
31	Palmyre 419	7130001303 (6) Tariff 315	478,342	309,633	0.65
32	Beard	4C6761	2,531,520	1,655,128	0.65
33	Telfair	3C3811	1,023,604	684,455	0.67
34	Bois Mangues (Old P.de Papayes)	6C1528	559,366	396,236	0.71
35	St Jean	7C3626	332,640	240,225	0.72
36	Bassin 435/717	7C3798	1,931,040	1,438,729	0.75
37	Cottage- Poonith	2C4693	731,610	547,607	0.75
38	Riche Terre	6C4986	357,729	269,682	0.75
39	Palmyre 26B	7C4198 (Tariff 315)	529,396	399,862	0.76
40	Cottage (New)	2C6371	630,720	479,633	0.76
41	Valentina (new)	7C7352	459,648	375,685	0.82
42	Bel Etang	4C4910	287,469	235,458	0.82

Energy Auditing, Management and Efficiency at CWA Pumping Stations – Phase I

43	F. Du Sac- Forbach	6C7464	1,735,359	1,438,694	0.83
44	MSA BH 117	6C3521	285,250	240,446	0.84
45	Yemen	7C5296	1,243,945	1,067,827	0.86
46	Haute Rive	2C2854	483,227	416,619	0.86
47	La Louisa	6C7117	1,432,083	1,240,671	0.87
48	Palma	7C1831	195,000	170,556	0.87
49	Melrose BH	6C6683	207,138	182,457	0.88
50	Petite Retraite	2C2849	2,123,840	1,889,010	0.89
51	B. Vue Mauricia	6C1527	511,428	459,135	0.90
52	Barkly (Swimming Pool)	3C3223	623,520	591,958	0.95
53	Gebert	5C5964	904,464	859,682	0.95
54	Le Bosquet	3C6475	41,512	39,902	0.96
55	Barkly (BH)	3C5878	1,392,000	1,343,368	0.97
56	P. Bon Espoir	2C7420	1,737,205	1,697,481	0.98
57	Calebasses	6C2997	285,000	286,326	1.00
58	Nouvelle France new	5C6940	1,602,514	1,678,125	1.05
59	Solitude	6C7044	392,468	411,910	1.05
60	MSA BH 309	6C3523	66,270	71,639	1.08
61	Mapou	6C7196	348,215	376,690	1.08
62	La Clemence	2C6258	196,692	215,063	1.09
63	Beau Songes	7C7212	1,007,906	1,109,272	1.10
64	Yemen New	7C8312	226,800	251,544	1.11
65	Balaclava	6C6107	83,701	92,907	1.11
66	F. Du Sac- Choisy	6C2562	1,174,013	1,378,164	1.17
67	Solferino BH	7C6567	298,881	365,538	1.22
68	Mon Loisir	2C6703	440,572	543,570	1.23
69	Camp Ithier	2C7848	387,688	483,024	1.25
70	Beau Plateau	2C7103	548,404	703,275	1.28
71	Laventure	2C6091	135,249	174,799	1.29
72	Bassin Loulou (Robinson)	6C6108	75,557	98,412	1.30
73	Petite Riviere	1C4072	97,397	132,137	1.36
74	Camp Thorel	6C7201	1,206,582	1,719,960	1.43
75	Labourdonnais	2C5741	209,316	301,599	1.44
76	Bambou (Eau Bonne)	3C4041	1,198,791	1,782,144	1.49
77	Camp Fouquereaux (new)	4C7355	219,456	342,872	1.56
78	Palmyre (new) BH827	7C7469 (Tariff 315)	346,385	601,119	1.74
79	B.Rose Clemencia	4C2896	1,265,905	2,470,903	1.95
80	Baie du Cap (Choisy) New	6020000073 (3) Tariff 315	54,071	137,695	2.55
81	Chamarel	7090003261 (5) Tariff 215	Operational in 2003		
82	Valentina (Lower Phoenix)	7C4896	N/A	572,887	-
83	Beau Bois b.h	3C7476	75,921	N/A	-
84	Beau Bois New	3C7872	Operational in 2003		
85	P. D'Or (New)	2C7137	N/A	1421222.00	-

Table 2.4: Production Cost for each Pumping Station for Year 2003

S.N	CWA Pumping Station	Account Number	Total Volume Pumped (m ³)	Total Energy Consumption (Rs)	Production Cost (Rs/m ³)
1	Solferino Candos	7C1970	2,047,680	237,765	0.12
2	Montee du Fil	4C3082	3,387,048	424,081	0.13
3	St Paul	4C1120	1,905,120	336,400	0.18
4	M.D.M.T - Plaisance	5C6067	540,000	138,361	0.26
5	Valentina (Lower Phoenix)	7C4896	2,211,840	592,611	0.27
6	Ebene	7C4864	869,246	254,463	0.29
7	Clairfonds	4C1520	2,363,433	709,208	0.30
8	Solferino Dookun	7C1529	2,414,670	765,648	0.32
9	Pont Fer (petit camp)	7C1545	1,237,440	423,298	0.34
10	La Louisa	6C7117	1,248,582	471,210	0.38
11	Powder Mills	6C1556	214,935	88,039	0.41
12	Trois Boutiques	5C3165	2,499,840	1,033,919	0.41
13	Camp La Boue	6C6109	341,113	141,315	0.41
14	P. D'Or No.3	2C2308	1,181,122	496,498	0.42
15	Constance	2C4420	4,231,408	1,841,976	0.44
16	Bananes	5C6764	488,160	221,718	0.45
17	Holyrood	7C1530	6,216,087	2,834,665	0.46
18	P. D'Or No.4	2C4281	1,199,770	568,701	0.47
19	Highlands	7C3694	694,008	350,405	0.50
20	Bassin 432	7C3894	4,070,160	2,106,738	0.52
21	Caroline	2C1937	3,947,160	2,147,375	0.54
22	Cluny	5C3152	8,601,120	4,682,015	0.54
23	Trianon	7C7418	1,776,698	1,028,961	0.58
24	P. D'Or No.1	2M0382	429,036	254,928	0.59
25	Café	5C6275	494,640	296,188	0.60
26	Bonne Mere	2C3357	2,315,001	1,406,238	0.61
27	P. D'Or No.2	2C4592	272,624	167,063	0.61
28	Gebert	5C5964	1,409,760	866,489	0.61
29	Bonne Veine	6C5410	884,928	546,131	0.62
30	Yemen	7C5296	1,609,920	1,010,796	0.63
31	Beard	4C6761	2,460,044	1,572,434	0.64
32	Camp Fouquereaux old	7C4923	65,520	44,148	0.67
33	Bois Mangues (Old P.de Papayes)	6C1528	530,472	381,395	0.72
34	P. D'Or (New)	2C7137	1,988,290	1,434,505	0.72
35	St Jean	7C3626	335,232	243,871	0.73
36	St Martin	3C5942	525,680	396,361	0.75
37	Telfair	3C3811	912,960	688,418	0.75
38	Palmyre 26B	7C4198 (Tariff 315)	514,080	387,655	0.75
39	Riche Terre	6C4986	381,160	290,868	0.76
40	Bassin 435/717	7C3798	2,054,422	1,569,804	0.76
41	Cottage- Poonith	2C4693	833,296	645,906	0.78
42	B. Vue Mauricia	6C1527	629,967	488,302	0.78
43	F. Du Sac- Forbach	6C7464	1,704,434	1,325,978	0.78
44	La Clemence	2C6258	154,201	125,945	0.82
45	Petite Retraite	2C2849	2,034,958	1,676,605	0.82

Energy Auditing, Management and Efficiency at CWA Pumping Stations – Phase I

46	Beau Songes	7C7212	1,187,950	980,519	0.83
47	Schoenfeld New	2C4322	822,647	680,064	0.83
48	Cottage (New)	2C6371	551,334	456,178	0.83
49	MSA BH 117	6C3521	280,000	240,266	0.86
50	Pierrefonds	7C7172	1,070,279	934,369	0.87
51	Haute Rive	2C2854	464,434	433,554	0.93
52	Beau Plateau	2C7103	592,189	571,192	0.96
53	Petite Riviere	1C4072	232,604	226,275	0.97
54	P. Bon Espoir	2C7420	1,840,951	1,876,315	1.02
55	Palmyre 419	7130001303 (6) Tariff 315	450,851	459,776	1.02
56	Barkly (BH) / SP	3C3223	2,099,952	2,143,895	1.02
57	Bambou (Eau Bonne)	3C4041	1,371,285	1,432,858	1.04
58	Valentina (new)	7C7352	334,080	351,304	1.05
59	Nouvelle France new	5C6940	1,645,200	1,754,075	1.07
60	Melrose BH	6C6683	107,707	120,461	1.12
61	F. Du Sac- Choisy	6C2562	1,323,053	1,499,853	1.13
62	Bel Etang	4C4910	130,048	148,962	1.15
63	Mon Loisir	2C6703	594,456	690,355	1.16
64	Labourdonnais	2C5741	214,635	249,607	1.16
65	Camp Ithier	2C7848	460,333	555,003	1.21
66	Camp Thorel	6C7201	1,439,899	1,754,687	1.22
67	Solferino BH	7C6567	291,390	360,899	1.24
68	Palma	7C1831	237,600	307,587	1.29
69	B.Rose Clemencia	4C2896	1,853,847	2,425,881	1.31
70	Solitude	6C7044	149,898	196,893	1.31
71	MSA BH 309	6C3523	39,000	54,455	1.40
72	Yemen New	7C8312	988,416	1,410,171	1.43
73	Mapou	6C7196	193,969	297,900	1.54
74	Laventure	2C6091	44,124	72,781	1.65
75	Palmyre (new) BH827	7C7469 (Tariff 315)	347,040	631,346	1.82
76	Camp Fouquereaux (new)	4C7355	169,200	313,176	1.85
77	Baie du Cap (Choisy) New	6020000073 (3) Tariff 315	31,536	86,881	2.75
78	Chamarel	7090003261 (5) Tariff 215	104,880	299,216	2.85
79	Balaclava	6C6107	4,723	29,616	6.27
80	Beau Bois b.h	3C7476	319,486	N/A.	-
81	Beau Bois New	3C7872		N/A.	-
82	Le Bosquet	3C6475	N/A	45,390	-
83	Bassin Loulou (Robinson)	6C6108	N/A	72,824	-
84	Calebasses	6C2997	N/A	78,530	-

Analysis III

Classification of the Annual Average Production Cost

Table 3.1: Production Range

Average Production Cost in Rs/m ³ in the range of:	No. of Sites		
	North	South	Total
$X \leq 0.25$	1	2	3
$0.25 < X \leq 0.50$	3	11	14
$0.50 < X \leq 0.75$	10	10	20
$0.75 < X \leq 1.00$	14	6	20
$1.00 < X \leq 1.25$	11	4	15
$1.25 < X \leq 1.50$	3	1	4
$X > 1.50$	2	4	6

Chart 3.1: Bar Chart representing the average production cost for north

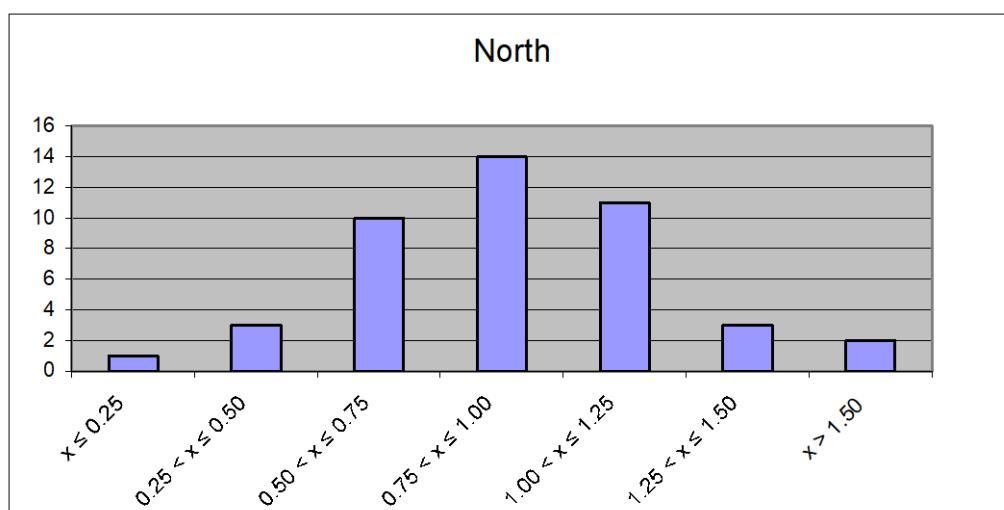


Chart 3.2: Bar Chart representing the average production cost for south

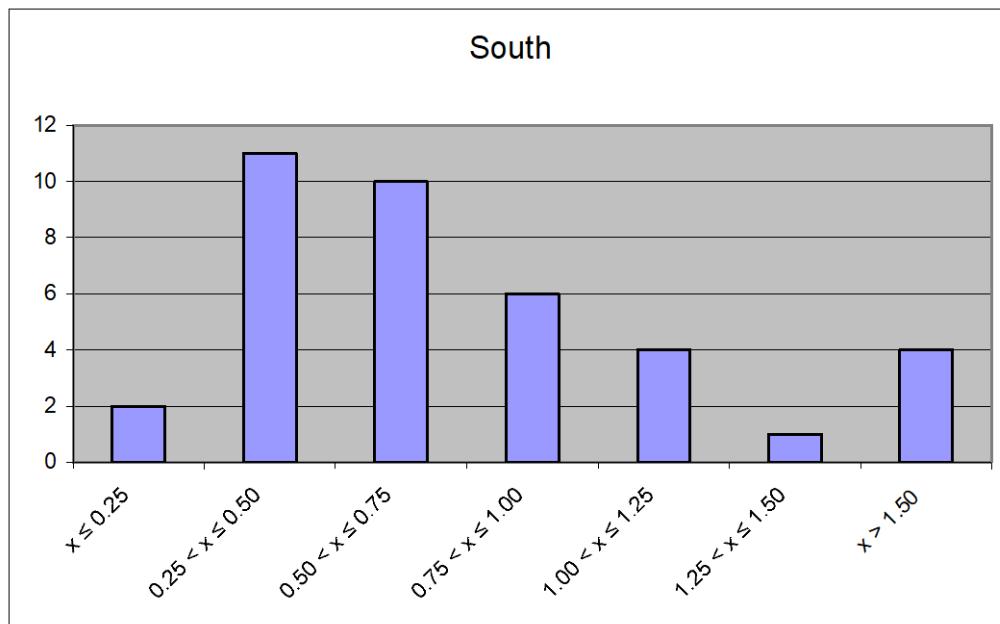
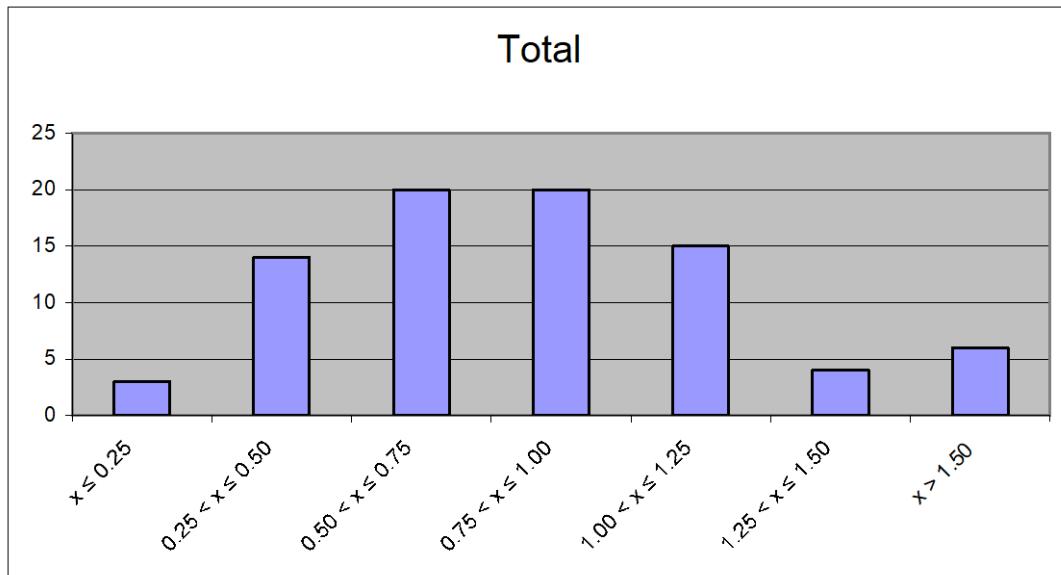


Chart 3.3: Bar Chart representing the average production cost for all pumping stations



Analysis IV

General Observations and Comments

Sites Omitted

Three pumping stations having both submersible and surface pump sets have been excluded in the calculation of the overall production values due to the reason that separate energy consumption metering equipment was not available. However, it is more economical and efficient to have combined metering system for this type of pumping stations. The sites in this category are as follows:

1. Bassin Loulou (Jamblon) – A/C No. 6C2914
2. MSA 306 – A/C No. 6C2798
3. Alma BH – A/C No. 6C1533

General comments

Note that data was unavailable for computing the production cost at Beau Bois and Valentina (Lower Phoenix) Pumping Stations in year 2001; Beau Bois, Valentina (Lower Phoenix) and Poudre D'Or (new) Pumping Stations in year 2002; Beau Bois, Le Bosquet, Calebasses and Bassin Loulou (Robinson) in year 2003. Le Bosquet and Calebasses Pumping Stations were consequently switched off in this particular year due to considerable decrease in the water level in these boreholes.

As a matter of fact, the average production cost for some sites was not based on 3 years data. Also, Barkly BH664 and Barkly BH501 were merged together in year 2003 under one account number. Thus for computing the average cost of production, related data was combined in year 2001 and 2002.

Production Figures

Detailed analysis indicates that most pumping stations have a production figure in the range of 25 cents and Rs 1.25 i.e 84%. However, since any particular borehole and its associated distribution network are not alike, the production figures differ even for same pumping yield.

Sites with relatively high production cost have been analyse separately for possible causes.

70% of all the southern pumping stations have a production figure between Rs 0.25 and Rs 1.00 and 79% of all pumping stations in the North have a production cost lying between Rs 0.50 and Rs 1.25.

Thus we note that the production cost for northern pumping stations is generally higher than southern stations. This is due to the fact that southern aquifers have higher yield and stability than in the northern pumping stations. Boreholes in the south are more stable than in the northern part of the island because of more rainwater to replenish the aquifers.

Analysis V

Analysis of sites with comparatively high average production cost

Analysis A: Baie du Cap (Choisy) 776 Pumping Station – South

Baie du Cap (Choisy) 776 Pumping Station

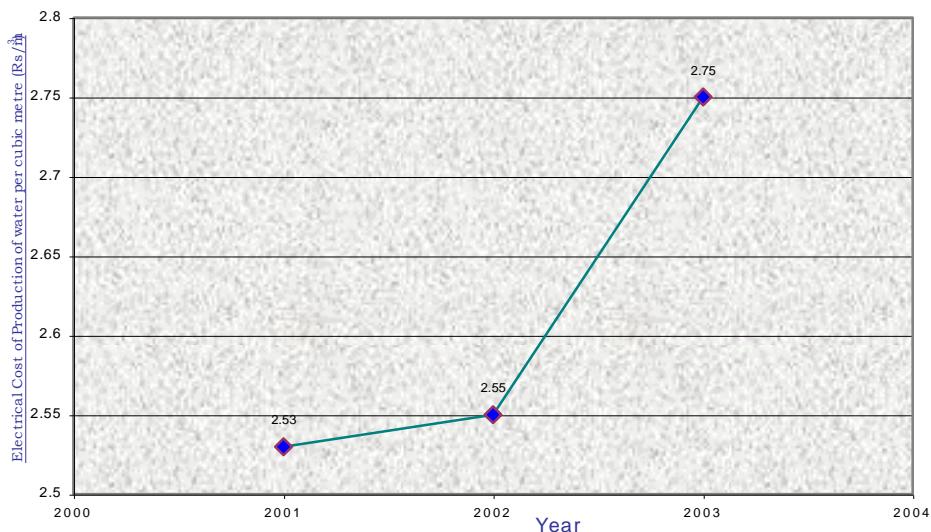


Table 5.1: Pump History

Year	Installed Pump (Max. Flow x Pump Head x Power Rating)		Annual Flow (m ³)	Annual Electricity Bill (Rs)
	m ³ /h x m	kW		
2001	15 x 60	5.5	49,777	126,178
2002	15 x 60 / 12 x 90 (Changed on 30/11/02)	5.5 / 5.6 (Changed on 30/11/02)	54,071	137,695
2003	12 x 90	5.6	31,536	86,881

The Baie du Cap (Choisy) Pumping station has also been working on timer being switched during 2 spells of time per day. In the first one, the pump is switched ON at 04h00 and

switched OFF at 12h30. During the second spell, the pump is switched ON at 14h00 and switched OFF at 21h30. Hence, the pump is being utilized for a total of 17 hours per day. The average production cost is currently Rs 2.61.

Electricity Billing

It is to be noted that Baie du Cap (Choisy) pumping station is declared under tariff 315 for CEB billing purposes, and hence, only the energy consumption in kWh is considered.

Discussion on Flow

The valve has been throttled at this site to have a stable Dynamic Water Level (DWL) with a flow of around $6 \text{ m}^3/\text{h}$. The safe yield being $5.7 \text{ m}^3/\text{h}$ and the rated pump capacity installed is $15 \text{ m}^3/\text{h}$

Causes of high production cost

❖ Electricity billing according to tariff 315.

The electricity billing is under Flat Rate tariff 315 for industrial consumers rather than tariff 313. However, this is in order since the industrial tariff 313 is only applicable for total declared load above 15 kW. (Refer to Appendix A for tariff descriptions)

❖ Incorrect pumpset rating.

As mentioned above, the safe yield is $5.7 \text{ m}^3/\text{h}$ but the installed pump was rated for 15 m^3 , which was again replaced with a 12 m^3 pump. The pumps are inappropriately rated. A pumpset with a hydraulic capacity of $6 \text{ m}^3/\text{h}$ at a head of 90 m would consist of a 2.5 kW motor. Hence, the production cost can be reduced to half. [Note: $\text{kW} = (\text{Q} \times \text{H}) / (367 \times \eta) = (6 \times 90) / (367 \times 0.7) = 2.1$ theoretical. Nearest manufacturers' rating = 2.5 kW]

Analysis B: Camp Fouquereaux (St Antoine) 727 Pumping Station – South

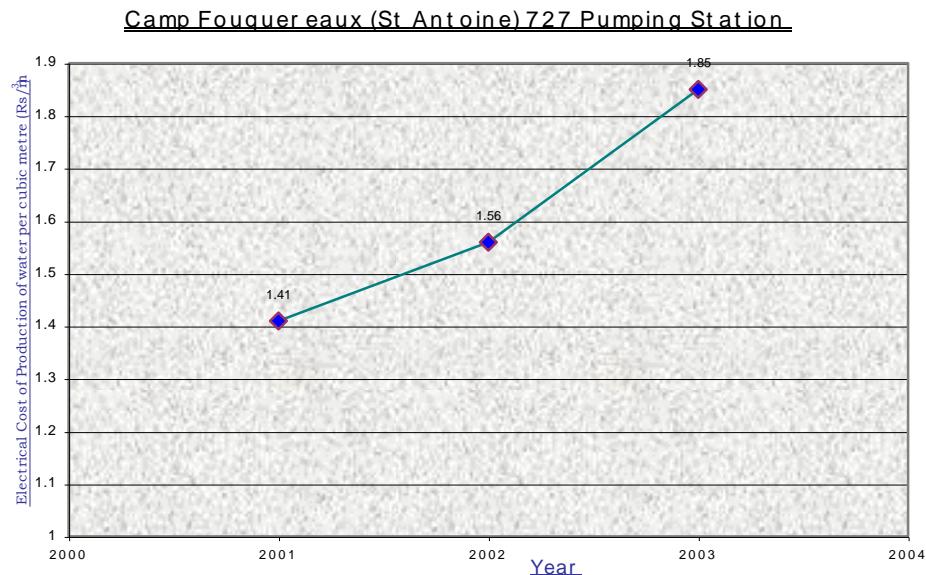


Table 6.7: Pump History

Year	Installed Pump (Max. Flow x Pump Head x Power Rating)		Annual Flow (m³)	Annual Electricity Bill (Rs)
	m³/h x m	kW		
2001	55 x 100 / 55 x 110 (Changed on 07.11.01)	22.4 / 26 (Changed on 07.11.01)	251,794	354,153
2002	55 x 110 / 35 x 107 (Changed on 15.11.02)	26 / 16.5 (Changed on 15.11.02)	219,456	342,872
2003	35 x 107	16.5	169,200	313,176

Possible causes of high production cost

This pumping station constitute of a relatively small yield but high delivery head. Thus a lot of energy is required, coupled with poor power factor, for extraction at this site. The average production cost is Rs 1.61.

Analysis C: Chamarel 796 Pumping Station – South

Cost of Production of water per Cubic Meter

Year 2003: Rs 2.85 / m³

Table 6.9: Pump History

Year	Installed Pump (Max. Flow x Pump Head x Power Rating)		Annual Flow (m ³)	Annual Electricity Bill (Rs)
	M ³ /h x m	KW		
2003	21 x 87	7.5	104,880	299,216

The Chamarel Pumping station was put into operation as from January 2003, working on timer being switched ON at 04h00 and switched OFF at 23h00. Thus, the pump is being utilized for a total of 19 hours per day.

Electricity Billing

Chamarel pumping station is declared under tariff 215 (Flat Rate Tariff for Commercial Consumers) for CEB billing purposes, and hence, only the energy consumption in kWh is considered.

Causes of high production cost

- ❖ *Electricity billing according to tariff 215.*

Electricity billing is based on tariff 215, which is a flat rate tariff for commercial consumers. This tariff is not appropriate for our purpose and thus need a change of tariff to 315, which shall bring the extraction cost down to 60% of the actual cost.

[kWh for tariff 315 : kWh for tariff 215 = 3.10/5.15 ≈ 60%]

Analysis D: Palmyre 827 Pumping Station – South

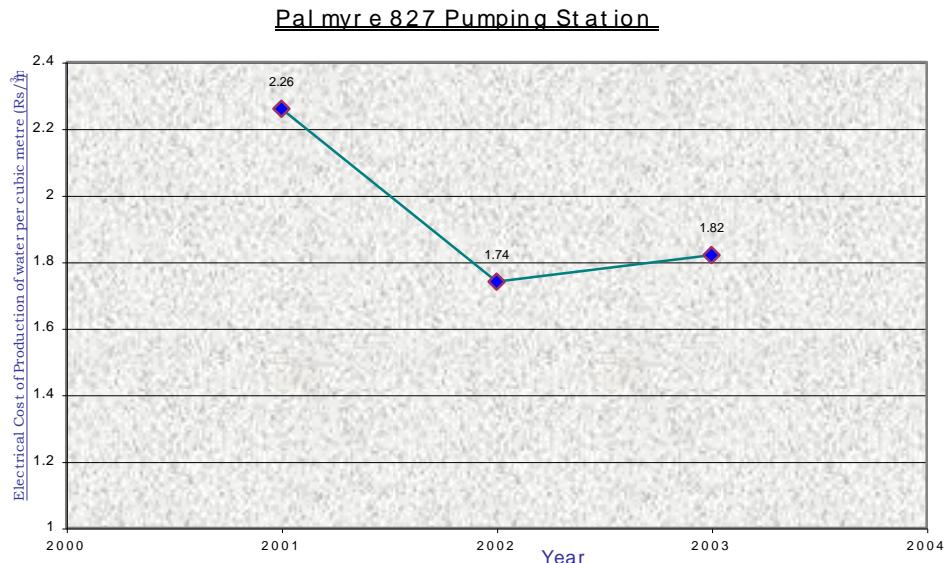


Table 6.11: Pump History

Year	Installed Pump (Max. Flow x Pump Head x Power Rating)		Annual Flow (m³)	Annual Electricity Bill (Rs)
	m³/h x m	kW		
2001	55 x 110 / 55 x 110 (Changed on 23.02.01)	30 / 30 (Changed on 23.02.01)	341,760	774,080
2002	55 x 110 / 55 x 110 (Changed on 22.02.02)	30 / 26 (Changed on 22.02.02)	346,385	601,119
2003	55 x 110	26	347,040	631,346

Causes of high production cost

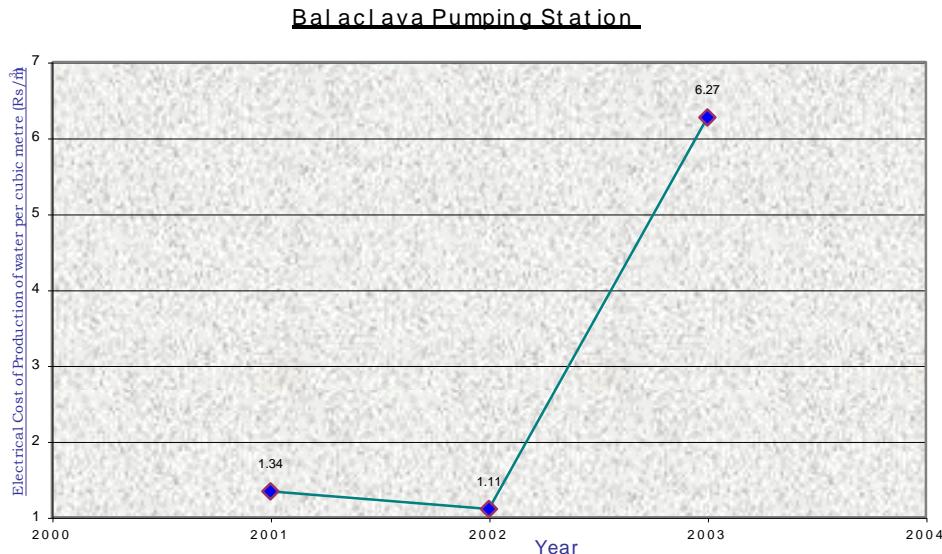
- ❖ Electricity billing according to tariff 315.

The billing is according to tariff 315, which is not appropriate for this site. The required tariff is 313, which would reduce the production cost down to around 67%.

[Workings: Average Cost of Electricity/Year = Rs 669,000 = {Rs 669,000X(1.8/3.1)} + Rs 60,000

Demand Charge (approximate) in tariff 313] / Rs 669,000 ≈ 67%]

Analysis E: Balaclava Pumping Station – North



Causes of high average production cost

The high average production cost of Rs 2.91/m³ is attributed to year 2003 where it reached Rs 6.27. This was due to the fact that the station was switched off on 16 January 2003 and minimum charge was being paid to CEB. The station has now been closed.

Analysis F: Belle Rose Clemencia 42B, 42C & 674 Pumping Station – North

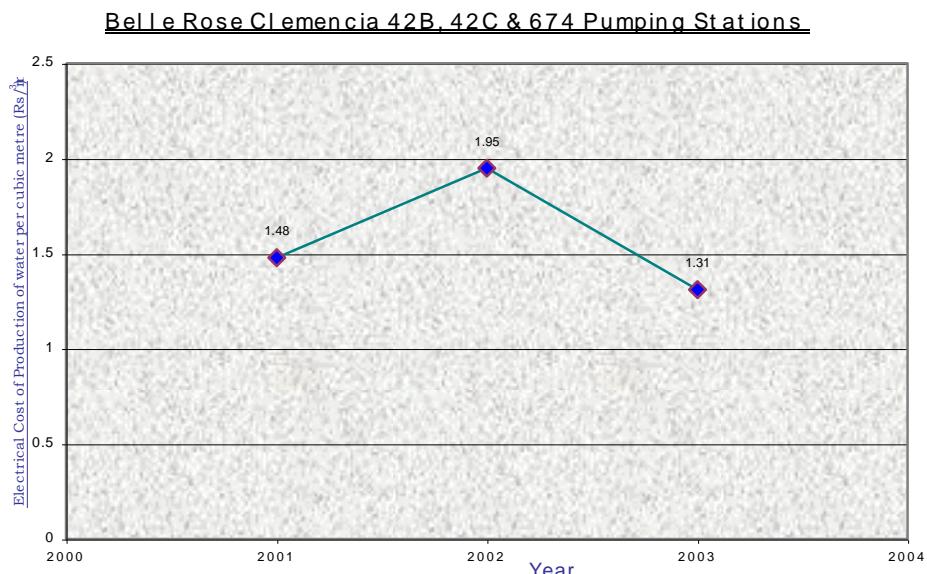


Table 6.23: Pump History

Year	Installed Pump (Max. Flow x Pump Head x Power Rating)		Annual Flow (m³)	Annual Electricity Bill (Rs)
	m³/h x m	kW		
2001	Pump 42B: 125 x 72	Pump 42B: 37	1,767,600	2,621,156
	Pump 42C: 300 x 75	Pump 42C: 92		
	Pump 674: 275 x 75	Pump 674: 75		
2002	Pump 42B: 125 x 72	Pump 42B: 37	1,265,905	2,470,903
	Pump 42C: 300 x 75	Pump 42C: 92		
	Pump 674: 275 x 75	Pump 674: 75		
2003	Pump 42B: 125 x 72	Pump 42B: 37	1,853,847	2,425,881
	Pump 42C: 300 x 75	Pump 42C: 92		
	Pump 674: 275 x 75	Pump 674: 75		

Causes of high average production cost

Year 2002 showed an abnormally high production cost. This resulted in a high average value of Rs 1.58/m³ per year. It was noted that the flowmeter was erratic in this particular year. Thus the flow recorded may not have been the actual value.

Analysis VI

Quantification of energy overpayment / wastage

❖ Energy overpayment / wastage due to excess KVA and Demand KVA

Charges

As per tariff 313, the CEB charges a penalty fee in terms of excess KVA for power factor less than 0.9 (see Appendix A). From the CEB bills the total amount paid for excess KVA for years 2001, 2002 & 2003 is tabulated below (see Appendix D for details). Moreover should the Power Factor be improved to above or equal to 0.9, this shall automatically result in a reduced Demand KVA. The associated savings as estimated is also tabulated below (see Appendix E for details).

Table 6.1: Amount paid for excess kva

Year	Amount Paid for excess KVA (Rs)	Estimated Savings in Demand KVA Charges (Rs)
2001	177,606	388,532
2002	110,298	325,326
2003	141,325	322,834
Total	429,229	1,036,692
Average	143,076	345,564

From the above table, the CWA is currently wasting an average of Rs 143,076 per year due to excess KVA and an associated estimated average of Rs 345,564 in demand KVA constituting a total amount of Rs 488,640. This amount is quite small compared to the annual energy charge but nevertheless constitute a considerable amount being wasted. The savings can be used to purchase power factor correctors instead thereby improving the efficiency at pumping stations with poor power factor. However it should be noted that the M&E department has already taken the initiative to install power factor correctors at all its site since September 2001. The number of

sites with average power factor ≥ 0.9 was 20 in year 2001 which was improved to 45 sites in year 2002 and 50 sites in year 2003.

❖ ***Energy overpayment / wastage due to inappropriate CEB tariff.***

It was noted that a few pumping stations were being billed on inappropriate tariff and thus require tariff change. These sites are given in the table below together with an approximate amount of savings in terms of Rupees and percentage.

Table 6.2: Estimated cost savings by tariff change

S.N	Site	A/C. No.	Actual Tariff	Required Tariff	Approximate Savings / Year (Rs)	Percentage savings
1	Chamarel 796	7090003261(5)	215	315	120,000	40%
2	Palmyre 827	7C7469	315	313	220,000	33%
3	Palmyre 26B	7C4198	315	313	153,000	36%
4	Palmyre 419	7130001303(6)	315	313	113,000	34%
Total (Rs)					606,000	

From the table above we observe a saving of approximately Rs 606,000 per year should the actual tariff be changed to the required tariff. Upon investigation it was found that the CWA has already requested tariff change for some sites including Palmyre26B and 827. Payment has already been effected on 30th September 2003, however the CEB has not yet carried out the necessary works on the metering equipment at Palmyre26B and 827 prior to the tariff change. (The estimated average

percentage savings for Palmyre 26B & 419 are based as per workings shown at Analysis D for Palmyre 827)

❖ ***Energy wastage due to oversized pumpsets***

Upon analysis, it was observed that the high production cost at Baie du Cap (Choisy) pumping station is not only associated with the CEB tariff but also due to an oversized pump. The maximum yield is only around $6 \text{ m}^3/\text{h}$ at this site but a $15 \text{ m}^3/\text{h} \times 60 \text{ m}$ pump capacity was installed. Afterwards it was replaced by a $12 \text{ m}^3 \times 90 \text{ m}$ pump capacity with throttled valve to regulate the flow to about $6 \text{ m}^3/\text{h}$. The motor ratings were 5.6 kW. A $6 \text{ m}^3/\text{h} \times 90 \text{ m}$ pump capacity would result in a 2.5 kW motor. This shall reduce the energy consumption to approximately half i.e around Rs 58,000 per year.

Moreover, it is observed that for a number of sites as per the Table 6.3, pumps installed are oversized as compared to the safe pumping yield and the actual flow recorded flow. The pump rating as recalculated based on the safe yield provides a rough estimate of the amount of energy being wasted. A 10% additional ‘head’ capacity was added on the actual ‘head’ for the calculations.

Table 6.3: Estimation of energy wastage due to oversized pumpsets

S.N	Site	Safe Yield (m ³ /h)	Installed Pump m ³ /h x m	Motor Rating (kW)	Head (m)	Theoretical Motor rating Based on Safe Yield (kW)	Available Motor Rating (kW)
1	Bambous Eau Bonne 247B	160	275 x 75	75	75	51.4	55
2	Bassin 432	330	392 x 72	130	72	101.7	110
3	Clairfonds No. 2	90	175 x 39	26	39	15.0	15
4	Cottage new	60	90 x 100	37	100	25.7	26
5	Fond du sac- Choisy 1	72	100 x 75	30	75	23.1	26
6	Holyyrod 826	243	300 x 34	45	34	35.4	37
7	P. Bon Espoir	194	240 x 100	110	100	83.1	92
8	P. D'Or(No. 3)	120	180 x 40	26	40	20.6	22
9	P. D'Or(No. 4)	156	180 x 40	30	40	26.7	26
10	Palmyre 26B	66	90 x 26	9.2	26	7.3	7.5
11	Schoenfeld new 337	96	130 x 30	15	30	12.3	13
12	Solferina Dookhun 359A	162	200 x 35	30	35	24.3	26
13	St Paul 153D	102	125 x 35	18.5	35	15.3	15
14	Telfair 531	60	72 x 100	30	100	25.7	26
15	Valentina 390B	100	182 x 37	30	37	15.8	15
16	Yemen 594B	96	180 x 75	55	75	30.8	30
Total kW				696.7			541.5

As per the sites identified in the table above, we observe an approximate amount of 155.2 kW being used in excess due to oversized pumps. This represents an approximate amount of Rs 2.45 million per year assuming a 24 hrs operation per day. However, energy wastage due to oversized pumpsets require in depth calculation and sizing exercises taking into account the actual variation in the Dynamic Water Level (DWL), flow and the distribution network for all borehole pumps across the island. This shall be covered in Phase 2 of this project.

Summary of Energy Overpayment / Wastage

The total estimated value of the energy overpayment / wastage from the above analysis amounts to **Rs 3, 6 M / year**.

Conclusion

The above figure represents a considerable amount ($\approx 6\%$) on the average yearly Electricity Bill of around Rs 60 million being paid to the CEB for borehole pumps.

Phase 2 of this project '*calculation of the hydraulic duty point for each borehole pump*' would provide a more precise picture on the energy wastage due to oversized pumps. However, it is recommended to carry out pump test at each borehole to reassess their characteristics prior to calculation of the hydraulic capacity of pumps. It is also advisable that this project be extended to surface pump site.

Appendix A: Tariff

Tariff	Description	Charges	Old Rate (up to 31 July 2004)	New Rate (as from 1 August 2004)
313	Maximum Demand Tariff For Industrial Consumers	Demand Charge	Rs 95 per kVA of Maximum Demand, subject to a minimum of 20 kVA	Rs 95 per kVA of Maximum Demand, subject to a minimum of 20 kVA
		Running Charge	Rs 1.80 per kWh	Rs 1.89 per kWh
		Minimum Charge	A sum equal to the highest Demand Charge paid in any one of the preceding six months of account	A sum equal to the highest Demand Charge paid in any one of the preceding six months of account
315	Flat Rate Tariff For Industrial Consumers	Running Charge	Rs 3.10 per kWh	Rs 3.26 per kWh
		Minimum Charge	Rs 65.00 per month or part thereof per kilowatt or fraction thereof of total connected load, subject to a minimum of Rs 65.00 per month	Rs 68.00 per month or part thereof per kilowatt or fraction thereof of total connected load, subject to a minimum of Rs 68.00 per month
215	Flat Rate Tariff For Commercial Consumers	Running Charge	Rs 5.15 per kWh	Rs 5.41 per kWh
		Minimum Charge	Rs 100.00 per month or part thereof per kilowatt or fraction thereof of total connected load, subject to a minimum of Rs 100.00 per month	Rs 105.00 per month or part thereof per kilowatt or fraction thereof of total connected load, subject to a minimum of Rs 105.00 per month

Power Factor Clause (Applicable to Tariff 313)

A surcharge of Rs50.00 per kVA, irrespective pf application of minimum charge or not, shall be levied on the excess kVA recorded for the month or part thereof if the calculated average power factor for the month or part thereof is less than 0.90.

The average Power Factor for a month is calculated from the ratio:

$$\frac{\text{Total kWh recorded for the month or part thereof}}{\text{Total kVAh recorded for the month or part thereof}}$$

Excess kVA is calculated from the formulae:

$$E = M * (0.90 - P)$$

0.9

Where E = Excess kVA

P = Calculated average power factor for the month or part thereof

M= Maximum Demand in kVA recorded for the month or part thereof

Choisy Baie du Cap

6020000073

Year	Month	Unit (kWh)	Amount (Rs)
2001	Jan	3110	9185
2001	Feb	2930	8654
2001	Mar	2560	7562
2001	Apr	2510	7415
2001	May	1390	4111
2001	Jun	5880	17356
2001	Jul	4140	12223
2001	Aug	4010	11840
2001	Sep	4350	12843
2001	Oct	3890	11486
2001	Nov	4270	12607
2001	Dec	3690	10896
2002	Jan	4150	12311
2002	Feb	3840	11934
2002	Mar	3580	11128
2002	Apr	3790	11779
2002	May	3970	12337
2002	Jun	4160	12926
2002	Jul	3660	11376
2002	Aug	3860	11996
2002	Sep	3660	11376
2002	Oct	3240	10074
2002	Nov	3330	10353
2002	Dec	3250	10105
2003	Jan	2330	7253
2003	Feb	2160	6726
2003	Mar	1930	6013
2003	Apr	2040	6354
2003	May	2210	6881
2003	Jun	2460	7656
2003	Jul	2600	8090
2003	Aug	2233	6952
2003	Sep	2737	8515
2003	Oct	2430	7563
2003	Nov	2510	7811
2003	Dec	2270	7067
2004	Jan	2880	8958
2004	Feb	2490	7749
2004	Mar	2340	7284
2004	Apr	2910	9051
2004	May	2400	7470
2004	Jun	2470	7687
2004	Jul	2590	8059

Chamarel Borehole

7090003261

Year	Month	Unit (kWh)	Amount (Rs)
------	-------	------------	-------------

Appendix B:

Electricity Bills as obtained from
Central Electricity Board for Baie du
Cap (Choisy) 776 Pumping Station.

Appendix C:

Electricity Bills as obtained from
Central Electricity Board for Chamarel
796 Pumping Station.

2003 Jan	4265	21995
2003 Feb	4792	24709
2003 Mar	4639	23921
2003 Apr	4804	24771
2003 May	5661	29184
2003 Jun	4685	24158
2003 Jul	4514	23277
2003 Aug	5159	26599
2003 Sep	4566	23545
2003 Oct	5440	28046
2003 Nov	4734	24410
2003 Dec	4771	24601
2004 Jan	4860	25059
2004 Feb	4514	23277
2004 Mar	4828	24894
2004 Apr	4770	24596
2004 May	4913	25332
2004 Jun	4744	24462
2004 Jul	4381	22592

Appendix D: Excess kva as extracted from ceb bills

SNo.	A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1	1C4072	274.5	247.5	274.5	274.5	284	302	284	0	333	302	338	540	3451.5
2	2C2308	27	27	0	0	0	0	0	0	0	0	0	0	54
3	2C4322	27	58.5	27	27	27	27	58.5	58.5	167	198	207	176	1057.5
4	2C4592	45	54	54	54	49.5	54	54	49.5	49.5	54	49.5	54	621
5	2C4693	117	112.5	94.5	76.5	76.5	76.5	76.5	76.5	76.5	0	0	0	783
6	2C1592													0
7	2C1937	139.5	139.5	144	144	144	212	212	212	212	144	144	140	1984.5
8	2C2849	207	148.5	148.5	153	306	306	306	306	302	374	212	203	2970
9	2C2854	0	0	0	0	0	0	0	0	0	40.5	0	0	40.5
10	2C3357	369	369	369	427.5	423	428	378	378	270	0	0	0	3411
11	2C4185	121.5	0	0	0	117	0	0	0	0	0	0	0	238.5
12	2C4281	0	0	0	0	0	0	0	0	0	0	0	0	0
13	2C4420	949.5	553.5	490.5	571.5	495	572	500	576	423	0	0	0	5130
14	2C5741	81	72	81	81	72	72	72	85.5	13.5	0	0	0	630
15	2C6091	0	0	0	0	0	0	0	0	0	0	0	0	0
16	2C6117	0	0	0	36	31.5	0	0	0	13.5	0	0	0	81
17	2C6258		0	238.5	382.5	392	387	405	419	410	0	0	0	2632.5
18	2C6371	315	310.5	283.5	283.5	275	279	279	126	122	0	144	144	2560.5
19	2C6703	220.5	225	202.5	207	221	221	239	239	194	0	0	0	1966.5
20	2C7103	270	270	270	274.5	270	302	279	306	306	0	0	0	2547
21	2C7137	0	45	45	45	45	49.5	0	212	315	302	347	356	1759.5
22	2C7420	805.5	886.5	747	666	504	500	563	558	491	491	495	495	7200
23	2C7848				459	297	302	302	306	306	279	284	279	2812.5
24	2M0382	0	0	0	0	0	0	0	0	0	0	0	0	0
25	3C3223	212	279	221	252	212	212	185	248	248	0	0	0	2066
26	3C3811	540	558	531	531	468	432	423	324	378	950	999	999	7133
27	3C4041	792	792	221	599	599	783	891	941	783	0	0	0	6399
28	3C5878	225	230	176	203	171	167	171	198	203	0	0	351	2093
29	3C5942	265.5	0	297	297	428	527	225	122	365	131	94.5	90	2839.5
30	3C6475	189	0	0	0	0	0	0	0	0	0	49.5	49.5	288
31	3C7476													0
32	3C7872									104	0	13.5	0	117
33	4C1120	342	176	176	176	176	198	180	162	176	63	0	0	1823
34	4C1520	0	0	0	0	0	0	0	0	0	0	0	0	0
35	4C2896	1067	1076	1229	1067	936	941	842	950	414	0	104	216	8838
36	4C3082	149	198	221	239	230	239	252	239	239	243	239	293	2777
37	4C4910	121.5	135	117	135	131	131	131	0	0	0	0	0	900
38	4C6471	0	0	0	0	0	0	0	0	0	0	0	0	0
39	4C6761	401	396	387	333	410	342	342	333	54	0	392	936	4325
40	4C7355	149	158	153	216	176	185	185	167	162	234	540	594	2916
41	5C3152	873	855	864	873	855	702	680	680	680	0	0	162	7223
42	5C3165	284	279	279	284	239	279	324	288	284	0	0	0	2538
43	5C5964	680	279	477	333	320	378	383	396	261	0	0	0	3506
44	5C6067	329	288	338	306	234	239	297	306	257	0	0	0	2592
45	5C6275	122	117	122	117	117	108	149	144	122	0	0	0	1116

46	5C6764	486	464	455	491	1463	662	216	243	243	0	0	0	4721
47	5C6940	477	477	482	482	477	473	486	477	239	0	144	189	4401
48	5C7470	0	0	0	0	0	0	0	0	0	0	27	27	54
49	6C1527	355.5	355.5	346.5	333	311	311	311	293	284	162	18	18	3096
50	6C1528	171	153	153	153	149	167	162	140	144	216	207	207	2020.5
51	6C1533	216	216	216	216	216	212	185	216	185	216	270	248	2610
52	6C1556	85.5	85.5	94.5	90	94.5	94.5	90	94.5	94.5	90	90	90	1093.5
53	6C2562	238.5	238.5	238.5	288	284	288	288	293	49.5	0	0	0	2205
54	6C2798	121.5	121.5	126	67.5	36	67.5	67.5	31.5	31.5	85.5	90	104	949.5
55	6C2914	270	301.5	292.5	283.5	257	288	212	58.5	45	0	0	0	2007
56	6C2997	315	292.5	364.5	382.5	387	369	351	297	293	27	0	0	3078
57	6C3521	144	130.5	144	130.5	144	149	149	135	94.5	0	0	0	1219.5
58	6C3523	0	0	0	0	0	0	0	0	0	0	0	0	0
59	6C4986	292.5	292.5	297	297	279	243	239	261	252	99	0	0	2551.5
60	6C5410	495	450	450	455	482	450	437	441	464	504	450	518	5594
61	6C6107	0	0	0	0	0	0	0	0	0	0	0	0	0
62	6C6108	108	103.5	99	99	99	90	140	99	104	85.5	0	0	1026
63	6C6109	58.5	54	49.5	49.5	49.5	45	45	54	45	0	0	0	450
64	6C6683	117	117	112.5	130.5	126	117	117	117	104	158	99	63	1377
65	6C7044	144	126	108	126	117	122	117	117	104	27	0	0	1107
66	6C7117	0	0	0	0	0	0	0	0	0	0	0	0	0
67	6C7196	310.5	207	265.5	256.5	266	248	248	266	212	0	0	0	2277
68	6C7201	243	243	247.5	247.5	248	243	248	243	243	0	0	0	2205
69	6C7464	49.5	49.5	49.5	49.5	0	49.5	49.5	49.5	49.5	49.5	49.5	49.5	544.5
70	7C1529	77	41	18	77	81	0	0	0	0	0	0	0	293
71	7C1530	0	0	203	0	0	0	0	0	0	0	0	0	203
72	7C1545	0	0	0	0	0	0	0	0	0	0	0	18	18
73	7C1831	135	176	95	113	113	113	117	221	171	0	0	0	1251
74	7C1970	0	0	0	0	0	50	72	72	59	50	45	36	383
75	7C3626	54	63	63	72	54	54	54	54	45	54	54	54	675
76	7C3694	45	27	27	27	41	41	41	54	95	41	248	369	1053
77	7C3798	0	0	0	0	0	0	0	0	0	0	0	0	0
78	7C3894	509	518	536	536	603	594	608	680	149	0	0	0	4730
79	7C4198	0	0	0	0	0	0	0	0	0	0	0	0	0
80	7C4864	117	113	108	113	117	113	117	99	95	0	0	0	990
81	7C4896	0	0	0	0	0	0	0	0	0	0	63	171	234
82	7C4923	50	36	23	32	23	23	18	27	54	54	77	86	500
83	7C5296	491	482	572	671	765	815	923	882	878	198	0	0	6674
84	7C6227	50	50	41	68	144	153	153	144	131	131	126	135	1323
85	7C6567	167	153	167	162	140	113	113	95	41	0	0	0	1148
86	7C7172	292.5	301.5	297	157.5	0	0	428	432	428	0	0	423	2758.5
87	7C7212	495	81	0	396	410	401	473	585	329	0	0	0	3168
88	7C7352	212	207	212	225	221	216	212	77	185	0	14	0	1778
89	7C7418	549	495	495	513	468	491	495	491	324	36	36	36	4428
90	7C7469	0	0	0	0	0	0	0	0	0	0	0	0	0
91	7C8312													0
Total Paid in x/s KVA - Year 2001 (Rs)													177606	

46	5C6764	0	0	0	0	35	50	5	0	0	0	0	90
47	5C6940	0	80	80	0	0	0	260	520	520	515	520	2495
48	5C7470	25	30	30	30	30	30	30	30	0	0	0	265
49	6C1527	33.5	20	40	40	40	55	40	40	40	60	40	60
50	6C1528	254	245	245	275	265	265	265	245	245	250	270	275
51	6C1533	297	310	305	310	310	275	275	240	270	275	340	325
52	6C1556	109	110	115	110	105	125	145	100	0	115	120	125
53	6C2562	0	0	0	0	0	0	0	0	0	0	0	0
54	6C2798	154.5	40	80	40	40	80	75	75	115	150	555	560
55	6C2914	0	0	0	0	0	0	0	0	0	0	0	0
56	6C2997	0	0	0	0	0	0	0	215	0	200	315	310
57	6C3521	0	10	20	0	0	215	195	80	80	80	80	95
58	6C3523	0	35	155	0	0	0	0	0	0	0	35	75
59	6C4986	0	0	0	0	0	0	0	0	0	0	0	0
60	6C5410	480.5	520	705	1290	1240	750	650	345	350	470	740	365
61	6C6107	0	0	0	0	0	85	90	285	275	85	70	115
62	6C6108	0	0	0	0	0	40	0	0	0	0	0	40
63	6C6109	0	0	0	0	0	0	0	0	0	0	0	0
64	6C6683	129.5	125	85	440	150	155	145	155	150	165	25	150
65	6C7044	0	135	155	140	730	185	115	0	0	0	0	1460
66	6C7117	0	0	0	0	0	0	0	0	0	0	0	0
67	6C7196	0	0	0	0	0	0	0	0	0	0	0	0
68	6C7201	0	0	0	0	0	0	0	0	0	0	0	0
69	6C7464	53	55	55	110	105	110	110	110	285	400	400	410
70	7C1529	0	0	0	0	0	0	0	0	0	0	0	0
71	7C1530	0	0	0	0	0	0	0	0	0	0	0	0
72	7C1545	92	0	20	20	20	135	0	0	0	0	0	35
73	7C1831	0	35	0	0	0	0	0	0	0	0	0	35
74	7C1970	53	200	100	115	115	0	0	0	0	0	0	583
75	7C3626	70	70	0	0	0	0	0	0	0	0	0	140
76	7C3694	431	510	255	250	215	0	0	0	0	0	0	1661
77	7C3798	0	0	0	0	0	0	310	325	195	150	90	175
78	7C3894	0	590	0	0	0	0	0	0	0	0	0	590
79	7C4198	0	0	0	0	0	0	0	0	0	0	0	0
80	7C4864	0	0	0	0	0	0	0	0	0	0	0	0
81	7C4896	189.5	170	120	0	0	0	0	0	0	0	0	479.5
82	7C4923	72.5	75	80	75	60	65	70	130	0	100	75	85
83	7C5296	98.5	920	910	555	0	0	0	0	0	0	0	2483.5
84	7C6227	179.5	185	175	145	130	0	0	0	40	80	85	95
85	7C6567	0	0	0	0	0	0	0	0	0	0	0	0
86	7C7172	468.5	0	0	0	0	0	55	0	0	0	0	523.5
87	7C7212	0	0	0	0	0	0	0	0	0	0	0	0
88	7C7352	58	0	0	0	0	0	0	0	0	0	0	58
89	7C7418	43.5	40	40	40	0	0	0	0	0	0	0	163.5
90	7C7469	0	0	0	0	0	0	0	0	0	0	0	0
91	7C8312									0	410	570	545
	Total Paid for x/s KVA - Year 2002 (Rs)												110298.5

Appendix E: Estimated Savings In Demand KVA

S.n	A/c No	Average Power factor	Total KVA charges (Rs)	Total KVA charges based on Pf 0.9 (Rs)	Estimated Savings in KVA demand (Rs)
1	1C4072	0.72	56832	45518	11314
2	2C1592	0.00	0	0	0
3	2C1937	0.88	139200	135591	3609
4	2C2849	0.87	146976	141532	5444
5	2C2854	0.91	28704	29156	0
6	2C3357	0.85	102872	97157	5715
7	2C4185	0.92	260800	267561	0
8	2C4281	0.95	34696	36624	0
9	2C4420	0.85	153853	145021	8832
10	2C5741	0.87	23160	22474	686
11	2C6091	0.98	19200	20907	0
12	2C6117	0.90	22216	22175	41
13	2C6258	0.78	29184	25266	3918
14	2C6371	0.82	54848	49719	5129
15	2C6703	0.83	41600	38210	3390
16	2C7103	0.82	45888	42022	3866
17	2C7137	0.87	95328	92239	3089
18	2C7420	0.81	145608	131047	14561
19	2C7848	0.59	39968	26201	13767
20	2M0382	1.00	21184	23420	0
21	3C3223	0.85	53056	49863	3193
22	3C3811	0.64	43680	30819	12861
23	3C4041	0.85	153744	145630	8114
24	3C5878	0.85	62624	59029	3595
25	3C5942	0.75	63360	52565	10795
26	3C6475	0.21	23904	5467	18437
27	3C7476	0.00	0	0	0
28	3C7872	0.29	6400	2039	4361
29	4C1120	0.80	40000	35481	4519
30	4C1520	0.98	62048	67736	0
31	4C2896	0.84	232866	216695	16171
32	4C3082	0.79	48576	42864	5712
33	4C4910	0.88	28800	28160	640
34	4C6471	0.00	0	0	0
35	4C6761	0.85	125664	118217	7447
36	4C7355	0.77	38176	32732	5444
37	5C3152	0.87	336000	322933	13067
38	5C3165	0.87	80576	77965	2611
39	5C5964	0.83	107904	100011	7893
40	5C6067	0.76	29040	24576	4464
41	5C6275	0.84	25152	23545	1607
42	5C6764	0.75	58064	48064	10000

43	5C6940	0.85	155456	147539	7917
44	5C7470	0.90	50360	50267	93
45	6C1527	0.78	42176	36396	5780
46	6C1528	0.81	36960	33093	3867
47	6C1533	0.83	63744	58904	4840
48	6C1556	0.71	19200	15182	4018
49	6C2562	0.88	94736	92543	2193
50	6C2798	0.87	65664	63779	1885
51	6C2914	0.81	39872	35996	3876
52	6C2997	0.72	28147	22648	5499
53	6C3521	0.80	19808	17589	2219
54	6C3523	0.96	19200	20480	0
55	6C4986	0.74	27168	22414	4754
56	6C5410	0.71	54144	42864	11280
57	6C6107	0.94	19200	20018	0
58	6C6108	0.78	19200	16569	2631
59	6C6109	0.85	19200	18151	1049
60	6C6683	0.83	32184	29651	2533
61	6C7044	0.85	30016	28265	1751
62	6C7117	0.94	90754	94535	0
63	6C7196	0.81	34035	30537	3498
64	6C7201	0.89	138083	136293	1790
65	6C7464	0.89	94464	93502	962
66	7C1529	0.92	73600	75304	0
67	7C1530	0.92	187840	191319	0
68	7C1545	0.91	49952	50461	0
69	7C1831	0.82	25856	23582	2274
70	7C1970	0.90	30288	30148	140
71	7C3626	0.84	19312	17989	1323
72	7C3694	0.84	31776	29746	2030
73	7C3798	0.98	99176	108267	0
74	7C3894	0.87	145728	141005	4723
75	7C4198	0.00	0	0	0
76	7C4864	0.83	23040	21333	1707
77	7C4896	0.94	35880	37508	0
78	7C4923	0.80	19200	16996	2204
79	7C5296	0.78	96288	83360	12928
80	7C6227	0.75	19200	15947	3253
81	7C6567	0.84	27448	25644	1804
82	7C7172	0.68	107301	80972	26328
83	7C7212	0.79	179669	158042	21627
84	7C7352	0.81	31552	28222	3330
85	7C7418	0.81	81312	73181	8131
86	7C7469		0	0	0
87	7C8312				0
Total Estimated Savings in Demand KVA (Rs) - Year 2001					388532

S.n	A/c No	Average Power factor	Total KVA charges (Rs)	Total KVA charges based on Pf 0.9 (Rs)	Estimated Savings in KVA demand (Rs)
1	1C4072	0.70	63315	48893	14422
2	2C1592	0.00	0	0	0
3	2C1937	0.85	183743	173705	10038
4	2C2849	0.88	160622	157647	2974
5	2C2854	0.91	38667	39240	0
6	2C3357	0.93	118232	122611	0
7	2C4185	0.94	319850	334066	0
8	2C4281	0.95	43426	45758	0
9	2C4420	0.93	147969	152901	0
10	2C5741	0.97	24631	26479	0
11	2C6091	0.97	22790	24605	0
12	2C6117	0.48	22790	12176	10614
13	2C6258	0.93	28577	29609	0
14	2C6371	0.82	43722	39633	4089
15	2C6703	0.91	53447	53843	0
16	2C7103	0.96	74666	79368	0
17	2C7137	0.84	119931	111380	8551
18	2C7420	0.82	146916	133584	13331
19	2C7848	0.79	66042	58154	7888
20	2M0382	0.99	22890	25263	0
21	3C3223	0.96	76010	81429	0
22	3C3811	0.58	81101	52641	28460
23	3C4041	0.95	183281	193463	0
24	3C5878	0.88	113817	111182	2635
25	3C5942	0.77	73412	63148	10264
26	3C6475	0.41	27558	12401	15157
27	3C7476	0.00	0	0	0
28	3C7872	0.00	0	0	0
29	4C1120	0.86	41496	39613	1883
30	4C1520	0.96	62128	65982	0
31	4C2896	0.94	238747	248253	0
32	4C3082	0.89	58008	57041	967
33	4C4910	0.98	46035	50127	0
34	4C6471	0.00	0	0	0
35	4C6761	0.89	165009	162564	2445
36	4C7355	0.66	58845	43044	15801
37	5C3152	0.88	380297	372902	7395
38	5C3165	0.97	88800	95789	0
39	5C5964	0.98	65328	70893	0
40	5C6067	0.91	27726	27880	0
41	5C6275	0.98	23853	25907	0
42	5C6764	0.88	44601	43775	826
43	5C6940	0.89	173548	171298	2250
44	5C7470	0.89	58699	58210	489

45	6C1527	0.88	42379	41359	1020
46	6C1528	0.76	38801	32550	6251
47	6C1533	0.81	83621	75569	8052
48	6C1556	0.64	22641	16017	6625
49	6C2562	0.97	104747	112409	0
50	6C2798	0.86	81790	78003	3787
51	6C2914	0.96	50861	54487	0
52	6C2997	0.86	32404	30903	1500
53	6C3521	0.84	25320	23726	1594
54	6C3523	0.43	22676	10708	11968
55	6C4986	1.00	30990	34519	0
56	6C5410	0.63	61270	42719	18551
57	6C6107	0.68	22790	17219	5571
58	6C6108	0.73	22790	18359	4431
59	6C6109	1.00	22790	25323	0
60	6C6683	0.76	42966	36282	6684
61	6C7044	0.85	42788	40411	2377
62	6C7117	0.92	98623	101089	0
63	6C7196	0.97	33051	35621	0
64	6C7201	0.97	129281	139336	0
65	6C7464	0.87	114007	109890	4117
66	7C1529	0.95	85705	89990	0
67	7C1530	0.92	220794	224883	0
68	7C1545	0.89	50114	49372	742
69	7C1831	0.87	29928	28764	1164
70	7C1970	0.92	34765	35377	0
71	7C3626	0.95	22790	24141	0
72	7C3694	0.82	37006	33819	3187
73	7C3798	0.92	172378	176368	0
74	7C3894	0.96	172088	183720	0
75	7C4198	0.00	0	0	0
76	7C4864	0.97	35195	37867	0
77	7C4896	0.93	47893	49312	0
78	7C4923	0.73	22706	18480	4226
79	7C5296	0.87	123520	119860	3660
80	7C6227	0.75	22790	19034	3756
81	7C6567	0.94	28517	29784	0
82	7C7172	0.59	126364	82722	43642
83	7C7212	0.93	187546	193971	0
84	7C7352	0.92	32791	33520	0
85	7C7418	0.91	86309	87348	0
86	7C7469	0.00	0	0	0
87	7C8312	0.28	31724	9782	21942
Total Estimated Savings in Demand KVA (Rs) - Year 2002					325326

S.n	A/c No	Average Power factor	Total KVA charges (Rs)	Total KVA charges based on Pf 0.9 (Rs)	Estimated Savings in KVA demand (Rs)
1	1C4072	0.71	63327	50075	13252
2	2C1592	0.00	0	0	0
3	2C1937	0.93	188670	195658	0
4	2C2849	0.84	71364	66805	4559
5	2C2854	0.91	35682	36211	0
6	2C3357	0.93	167839	173278	0
7	2C4185	0.94	328890	344725	0
8	2C4281	0.94	43426	45477	0
9	2C4420	0.93	140794	145487	0
10	2C5741	0.86	23251	22196	1055
11	2C6091	0.98	22800	24784	0
12	2C6117	0.00	0	0	0
13	2C6258	0.65	23066	16766	6300
14	2C6371	0.92	40774	41680	0
15	2C6703	0.92	56502	57601	0
16	2C7103	1.01	59128	66191	0
17	2C7137	0.84	120897	112166	8731
18	2C7420	0.83	163741	150096	13645
19	2C7848	0.79	63346	55310	8036
20	2M0382	0.99	22800	25186	0
21	3C3223	0.90	158384	159117	0
22	3C3811	0.55	85614	52637	32977
23	3C4041	0.91	156722	157738	0
24	3C5878	0.88	59584	58260	1324
25	3C5942	0.71	69483	54621	14862
26	3C6475	0.72	25460	20368	5092
27	3C7476	0.00	0	0	0
28	3C7872	0.00	0	0	0
29	4C1120	0.93	49552	51250	0
30	4C1520	0.93	84968	87722	0
31	4C2896	0.94	246485	257668	0
32	4C3082	0.62	61332	42478	18854
33	4C4910	0.88	34713	33974	739
34	4C6471	0.00	0	0	0
35	4C6761	0.93	151278	155760	0
36	4C7355	0.73	68134	55195	12939
37	5C3152	0.85	400330	378089	22241
38	5C3165	0.95	87020	91532	0
39	5C5964	0.84	75468	70437	5031
40	5C6067	0.99	23846	26098	0
41	5C6275	0.98	24928	27005	0
42	5C6764	0.92	41441	42515	0
43	5C6940	0.91	179646	180977	0
44	5C7470	0.89	59054	58507	547

45	6C1527	0.86	43852	41944	1908
46	6C1528	0.75	37430	31192	6238
47	6C1533	0.81	70224	63527	6697
48	6C1556	0.66	22800	16699	6101
49	6C2562	0.97	106850	115161	0
50	6C2798	0.77	92198	79137	13061
51	6C2914	0.92	50958	52090	0
52	6C2997	0.59	34525	22697	11828
53	6C3521	0.81	23104	20794	2310
54	6C3523	0.66	22800	16771	6029
55	6C4986	0.96	25764	27601	0
56	6C5410	0.91	53609	54403	0
57	6C6107	0.10	22800	2576	20224
58	6C6108	0.74	22800	18810	3990
59	6C6109	0.99	22800	24996	0
60	6C6683	0.72	22800	18177	4623
61	6C7044	0.90	44460	44460	0
62	6C7117	0.59	90843	59048	31795
63	6C7196	0.98	26714	29089	0
64	6C7201	0.97	125372	134659	0
65	6C7464	0.81	118560	107253	11307
66	7C1529	0.95	56088	59204	0
67	7C1530	0.90	230280	230067	213
68	7C1545	0.91	49590	50233	0
69	7C1831	1.06	22811	26887	0
70	7C1970	0.97	27759	29892	0
71	7C3626	1.00	22800	25312	0
72	7C3694	0.86	33231	31785	1446
73	7C3798	0.94	179354	186827	0
74	7C3894	0.97	157662	169341	0
75	7C4198	0.00	0	0	0
76	7C4864	0.95	33364	35187	0
77	7C4896	0.94	44480	46539	0
78	7C4923	0.79	22914	20071	2843
79	7C5296	0.92	80484	82645	0
80	7C6227	0.78	22800	19697	3103
81	7C6567	0.94	26586	27792	0
82	7C7172	0.89	125290	123318	1972
83	7C7212	0.90	179657	179324	333
84	7C7352	0.87	31312	30268	1044
85	7C7418	0.92	80883	82755	0
86	7C7469	0.00	0	0	0
87	7C8312	0.76	99572	83991	15581
Total Estimated Savings in Demand KVA (Rs) - Year 2003					322834

Appendix f

Electricity billings received from the CEB - Northern Pumping Stations Year 2001

Energy_Charge (Rs)

A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1C4072	11002.8	8044.5	6798.9	13078.8	14116.8	6487.5	9497.7	0	7681.2	21279	21175.2	22680.3
2C1592												
2C1937	169367	141514	134421	170924	129058	165907	136497	159506	139957	131826	167464	149299
2C2849	159852	140960.4	157360.8	142517.4	179366.4	161720.4	145008.6	160474.8	145112.4	131722.2	139922.4	128919.6
2C2854	27645.4	22974.4	24393	21971	29617.6	27195.6	24842.8	28129.8	27437.8	25673.2	30413.4	23943.2
2C3357	108048.88	96016.73	109612.8	104905.47	110124.88	106465.93	110074.71	99077.1	96630.88	101123.69	96006.35	102374.48
2C4185	221440	232339	215731	252753	234588	248428	242892	274032	257251	259846	269188	221959
2C4281	39435.35	35335.25	39371.34	38933.65	41812.37	40919.69	41314.13	41087.5	42032.08	42540.7	40618.67	41118.64
2C4420	139934.51	126987.19	142093.55	136590.42	143154.04	136394.93	144200.69	142129.88	138763.3	141560.71	138157.8	142138.53
2C5741	23413.82	19362.16	24204.43	23143.94	24396.46	20448.6	24081.6	23491.67	23481.29	24581.57	21272.08	19931.33
2C6091	14419.55	13037.28	14260.39	13843.46	14400.52	13618.56	14222.33	14158.32	13935.15	14685.97	14085.66	14445.5
2C6117	8760.72	8760.72	8765.91	6295.47	1384	20.76	24.22	74.39	51.9	31.14	20.76	1977.39
2C6258	24218	19820.61	21195.96	21555.8	22628.4	20933	21798	23355	20137.2	24739	18511	11867.8
2C6371	48336.2	48440	45360.6	53353.2	45845	48751.4	42315.8	36503	32558.6	33319.8	35119	31589.8
2C6703	38039.24	34219.4	38437.14	37542.73	39141.25	37748.6	38201.86	29986.09	40059.88	40758.8	40881.63	50164.81
2C7103	38198.4	39790	38233	38475.2	39063.4	38129.2	40205.2	47021.4	36468.4	44703.2	55290.8	47955.6
2C7137	89942.7	86932.5	97883.4	93575.7	106706.4	101827.8	92901	120408	96482.1	119370	94198.5	105460.8
2C7420	155968.15	118094.99	127430.07	120006.64	126571.99	123447.61	126919.72	126309.03	121317.98	124895.62	122279.86	125738.13
2C7848			31140	45845	57712.8	47678.8	56121.2	49339.6	45222.2	59269.8	50550.6	
2M0382	27264.8	27126.4	23528	27541.6	23597.2	22144	23528	25880.8	23389.6	24150.8	25604	23043.6
3C5942	62850.9	0	48526.5	39080.7	32489.4	34721.1	27403.2	11573.7	52574.7	60982.5	53197.5	60567.3
3C6475	11418	0	0	0	0	0	0	0	0	0	28596.9	28596.9
3C7476												
3C7872								1660.8	8269.4	8511.6	5224.6	
4C2896	200392.82	185608.24	205785.23	195870.6	197640.39	196671.59	203780.16	203067.4	192033.46	199631.62	197739	201231.87
4C4910	34409.7	25742.4	31451.4	19358.7	27922.2	26157.6	27143.7	18113.1	18113.1	21849.9	13753.5	27455.1
4C6471	59466.1	54008.6	57775.75	38411.95	973.5	5138.9	40155.4	17661.65	4044.45	24278.5	8150.85	63537.1
6C1527	34807.6	37541	34150.2	39513.2	41589.2	36606.8	36053.2	41866	34219.4	35845.6	39859.2	34392.4
6C1528	36745.2	39651.6	33700.4	39236.4	40897.2	34807.6	34703.8	40101.4	34288.6	29513.8	31451.4	27541.6
6C1556	8234.8	8338.6	7439	9791.8	8857.6	7127.6	8269.4	8719.2	5916.6	7854.2	6677.8	7577.4
6C2562	101824.34	90764.45	99912.69	96305.64	100016.49	97371.32	100791.53	101846.83	96578.98	104760.15	103943.59	104237.69
6C2798	41411.01	37092.93	44042.34	50213.25	64663.94	57986.14	56673.07	55048.6	50249.58	49040.31	44779.32	42566.65
6C2914	18476.4	21625	17230.8	26434.4	29686.8	23043.6	31105.4	37022	30275	32143.4	34807.6	27680
6C2997	22861.95	19355.24	20176.99	20408.81	21526.39	20533.37	22640.51	25121.33	24380.89	24972.55	21628.46	18398.55
6C3521	17196.2	19064.6	15500.8	18165	18165	16469.6	16711.8	19030	16089	17334.6	18303.4	15985.2
6C3523	11694.8	12559.8	8996	11002.8	13528.6	11556.4	11279.6	12663.6	10310.8	10449.2	11106.6	9342
6C4986	20656.2	21521.2	18545.6	22939.8	16677.2	25638.6	21486.6	24773.6	20379.4	21763.4	23597.2	20587
6C6107	9786.61	9001.19	10260.63	10684.48	11030.48	10876.51	11279.6	11250.19	10748.49	10402.49	9421.58	9188.03
6C6108	9425.04	8518.52	9483.86	9253.77	9587.66	9369.68	9892.14	10085.9	9570.36	9688	9383.52	9829.86
6C6109	7705.42	7030.72	7753.86	7376.72	7670.82	7613.73	7563.56	7541.07	7445.92	7954.54	7598.16	8092.94
6C6683	9651.67	12511.36	15180.75	8042.77	4854.38	10563.38	14213.68	18979.83	18030.06	22998.62	28344.32	207.6
6C7044	30309.6	38890.4	20794.6	31797.4	22836	34565.4	26988	30897.8	27610.8	19895	33354.4	30413.4
6C7117	95570.39	85157.52	94919.91	89223.02	94345.55	91025.68	95291.86	95451.02	90868.25	94400.91	91067.2	94547.96
6C7196	28477.53	28615.93	30266.35	27712.87	29529.37	29095.14	28911.76	29186.83	28937.71	29681.61	29012.1	29420.38
6C7201	128871.16	114477.56	133289.58	129144.5	133466.04	127821.05	132656.4	131959.21	124340.29	127355.68	123108.53	118034.44
6C7464	110754.6	105876	112882.5	114750.9	84545.1	112415.4	114491.4	113038.2	102710.1	90980.7	123418.2	107536.8

7C7172	91074.12	95634.4	5093.12	3.46	0	0	50586.93	128734.49	115562.27	127476.78	103106.27	107024.72	
7C7212	149862.98		17.3	0	91947.77	28271.66	133187.51	132391.71	134929.62	130135.79	191727.25	201243.98	206029.16

Demand (kVA) Charge (Rs)

A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1C4072	5424	5424	5424	4464	4512	4512	4512	4512	4512	4512	4512	4512
2C1592												
2C1937	12000	11360	11680	11680	11680	11680	11680	11680	11680	11360	11360	11360
2C2849	12192	12192	12192	12192	12288	12288	12288	12288	12288	12288	12288	12192
2C2854	2080	2080	2048	2048	2048	2112	2112	2112	2272	3264	3264	3264
2C3357	8512	8512	8472	8576	8576	8576	8608	8608	8608	8608	8608	8608
2C4185	20640	20640	20640	20640	19520	19520	23200	23200	23200	23200	23200	23200
2C4281	2808	2808	2808	2760	2832	2896	2944	2968	2968	2968	2968	2968
2C4420	13778.4	13778.4	13778.4	13778.4	13778.4	13778.4	13778.4	11480.8	11480.8	11480.8	11480.8	11480.8
2C5741	2008	2008	2008	1864	1864	1872	1896	1928	1928	1928	1928	1928
2C6091	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
2C6117	1888	1888	1888	1888	1888	1888	1888	1888	1888	1888	1736	1600
2C6258	2000	2000	2368	2560	2560	2560	2560	2560	2560	2560	2496	2400
2C6371	4608	4608	4608	4608	4608	4608	4608	4544	4544	4544	4480	4480
2C6703	3536	3536	3288	3320	3320	3320	3320	3496	3496	3496	3736	3736
2C7103	3840	3840	3840	3712	3712	3712	3744	3744	3744	4000	4000	4000
2C7137	7680	7680	7680	7536	7392	7680	7680	8400	8400	8400	8400	8400
2C7420	13072.8	13072.8	13072.8	13072.8	12959.2	12956	12897.6	12897.6	10878.4	10676	10036.8	10015.2
2C7848				4320	4320	4384	4416	4480	4480	4480	4544	4544
2M0382	1856	1856	1856	1856	1792	1792	1728	1728	1728	1664	1664	1664
3C5942	5280	5280	5280	5280	5280	5280	5280	5280	5280	5280	5280	5280
3C6475	2160	2160	2160	2160	2160	2160	2016	1600	1600	1600	2064	2064
3C7476												
3C7872									1600	1600	1600	1600
4C2896	19192	19192	19647.2	19647.2	19647.2	19647.2	19647.2	19647.2	19647.2	18984	18984	18984
4C4910	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400
4C6471	0	0	0	0	0	0	0	0	0	0	0	0
6C1527	3552	3552	3552	3552	3552	3552	3552	3552	3552	3552	3328	3328
6C1528	3104	3104	3104	3104	3104	3104	3104	3104	3104	3104	2976	2944
6C1556	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
6C2562	8168	8168	8168	7768	7768	7768	7728	7840	7840	7840	7840	7840
6C2798	5408	5152	5152	5568	5568	5568	5568	5568	5568	5568	5488	5488
6C2914	3328	3328	3328	3328	2720	2720	3104	3168	3712	3712	3712	3712
6C2997	2318.4	2323.2	2336.8	2336.8	2336.8	2336.8	2354.4	2360.8	2360.8	2360.8	2360.8	2360.8
6C3521	1664	1664	1664	1664	1664	1664	1664	1664	1664	1632	1600	1600
6C3523	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
6C4986	2272	2272	2272	2272	2272	2144	2144	2304	2304	2304	2304	2304
6C6107	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
6C6108	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
6C6109	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
6C6683	2640	2640	2640	2640	2640	2640	2648	2664	2704	2776	2776	2776
6C7044	2528	2528	2528	2528	2528	2528	2528	2528	2496	2496	2400	2400
6C7117	10104	10104	8553.6	6536	6536	6536	6648	6648	7272	7272	7272	7272
6C7196	2951.2	2951.2	2951.2	2951.2	2830.4	2830.4	2830.4	2830.4	2830.4	2757.6	2672.8	2648
6C7201	14384.8	14384.8	14384.8	14221.6	10801.6	10801.6	9856.8	9856.8	9856.8	9838.4	9838.4	9838.4
6C7464	7920	7920	7920	7824	7824	7824	7872	7872	7872	7872	7872	7872

7C7172	7991.2	7991.2	7991.2	7984	7984	7984	9787.2	9917.6	9917.6	9917.6	9917.6	9917.6
7C7212	15876.8	15876.8	15876.8	15876.8	15876.8	15868	15800.8	13334.4	13334.4	13982.4	13982.4	13982.4

Power Factor

7C7172 0.84 0.84 0.84 0.5 0 0 0.83 0.83 0.83 0.9 0.91 0.83
 7C7212 0.85 0.77 0 0.84 0.84 0.84 0.83 0.83 0.85 0.95 0.95 0.95

Excess kVA Charge (Surcharge) (Rs)

7C7172	292.5	301.5	297	157.5	0	0	427.5	432	427.5	0	0	423
7C7212	495	81	0	396	409.5	400.5	472.5	585	328.5	0	0	0

Appendix g

Electricity billings received from the CEB - Northern Pumping Stations Year 2002

Energy_Charge (Rs)

A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1C4072	21091.82	1782	7182	3510	2106	1944	432	0	2862	864	4050	18306
2C1592												
2C1937	126406.72	148860	154620	193860	144000	145980	138780	163620	179100	158760	169740	200700
2C2849	161045.45	129924	148176	129816	150336	177552	128196	152604	151632	142128	167616	88020
2C2854	32388.03	29268	33084	27792	32832	37584	28476	33480	33444	29340	33444	26820
2C3357	101194.89	102762	98555.4	101795.4	104446.8	100083.6	94617	91350	86103	107217	104646.6	112581
2C4185	213784.2	289440	255600	256860	278460	268200	229860	294840	230040	286380	229140	248760
2C4281	38649.65	40885.2	45009	44101.8	46216.8	44987.4	45977.4	45505.8	43772.4	43918.2	41630.4	42885
2C4420	136518.72	125737.2	145890	142075.8	145031.4	141888.6	147508.2	147873.6	143046	139982.4	141188.4	144689.4
2C5741	22856.49	22291.2	23596.2	22537.8	25164	22626	22809.6	20635.2	23914.8	23517	22845.6	24174
2C6091	13851.6	13496.4	14970.6	14578.2	14994	14673.6	14776.2	12987	190.8	13581	9156.6	14752.8
2C6117	983.36	41.4	21.6	16.2	0	0	5.4	1.8	0	0	0	0
2C6258	21460	16884	15552	15084	13896	12492	15912	14256	13320	18396	14616	14508
2C6371	32648.08	40176	34920	39744	32796	36036	37980	34380	32580	40968	38952	32724
2C6703	35009.23	13372.2	40843.8	41166	44006.4	42228	40071.6	40014	39083.4	50419.8	51309	52425
2C7103	50785.16	54792	49356	58248	49608	54144	46944	53964	48024	62352	50436	49896
2C7137	82077.79	100764	109350	119934	106596	99090	123822	109836	100764	122958	91044	130626
2C7420	117574.12	120846.6	132730.2	129123	133171.2	129501	133597.8	129828.6	129828.6	131122.8	126061.2	130316.4
2C7848	48166.86	48096	53748	37620	17136	18720	17748	19368	16848	37764	49068	48744
2M0382	22575.04	25704	22824	26064	21888	24264	24768	22536	21312	26784	22248	24048
3C5942	45853.15	20034	17550	0	5778	34614	46764	66366	60588	47790	60048	63018
3C6475	4397.61	1242	3186	1674	0	0	0	0	0	0	54	0
3C7476												
3C7872	0	0	0	0	0	0	0	0	0	0	0	0
4C2896	188588.52	183400.2	200437.2	183619.8	188778.6	182336.4	178504.2	156387.6	162275.4	199528.2	200354.4	207495
4C4910	21860.64	23706	20142	16902	12474	11880	6318	8532	6264	21222	13554	26568
4C6471	32864.35	5635.8	8704.8	5725.7	1829	65.1	427.8	511.5	6.2	43434.1	24951.9	55818.6
6C1527	41091.29	33624	38340	38052	39348	33732	29160	30132	21960	39456	35640	35712
6C1528	33935.74	26172	29844	29988	33012	28044	29844	33048	19584	32400	28800	29664
6C1556	8744.19	7704	8784	8496	8208	8640	7236	1692	0	5760	7596	7740
6C2562	99312.66	94631.4	105219	104130	108671.4	105818.4	109911.6	112068	105003	109688.4	108527.4	110435.4
6C2798	49585.32	60681.6	67075.2	61925.4	63990	63108	64398.6	59220	54237.6	56237.4	50603.4	48238.2
6C2914	35417.36	38484	52776	48924	50220	44928	42948	45108	39924	45072	33516	26928
6C2997	21348.19	19330.2	27061.2	29322	26982	26204.4	19404	275.4	4818.6	26595	25381.8	26159.4
6C3521	17567.29	17352	17100	19260	20124	15552	17064	19476	16704	20376	15840	17856
6C3523	11618.92	4752	1620	0	0	0	0	0	0	8100	11448	11124
6C4986	24672.15	14076	19728	19980	22212	21204	18936	19476	16956	22428	20736	18288
6C6107	9285.34	9698.4	10605.6	10177.2	5227.2	4978.8	4786.2	181.8	149.4	4773.6	4568.4	4680
6C6108	9964.88	9824.4	10526.4	9835.2	10179	4752	0	1.8	0	5841	7441.2	7216.2
6C6109	8915	10623.6	11781	11318.4	11604.6	11077.2	8965.8	8991	8634.6	10958.4	11433.6	9329.4
6C6683	17799.44	18327.6	16970.4	9855	13937.4	13608	13482	14052.6	13775.4	5380.2	151.2	277.2
6C7044	32429.76	26676	28908	29988	23364	28872	23364	27828	31104	35208	38412	41508
6C7117	93139.21	86344.2	98884.8	95362.2	98328.6	95214.6	93922.2	97567.2	94582.8	99138.6	94231.8	95331.6
6C7196	26103.21	27909	28312.2	29779.2	30315.6	29260.8	30092.4	28915.2	29169	29484	26445.6	27853.2
6C7201	129899.44	122506.2	138250.8	133930.8	129947.4	134186.4	138486.6	130134.6	132519.6	136463.4	130410	133943.4
6C7464	118121.76	97200	102330	105192	115398	102330	103896	130896	98658	108756	116964	122742

7C7172	41046.04	0	0	0	0	63	54	36	76046.4	131193	125595	129218.4
7C7212	114890.09	48.6	129.6	37.8	50.4	691.2	58685.4	59214.6	139618.8	176949	182842.2	188568

Demand (kVA) Charge (Rs)

A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1C4072	5060.76	5358	5358	5358	5358	5301	5301	5301	5301	5187	5187	5244
2C1592												
2C1937	13122.76	13490	13490	15960	15960	15960	15960	15960	15960	15960	15960	15960
2C2849	14131.64	14478	14250	14136	14022	14022	14022	13908	13908	13794	13566	6384
2C2854	3783.27	3876	3876	3876	2964	2964	2964	2964	2850	2850	2850	2850
2C3357	10169.94	10212.5	10212.5	10212.5	10212.5	10212.5	10212.5	10212.5	9158	9158	9148.5	9110.5
2C4185	26680	22990	22990	22610	27550	27550	27550	27930	28500	28500	28500	28500
2C4281	3506.55	3524.5	3562.5	3581.5	3648	3657.5	3657.5	3657.5	3657.5	3657.5	3657.5	3657.5
2C4420	13564.01	13633.45	13357	12112.5	12112.5	11848.4	11848.4	11848.4	11848.4	11932	11932	11932
2C5741	2277.84	2289.5	2242	1947.5	1995	1995	1995	1995	1995	1995	1995	1909.5
2C6091	1890.32	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
2C6117	1890.32	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
2C6258	2775	2850	2774	2698	2356	2356	2356	2356	2356	1900	1900	1900
2C6371	5152	3458	3458	3534	3534	3534	3534	3534	3534	3534	3458	3458
2C6703	4413.9	4436.5	4436.5	4436.5	4471.65	4471.65	4471.65	4471.65	4471.65	4471.65	4471.65	4422.25
2C7103	4556.45	4750	5206	5206	5206	7106	7106	7106	7106	7106	7106	7106
2C7137	9920.69	9975	9975	10032	10032	10032	10032	10032	10032	10032	9918	9918
2C7420	11892.02	11970.95	11970.95	12342.4	12342.4	12342.4	12342.4	12342.4	12342.4	12342.4	12342.4	12342.4
2C7848	5507.86	5662	5662	5662	5662	5662	5662	5472	5472	5206	5206	5206
2M0382	1913.6	1976	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
3C5942	6095.29	6270	6270	6270	6270	6270	6270	5757	5700	5586	6327	6327
3C6475	2382.71	2451	2451	2451	2451	2451	2280	2280	2280	2280	1900	1900
3C7476												
3C7872	1835.14	1900	1900	1900	1900	1900	1900	1900	1900			
4C2896	22428.68	22543.5	20364.2	20364.2	20364.2	20364.2	20363.25	18094.65	16684.85	16459.7	19243.2	21472.85
4C4910	4140	4503	4503	4503	4503	4503	4503	4503	2679	2565	2565	2565
4C6471	0	0	0	0	0	0	0	0	0	0	0	0
6C1527	3695.06	3952	3876	3876	3382	3382	3382	3382	3382	3382	3344	3344
6C1528	3233.18	3458	3458	3420	3192	3192	3192	3154	3154	3154	3078	3116
6C1556	1741.18	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
6C2562	9262.58	9310	9177	8474	8569	8569	8569	8569	8569	8569	8569	8540.5
6C2798	6559.42	6621.5	6640.5	6906.5	6906.5	6906.5	6906.5	6906.5	6906.5	6906.5	6783	6840
6C2914	4083.2	4408	4408	4256	4256	4256	4256	4256	4256	4142	4142	4142
6C2997	2789.17	2803.45	2783.5	2717.95	2593.5	2593.5	2593.5	2593.5	2424.4	2835.75	2837.65	2837.65
6C3521	1760	1900	1900	1900	1900	2280	2280	2280	2280	2280	2280	2280
6C3523	1776.47	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
6C4986	2565.82	2736	2736	2736	2736	2736	2736	2736	2736	2736	1900	1900
6C6107	1890.32	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
6C6108	1890.32	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
6C6109	1890.32	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
6C6683	3279.71	3296.5	3296.5	4184.75	4184.75	4184.75	4184.75	4184.75	4184.75	4184.75	1900	1900
6C7044	2659.77	2888	2926	3002	3914	3914	3914	3914	3914	3914	3914	3914
6C7117	8591.52	8635.5	8635.5	8056	8113	8113	8113	8113	8113	8113	8113	7913.5
6C7196	3113.36	3129.3	3060.9	2788.25	2788.25	2788.25	2788.25	2788.25	2788.25	2343.65	2343.65	2330.35
6C7201	11623.59	11626.1	11472.2	11377.2	10405.35	10405.35	10405.35	10405.35	10405.35	10405.35	10374.95	10374.95
6C7464	8841.94	9291	9234	9462	9462	9462	9462	9462	9747	9804	9804	9975

7C7172 11717.16 11777.15 11667.9 11667.9 11450.35 11450.35 11450.35 4876.35 10076.65 10076.65 10076.65 10076.65
 7C7212 16525.2 16609.8 16609.8 16609.8 16609.8 16609.8 16609.8 11105.5 15064.15 15064.15 15064.15 15064.15

Power Factor

A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1C4072	0.68	0.66	0.76	0.71	0.75	0.82	0.73	0	0.82	0.8	0.8	0.81
2C1592												
2C1937	0.88	0.87	0.87	0.84	0.84	0.84	0.84	0.85	0.84	0.85	0.84	0.85
2C2849	0.88	0.88	0.88	1	0.91	0.89	0.87	0.87	0.87	0.85	0.85	0.85
2C2854	0.92	0.92	0.92	0.91	0.92	0.92	0.91	0.91	0.91	0.91	0.9	0.91
2C3357	0.92	0.89	0.96	0.93	0.93	0.93	0.94	0.94	0.94	0.91	0.97	0.94
2C4185	0.94	0.94	0.94	0.95	0.94	0.95	0.94	0.94	0.92	0.94	0.94	0.94
2C4281	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94
2C4420	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
2C5741	0.97	0.97	0.97	0.97	0.97	0.96	0.97	0.97	0.97	0.97	0.96	0.96
2C6091	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.88	0.98	0.98	0.98
2C6117	0.98	0.79	1	1	0	0	1	1	0	0	0	0
2C6258	0.95	0.93	0.94	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.8
2C6371	0.81	0.82	0.82	0.82	0.82	0.81	0.82	0.82	0.81	0.82	0.81	0.81
2C6703	0.91	0.82	0.88	0.93	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.92
2C7103	0.98	0.98	0.88	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
2C7137	0.83	0.84	0.84	0.84	0.84	0.83	0.83	0.84	0.84	0.84	0.83	0.83
2C7420	0.82	0.82	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.81	0.81	0.81
2C7848	0.8	0.77	0.78	0.78	0.78	0.77	0.79	0.78	0.79	0.81	0.82	0.84
2M0382	0.98	0.99	0.99	0.99	0.99	1	0.99	1	1	0.99	1	1
3C5942	0.84	0.86	0.84	0	0.84	0.84	0.85	0.85	0.84	0.84	0.82	0.87
3C6475	3.28	0.51	0.68	0.37	0	0	0	0	0	0	0.02	0
3C7476												
3C7872	0	0	0	0	0	0	0	0				
4C2896	0.88	0.88	0.94	0.95	0.95	0.94	0.95	0.95	0.95	0.95	0.95	0.94
4C4910	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
4C6471												
6C1527	0.88	0.89	0.88	0.88	0.88	0.87	0.88	0.88	0.88	0.87	0.88	0.87
6C1528	0.76	0.76	0.76	0.75	0.75	0.75	0.75	0.76	0.76	0.76	0.75	0.75
6C1556	0.69	0.7	0.69	0.71	0.71	0.69	0.69	0.71	0	0.7	0.68	0.67
6C2562	0.97	0.97	0.97	0.96	0.97	0.96	0.96	0.96	0.96	0.97	0.97	0.97
6C2798	0.86	0.89	0.88	0.89	0.89	0.88	0.88	0.88	0.87	0.86	0.76	0.76
6C2914	0.97	0.98	0.98	0.98	0.99	0.99	0.96	0.95	0.95	0.95	0.96	0.91
6C2997	0.91	0.93	0.93	0.93	0.92	0.92	0.92	0.73	0.91	0.78	0.71	0.71
6C3521	0.9	0.89	0.88	0.93	0.94	0.74	0.75	0.82	0.82	0.82	0.82	0.81
6C3523	0.96	0.85	0.68	0	0	0	0	0	0	0.97	0.85	0.79
6C4986	0.91	0.93	1.05	1.26	1.07	0.97	0.97	0.98	0.98	0.97	0.97	0.97
6C6107	0.93	0.95	0.94	0.94	0.92	0.74	0.67	0.03	0.02	0.67	0.68	0.67
6C6108	0.98	0.99	0.98	0.97	0.98	0.83	0	0	0	1	1	0.97
6C6109	1	1	1	1	1	1	1	1	1	1	1	1
6C6683	0.83	0.83	0.85	0.72	0.73	0.72	0.73	0.72	0.73	0.72	0.81	0.73
6C7044	0.95	0.82	0.81	0.82	0.58	0.82	0.82	0.96	0.92	0.9	0.9	0.9
6C7117	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.91
6C7196	0.98	0.98	0.94	0.97	0.96	0.97	0.97	0.97	0.97	0.97	0.98	0.98
6C7201	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
6C7464	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.88	0.85	0.83	0.83	0.83

7C7172	0.83	0	0	0	0	0.67	0.88	0.91	0.95	0.95	0.94	0.94
7C7212	0.95	0.87	0.94	0.88	0.9	0.93	0.95	0.95	0.95	0.95	0.95	0.95

Excess kVA_Charge (Surcharge) (Rs)

A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1C4072	646.5	735	435	575	445	235	500	0	235	305	305	275
2C1592												
2C1937	152.5	235	235	560	535	555	560	460	545	450	545	455
2C2849	162.5	165	165	0	0	35	100	100	110	170	165	170
2C2854	0	0	0	0	0	0	0	0	0	0	0	0
2C3357	0	60	0	0	0	0	0	0	0	0	0	0
2C4185	0	0	0	0	0	0	0	0	0	0	0	0
2C4281	0	0	0	0	0	0	0	0	0	0	0	0
2C4420	0	0	0	0	0	0	0	0	0	0	0	0
2C5741	0	0	0	0	0	0	0	0	0	0	0	0
2C6091	0	0	0	0	0	0	0	0	0	0	0	0
2C6117	0	0	0	0	0	0	0	0	0	0	0	0
2C6258	0	0	0	0	0	0	0	0	0	0	0	110
2C6371	176.5	160	160	165	160	180	155	155	175	160	180	180
2C6703	0	125	50	0	0	0	0	0	0	0	0	0
2C7103	0	0	60	0	0	0	0	0	0	0	0	0
2C7137	393.5	345	350	350	345	405	405	345	345	345	395	405
2C7420	558	560	490	575	565	560	555	575	575	615	620	615
2C7848	324.5	405	385	360	365	395	330	360	325	275	245	185
2M0382	0	0	0	0	0	0	0	0	0	0	0	0
3C5942	216	135	200	0	195	195	160	165	195	195	295	100
3C6475	0	495	295	705	0	0	0	0	0	0	295	0
3C7476												
3C7872	0	0	0	0	0	0	0	0	0	0	0	0
4C2896	239	210	0	0	0	0	0	0	0	0	0	0
4C4910	0	0	0	0	0	0	0	0	0	0	0	0
4C6471	0	0	0	0	0	0	0	0	0	0	0	0
6C1527	33.5	20	40	40	40	55	40	40	40	60	40	60
6C1528	254	245	245	275	265	265	265	245	245	250	270	275
6C1556	109	110	115	110	105	125	145	100	0	115	120	125
6C2562	0	0	0	0	0	0	0	0	0	0	0	0
6C2798	154.5	40	80	40	40	80	75	75	115	150	555	560
6C2914	0	0	0	0	0	0	0	0	0	0	0	0
6C2997	0	0	0	0	0	0	0	215	0	200	315	310
6C3521	0	10	20	0	0	215	195	80	80	80	80	95
6C3523	0	35	155	0	0	0	0	0	0	0	35	75
6C4986	0	0	0	0	0	0	0	0	0	0	0	0
6C6107	0	0	0	0	0	85	90	285	275	85	70	115
6C6108	0	0	0	0	0	40	0	0	0	0	0	0
6C6109	0	0	0	0	0	0	0	0	0	0	0	0
6C6683	129.5	125	85	440	150	155	145	155	150	165	25	150
6C7044	0	135	155	140	730	185	115	0	0	0	0	0
6C7117	0	0	0	0	0	0	0	0	0	0	0	0
6C7196	0	0	0	0	0	0	0	0	0	0	0	0
6C7201	0	0	0	0	0	0	0	0	0	0	0	0
6C7464	53	55	55	110	105	110	110	110	285	400	400	410

Appendix h

Electricity billings received from the CEB - Northern Pumping Stations Year 2003

Energy_Charge (Rs)													
A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1C4072	26,082	6,966	2,322	108	3,240	324	1,296	17,496	10,692	5,724	43,038	38,880	
2C1592													
2C1937	156,420	152,640	149,580	167,940	160,200	155,700	168,660	163,260	157,500	178,740	146,520	198,000	
2C2849	114,588	93,744	94,932	157,032	123,552	141,912	130,140	167,940	134,244	153,036	153,252	138,564	
2C2854	36,792	31,896	30,384	35,748	31,248	32,040	29,052	37,548	30,420	34,956	35,136	32,652	
2C3357	111,078	96,066	107,818	106,567	101,167	102,850	97,448	101,626	97,859	107,046	100,264	108,016	
2C4185	207,900	222,660	220,320	256,140	271,620	251,640	278,280	289,440	316,260	237,060	275,040	252,900	
2C4281	41,423	37,161	42,268	41,485	44,739	45,308	46,321	47,399	45,572	46,249	43,490	43,861	
2C4420	140,553	124,571	140,778	139,640	141,179	140,893	146,671	147,100	142,438	147,267	141,898	148,194	
2C5741	19,008	18,635	16,488	16,479	18,464	16,468	17,118	19,030	21,625	23,209	20,398	18,778	
2C6091	7,349	2,678	2,590	1,042	1,015	2,162	806	884	2,893	10,179	7,915	10,467	
2C6117													
2C6258	15,264	13,608	13,104	5,652	6,768	1,188	0	0	4,572	14,148	11,700	15,660	
2C6371	32,760	34,524	25,164	37,836	33,912	36,900	36,540	35,316	39,852	36,576	31,464	34,020	
2C6703	51,568	47,196	52,843	51,656	55,798	54,247	56,236	55,957	54,463	59,330	51,714	42,818	
2C7103	55,404	51,156	39,708	42,948	38,268	41,364	42,912	44,820	38,016	43,344	37,152	36,972	
2C7137	88,938	106,920	113,562	105,192	93,042	113,562	123,714	111,888	113,994	113,292	95,742	129,222	
2C7420	127,393	116,678	128,929	118,519	113,558	120,076	156,285	167,321	162,707	167,708	159,766	166,653	
2C7848	51,840	33,840	30,312	33,192	44,784	45,324	39,924	41,796	41,472	45,792	40,752	38,484	
2M0382	20,232	20,592	19,152	24,048	19,080	18,792	2,160	20,952	24,552	19,944	21,456	21,168	
3C5942	48,114	36,018	270	3,294	54	0	17,496	23,004	28,674	59,778	54,540	53,946	
3C6475	17,982	54	108	216	0	0	0	0	0	0	0	0	
3C7476													
3C7872													
4C2896	207,668	162,844	190,406	177,313	181,514	173,828	176,915	179,379	172,098	179,872	180,169	197,392	
4C4910	27,000	22,572	6,750	13,122	15,822	3,780	2,970	2,268	1,026	4,914	4,536	8,694	
4C6471	52,015	40,483	1,832	9	1,197	884	1,690	6	22	2,102			
6C1527	41,760	31,860	29,808	36,396	36,540	34,884	42,804	33,552	37,368	39,024	40,392	39,132	
6C1528	34,920	30,060	27,000	19,044	19,404	27,972	32,832	29,016	29,016	30,168	31,788	29,520	
6C1556	5,220	3,780	3,816	828	5,832	6,912	6,408	6,192	6,840	6,444	7,200	4,032	
6C2562	114,379	105,140	117,110	111,083	118,289	115,733	119,173	119,993	115,990	118,912	115,555	121,649	
6C2798	44,221	40,410	53,163	56,284	66,456	61,000	65,005	59,612	61,394	61,274	58,655	61,042	
6C2914	35,028	33,804	35,784	43,668	50,796	32,292	30,420	30,132	34,956	31,644	28,692	23,688	
6C2997	24,205	2,968	2,581	1,656	76	76	94	122	9,187	101	81	754	
6C3521	20,232	17,676	16,740	20,124	17,532	16,596	19,368	17,028	17,064	17,568	18,396	17,748	
6C3523	12,564	7,416	0	0	0	0	0	0	0	396	7,740	2,664	
6C4986	23,796	21,528	18,972	22,104	23,976	20,736	25,236	22,140	22,500	18,432	23,508	22,176	
6C6107	2,198	76	119	117	104	191	227	216	162	139	200	133	
6C6108	7,564	7,241	8,080	1,692	0	0	2	0	806	8,465	8,046	8,127	
6C6109	8,309	7,027	9,527	5,267	11,594	10,962	11,493	11,506	11,061	11,576	11,282	8,881	
6C6683	7,085	8,986	10,453	10,087	10,393	10,204	9,679	10,138	9,967	8,419	52	65	
6C7044	32,976	8,388	0	0	0	0	0	0	14,328	34,560	37,296	24,840	
6C7117	96,930	85,043	99,356	96,068	2,633	52	45	31	36	41	22	29	
6C7196	27,023	24,903	26,982	25,090	25,857	24,660	25,065	25,148	24,143	24,950	5,913	12,053	
6C7201	134,903	121,687	137,777	135,664	140,342	135,731	139,226	140,188	133,531	139,495	133,738	137,032	
6C7464	101,790	102,006	113,508	101,250	111,186	82,404	105,138	108,270	89,532	92,016	100,386	94,392	

7C7172	129,434	49,298	52,994	117,254	270	81	68	68,953	48,521	95,047	121,426	125,089
7C7212	157,968	71,042	1,724	2,129	1,076	173	144	29,452	114,008	131,355	130,891	160,038

Demand (kVA) Charge (Rs)												
A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1C4072	5,301	5,301	5,301	5,301	5,301	5,301	5,301	5,244	5,244	5,244	5,244	5,244
2C1592												
2C1937	15,960	15,770	15,580	15,580	15,580	15,580	15,770	15,770	15,770	15,770	15,770	15,770
2C2849	6,384	6,384	6,384	5,814	5,814	5,814	5,814	5,814	5,814	5,814	5,814	5,700
2C2854	2,850	2,888	2,888	2,926	2,926	2,964	3,040	3,040	3,040	3,040	3,040	3,040
2C3357	9,111	16,758	16,758	16,758	16,758	16,758	16,758	16,758	10,555	10,555	10,156	10,156
2C4185	28,500	28,500	28,500	21,090	22,040	22,420	29,640	29,640	29,640	29,640	29,640	29,640
2C4281	3,629	3,601	3,601	3,506	3,553	3,648	3,648	3,648	3,648	3,648	3,648	3,648
2C4420	11,932	11,932	11,932	11,932	11,734	11,566	11,616	11,630	11,630	11,630	11,630	11,630
2C5741	1,910	1,929	1,929	1,929	1,929	1,929	1,929	1,948	1,948	1,957	1,957	1,957
2C6091	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
2C6117												
2C6258	1,900	1,900	1,900	1,938	1,938	1,938	1,938	1,938	1,938	1,900	1,900	1,900
2C6371	3,458	3,458	3,458	3,458	3,458	3,458	3,458	3,458	3,458	3,344	3,344	2,964
2C6703	4,422	4,412	4,412	4,466	4,492	4,528	4,557	4,593	5,155	5,155	5,155	5,155
2C7103	6,764	6,764	4,560	4,560	4,560	4,560	4,560	4,560	4,560	4,560	4,560	4,560
2C7137	9,861	9,861	9,861	9,861	9,975	10,032	10,146	10,260	10,260	10,260	10,260	10,260
2C7420	12,342	12,342	12,342	11,937	11,942	14,376	14,435	14,805	14,805	14,805	14,805	14,805
2C7848	5,206	5,206	5,206	5,320	5,320	5,320	5,320	5,320	5,320	5,320	5,244	5,244
2M0382	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
3C5942	6,327	6,327	6,327	6,327	6,327	5,757	5,643	5,529	5,529	5,130	5,130	5,130
3C6475	2,280	2,280	2,280	2,280	2,280	2,280	2,280	1,900	1,900	1,900	1,900	1,900
3C7476												
3C7872												
4C2896	21,473	21,473	21,473	21,473	21,473	21,473	21,102	21,102	18,815	18,815	18,656	19,157
4C4910	2,565	2,736	2,736	2,736	2,736	2,736	3,078	3,078	3,078	3,078	3,078	3,078
4C6471	0	0	0	0	0	0	0	0	0	0	0	0
6C1527	3,344	3,344	3,344	3,344	3,344	3,382	3,420	4,066	4,066	4,066	4,066	4,066
6C1528	3,116	3,116	3,116	3,116	3,116	3,116	3,116	3,078	3,078	3,078	3,078	3,306
6C1556	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
6C2562	8,683	8,721	8,750	8,835	8,892	8,902	8,987	8,997	8,997	8,997	9,016	9,073
6C2798	7,201	7,306	7,657	7,657	7,809	7,809	7,809	7,809	7,809	7,809	7,809	7,714
6C2914	4,142	4,142	4,028	4,332	4,370	4,370	4,370	4,370	4,370	4,370	4,370	3,724
6C2997	2,838	2,838	2,882	2,887	2,887	2,887	2,887	2,887	2,887	2,887	2,852	2,906
6C3521	2,204	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
6C3523	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
6C4986	1,900	2,280	2,280	2,280	2,280	2,280	2,280	2,280	2,204	1,900	1,900	1,900
6C6107	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
6C6108	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
6C6109	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
6C6683	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
6C7044	3,724	3,724	3,724	3,724	3,724	3,724	3,724	3,686	3,648	3,648	3,648	3,762
6C7117	7,933	8,094	8,094	8,094	8,104	8,104	8,104	8,104	8,104	8,104	8,104	8,104
6C7196	2,330	2,330	2,330	2,296	2,212	2,212	2,212	2,212	2,212	2,077	2,077	2,214
6C7201	10,375	10,375	10,359	10,389	10,399	10,399	10,443	10,475	10,475	10,561	10,561	10,561
6C7464	9,975	9,975	9,975	9,975	9,975	9,975	9,975	9,975	9,975	9,861	9,861	8,949

7C7172	10,077	10,077	10,587	10,587	10,587	10,587	10,587	10,587	10,587	10,585	10,221	10,221
7C7212	15,064	15,064	15,064	14,815	14,656	14,457	14,457	15,216	15,216	15,216	15,216	15,216

Power Factor												
A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1C4072	0.81	0.80	0.75	0.20	0.76	0.32	0.75	0.81	0.80	0.79	0.88	0.87
2C1592	n/a											
2C1937	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.86	0.93	1.64	0.91	0.91
2C2849	0.85	0.84	0.85	0.84	0.84	0.84	0.84	0.84	0.85	0.84	0.84	0.84
2C2854	0.91	0.92	0.91	0.91	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91
2C3357	0.94	0.95	0.95	1.14	0.80	0.92	0.92	0.92	0.92	0.90	0.89	0.90
2C4185	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.94	0.95	0.95
2C4281	0.94	0.94	0.94	0.94	0.94	0.95	0.94	0.94	0.94	0.94	0.95	0.95
2C4420	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
2C5741	0.96	0.96	0.82	0.77	0.81	0.81	0.80	0.83	0.89	0.88	0.87	0.91
2C6091	0.98	0.98	0.98	0.97	0.97	0.98	0.98	0.98	0.98	0.98	0.98	0.98
2C6117	n/a											
2C6258	0.74	0.74	0.74	0.74	0.76	0.69	0.00	0.00	0.86	0.86	0.86	0.86
2C6371	0.81	0.81	0.81	0.93	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
2C6703	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.92	0.92	0.92
2C7103	0.96	0.96	0.98	1.06	1.07	1.05	1.01	1.00	1.00	1.00	1.00	1.00
2C7137	0.83	0.83	0.83	0.83	0.83	0.84	0.84	0.84	0.84	0.84	0.84	0.83
2C7420	0.81	0.81	0.81	0.81	0.81	0.82	0.83	0.83	0.83	0.84	0.85	0.85
2C7848	0.85	0.82	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.78	0.79	0.80
2M0382	1.00	0.99	0.99	0.99	1.00	1.00	0.97	1.00	1.00	1.00	0.99	1.00
3C5942	0.82	0.86	0.63	0.97	0.00	0.00	0.85	0.86	0.89	0.89	0.86	0.86
3C6475	0.72	0.02	0.04	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3C7476	n/a											
3C7872	n/a											
4C2896	0.94	0.94	0.95	0.95	0.95	0.94	0.95	0.94	0.94	0.93	0.93	0.93
4C4910	0.98	0.95	0.81	0.81	0.83	0.93	0.82	0.81	0.83	0.94	0.93	0.93
4C6471	n/a											
6C1527	0.87	0.85	0.84	0.84	0.86	0.87	0.87	0.88	0.87	0.86	0.86	0.86
6C1528	0.75	0.75	0.74	0.74	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.77
6C1556	0.68	0.68	0.69	0.64	0.66	0.67	0.65	0.65	0.65	0.65	0.66	0.63
6C2562	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
6C2798	0.78	0.70	0.74	0.76	0.77	0.78	0.76	0.76	0.76	0.81	0.85	0.80
6C2914	0.97	0.98	0.99	0.98	0.97	0.92	0.89	0.91	0.92	0.88	0.86	0.77
6C2997	0.70	0.68	0.73	0.72	0.43	0.44	0.48	0.54	0.73	0.50	0.46	0.69
6C3521	0.81	0.81	0.81	0.80	0.80	0.80	0.81	0.82	0.82	0.82	0.81	0.81
6C3523	0.77	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.82	0.67
6C4986	0.97	0.91	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.96	0.97
6C6107	0.33	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.67	0.02
6C6108	0.98	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.97	0.96
6C6109	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.85
6C6683	0.67	0.66	0.66	0.67	0.67	0.68	0.67	0.67	0.67	0.65	0.97	0.97
6C7044	0.90	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.91	0.91	0.88
6C7117	0.91	0.91	0.91	0.91	0.89	0.40	0.32	0.28	0.37	0.44	0.29	0.39
6C7196	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
6C7201	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.96	0.96	0.96	0.96
6C7464	0.83	0.83	0.83	0.83	0.83	0.80	0.80	0.80	0.81	0.81	0.80	0.80

7C7172	0.93	0.93	0.93	0.93	0.86	0.68	0.75	0.93	0.93	0.93	0.92	0.91
7C7212	0.95	0.95	0.87	0.87	0.92	0.78	0.74	0.94	0.94	0.94	0.94	0.94

Excess kVA_Charge (Rs)												
A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1C4072	280	305	455	2,055	425	1,760	450	275	300	325	60	90
2C1592												
2C1937	450	455	450	455	450	455	460	370	0	0	0	0
2C2849	165	200	165	205	205	200	200	200	165	200	200	200
2C2854	0	0	0	0	0	0	0	0	0	0	0	0
2C3357	0	0	0	0	540	0	0	0	0	0	55	0
2C4185	0	0	0	0	0	0	0	0	0	0	0	0
2C4281	0	0	0	0	0	0	0	0	0	0	0	0
2C4420	0	0	0	0	0	0	0	0	0	0	0	0
2C5741	0	0	90	135	95	90	100	80	10	25	35	0
2C6091	0	0	0	0	0	0	0	0	0	0	0	0
2C6117												
2C6258	175	180	180	180	155	225	0	0	30	30	30	30
2C6371	180	180	180	0	0	0	0	0	0	0	0	0
2C6703	0	0	0	0	0	0	0	0	30	0	0	0
2C7103	0	0	0	0	0	0	0	0	0	0	0	0
2C7137	395	395	395	405	410	350	355	360	355	360	350	410
2C7420	620	620	625	630	630	675	590	605	605	515	435	430
2C7848	150	245	390	405	385	385	400	400	395	360	330	300
2M0382	0	0	0	0	0	0	0	0	0	0	0	0
3C5942	265	130	875	0	0	0	70	55	30	30	120	115
3C6475	240	205	460	665	0	0	0	0	0	0	0	0
3C7476												
3C7872												
4C2896	0	0	0	0	0	0	0	0	0	0	0	0
4C4910	0	0	145	140	110	0	145	145	110	0	0	0
4C6471	0	0	0	0	0	0	0	0	0	0	0	0
6C1527	55	95	115	115	80	60	60	50	60	80	80	80
6C1528	275	270	285	285	270	265	265	265	265	265	265	250
6C1556	115	115	115	140	155	160	145	170	200	165	110	145
6C2562	0	0	0	0	0	0	0	0	0	0	0	0
6C2798	505	855	715	620	595	540	630	620	620	395	200	400
6C2914	0	0	0	0	0	0	20	0	0	40	85	265
6C2997	325	350	285	305	5	5	5	10	285	160	15	355
6C3521	90	90	95	105	100	100	90	80	80	80	90	90
6C3523	85	80	0	0	0	0	0	0	0	470	60	180
6C4986	0	0	0	0	0	0	0	0	0	0	0	0
6C6107	175	275	270	270	290	270	275	280	275	275	5	275
6C6108	0	0	0	0	0	0	0	0	0	0	0	0
6C6109	0	0	0	0	0	0	0	0	0	0	0	30
6C6683	215	225	230	210	215	200	205	205	205	225	0	0
6C7044	0	0	0	0	0	0	0	0	0	0	0	45
6C7117	0	0	0	0	45	5	15	5	5	5	0	5
6C7196	0	0	0	0	0	0	0	0	0	0	0	0
6C7201	0	0	0	0	0	0	0	0	0	0	0	0
6C7464	410	405	410	410	405	525	525	515	510	460	455	510

7C7172	0	0	0	0	0	455	190	0	0	0	0	0
7C7212	0	0	195	215	0	215	235	0	0	0	0	0

Appendix I

Electricity billings received from the CEB - Southern Pumping Stations Year 2001

Energy Charge (Rs)												
A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3C3223	54910	39133	41901	40482	45672	37403	40897	46883	39236	43804	41382	47367
3C3811	30154	27767	25379	23511	23926	29843	29739	28078	30517	30413	33891	48008
3C4041	110725	119536	91991	134177	136101	128748	146801	150795	143504	147489	135975	136070
3C5878	52246	53146	56363	54703	60931	52592	55741	63802	52627	59927	58024	89891
4C1120	22352	16885	18546	17854	21106	18061	20760	19930	17992	19514	27265	21660
4C1520	44945	38164	38821	37645	46295	37749	41970	40551	35361	39236	35188	31901
4C3082	37679	34981	39963	38095	44842	38302	40897	46295	38510	48786	36538	39029
4C6761	104423	103800	110651	105253	122276	103696	113038	126636	103904	132449	101205	111793
4C7355	28510	19272	24255	19445	30344	28234	29791	32905	27853	27023	20241	25189
5C3152	413470	325759	381465	326278	336485	362954	349287	379562	330257	367625	379043	281298
5C3165	93558	72868	72522	82902	81379	72729	79372	87192	71068	77781	81587	58612
5C5964	66294	55775	61173	51554	52315	53561	47540	49893	41658	48025	60412	44634
5C6067	11806	11534	19924	14070	11075	11544	12030	11899	11359	12058	15001	17838
5C6275	24981	19687	19895	23113	23770	20033	21590	23632	20345	22594	23251	17369
5C6764	27208	24538	27393	25917	18743	25210	42127	42048	42048	74599	40795	40795
5C6940	120562	106148	119327	110367	113410	117720	117749	114049	114019	124730	87182	82284
5C7470	38816	33564	35977	34887	38069	38261	37830	38015	37055	38193	38935	38354
6C1533	28787	25950	29583	25639	22525	28856	27542	32455	34911	34981	40447	30413
6C5410	39825	41935	45949	39306	38960	47056	38960	39963	42904	35880	37576	34565
7C1529	90790	76258	84009	75151	49063	52523	56882	55152	55014	60758	55568	48371
7C1530	175941	180266	199815	187013	216077	195317	202064	196009	194625	202929	182515	143071
7C1545	63526	50689	51900	56017	55983	57644	52454	54633	54322	55879	45914	29583
7C1831	28268	17646	25500	22490	24393	24601	23251	19791	16089	17369	18442	15016
7C1970	28960	23459	26729	24601	26936	20656	20293	20241	20241	22058	20604	18528
7C3626	18170	16364	18189	17487	18319	17895	18648	18501	17989	18288	17705	18193
7C3694	26365	22109	23666	25535	24445	25431	22628	23096	21227	23511	21435	19203
7C3798	95697	87733	93894	94209	97349	94154	97074	97935	94306	97337	94456	97634
7C3894	168467	136289	156219	134213	153832	154558	134732	157465	137535	149161	151652	127363
7C4198	40504	26804	37312	33025	33379	36253	31267	37733	32075	37185	35857	30285
7C4864	18892	14636	17508	15674	19341	16400	16539	18719	20760	21071	17023	18615
7C4896	42094	38866	42676	41636	43873	41807	42985	43854	42617	43845	41655	43255
7C4923	7231	6159	7750	4152	4948	5155	4809	4982	4602	4567	3841	3149
7C5296	73733	63318	62349	69719	84078	74234	72401	78888	70376	81639	73490	68352
7C6227	9576	10645	11693	9456	7218	7929	8318	7327	6683	7034	6100	6624
7C6567	14317	12949	11179	13087	17340	27241	27908	27910	27016	27763	26741	27457
7C7352	12664	26642	27403	28095	26850	31451	27922	27542	26642	30275	26158	20725
7C7418	99596	61553	73542	82365	93005	77279	71466	82313	71882	81068	78110	52575
7C7469	82836	49560	65962	57112	57466	63012	59826	73927	59531	70269	73632	60947
7C8312												

Demand (kVA) Charge (Rs)												
A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3C3223	4256	4448	4448	4448	4448	4448	4448	4448	4448	4448	4384	4384
3C3811	3024	3024	3024	2976	2976	2976	2976	2976	2880	5616	5616	5616
3C4041	12688	12688	12688	12688	12688	12688	12936	12936	12936	12936	12936	12936

3C5878	4736	4704	4704	4640	4640	4640	4640	4640	4640	4640	4640	8000	8000
4C1120	3648	3648	3648	3648	3648	3648	3648	2240	2240	3328	3328	3328	3328
4C1520	5440	5440	5440	5088	5056	5056	5056	5056	5056	5120	5120	5120	5120
4C3082	6144	6144	3552	3552	3648	3648	3648	3648	3648	3648	3648	3648	3648
4C6761	9408	9408	10368	10368	10368	10368	10368	10368	10368	9312	12480	12480	12480
4C7355	3136	3136	3136	3168	3168	3168	3168	3168	3168	3168	3200	3392	
5C3152	28000	28000	28000	28000	28000	28000	28000	28000	28000	28000	28000	28000	28000
5C3165	6976	6976	6976	6720	6720	6720	6528	6592	6592	6592	6592	6592	6592
5C5964	10880	10880	10880	10880	10880	10880	10880	7616	7616	5504	5504	5504	5504
5C6067	2480	2480	2480	2480	2480	2480	2360	2360	2360	2360	2360	2360	2360
5C6275	3072	2176	2048	2048	2048	2048	1952	1952	1952	1952	1952	1952	1952
5C6764	3248	3248	3248	5856	5856	5856	5856	5856	5856	5856	5856	5856	4080
5C6940	12976	12976	12976	12976	12864	12952	12952	12952	12952	12952	12952	12952	12952
5C7470	4288	4184	4184	4184	4184	4184	4192	4192	4192	4192	4192	4192	4192
6C1533	4992	4928	4928	4928	4928	4928	4928	4928	4928	4928	7200	7200	
6C5410	5056	5056	5056	5056	4352	4224	4224	4224	4224	4224	4224	4224	4224
7C1529	6208	6208	6208	6272	6400	6400	6400	6400	6400	6400	6400	6400	3904
7C1530	15200	15200	16320	16320	16320	16320	16320	16320	16320	14400	14400	14400	
7C1545	4256	4256	4256	4256	4256	4256	4032	4032	4032	4032	4032	4032	
7C1831	2048	2048	2144	2144	2144	2144	2144	2208	2208	2208	2208	2208	
7C1970	3024	3024	3024	3024	3024	2352	2352	2352	2352	1920	1920	1920	
7C3626	1600	1600	1600	1616	1616	1616	1616	1616	1616	1600	1600	1600	
7C3694	2976	2976	2976	2976	2976	2400	2400	2256	2256	2256	2640	2688	
7C3798	11928	11928	11928	11928	6384	6384	6416	6456	6456	6456	6456	6456	
7C3894	11904	11904	12192	12192	12192	12192	12192	12192	12192	12192	12192	12192	
7C4198	0	0	0	0	0	0	0	0	0	0	0	0	
7C4864	1600	1600	1600	1600	1600	1600	1600	2560	2560	2560	2560	2560	
7C4896	2856	2856	2888	2888	2896	2920	2936	2960	2960	2960	3368	3392	
7C4923	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	
7C5296	6080	6432	7008	7168	7200	7248	7776	7776	7776	10608	10608	10608	
7C6227	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	
7C6567	2304	2304	2304	2288	2232	2288	2288	2288	2288	2288	2288	2288	
7C7352	2592	2592	2592	2592	2592	2656	2656	2656	2656	2656	2656	2656	
7C7418	6816	6816	6816	6816	6816	6816	6816	6816	6816	6816	6576	6576	
7C7469	0	0	0	0	0	0	0	0	0	0	0	0	
7C8312													

Power Factor													
A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
3C3223	0.82	0.80	0.82	0.81	0.82	0.82	0.83	0.81	0.81	0.92	0.94	0.95	
3C3811	0.60	0.60	0.60	0.60	0.64	0.66	0.66	0.72	0.69	0.63	0.61	0.61	
3C4041	0.80	0.80	0.87	0.82	0.82	0.80	0.79	0.78	0.80	0.97	0.99	0.99	
3C5878	0.82	0.82	0.84	0.83	0.84	0.84	0.84	0.83	0.83	0.96	0.90	0.83	
4C1120	0.75	0.76	0.76	0.76	0.76	0.76	0.76	0.77	0.76	0.87	0.95	0.92	
4C1520	0.98	0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.96	0.99	0.98	
4C3082	0.83	0.81	0.80	0.79	0.80	0.79	0.79	0.79	0.79	0.79	0.79	0.76	
4C6761	0.83	0.83	0.84	0.84	0.83	0.84	0.84	0.84	0.84	0.95	0.85	0.78	
4C7355	0.81	0.81	0.81	0.79	0.81	0.80	0.80	0.80	0.80	0.78	0.63	0.62	
5C3152	0.85	0.85	0.85	0.85	0.85	0.86	0.86	0.86	0.86	0.90	0.90	0.89	
5C3165	0.83	0.83	0.83	0.83	0.84	0.83	0.82	0.83	0.83	0.95	1.06	0.97	
5C5964	0.80	0.81	0.80	0.80	0.79	0.79	0.76	0.75	0.80	0.97	0.97	0.97	

Excess KVA Charge (Rs)

Appendix J Electricity billings received from the CEB - Southern Pumping Stations Year 2002

Energy Charge (Rs)													
A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
3C3223	46272	48672	38880	43380	47664	38448	37296	46260	41472	48384	38088	40932	
3C3811	55839	36450	36180	64422	57240	46170	52056	48816	49734	53460	43578	44496	
3C4041	139694	113483	139862	164268	133823	123977	137351	141068	123732	129978	120139	131189	
3C5878	91614	106848	94608	104328	117864	95112	101808	101808	106200	118800	91440	97632	
4C1120	24436	22104	16848	31032	27216	21888	25704	23832	22896	25272	26712	23184	
4C1520	37622	37692	42336	46296	45216	39888	43020	39744	38016	40176	39780	39348	
4C3082	30856	37584	40500	45468	39744	40068	41472	45900	36612	49680	37260	49140	
4C6761	117812	110052	111564	135108	117828	117720	120744	135108	111780	147636	117180	144504	
4C7355	25713	25812	25740	23040	20160	25776	27432	29448	26172	17532	9504	20304	
5C3152	363779	336600	317520	354600	377100	326520	382320	344880	321660	395460	370440	337320	
5C3165	80133	75024	78696	78336	78912	69696	82440	91008	77760	86328	89784	74088	
5C5964	65786	69336	64944	68976	70632	61992	74520	66096	60336	71352	62928	57456	
5C6067	10603	9596	9866	9124	9135	8528	10039	10827	14436	11038	9857	11104	
5C6275	25148	21636	23184	23184	24012	21096	23472	24912	21168	23508	24264	19908	
5C6764	42393	5429	63	9112	3494	385	68	56	31239	42581	41683	42620	
5C6940	121734	88610	98548	128374	131908	131089	132656	134113	133474	137155	130160	134266	
5C7470	39710	37845	42318	41179	42331	42849	42327	40644	35015	34841	36194	39695	
6C1533	34983	23184	22680	22896	24120	38232	28368	34632	37584	35640	41184	40536	
6C5410	39171	38376	46908	29628	24984	23976	20160	21996	22428	21780	23256	19980	
7C1529	61094	49824	55944	59472	58248	53208	60912	58536	59832	60624	57024	53136	
7C1530	198024	172620	184680	193680	185220	168660	191880	183960	232740	216900	174600	172260	
7C1545	35880	34056	39492	37224	38304	34632	37980	39600	35352	37368	36864	23580	
7C1831	23341	11304	12924	8676	11592	108	0	0	6840	20088	23508	22212	
7C1970	23603	16470	19548	19440	19710	18360	20304	20088	19494	19278	18792	17820	
7C3626	17986	16405	18401	17815	18466	18023	18194	18481	18076	18718	18041	18688	
7C3694	24590	20196	18522	17496	17982	19494	17118	18792	17172	18576	17928	21654	
7C3798	96413	111740	101158	98568	99875	97679	99139	98122	94518	99112	147524	121264	
7C3894	166703	67932	172044	182844	152604	144828	160056	165132	147744	173124	147204	143424	
7C4198	34171	25181	36298	40821	31552	34038	29841	33669	31521	39159	32671	30941	
7C4864	23556	15696	19116	19656	17712	19224	18036	20160	19800	22464	19332	21456	
7C4896	42288	41071	44518	43672	44932	44451	46051	46377	44275	46040	37771	43074	
7C4923	4587	3888	4788	4464	324	1404	1296	1008	144	1116	1512	1368	
7C5296	79065	66042	78192	87696	77814	76302	83916	79002	76842	87480	73926	75546	
7C6227	6420	8674	6257	4702	2956	189	193	189	180	11286	10987	10201	
7C6567	27351	26608	29333	28102	28849	28100	27567	28564	27652	28798	27704	28397	
7C7352	25568	29412	32796	30420	30528	25992	28224	29052	25992	28656	29808	26388	
7C7418	82410	73710	96984	76248	86022	75006	95634	71172	77004	80028	80784	71334	
7C7469	60913	34038	30380	59706	47492	49104	54312	56978	49166	59892	50530	48608	
7C8312									126	67977	71190	79002	

4C1120	3876	3952	3952	3952	3648	2736	2736	2736	2736	2736	2736	4180	4256
4C1520	5964	6080	6080	6080	3420	3420	4788	4788	4788	4788	4788	5890	6042
4C3082	4314	4218	4218	5244	5244	5244	5244	5244	5244	5244	5244	5016	3534
4C6761	14757	14820	14820	14820	14820	14820	14820	14820	11970	11970	11970	11286	11286
4C7355	4011	4028	4028	4028	4028	4028	4028	4028	6232	6802	6802	6802	6802
5C3152	30697	32300	32300	31540	31160	31160	31160	31160	30780	32680	32680	32680	32680
5C3165	7404	7828	7828	7828	7828	7828	7828	7828	6612	6612	6688	6688	6688
5C5964	4984	5624	5624	5624	5624	5624	5624	5624	5244	5244	5244	5244	5244
5C6067	2788	2755	2717	2157	1976	2109	2204	2204	2204	2204	2204	2204	2204
5C6275	2193	2280	2280	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
5C6764	4168	4190	4190	3610	3610	3610	3610	3610	3401	3534	3534	3534	3534
5C6940	15302	15105	14972	13500	13500	13500	13500	14773	14849	14849	14849	14849	14849
5C7470	4953	4883	4864	4855	4855	4874	4874	4874	4874	4931	4931	4931	4931
6C1533	7773	8550	8550	8550	8550	6004	6004	5928	5928	5928	5928	5928	5928
6C5410	4422	4940	5244	5244	5244	5244	5244	5244	5168	5168	4864	4864	4864
7C1529	4385	4636	4636	4636	8968	8968	8968	8968	8968	8968	8968	8968	4636
7C1530	16354	17290	17290	17290	17290	18240	18240	18240	20140	20140	20140	20140	20140
7C1545	4514	4712	4674	4674	4674	3838	3838	3838	3838	3838	3838	3838	3838
7C1831	2530	2622	2052	2052	2052	2660	2660	2660	2660	2660	2660	2660	2660
7C1970	3073	3249	3249	3249	3249	3249	3249	3135	2223	2280	2280	2280	2280
7C3626	1890	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
7C3694	3034	3363	3363	3363	3363	3363	3363	3135	2394	2394	2508	2508	2508
7C3798	14017	14222	14222	14222	14222	14279	14279	14279	14279	15039	15039	15039	15039
7C3894	13970	14364	14478	14478	14478	14478	14478	14478	14136	14136	14136	14136	14136
7C4198	0	0	0	0	0	0	0	0	0	0	0	0	0
7C4864	2971	3040	3040	3040	2888	2888	2888	2888	2888	2888	2888	2888	2888
7C4896	4102	4133	4133	4133	4133	4133	4133	4114	3582	3582	3582	3582	3582
7C4923	1806	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
7C5296	12256	12597	12597	12597	12597	12597	8721	8721	8664	8607	6783	6783	6783
7C6227	1890	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
7C6567	2684	2603	2594	2328	2328	2328	2328	2280	2280	2280	2242	2242	2242
7C7352	2961	2888	2888	2774	2774	2774	2774	2774	2470	2470	2470	2470	2470
7C7418	7421	7752	7695	7125	7125	7125	7125	7125	7011	6840	6840	6840	6840
7C7469	0	0	0	0	0	0	0	0	0	0	0	0	0
7C8312								7260	8096	8096	8272		

Power Factor													
A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
3C3223	0.95	0.95	0.95	0.95	0.96	0.82	1.10	1.08	0.95	0.96	0.95	0.95	
3C3811	0.64	0.55	0.56	0.62	0.59	0.59	0.58	0.58	0.58	0.58	0.58	0.58	0.56
3C4041	0.96	0.89	0.93	0.87	0.90	0.98	0.98	0.97	0.98	0.98	0.98	0.98	0.98
3C5878	0.83	0.88	0.90	0.90	0.90	0.90	0.89	0.88	0.92	0.87	0.84	0.84	
4C1120	0.92	0.92	0.88	0.86	0.88	0.89	0.70	0.70	0.82	0.92	0.90	0.92	
4C1520	0.97	0.94	0.98	0.97	0.98	0.98	0.84	0.96	0.97	0.97	0.95	0.96	
4C3082	0.78	0.79	0.78	0.70	0.92	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.94
4C6761	0.79	0.79	0.80	0.83	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92
4C7355	0.68	0.81	0.65	0.62	0.62	0.62	0.62	0.62	0.62	0.61	0.71	0.72	
5C3152	0.89	0.88	0.90	0.90	0.89	0.89	0.90	0.90	0.88	0.86	0.85	0.85	
5C3165	0.97	0.98	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
5C5964	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.97	
5C6067	0.92	0.92	0.95	0.97	0.96	0.89	0.87	0.89	0.88	0.88	0.87	0.86	

5C6275	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.98	0.98	0.97	0.97	0.97	0.98
5C6764	0.95	0.94	0.80	0.94	0.94	0.88	0.72	0.63	0.95	0.95	0.95	0.95	0.95
5C6940	0.92	0.89	0.89	0.93	0.93	0.93	0.94	0.87	0.84	0.84	0.84	0.84	0.84
5C7470	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.90	0.90	0.90
6C1533	0.81	0.81	0.81	0.81	0.81	0.82	0.82	0.83	0.82	0.82	0.80	0.80	0.80
6C5410	0.72	0.72	0.67	0.47	0.49	0.53	0.66	0.66	0.66	0.66	0.64	0.65	
7C1529	0.94	0.95	0.95	0.94	0.91	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
7C1530	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92	0.91	0.91	0.90	0.91	0.91
7C1545	0.85	0.90	0.89	0.89	0.89	0.84	0.90	0.90	0.90	0.90	0.90	0.90	0.88
7C1831	0.93	0.87	0.91	0.91	0.91	1.00	0.00	0.00	1.16	1.23	1.21	1.25	
7C1970	0.87	0.79	0.82	0.81	0.81	0.99	0.99	0.99	0.99	0.99	0.98	0.96	
7C3626	0.83	0.83	0.92	0.92	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7C3694	0.66	0.64	0.76	0.69	0.72	0.92	0.90	0.91	0.91	0.92	0.91	0.93	
7C3798	0.98	0.97	0.98	0.98	0.98	0.94	0.86	0.86	0.86	0.87	0.89	0.88	
7C3894	1.00	0.83	0.97	0.98	0.98	0.96	0.97	0.96	0.97	0.97	0.97	0.97	
7C4198													
7C4864	0.98	0.97	0.98	0.98	0.98	0.98	0.96	0.96	0.96	0.96	0.96	0.95	
7C4896	0.82	0.83	0.85	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.95	0.95	
7C4923	0.74	0.73	0.73	0.73	0.75	0.75	0.73	0.57	1.00	0.65	0.71	0.70	
7C5296	0.88	0.72	0.72	0.79	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	
7C6227	0.71	0.69	0.71	0.74	0.75	0.76	0.76	0.76	0.77	0.80	0.79	0.78	
7C6567	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
7C7352	0.86	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.93	
7C7418	0.89	0.89	0.89	0.89	0.90	0.90	0.92	0.93	0.93	0.93	0.93	0.93	
7C7469													
7C8312									1.00	0.80	0.76	0.77	

Excess KVA Charge (Rs)													
A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
3C3223	0	0	0	0	0	200	0	0	0	0	0	0	0
3C3811	978	1355	1305	1090	1190	1190	1260	1280	1280	1300	1300	1385	
3C4041	0	80	0	220	0	0	0	0	0	0	0	0	0
3C5878	378.5	110	0	0	0	0	55	110	0	165	335	335	
4C1120	0	0	30	65	30	15	310	310	125	0	0	0	
4C1520	0	0	0	0	0	0	170	0	0	0	0	0	
4C3082	289	265	290	615	0	0	0	0	0	0	0	0	
4C6761	952.5	955	685	490	0	0	0	0	0	0	0	0	
4C7355	518.5	210	520	585	585	570	590	590	1020	1155	520	530	
5C3152	174.5	365	0	0	175	175	0	0	360	765	955	945	
5C3165	0	0	0	0	0	0	0	0	0	0	0	0	
5C5964	0	0	0	0	0	0	0	0	0	0	0	0	
5C6067	0	0	0	0	0	10	40	10	25	25	35	45	
5C6275	0	0	0	0	0	0	0	0	0	0	0	0	
5C6764	0	0	0	0	0	35	50	5	0	0	0	0	
5C6940	0	80	80	0	0	0	0	260	520	520	515	520	
5C7470	25	30	30	30	30	30	30	30	30	0	0	0	
6C1533	297	310	305	310	310	275	275	240	270	275	340	325	
6C5410	480.5	520	705	1290	1240	750	650	345	350	470	740	365	
7C1529	0	0	0	0	0	0	0	0	0	0	0	0	
7C1530	0	0	0	0	0	0	0	0	0	0	0	0	
7C1545	92	0	20	20	20	135	0	0	0	0	0	35	

7C1831	0	35	0	0	0	0	0	0	0	0	0	0
7C1970	53	200	100	115	115	0	0	0	0	0	0	0
7C3626	70	70	0	0	0	0	0	0	0	0	0	0
7C3694	431	510	255	250	215	0	0	0	0	0	0	0
7C3798	0	0	0	0	0	0	310	325	195	150	90	175
7C3894	0	590	0	0	0	0	0	0	0	0	0	0
7C4198	0	0	0	0	0	0	0	0	0	0	0	0
7C4864	0	0	0	0	0	0	0	0	0	0	0	0
7C4896	189.5	170	120	0	0	0	0	0	0	0	0	0
7C4923	72.5	75	80	75	60	65	70	130	0	100	75	85
7C5296	98.5	920	910	555	0	0	0	0	0	0	0	0
7C6227	179.5	185	175	145	130	0	0	0	40	80	85	95
7C6567	0	0	0	0	0	0	0	0	0	0	0	0
7C7352	58	0	0	0	0	0	0	0	0	0	0	0
7C7418	43.5	40	40	40	0	0	0	0	0	0	0	0
7C7469	0	0	0	0	0	0	0	0	0	0	0	0
7C8312									0	410	570	545

Appendix K

Electricity billings received from the CEB - Southern Pumping Stations Year 2003

Energy Charge (Rs)

A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3C3223	48,564	41,076	37,800	42,984	45,828	45,828	201,204	162,756	165,780	168,372	168,156	180,468
3C3811	53,028	45,252	44,442	46,332	49,842	51,624	42,930	47,898	54,756	51,084	46,332	52,164
3C4041	122,535	113,542	128,934	135,070	122,440	130,412	110,072	123,412	111,458	122,144	25,749	25,749
3C5878	119,304	96,840	98,640	110,664	116,496	72,432						
4C1120	26,784	23,112	23,256	23,184	24,912	23,472	21,240	21,096	20,808	28,800	22,104	28,080
4C1520	44,028	37,188	77,184	84,384	80,244	68,868	52,128	36,072	33,912	37,656	34,164	38,052
4C3082	37,584	41,364	40,176	49,572	39,312	25,920	16,092	12,852	14,688	16,092	13,608	44,869
4C6761	112,428	116,532	111,240	137,700	113,184	121,716	127,872	114,696	124,092	137,916	119,124	84,656
4C7355	27,972	21,672	23,328	18,936	0	8,460	25,128	23,004	21,852	24,336	20,988	24,156
5C3152	395,460	334,980	345,960	392,400	324,540	319,860	374,400	304,380	350,100	379,800	364,680	383,580
5C3165	89,208	85,464	71,496	74,232	76,176	71,568	75,960	76,536	77,112	90,000	69,264	89,568
5C5964	68,472	58,536	62,136	69,480	65,088	64,512	59,544	61,560	69,624	72,360	66,816	70,128
5C6067	11,236	9,446	10,566	10,012	9,365	8,395	8,843	8,149	8,008	9,893	9,850	10,753
5C6275	23,724	23,004	21,456	22,356	23,832	21,240	23,076	23,256	20,844	20,844	25,848	21,780
5C6764	41,321	30,447	113	103	131	124	19,010	2,797	157	1,741	39,451	44,885
5C6940	135,299	118,904	130,414	125,618	130,205	133,765	132,059	144,407	133,708	133,708	133,708	120,976
5C7470	39,366	30,733	37,719	34,974	37,285	37,413	37,161	43,990	42,599	44,793	46,699	45,360
6C1533	49,536	42,624	38,520	43,992	39,096	45,144	41,616	51,336	43,344	37,872	31,752	20,088
6C5410	27,216	29,952	47,374	41,762	47,504	45,430	38,803	41,980	42,635	45,295	42,203	41,260
7C1529	66,240	56,016	53,712	63,360	62,208	52,848	57,960	58,320	62,352	60,480	54,720	61,344
7C1530	222,120	192,600	205,020	246,780	247,680	207,360	222,120	225,180	238,320	229,860	176,760	190,080
7C1545	38,916	37,044	33,624	38,988	21,420	21,816	30,204	32,868	29,232	29,304	31,644	28,548
7C1831	27,396	23,076	22,392	29,038	23,933	20,041	23,004	23,823	20,435	23,206	23,855	24,577
7C1970	20,736	18,414	15,930	16,902	17,820	16,848	17,712	16,470	18,360	18,198	14,202	18,414
7C3626	18,680	16,866	18,689	17,996	18,700	18,022	18,900	18,900	18,900	18,317	18,243	18,857
7C3694	27,054	26,190	23,328	27,054	30,618	25,056	27,000	28,728	24,354	27,108	23,652	26,082
7C3798	106,101	97,216	98,336	93,580	97,439	94,055	98,363	102,521	137,245	166,549	170,563	127,881
7C3894	178,524	154,872	151,416	185,976	168,372	148,392	157,140	172,800	159,624	175,068	146,232	150,660
7C4198	37,591	30,529	28,691	31,787	29,326	26,164	35,204	38,809	34,013	36,844	28,948	29,751
7C4864	19,332	25,308	16,416	19,980	16,848	16,056	18,648	16,812	18,864	17,388	17,280	18,072
7C4896	45,934	40,167	46,622	43,972	45,268	43,981	44,296	47,605	46,510	49,102	46,480	48,195
7C4923	900	972	792	108	252	720	936	1,836	1,332	2,628	3,456	6,552
7C5296	85,860	75,276	69,714	83,268	79,380	70,794	81,702	79,650	73,872	85,104	70,956	74,736
7C6227	10,060	9,277	10,192	9,806	10,098	9,583	9,909	9,884	9,488	9,864	9,374	7,585
7C6567	28,561	25,137	28,777	26,964	28,852	27,441	28,543	28,589	27,724	28,314	27,000	28,417
7C7352	21,456	20,448	27,468	26,136	18,504	25,704	28,044	31,320	29,520	33,876	28,260	28,476
7C7418	78,354	79,002	72,900	79,866	109,728	52,812	79,326	89,748	72,684	91,584	66,798	75,276
7C7469	56,234	45,942	45,074	53,506	19,654	83,576	56,420	60,140	53,940	59,644	48,484	48,732
7C8312	94,185	84,357	83,412	103,509	103,068	112,770	130,851	127,449	117,306	132,111	105,651	108,990

Demand (kVA) Charge (Rs)

A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3C3223	8,550	8,550	4,522	4,522	8,550	17,670	17,670	17,670	17,670	17,670	17,670	17,670
3C3811	7,011	7,011	7,068	7,068	7,125	7,125	7,125	7,125	7,239	7,239	7,239	7,239

3C4041	13,262	13,262	12,901	12,702	12,711	12,787	12,787	13,262	13,262	13,262	13,262	13,262
3C5878	9,576	9,652	9,652	9,652	9,652	11,400						
4C1120	4,256	4,256	4,256	4,256	4,256	4,256	2,736	4,256	4,256	4,256	4,256	4,256
4C1520	6,042	6,042	6,574	6,650	7,600	7,600	7,600	7,600	7,600	7,600	7,600	6,460
4C3082	3,876	3,876	3,876	3,876	3,876	4,104	4,104	4,104	7,410	7,410	7,410	7,410
4C6761	11,286	11,286	11,286	11,286	10,374	10,374	14,820	14,820	14,820	14,820	14,820	14,820
4C7355	6,802	6,802	6,802	5,282	5,282	5,282	5,282	4,978	4,940	4,940	4,940	4,940
5C3152	33,250	33,250	33,250	33,250	33,440	33,440	33,440	33,440	33,440	33,440	33,440	33,440
5C3165	6,688	6,688	6,688	6,688	7,600	7,600	7,676	7,676	7,676	7,676	7,676	7,676
5C5964	6,004	6,156	6,156	6,156	6,384	6,384	6,384	6,384	6,384	6,384	6,384	6,308
5C6067	2,204	2,081	2,081	2,052	2,052	1,957	1,919	1,900	1,900	1,900	1,900	1,900
5C6275	1,900	2,204	2,204	2,204	2,204	2,204	2,204	1,900	1,900	1,900	1,900	1,900
5C6764	3,534	3,534	3,534	3,458	3,458	3,316	3,316	3,420	3,420	3,601		
5C6940	14,858	15,086	15,086	15,086	15,086	15,086	15,086	14,953	14,877	14,678	14,678	
5C7470	4,931	4,931	4,931	4,931	4,921	4,921	4,921	4,921	4,921	4,921	4,921	4,883
6C1533	5,852	5,852	5,852	5,852	5,852	5,852	5,852	5,852	5,852	5,852	5,852	5,852
6C5410	4,864	4,864	4,864	4,864	3,613	4,074	4,074	4,074	4,074	4,690	4,690	
7C1529	4,636	4,636	4,636	4,636	4,636	4,636	4,636	4,712	4,712	4,712	4,712	4,864
7C1530	20,140	20,140	20,140	19,380	18,810	18,810	18,810	18,810	18,810	18,810	18,810	18,810
7C1545	3,192	3,192	3,268	3,306	4,560	4,560	4,560	4,560	4,560	4,560	4,560	4,712
7C1831	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,911
7C1970	2,280	2,280	2,280	2,280	2,337	2,337	2,337	2,337	2,337	2,337	2,337	2,337
7C3626	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
7C3694	2,508	2,508	2,508	2,679	2,850	2,850	2,850	2,850	2,850	2,850	2,964	2,964
7C3798	15,039	15,039	15,039	15,039	15,039	14,991	14,991	14,991	14,792	14,792	14,801	14,801
7C3894	12,768	12,996	12,996	13,110	13,224	13,224	13,224	13,224	13,224	13,224	13,224	13,224
7C4198	0	0	0	0	0	0	0	0	0	0	0	0
7C4864	2,888	3,268	3,268	3,268	3,268	3,268	3,268	1,900	1,900	1,900	1,900	1,900
7C4896	3,582	3,582	3,572	3,572	3,572	3,572	3,762	3,762	3,762	3,914	3,914	3,914
7C4923	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,938	1,938	1,938
7C5296	6,783	6,783	6,783	6,783	6,783	6,555	6,555	6,555	6,555	6,897	6,897	
7C6227	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
7C6567	2,233	2,233	2,214	2,204	2,204	2,214	2,214	2,214	2,214	2,214	2,214	2,214
7C7352	2,508	2,622	2,622	2,622	2,622	2,622	2,622	2,584	2,622	2,622	2,622	2,622
7C7418	6,840	6,612	6,612	6,612	6,783	6,783	6,783	6,783	6,783	6,783	6,783	6,726
7C7469	0	0	0	0	0	0	0	0	0	0	0	0
7C8312	8,272	8,272	8,272	8,272	8,316	8,316	8,316	8,316	8,316	8,316	8,316	8,272

Power Factor

A/c No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3C3223	0.95	0.95	0.93	0.95	0.89	0.89	0.84	0.85	0.83	0.89	0.91	0.97
3C3811	0.54	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.65	0.60	0.56
3C4041	0.97	0.97	0.97	0.96	0.97	0.97	0.97	0.97	0.97	0.97	0.59	0.59
3C5878	0.84	0.85	0.87	0.91	0.91	0.90						
4C1120	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.96	0.95
4C1520	0.97	0.97	0.93	0.93	0.93	0.93	0.96	0.98	0.84	0.79	0.94	0.98
4C3082	0.94	0.94	0.94	0.94	0.87	0.39	0.27	0.27	0.32	0.32	0.32	0.96
4C6761	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92
4C7355	0.72	0.74	0.73	0.73	0.00	0.73	0.74	0.74	0.73	0.73	0.72	0.71
5C3152	0.85	0.84	0.84	0.85	0.84	0.84	0.84	0.85	0.85	0.86	0.87	0.87
5C3165	0.97	0.97	0.97	0.97	0.97	0.92	0.95	0.83	0.90	0.97	0.97	0.97

Excess KVA Charge (Rs)

7C1530	0	0	220	0	0	0	0	0	0	0	0	285
7C1545	20	20	20	40	0	0	0	0	0	0	0	0
7C1831	0	0	0	0	0	0	0	0	0	0	0	0
7C1970	0	0	0	0	0	0	0	0	0	0	0	0
7C3626	0	0	0	0	0	0	0	0	0	0	0	0
7C3694	0	0	0	80	85	95	95	95	120	120	120	140
7C3798	260	0	0	0	0	0	0	0	0	85	85	175
7C3894	0	0	0	0	0	0	0	0	0	0	0	0
7C4198	0	0	0	0	0	0	0	0	0	0	0	0
7C4864	0	95	0	0	0	0	0	0	0	0	0	0
7C4896	0	0	0	0	0	0	0	0	0	0	0	0
7C4923	90	75	75	135	10	20	0	70	30	115	60	70
7C5296	0	0	0	0	0	0	0	0	0	0	0	0
7C6227	95	85	85	90	85	95	85	95	95	95	130	130
7C6567	0	0	0	0	0	0	0	0	0	0	0	0
7C7352	205	230	0	45	300	0	0	0	0	0	0	0
7C7418	0	0	0	0	0	0	0	0	0	0	0	0
7C7469	0	0	0	0	0	0	0	0	0	0	0	0
7C8312	710	370	570	575	630	570	585	570	575	570	615	600

Appendix L

BOREHOLE AND PUMP INFORMATION (M & E - NORTH)

Desktop Study Part I - Energy Auditing, Management and Efficiency at CWA Pumping Stations

Year 2001

S.N	CWA Pumping Station	Code	BH dia (mm)	Casing Dia (mm)	Borehole Depth (m)	Tested Data from W.R.Unit		Actual DWL variation recorded		Tested Yield data from W.R.U (m³/h)	Ground Level from W.R.U (m AMSL)	Pumping To	Installed Pump capacity		Annual Flow (m³)	Account Number	Annual Energy consumption for Year 2001 in Rupees				Remarks	
						SWL (m)	DWL (m)	Min. (m)	Max. (m)				m³/h	kW			Maximum Demand	Energy Charge (kWh)	Excess kVA	Total		
DWS - Port Louis																						
1	Beau Bois b.h	825	350	300	123.00	7.19	20.71	24.50	31.80	40.00	439.66	Distribution Nouvelle Decouverte	55 x 110 / 50 x 80 (09.04.01)	26 / 18.5 (09.04.01)	170,141	3C7476	Not Avail.	Not Avail.	Not Avail.	Not Avail.	Not in operation until 2003	
2	Beau Bois New	871	350	300	120.00	5.85	33.25	Not Avail.	Not Avail.	88.00	435.00	Not Avail.	Not Avail.	Not Avail.	Not Avail.	3C7872	Not Avail.	Not Avail.	Not Avail.	Not Avail.	Not in operation until 2003	
3	Beau Songes	722B	350	300	81.00	22.85	50.35	50.40	60.20	110.00	233.00	Distribution Mains to P.Louis	120 x 100	55								
4	Beau Songes	722C	350	300	85.00	20.22	51.40	24.40	52.00	240.00	233.35	Distribution Mains to P.Louis	240 x 100	92	1,153,805	7C7212	179,669	1,399,745	3,168	1,582,582		
5	Le Bosquet	160A	350	300	45.72	21.45	38.85	22.60	26.30	102.00	149.74	Old Bosquet Res.	90 x 40	15	138,953	3C6475	23,904	68,612	288	92,804		
6	Pierrefonds	F2A	352	300	42.00	32.00	37.70	33.70	40.20	114.00	80.76	Distribution Mains	90 x 100	37	233,164	1C4072	56,832	141,843	3,452	202,127	Station BH F2A used for temporary pumping only	
7	St Martin	712	350	300	145.00	37.43	67.31	59.60	84.00	170.00	270.37	Distribution Mains to P.Louis	275 x 75 / 300 x 75 (12.07.01)	75 / 92 (12.07.01)	734,993	7C7172	107,301	824,297	2,759	934,357		
8	St Martin	367A	350	300	33.00	16.90	22.80	18.40	22.00	135.10	135.10	New Bosquet Res.	50 x 75	15								
9	St Martin	367B	350	300	34.00	16.60	20.80	17.30	25.50	135.00	135.00	New Bosquet Res.	120 x 90	45	727,390	3C5942	63,360	483,968	2,840	550,168		
DWS - North																						
10	B. Vue Mauricia	82	350	300	64.30	34.68	36.54	38.85	58.70	78.00	87.63	Bois Mangues Res.	80 x 75	26	763,707	6C1527	42,176	446,444	3,096	491,716		
11	Balaclava	SW 40A	250	200	36.90	3.97	22.82	22.00	28.80	30.00	22.75	Distribution Mains	45 x 45	11								
12	Balaclava	595	350	300	26.21	3.61	15.07	19.30	23.10	30.00	24.34	Distribution Mains	45 x 45	11	106,600	6C6107	19,200	123,930	0	143,130		
13	Bassin Loulou (Jamblon)	85B	200	150	33.00	20.60	28.40	30.00	32.30	182.30	182.30	Creve Coeur Res.	90 x 60	22	200,544	6C2914	39,872	329,530	2,007	371,409		
14	Bassin Loulou (Robinson)	85D	200	150	34.00	2.90	18.92	0.00	30.00	42.00	189.00	Distribution Mains	20 x 80	7.5	100,441	6C6108	19,200	114,086	1,026	134,314		
15	Beau Plateau	737	250	200	125.00	12.50	23.00	21.70	35.05	100.00	42.18	Distribution Mains	55 x 110 / 70 x 110 (05.10.01)	37 / 30 (05.10.01)	572,981	2C7103	45,888	503,534	2,547	551,969		
16	Bois Mangues (Old P.de Papaves)	12	350	250	66.00	33.00	46.00	33.90	48.50	54.00	82.69	Old Bois Mangues Res.	75 x 75 / 60 x 96 (24.09.01)	22 / 22 (24.09.01)	1,039,683	6C1528	36,960	422,639	2,021	461,620		
17	Calebasses	B471	300	250	37.00	33.22	32.80	8.60	21.60	37.80	51.17	Calebasses Res. / Distribution Mains	40 x 70	18.5	292,607	6C2997	28,147	262,005	3,078	293,230		
18	Camp La Boue	SW26	200	150	25.00	5.00	9.00	8.10	18.70	24.00	149.83	Distribution Mains	20 x 75	5.6	1,129,509	6C6109	19,200	91,347	450	110,997	Station BH SW26 works on timer for 8 hours per day	
19	Camp Thorel	754	350	300	91.00	9.99	23.37	22.50	33.10	240.00	343.25	Camp Thorel Res. / Salazie Res.	240 x 105	92	1,180,218	6C7201	138,083	1,524,524	2,205	1,664,812		
20	Cottage (New)	563A	350	300	80.00	Not Avail.	46.40	49.10	61.20	84.00	61.74	Distribution Mains	80 x 79 / 90 x 100 (18.07.01)	25 / 37 (18.07.01)	613,200	2C6371	54,848	501,492	2,561	558,901		
21	Cottage- Poonith	564	355	305	73.00	22.66	40.87	46.00	55.10	60.00	68.42	Distribution Mains	90 x 106 / 90 x 75 (07.02.01)	45 / 30 (07.02.01)	363,540	2C4693	50,112	435,891	783	486,786	Station BH 564 works on timer for 20 hours per day	
22	F. Du Sac- Choisy	1	300	250	48.76	39.18	39.44	39.50	41.40	72.00	41.06	Distribution Mains	70 x 100 / 100 x 75 (25.09.01)	30 / 37 (25.09.01)								
23	F. Du Sac- Choisy	643	350	300	47.00	Not Avail.	Not Avail.	39.20	42.00		41.06	Distribution Mains	100 x 100	37	1,583,735	6C2562	94,736	1,198,354	2,205	1,295,295		
24	F. Du Sac- Forbach	743	350	300	123.00	43.00	47.00	46.00	48.00	261.00	45.20	Rouge Terre Res.	245 x 79	75	1,958,792	6C7464	94,464	1,293,400	1,387,864			
25	Haute Rive	391B	300	250	40.00								80 x 75 / 80 x 70 (19.10.01)	22 / 22 (19.10.01)								
26	La Clemence	692	350	300	60.00	10.52	29.47	37.50	52.10	54.00	46.99	Distribution Mains	40 x 67	11	253,739	2C6258	29,184	250,760	2,633	282,577		
27	La Louisia	751	350	300	124.00	19.22	48.34	59.40	67.50	274.00	77.10	Old Plaines des Papayes Res.	270 x 100	110	1,690,138	6C7117	90,754	1,111,869	0	1,202,623		
28	Labourdonnais	551A	255	200	84.00	48.85	61.37	50.00	64.00	42.00	82.00	Rouillard Res.	35 x 107	15	264,195	2C5741	23,160	271,809	630	295,599	Station BH 551A works on timer for 20 hours per day	
29	Mapou	558	250	200	87.00	23.32	54.73	41.20	48.40	65												

BOREHOLE AND PUMP INFORMATION (M & E - NORTH)

Desktop Study Part I - Energy Auditing , Management and Efficiency at CWA Pumping Stations

Year 2002

S.N	CWA Pumping Station	Code	BH dia (mm)	Casing Dia (mm)	Borehole Depth (m)	Tested Data from W.R.Unit		Actual DWL variation recorded	Tested Yield data from W.R.U (m³/h)	Tested Ground Level from W.R.U (m AMSL)	Pumping To	Installed Pump capacity		Annual Flow (m³)	Account Number	Annual Energy consumption for Year 2002 in Rupees				Remarks	
						SWL (m)	DWL (m)					m³/h x m	kW			Maximum Demand	Energy Charge (kWh)	Excess kVA	Total		
DWS - Port Louis																					
1	Beau Bois b.h	825	350	300	123.00	7.19	20.71	23.50	31.80	40	439.66	Distribution Nouvelle Decouverte	50 x 80	18.5	75,921	3C7476	Not Avail.	Not Avail.	Not Avail.	Not Avail.	Not in operation until 2003
2	Beau Bois New	871	350	300	120.00	5.85	33.25	Not Avail.	Not Avail.	88	435		Not Avail.	Not Avail.	3C7872	Not Avail.	Not Avail.	Not Avail.	Not Avail.	Not Avail.	Not in operation until 2003
3	Beau Songes	722B	350	300	81.00	22.85	50.35	40.30	57.20	110	233	Distribution Mains to P.Louis	100 x 125	45							
	Beau Songes	722C	350	300	85.00	20.22	51.40	20.00	52.30	240	233.35	Distribution Mains to P.Louis	240 x 100	92	1,007,906	7C7212	187,546	921,726	0	1,109,272	
4	Le Bosquet	160A	350	300	45.72	21.45	38.85	18.40	27.70	102	149.74	Old Bosquet Reservoir	90 x 40	15	41,512	3C6475	27,558	10,554	1,790	39,902	Non-return valve defective and flowmeter faulty in 2002
5	Petite Riviere	F2A	352	300	42.00	32.00	37.70	31.40	39.00	114	80.76	Distribution Mains	90 x 100	37	97,397	1C4072	63,315	64,130	4,692	132,137	Station BH F2A used for temporary pumping only
6	Pierrefonds	712	350	300	145.00	37.43	67.31	42.80	83.80	170	270.37	Distribution Mains to P.Louis	300 x 75	92	1,042,695	7C7172	126,364	503,252	524	630,140	
7	St Martin	367A	350	300	33.00	16.90	22.80	18.70	20.00	135.1	135.1	New Bosquet Reservoir	50 x 75	15							
	St Martin	367B	350	300	34.00	16.60	20.80	17.40	21.20	135	135	New Bosquet Reservoir	120 x 90	45	916,340	3C5942	73,412	468,403	2,051	543,866	
DWS - North																					
8	B. Vue Mauricia	82	350	300	64.3	34.68	36.54	34.00	38.80	78	87.63	Bois Mangues Res.	80 x 75	26	511,428	6C1527	42,379	416,247	509	459,135	
9	Balaclava	SW 40A	250	200	36.9	3.97	22.82	16.60	28.00	30	22.75	Distribution Mains	45 x 45 / 50 x 50	11/11							
	Balaclava	595	350	300	26.21	3.61	15.07	10.60	24.00	30	24.34	Distribution Mains	(30.04.02)	(30.04.02)							
10	Bassin loulou (Jamblon)	85B	200	150	33			19.80	21.30	30	182.3	Creve Coeur Res.	45 x 45	11	83,701	6C6107	22,790	69,112	1,005	92,907	
11	Bassin Loulou (Robinson)	85D	200	150	34	2.9	18.92	22.70	29.70	42	189	Distribution Mains	90 x 60	22	208,968	6C2914	50,861	504,245	0	555,106	
12	Beau Plateau	737	250	200	125	12.5	23	22.20	24.60	100	42.18	Distribution Mains	20 x 80	7.5	75,557	6C6108	22,790	75,582	40	98,412	
	Bois Mangues (Old P.de Papayes)	12	350	250	66	33	46	34.30	47.00	54	82.69	Old Bois Mangues Res.	60 x 96	22	559,366	6C1528	38,801	364,336	3,099	396,236	
14	Calebasses	B471	300	250	37	33.22	32.8	0.00	20.30	37.8	51.17	Calebasses Res. / Distribution Mains	40 x 70	18.5	285,000	6C2997	32,404	252,882	1,040	286,326	
15	Camp La Boue	SW26	200	150	25	5	9	6.00	19.80	24	149.83	Distribution Mains	20 x 75	5.6	884,865	6C6109	22,790	123,633	0	146,423	Station BH SW26 works on timer for 8 hours per day
16	Camp Thorel	754	350	300	91	9.99	23.37	31.50	37.00	240	343.25	Camp Thorel Res. / Salazie Res.	240 x 105	92	1,206,582	6C7201	129,281	1,590,679	0	1,719,960	
17	Cottage (New)	563A	350	300	80	Not Avail.	46.4	31.90	63.70	84	61.74	Distribution Mains	90 x 100	37	630,720	2C6371	43,722	433,904	2,007	479,633	
18	Cottage - Poomith	564	355	305	73	22.66	40.87	26.90	50.00	60	68.42	Distribution Mains	90 x 75	30	731,610	2C4693	45,826	501,536	245	547,607	Station BH 564 works on timer for 20 hours per day
19	F. Du Sac- Choisy	1	300	250	48.76	39.18	39.44	38.70	40.90	72	41.06	Distribution Mains	100 x 100 / 90 x 100	37 / 37							
	F. Du Sac- Choisy	643	350	300	47	Not Avail.	Not Avail.	40.70	41.60		41.06	Distribution Mains	(09.10.02)	(09.10.02)	1,174,013	6C2562	104,747	1,273,417	0	1,378,164	
20	F. Du Sac- Forbach	743	350	300	123	43	47	45.90	59.30	261	45.2	Rouge Terre Res.	245 x 79	75	1,735,359	6C7464	114,007	1,322,484	2,203	1,438,694	
21	Haute Rive	391B	300	250	40.00	Not Avail.	Not Avail.	29.50	34.50	72.00	18.87	Belle Vue Maurel Res. / Distribution Mains	80 x 70	22	483,227	2C2854	38,667	377,952	0	416,619	
22	La Clemence	692	350	300	60.00	10.52	29.47	26.20	37.80	54.00	46.99	Distribution Mains	40 x 67	11	196,692	2C6258	28,577	186,376	110	215,063	
23	La Louisa	751	350	300	124.00	19.22	48.34	67.40	73.00	274.00	77.10	Old Plaines des Papayes Res.	270 x 100	110	1,432,083	6C7117	98,623	1,142,048	0	1,240,671	
24	Labourdonnais	551A	255	200	84.00	48.85	61.37	48.40	52.10	42.00	82.00	Rouillaud Res.	35 x 107	15	209,316	2C5741	24,631	276,968	0	301,599	Station BH 551A works on timer for 20 hours per day
25	Mapou	558	250	200	87.00	23.32	54.73	43.00	47.80	65.00	88.39	Distribution Mains	50 x 105 / 60 x 80	22 / 22.4							
26	Mon Loisir	720	350	300	61.80	15.80	40.43	26.00	45.80	100.00	70.04	Distribution Mains	(21.03.02)	(21.03.02)	348,215	6C7196	33,051	343,639	0	376,690	Station BH 558 works on timer for 18 hours per day
27	MSA BH 117	117A	350	300	58.00	12.60	21.40				66.00	</									

BOREHOLE AND PUMP INFORMATION (M & E - NORTH)

Desktop Study Part I - Energy Auditing , Management and Efficiency at CWA Pumping Stations

Year 2003

S.N	CWA Pumping Station	Code	BH dia (mm)	Casing Dia (mm)	Borehole Depth (m)	Tested Data from W.R.Unit		Actual DWL variation recorded	Tested Yield data from W.R.U (m³/h)	Tested Ground Level from W.R.U (m AMSL)	Pumping To	Installed Pump capacity		Annual Flow (m³)	Account Number	Annual Energy consumption for Year 2003 in Rupees				Remarks	
						SWL (m)	DWL (m)					m³/h x m	kW			Maximum Demand	Energy Charge (kWh)	Excess kVA	Total		
DWS - Port Louis																					
1	Beau Bois b.h	825	350	300	123.00	7.19	20.71	24.80	89.00	40	439.66	Distribution Nouvelle Decouverte	50 x 80 / 50 x 150 (13.11.03)	18.5 / 30 (13.11.03)	319,486	3C7476	Not Avail.	Not Avail.	Not Avail.	Not Avail..	Not in operation until 2003
2	Beau Bois New	871	350	300	120.00	5.85	33.25	32.00	42.00	88	435	Malinga Reservoir	75 x 80	26	3C7872	Not Avail.	Not Avail.	Not Avail.	Not Avail..	Not in operation until 2003	
3	Beau Songes	722B	350	300	81.00	22.85	50.35	25.30	55.80	110	233	Distribution Mains to P.Louis	100 x 125	45							
	Beau Songes	722C	350	300	85.00	20.22	51.40	31.00	56.30	240	233.35	Distribution Mains to P.Louis	240 x 100	92	1,187,950	7C7212	179,658	800,001	860	980,519	
4	Le Bosquet	160A	350	300	45.72	21.45	38.85	Not Avail.	Not Avail.	102	149.74	Old Bosquet Reservoir	90 x 40	15	Not Avail.	3C6475	25,460	18,360	1,570	45,390	values or flow available. Non-return valve defective
5	Petite Riviere	F2A	352	300	42.00	32.00	37.70	32.50	37.70	114	80.76	Distribution Mains	90 x 100	37	232,604	1C4072	63,327	156,168	6,780	226,275	Station BH F2A used for temporary pumping only
6	Pierrefonds	712	350	300	145.00	37.43	67.31	54.20	83.40	170	270.37	Distribution Mains to P.Louis	300 x 75	92	1,070,279	7C7172	125,288	808,436	645	934,369	
7	St Martin	367A	350	300	33.00	16.90	22.80	19.20	20.80	135.1	135.1	New Bosquet Reservoir	50 x 75	15							
	St Martin	367B	350	300	34.00	16.60	20.80	17.20	22.50	135	135	New Bosquet Reservoir	120 x 90 / 100 x 95 (11.09.03)	45 / 37 (11.09.03)	525,680	3C5942	69,483	325,188	1,690	396,361	
DWS - North																					
8	B. Vue Mauricia	82	350	300	64.30	34.68	36.54	32.00	40.60	78	87.63	Bois Manques Res.	80 x 75 / 75 x 80 (18.08.03)	26 / 26 (18.08.03)	629,967	6C1527	43,852	443,520	930	488,302	
9	Balaclava	SW 40A	250	200	36.90	3.97	22.82	3.20	15.30	30	22.75	Distribution Mains	50 x 50	11							Flowmeter faulty in 2003. Pump switched off on 16.01.03
	Balaclava	595	350	300	26.21	3.61	15.07	4.10	10.20	30	24.34	Distribution Mains	45 x 45	11	4,723	6C6107	22,800	3,881	2,935	29,616	Flowmeter faulty in 2003. Pump switched off on 16.01.03
10	Bassin Loulou (Jambon)	85B	200	150	33.00			18.90	21.90	30	182.3	Creve Coeur Res.	90 x 60	22	206,400	6C2914	50,958	410,904	410	462,272	
11	Bassin Loulou (Robinson)	85D	200	150	34.00	2.90	18.92	0.00	30.00	42	189	Distribution Mains	20 x 80	7.5	Not Avail.	6C6108	22,800	50,024	0	72,824	No flowmeter values recorded after 23.01.03
12	Beau Plateau	737	250	200	125.00	12.50	23.00	30.10	34.00	100	42.18	Distribution Mains	70 x 110 / 77 x 92 (18.03.03)	37 / 26 (18.03.03)	592,189	2C7103	59,128	512,064	0	571,192	
13	Bois Mangues (Old P.de Papayes)	12	350	250	66.00	33.00	46.00	33.00	44.40	54	82.69	Old Bois Mangues Res.	60 x 96 / 60 x 70 (28.11.03)	22 / 22 (28.11.03)	530,472	6C1528	37,430	340,740	3,225	381,395	
14	Calebasses	B471	300	250	37.00	33.22	32.80			37.8	51.17	Calebasses Res. / Distribution Mains	40 x 70	18.5	Not Avail.	6C2997	34,525	41,900	2,105	78,530	Pump switched OFF hence no further flowmeter readings
15	Camp La Boue	SW26	200	150	25.00	5.00	9.00	6.90	18.70	24	149.83	Distribution Mains	20 x 75	5.6	341,113	6C6109	22,800	118,485	30	141,315	Station BH SW26 works on timer for 8 hours per day
16	Camp Thorel	754	350	300	91.00	9.99	23.37	32.40	34.40	240	343.25	Camp Thorel Res. / Salazie Res.	240 x 105	92	1,439,899	6C7201	125,372	1,629,315	0	1,754,687	
17	Cottage (New)	563A	350	300	80.00	Not Avail.	46.40	47.50	63.70	84	61.74	Distribution Mains	90 x 100	37	551,334	2C6371	40,774	414,864	540	456,178	
18	Cottage- Poonith	564	355	305	73.00	22.66	40.87	37.90	52.60	60	68.42	Distribution Mains	90 x 75 / 90 x 100 (15.06.03)	30 / 37 (15.06.03)	833,296	2C4693	56,924	587,052	1,930	645,906	Station BH 564 works on timer for 20 hours per day
19	F. Du Sac- Choisy	1	300	250	48.76	39.18	39.44	40.00	41.80	72	41.06	Distribution Mains	100 x 75	37							
	F. Du Sac- Choisy	643	350	300	47.00	Not Avail.	Not Avail.	40.70	41.70		41.06	Distribution Mains	90 x 100	37	1,323,053	6C2562	106,847	1,393,006	0	1,499,853	
20	F. Du Sac- Forbach	743	350	300	123.00	43.00	47.00	39.50	48.20	261	45.2	Rouge Terre Res.	245 x 79 / 300 x 60 (23.05.03)	75 / 66 (23.05.03)	1,704,434	6C7464	118,560	1,201,878	5,540	1,325,978	
21	Haute Rive	391B	300	250	40.00	Not Avail.	Not Avail.	13.60	34.00	72.00	18.87	Belle Vue Maurel Res. / Distribution Mains	80 x 70	22	464,434	2C2854	35,682	397,872	0	433,554	
22	La Clemence	692	350	300	60.00	10.52	29.47	33.40	36.10	54.00	46.99	Distribution Mains	40 x 67 / 20 x 90 (06.06.03)	11 x 11 (06.06.03)	154,201	2C6258	23,066	101,664	1,215	125,945	Pump switched OFF as at 10.06.03
23	La Louisia	751	350	300	124.00	19.22	48.34	57.00	73.80	274.00	77.10	Old Plaines des Papayes Res.	270 x 100	110	1,248,582	6C7117	90,839	380,286	85	471,210	
24	Labourdonnais	551A	255	200	84.00	48.85	61.37	40.10	58.30	42.00	82.00	Rouillard Res.	35 x 107 / 40 x 80 (08.12.03)	15 / 13 (08.12.03)	214,635	2C5741	23,247	225,700	660	249,607	Station BH 551A works on timer for 20 hours per day
25	Mapou	558	250	200	87.00	23.32	54.73	30.45													

BOREHOLE AND PUMP INFORMATION (M & E - SOUTH)

Desktop Study Part I - Energy Auditing, Management and Efficiency at CWA Pumping Stations

Year 2001

S.N	CWA Pumping Station	Code	BH dia (mm)	Casing Dia (mm)	Borehole Depth (m)	Tested Data from W.R.Unit		Actual DWL variation recorded	Tested Yield data from W.R.U (m³/h)	Tested Ground Level from W.R.U (m AMSL)	Pumping To	Installed Pump capacity		Annual Flow (m³)	Account Number	Annual Energy Consumption for Year 2001 in Rupees				Remarks
						SWL (m)	DWL (m)					m³/h x m	kW			Maximum Demand	Energy Charge (kWh)	Excess kVA	Total	
DWS SOUTH																				
1	Baie du Cap (Choisy) New	776	250	200	37.00	7.80	27.00	4.60	28.10	5.7	96.64	Distribution Mains	15 x 60	5.5	49,777	6020000073 (3) Tariff 315	Not applicable	126,178	126,178	Station works on timer for 12 hours per day. Electricity billing in Tariff 315, only energy consumption in kWh considered.
2	Bananes	723	350	300	83.00	27.99	58.63	15.10	43.20	114.0	369.17	Distribution Mains	180 x 80	37.0	1,140,480	5C6764	58,064	431,420	4,721	494,205
3	Café	387	350	300	36.00			3.00	10.80		59.60	Distribution Mains	50 x 50	15.0	474,100	5C6275	25,152	260,261	1,116	286,529
4	Cluny	217A	350	300	42.60	10.40	11.20	7.20	16.90	300.0	273.80	New Cluny Res.	350 x 50	75.0						Flowmeter defective as from June 2001 till September 2002
	Cluny	217B	350	300	45.72	11.72	11.67	8.00	17.10	300.0	273.22	New Cluny Res.	275 x 75	92.0						Flowmeter defective as from June 2001 till September 2002
	Cluny	217C	350	300	45.00	6.48	6.48	7.70	18.30	300.0	275.91	Distribution Mains	388 x 55 / 350 x 72.2	92 / 92	9,110,880	5C3152	336,000	4,233,483	7,223	4,576,706
											(26.04.01)		(26.04.01)							Flowmeter defective till September 2001
5	Gebert	667	300	250	82.00			10.40	39.30	160.0	257.03	Distribution Mains	150 x 80	45.0	725,760	5C5964	107,904	632,834	3,506	744,244
6	M.D.M.T - Plaisance	548A	350	300	30.48	39.60		4.10	18.60	30.0	57.19	S.S.R Airport	30 x 50	7.5						
	M.D.M.T - Plaisance	548B	350	300	30.13			3.70	23.40	30.0		S.S.R Airport	30 x 55	11.0	333,720	5C6067	29,040	160,139	2,592	191,771
7	Nouvelle France new	725	350	300	76.74	49.07	54.03	38.70	59.20	267.0	444.35	Nouvelle France Res.	290 x 105	110.0	1,589,760	5C6940	155,456	1,327,545	4,401	1,487,402
8	Trois Boutiques	204A	350	300	36.80	14.69	19.40	8.30	19.80	250.0	71.47	Distribution Mains	220 x 75	66.0						Station works on timer for 20 hours per day
	Trois Boutiques	204B	300	250	36.58							Distribution Mains	55 x 110	26.0	2,259,840	5C3165	80,576	931,570	2,538	1,014,684
																			First pump works depending upon the water level at MDMT.	
																			Second Pump temporarily OFF	
DWS MAV UPPER																				
9	Alma	316A	300	250	39.90	10.20	32.00	13.50	30.90	25.0	464.56	Alma Res.	20 x 90	7.5	219,283	6C1533	63,744	362,089	2,610	428,443
10	Beard	715B	350	300	60.00	30.71	43.08	23.80	34.80	250.0	544.12	Beard Res.	275 x 75 / 270 x 100	110 x 110						Station 715B used as Stand-by borehole. Station OFF
11	Beard (new)	828	350	300	117.00	31.49	83.54	20.00	58.20	209.0		Beard Res.	200 x 100 / 210 x 110	75 / 92	2,432,160	4C6761	125,664	1,339,124	4,325	1,469,113
12	Bonne Veine No. 1	623	350	300	50.60	2.14	9.35	2.50	26.10	96.0	456.50	Distribution Mains	72 x 83	30.0						
	Bonne Veine No. 2	619	250	200	52.00	2.48	7.71			114.0	456.30	Distribution Mains	40 x 90	22.0	1,012,172	6C5410	54,144	482,878	5,594	542,616
13	Camp Fouquereaux old	SW 91B	200	150	42.55	6.40	13.36	6.00	14.20	21.0	451.00	Distribution Mains	20 x 95	9.2	109,901	7C4923	19,200	61,346	500	81,046
14	Camp Fouquereaux (new)	727	350	300	122.00	12.53	75.11	17.50	114.00	36.0	496.38	Distribution Mains	55 x 100 / 55 x 110	22.4 / 26						
16	Montee du Fil	488A	350	300	53.80	19.40	23.54	16.80	17.10	348.0	489.02	La Marie Res.	394 x 38.5	85.0						Station 488A used as Stand-by borehole. Station OFF
	Montee du Fil	488C	450	400	53.34	21.68	24.44	14.90	23.60	348.0		La Marie Res.	175 x 40	26.0	1,632,960	4C3082	48,576	483,916	2,777	535,269
DWS MAV LOWER																				
24	Bambou (Eau Bonne)	247A	350	300	23.80	12.00	12.00	9.50	10.60	120.0	158.00	Bambou Reservoir	120 x 97 / 100 x 95	51 / 37						Station BH 247A works on timer for 13.5 hours per day
	Bambou (Eau Bonne)	247B	400	355	26.30	11.00	13.00	9.40	16.00	160.0	158.00	Bambou Reservoir	160 x 103	75.0	1,286,483	3C4041	153,744	1,581,912	6,399	1,742,055
25	Barkly (BH)	664	350	300	72.00	22.00	49.00	25.80	27.20	250.0	212.05	Distribution Mains	90 x 100 / 200 x 100	37 / 75						
26	Barkly (Swimming Pool)	501	350	250	44.00	22.85	32.88	20.00	28.90	90.0	215.94	Distribution Mains	90 x 100	37.0	614,304	3C3223	53,056	519,069	2,066	574,191
27	Bassin 432	432	350	300	53.60	29.36	33.30	30.00	36.70	330.0	311.65	Stanley Res.	392 x 72.3	130.0						
	Bassin 432	432B	350	300	54.10	29.34	31.29			330.0		Stanley Res.	300 x 100	92.0	4,108,752	7C3894	145,728	1,761,486	4,730	1,911,944
28	Bassin 435	435	300	261	58.00	20.50	44.00	30.20	36.90	90.0	290.00	Palmyre Res.	130 x 30	15.0						
29	Bassin 717	717	350	300	143.00	25.75	61.62	45.50	66.60	191.0	298.11	Stanley Res.	220 x 105	92.0	1,760,876	7C3798	99,176	1,141,778	0	1,240,954
30	Chamarel	796	250	200																

BOREHOLE AND PUMP INFORMATION (M & E - SOUTH)

Desktop Study Part I - Energy Auditing , Management and Efficiency at CWA Pumping Stations

Year 2002

S.N	CWA Pumping Station	Code	BH dia (mm)	Casing Dia (mm)	Borehole Depth (m)	Tested Data from W.R.Unit		Actual DWL variation recorded		Tested Yield data from W.R.U (m³/h)	Tested Ground Level from W.R.U (m AMSL)	Pumping To	Installed Pump capacity		Annual Flow (m³)	Account Number	Annual Energy Consumption for Year 2002 in Rupees				Remarks	
						SWL (m)	DWL (m)	Min. (m)	Max. (m)				m³/h x m	kW			Maximum Demand	Energy Charge (kWh)	Excess kVA	Total		
DWS SOUTH																						
1	Baie du Cap (Choisy) New	776	250	200	37.00	7.80	27.00	6.30	15.10	5.7	96.64	Distribution Mains	15 x 60 / 12 x 90 (30.11.02)	5.5 / 5.6 (30.11.02)	6020000073 (3) Tariff 315	54,071	Not applicable	137,695	137,695	Station works on timer for 12 hours per day. Electricity billing in Tariff 315, only energy consumption in kWh considered		
2	Bananes	723	350	300	83.00	27.99	58.63	14.50	40.10	114.0	369.17	Distribution Mains	180 x 80	37.0	698,400	5C6764	44,600	219,122	90	263,812	Station OFF during 5 months	
3	Café	387	350	300	36.00			3.10	9.60		59.60	Distribution Mains	50 x 50	15.0	488,640	5C6275	23,853	275,492	0	299,345		
4	Cluny	217A	350	300	42.60	10.40	11.20	7.70	16.80	300.0	273.80	New Cluny Res.	350 x 50	75.0							Flowmeter defective as from June 2001 till September 2002	
	Cluny	217B	350	300	45.72	11.72	11.67	7.80	18.40	300.0	273.22	New Cluny Res.	275 x 75	92.0							Flowmeter defective as from June 2001 till September 2002	
	Cluny	217C	350	300	45.00	6.48	6.48	7.20	16.10	300.0	275.91	Distribution Mains	350 x 72.2 / 300 x 75 (25.02.02)	92 / 92 (25.02.02)	8,936,640	5C3152	380,297	4,228,199	3,915	4,612,411		
5	Gebert	667	300	250	82.00			11.00	37.60	160.0	257.03	Distribution Mains	150 x 80	45.0	904,464	5C5964	65,328	794,354	0	859,682	Station OFF during 1 month	
6	M.D.M.T - Plaisance	548A	350	300	30.48	39.60		6.00	17.00	30.0	57.19	S.S.R Airport	30 x 50	7.5							Station OFF during 1 month	
	M.D.M.T - Plaisance	548B	350	300	30.13			5.80	17.60	30.0		S.S.R Airport	30 x 55 / 45 x 40 (14.03.02)	11 / 7.5 (14.03.02)	656,640	5C6067	27,726	124,152	190	152,068	Station OFF during 1 month	
7	Nouvelle France new	725	350	300	76.74	49.07	54.03	39.00	53.10	267.0	444.35	Nouvelle France Res.	290 x 105	110.0	1,602,514	5C6940	173,544	1,502,086	2,495	1,678,125	Station works on timer for 20 hours per day	
8	Trois Boutiques	204A	350	300	36.80	14.69	19.40	7.70	18.70	250.0	71.47	Distribution Mains	220 x 75	66.0							First pump works depending upon the water level at MDMT.	
	Trois Boutiques	204B	300	250	36.58							Distribution Mains	55 x 110	26.0	2,263,680	5C3165	88,800	962,205	0	1,051,005	Second Pump temporarily OFF	
DWS MAV UPPER																						
9	Alma	316A	300	250	39.90	10.20	32.00	12.80	21.10	25.0	464.56	Alma Res.	20 x 90	7.5	231,552	6C1533	83,621	384,039	3,532	471,192		
10	Beard	715B	350	300	60.00	30.71	43.08	21.00	27.20	250.0	544.12	Beard Res.	270 x 100	110.0							Station 715B used as Stand-by borehole. Station OFF	
11	Beard (new)	828	350	300	117.00	31.49	83.54	21.30	30.90	209.0		Beard Res.	210 x 110	92.0	2,531,520	4C6761	165,009	1,487,036	3,083	1,655,128		
12	Bonne Veine No. 1	623	350	300	50.60	2.14	9.35	0.50	9.80	96.0	456.50	Distribution Mains	70 x 100	30.0								
	Bonne Veine No. 2	619	250	200	52.00	2.48	7.71	3.00	5.70	114.0	456.30	Distribution Mains	40 x 90	22.0	1,127,808	6C5410	61,270	332,643	7,906	401,819	BH 619 used as Stand-by borehole.	
13	Camp Fouquereaux old	SW 91B	200	150	42.55	6.40	13.36	7.30	10.00	21.0	451.00	Distribution Mains	20 x 95	9.2	94,176	7C4923	22,706	25,899	888	49,493		
14	Camp Fouquereaux (new)	727	350	300	122.00	12.53	75.11	72.10	102.00	36.0	496.38	Distribution Mains	55 x 110 / 35 x 107 (15.11.02)	26 / 16.5 (15.11.02)	219,456	4C7355	58,845	276,633	7,394	342,872		
16	Montee du Fil	488A	350	300	53.80	19.40	23.54	11.90	12.70	348.0	489.02	La Marie Res.	394 x 38.5	85.0							BH 488A OFF during 2 months	
	Montee du Fil	488C	450	400	53.34	21.68	24.44	10.30	23.10	348.0		La Marie Res.	175 x 40	26.0	2,998,080	4C3082	58,008	494,284	1,459	553,751		
DWS MAV LOWER																						
24	Bambou (Eau Bonne)	247A	350	300	23.80	12.00	12.00	8.70	15.50	120.0	158.00	Bambou Reservoir	100 x 95 / 125 x 100 (24.10.02)	37 / 55 (24.10.02)							Station BH 247A works on timer for 13.5 hours per day	
	Bambou (Eau Bonne)	247B	400	355	26.30	11.00	13.00	8.60	14.70	160.0	158.00	Bambou Reservoir	160 x 103 / 275 x 75 (03.09.02)	75 / 75 (03.09.02)	1,198,791	3C4041	183,281	1,598,563	300	1,782,144	Station BH 247B works 24hrs per day	
25	Barkly (BH)	664	350	300	72.00	22.00	49.00	28.60	40.30	250.0	212.05	Distribution Mains	200 x 100	75.0	1,392,000	3C5878	113,817	1,228,062	1,489	1,343,368		
26	Barkly (Swimming Pool)	501	350	250	44.00	22.85	32.88	25.00	32.10	90.0	215.94	Distribution Mains	90 x 100	37.0	623,520	3C3223	76,010	515,748	200	591,958		
27	Bassin 432	432	350	300	29.36	33.30	30.70	34.70	33.00		311.65	Stanley Res.	392 x 72.3	130.0								
	Bassin 432	432B	350	300	54.10	29.34	31.29	30.00	35.50	330.0		Stanley Res.	300 x 100	92.0	4,195,440	7C3894	172,088	1,823,639	590	1,996,317		
28	Bassin 435	435	300	261	58.00	20.50	44.00	33.10	40.60	90.0	290.00	Palmyre Res.	130 x 30 / 90 x 54 (02.02.02)	15 / 18.5 (02.02.02)								
29	Bassin 717	717	350	300	143.00	25.75	61.62	58.20	63.70	191.0	298.11											

BOREHOLE AND PUMP INFORMATION (M & E - SOUTH)

Desktop Study Part I - Energy Auditing , Management and Efficiency at CWA Pumping Stations

Year 2003

S.N	CWA Pumping Station	Code	BH dia (mm)	Casing Dia (mm)	Borehole Depth (m)	Tested Data from W.R.Unit		Actual DWL variation recorded		Tested Yield data from W.R.U (m³/h)	Tested Ground Level from W.R.U (m AMSL)	Pumping To	Installed Pump capacity		Annual Flow (m³)	Account Number	Annual Energy Consumption for Year 2003 in rupees				Remarks	
						SWL (m)	DWL (m)	Min. (m)	Max. (m)				m³/h x m	kW			Maximum Demand	Energy Charge (kWh)	Excess kVA	Total		
DWS SOUTH																						
1	Baie du Cap (Choisy) New	776	250	200	37.00	7.80	27.00	3.80	31.00	5.7	96.64	Distribution Mains	12 x 90	5.6	31,536	6020000073 (3)	Tariff 315	Not applicable	86,881	Not applicable	86,881	Station works on timer for 12 hours per day. Electricity billing in Tariff 315, only energy consumption in kWh considered
2	Bananes	723	350	300	83.00	27.99	58.63	15.00	26.10	114.0	369.17	Distribution Mains	180 x 80	37.0	488,160	5C6764	41,439	180,279	0	221,718	0	Station OFF during 7 months
3	Café	387	350	300	36.00			2.40	8.90		59.60	Distribution Mains	50 x 50	15.0	494,640	5C6275		24,928	271,260	0	296,188	
4	Cluny	217A	350	300	42.60	10.40	11.20	7.20	16.50	300.0	273.80	New Cluny Res.	350 x 50	75.0								
	Cluny	217B	350	300	45.72	11.72	11.67	8.00	16.90	300.0	273.22	New Cluny Res.	275 x 75	92.0								
	Cluny	217C	350	300	45.00	6.48	6.48	7.40	16.20	300.0	275.91	Distribution Mains	350 x 72 / 300 x 75	110 x 92	8,601,120	5C3152	400,330	4,270,140	11,545	4,682,015		
											(08.04.03)											
5	Gebert	667	300	250	82.00			8.60	38.00	160.0	257.03	Distribution Mains	150 x 80	45.0	1,409,760	5C5964		75,468	788,256	2,765	866,489	
6	M.D.M.T - Plaisance	548A	350	300	30.48	39.60		3.00	16.00	30.0	57.19	S.S.R Airport	30 x 50	7.5								
	M.D.M.T - Plaisance	548B	350	300	30.13			3.00	20.00	30.0		S.S.R Airport	45 x 40	7.5	540,000	5C6067		23,845	114,516	0	138,361	
7	Nouvelle France new	725	350	300	76.74	49.07	54.03	37.10	49.50	267.0	444.35	Nouvelle France Res.	290 x 105 / 252 x 100	110 / 92	1,645,200	5C6940		179,645	1,572,770	1,660	1,754,075	Station works on timer for 20 hours per day
8	Trois Boutiques	204A	350	300	36.80	14.69	19.40	4.80	17.00	250.0	71.47	Distribution Mains	220 x 75	66.0								
	Trois Boutiques	204B	300	250	36.58							Distribution Mains	55 x 110	26.0	2,499,840	5C3165		87,020	946,584	315	1,033,919	First pump works depending upon the water level at MDMT. Second Pump temporarily OFF
DWS MAV UPPER																						
9	Alma	316A	300	250	39.90	10.20	32.00	14.20	32.80	25.0	464.56	Alma Res.	20 x 90	7.5	208,080	6C1533		70,224	484,920	3,510	558,654	
10	Beard	715B	350	300	60.00	30.71	43.08			250.0	544.12	Beard Res.	270 x 100	110.0								
11	Beard (new)	828	350	300	117.00	31.49	83.54	24.00	57.50	209.0		Beard Res.	210 x 110	92.0	2,460,044	4C6761		151,278	1,421,156	0	1,572,434	
12	Bonne Veine No. 1	623	350	300	50.60	2.14	9.35	0.80	25.20	96.0	456.50	Distribution Mains	70 x 100	30.0								
	Bonne Veine No. 2	619	250	200	52.00	2.48	7.71	1.00	4.00	114.0	456.30	Distribution Mains	40 x 90	22.0	884,928	6C5410		53,608	491,413	1,110	546,131	BH 619 used as Stand-by borehole.
13	Camp Fouquereaux old	SW 91B	200	150	42.55	6.40	13.36	4.00	10.20	21.0	451.00	Distribution Mains	20 x 95	9.2	65,520	7C4923		22,914	20,484	750	44,148	
14	Camp Fouquereaux (new)	727	350	300	122.00	12.53	75.11	89.10	98.00	36.0	496.38	Distribution Mains	35 x 107	16.5	169,200	4C7355		68,134	239,832	5,210	313,176	Station OFF during 2 months
15	Montee du Fil	488A	350	300	53.80	19.40	23.54			348.0	489.02	La Marie Res.	394 x 38.5	85.0								
	Montee du Fil	488C	450	400	53.34	21.68	24.44	17.00	27.00	348.0	La Marie Res.	175 x 40	26.0	3,387,048	4C3082		61,332	352,129	10,620	424,081	BH 488A used as Stand-by borehole. Not enough values for DWL	
DWS MAV LOWER																						
24	Bambou (Eau Bonne)	247A	350	300	23.80	12.00	12.00			120.0	158.00	Bambou Reservoir	125 x 100	55.0								
	Bambou (Eau Bonne)	247B	400	355	26.30	11.00	13.00	8.40	18.00	160.0	158.00	Bambou Reservoir	275 x 75	75.0	1,371,285	3C4041		156,722	1,271,516	4,620	1,432,858	BH 247A works on timer for 13.5 hours per day. Not enough values for DWL Station BH 247B works 24hrs per day
25	Barkly (BH)	664	350	300	72.00	22.00	49.00	42.00	50.50	250.0	212.05	Distribution Mains	200 x 100 / 252 x 100	75 / 90 (13.06.03)								
26	Barkly (Swimming Pool)	501	350	250	44.00	22.85	32.88	19.20	31.40	90.0	215.94	Distribution Mains	252 x 100 / 250 x 85	90 / 93.2 (27.11.03)	2,099,952	3C3223		217,968	1,923,192	2,735	2,143,895	Note that CEB merged the existing accounts of BH 664 and BH 501as joint account 3C3223 in July 2003. Hence, data for both stations are compiled together for this year.
27	Bassin 432	432	350	300	53.60	29.36	33.30	27.80	35.20	330.0	311.65	Stanley Res.	392 x 72.3	130.0								
	Bassin 432	432B	350	300	54.10	29.34	31.29	29.00	40.80	330.0		Stanley Res.	300 x 100	92.0	4,070,160	7C3894		157,662	1,949,076	0	2,106,738	
28	Bassin 435	435	300	261	58.00	20.50	44.00	23.00	41.50	90.0	290.00	Palmyre Res.	90 x 54	18.5								
29	Bassin 717	717	350	300	143.00	25.75	61.62	26.50	65.00	191.0												