

जल विद्युत गृहों के कार्य
निष्पादन का पुनर्विलोकन

**REVIEW OF PERFORMANCE OF
HYDRO POWER STATIONS
2013-14**

भारत सरकार विद्युत
मंत्रालय



**Government of India
Ministry of Power**

केन्द्रीय
विद्युत
प्राधिकरण



**CENTRAL
ELECTRICITY
AUTHORITY**

विद्युत अधिनियम, 2003 की धारा 73 (आई) व (जे) के तहत के0वि0प्रा10 के सांविधिक दायित्व का निर्वहन करते हुए प्रकाशित
(PUBLISHED IN FULFILLMENT OF CEA'S OBLIGATION UNDER SECTION 73 (i) & (j) OF THE ELECTRICITY ACT, 2003)

FUNCTIONS AND DUTIES OF CEA AS PER ELECTRICITY ACT-2003

- a) Advise the Central Government on the matters relating to the national electricity policy, formulate short-term and perspective plans for development of the electricity system and coordinate the activities of the planning agencies for the optimal utilization of resources to sub serve the interests of the national economy and to provide reliable and affordable electricity to all consumers;
- b) Specify the technical standards for construction of electrical plants, electric lines and connectivity to the grid;
- c) Specify the safety requirements for construction, operation and maintenance of electrical plants and electric lines;
- d) Specify the Grid Standards for operation and maintenance of transmission lines;
- e) Specify the conditions for installation of meters for transmission and supply of electricity;
- f) Promote and assist in the timely completion of schemes and projects for improving and augmenting the electricity system;
- g) Promote measures for advancing the skills of persons engaged in electricity industry;
- h) Advise Central Government on any matter on which its advice is sought or make recommendation to that Government on any matter if, in the opinion of the Authority, the recommendation would help in improving the generation, transmission, trading, distribution and utilization of electricity;
- i) Collect and record the data concerning the generation, transmission, trading, distribution and utilization of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters;
- j) Make public from time to time the information secured under this Act, and provides for the publication of reports and investigations;
- k) Promote research in matters affecting the generation, transmission, distribution and trading of electricity;
- l) Carry out, or cause to be carried out, any investigation for the purpose of generating or transmitting or distributing electricity;
- m) Advise any State Government, licensees or the generating companies on such matters which shall enable them to operate and maintain the electricity system under their ownership or control in an improved manner and where necessary, in coordination with any other Government, licensee or the generating company owning or having the control of another electricity system;
- n) Advise the Appropriate Government and the Appropriate Commission on all technical matters relating to generation, transmission and distribution of electricity; and
- o) Discharge such other functions as may be provided under this Act.

केन्द्रीय विद्युत प्राधिकरण
CENTRAL ELECTRICITY AUTHORITY

जल विद्युत केन्द्रों के कार्य निष्पादन का पुनर्विलोकन
REVIEW OF PERFORMANCE OF
HYDRO POWER STATIONS 2013-14



जल विद्युत आयोजना एवं अन्वेषण प्रभाग
HYDRO PLANNING & INVESTIGATION DIVISION

नई दिल्ली
NEW DELHI
अक्टूबर, 2014
OCTOBER-2014

विद्युत अधिनियम, 2003 की धारा 73 (आई) व (जे) के तहत के0वि0प्रा0 के सांविधिक दायित्व का निर्वहन करते हुए प्रकाशित
IN FULFILLMENT OF CEA'S OBLIGATION UNDER SECTION 73 (i) & (j) OF THE ELECTRICITY ACT, 2003



प्राक्कथन

जल विद्युत शक्ति हमारे देश में पिछले 100 वर्षों से नवीनीकरण ऊर्जा का सबसे विश्वसनीय स्रोत रहा है। जल विद्युत शक्ति केन्द्रों की उपलब्धता में सतत सुधार के उद्देश्य से केन्द्रीय विद्युत प्राधिकरण (के.वि.प्रा.), केन्द्रीय पी. एस. यू., राज्य विद्युत बोर्डों और राज्य व निजी क्षेत्र में विद्युत यूटिलिटीयों के निकट सहयोग से उनके वार्षिक निष्पादन की समीक्षा के लिए अध्ययन करता है।

‘वर्ष 2013-14 के दौरान जल विद्युत शक्ति केन्द्रों के निष्पादन की समीक्षा संबंधी रिपोर्ट’ विद्युत अधिनियम, 2003 के खंड 73 (आई) और (जे) के तहत सांविधिक दायित्व को आंशिक रूप से पूरा करने में केन्द्रीय विद्युत प्राधिकरण द्वारा किए गए ऐसे प्रकाशनों की श्रृंखला में 27वीं हैं। इस रिपोर्ट में 40531.41 मेगावाट की कुल प्रतिस्थापित क्षमता वाले 188 जल विद्युत केन्द्रों की 653 जल विद्युत इकाइयों के निष्पादन के व्यापक विश्लेषण का प्रावधान है, जिसके लिए केन्द्रीय, राज्य और निजी क्षेत्रों में उत्पादन यूटिलिटीयों द्वारा आउटेज संबंधी आंकड़े उपलब्ध कराए गए हैं।

प्रचालन उपलब्धता संबंधी सूचना पर्याप्त और विश्वसनीय विद्युत आपूर्ति सुनिश्चित करने में काफी महत्वपूर्ण है। अध्ययनों के अनुसार वर्ष 2013-14 के दौरान जल विद्युत केन्द्रों की औसत प्रचालन उपलब्धता 88.48% थी। प्रणोदित और योजनाबद्ध आउटेज के कारण जल विद्युत इकाइयों की औसत गैर-उपलब्धता क्रमशः 5.55% और 5.97% थी। वर्ष 2013-14 के दौरान जल विद्युत केन्द्रों से उत्पादन 134.848 बिलियन यूनिट था, जो 122.263 बिलियन यूनिट के उत्पादन लक्ष्य से 10.29% ज्यादा था।

मुझे विश्वास है कि यह समीक्षा विद्युत केन्द्र प्राधिकारियों को उपयुक्त प्रचालन एवं रखरखाव की (ओ. एंड एम.) नीति तैयार करके जल विद्युत संयंत्रों की उपलब्धता में और सुधार लाने में उपयोगी मार्गदर्शन प्रदान करेगा। प्रणोदित कामबंदी के कारणों का भी व्यापक विश्लेषण करने की आवश्यकता है। विनिर्माताओं / ओ. एंड एम. एजेंसियों द्वारा उचित उपाय करने की भी आवश्यकता है ताकि इनकी पुनरावृत्ति को कम किया जा सके तथा प्रचालन उपलब्धता में सुधार किया जा सके।

समीक्षा के लिए आउटेज आंकड़े/सूचना उपलब्ध कराने के लिए मैं सभी उत्पादन यूटिलिटीयों का हार्दिक धन्यवाद करता हूँ। मैं इस रिपोर्ट के लिए अपेक्षित निविष्टि आंकड़ों का विश्लेषण करने में सूचना प्रौद्योगिकी प्रभाग द्वारा प्रदान किए गए सहयोग के लिए उनको धन्यवाद देता हूँ।

नई दिल्ली
अक्टूबर, 2014


(के० एन० गर्ग)
सदस्य (जल विद्युत), के० वि० प्रा०



FOREWORD

Hydro Electric Power has been the most reliable source of renewable energy for the last over 100 years in our country. In the quest for continuous improvement in availability of Hydro Power Stations, Central Electricity Authority (CEA) carries out studies to review their annual performance in close co-operation with Central PSUs, State Electricity Boards and Power Utilities in State and Private Sector.

The report on 'Review of Performance of Hydro Power Stations during the year 2013-14' is twenty seventh in the series of such publication by Central Electricity Authority in partial fulfillment of the statutory obligations under Section 73(i) & (j) of the Electricity Act, 2003. The report provides exhaustive analysis of performance of 653 hydro electric units installed at 188 hydro electric stations having total installed capacity of 40531.41 MW for which outage data has been provided by generation utilities in State, Central and Private sectors.

The information on operation availability is of vital importance in ensuring adequate and reliable power supply. According to the studies, the average operating availability of hydroelectric stations during the year 2013-14 was 88.48%. The average non-availability of hydro units due to forced and planned outages was 5.55% and 5.97% respectively. The generation from hydro stations during 2013-14 was 134.848 Billion Units which was 10.29% more than the generation target of 122.263 Billion Units.

I am confident that the review would provide useful guidance to power station authorities in making further improvement in the availability of hydel plants by chalking out suitable O&M strategies. There is also a need to undertake detailed analysis of the reasons of forced outages and to devise measures by the manufactures/O&M agencies so as to minimise the recurrence of the same and to improve the operating availability.

I wish to express my sincere thanks to all the generating utilities for providing outage data/information for the review. I would also like to put on record the co-operation extended by Information Technology Division in undertaking the analysis of the input data required for this report.

NEW DELHI
October, 2014


(K. N. Garg)
Member (Hydro), CEA



प्रस्तावना

किसी भी देश के विकास के लिए विद्युत शक्ति महत्वपूर्ण बुनियादी आवश्यकताओं में से एक है। हमारे देश में 100 वर्षों से भी अधिक समय से जल विद्युत सबसे विश्वसनीय नवीकरणीय ऊर्जा का स्रोत रहा है। दिनांक 31.03.2014 को 243029 मेगावाट की कुल प्रतिष्ठापित विद्युत उत्पादन क्षमता में से 40531 मेगावाट (16.68%) (25 मेगावाट से ज्यादा स्टेशन प्रतिष्ठापित क्षमता) की जल विद्युत क्षमता है।

केन्द्रीय विद्युत प्राधिकरण (के. वि. प्रा.) उत्पादन निष्पादन के सतत प्रबोधन, ब्रेक डाउन के कारणों के विश्लेषण, नवीनीकरण तथा आधुनिकीकरण कार्यों आदि के द्वारा उर्जा उत्पादक यूटिलिटीज के सहयोग से जल विद्युत केन्द्रों के निष्पादन में सुधार के लिए सघन प्रयास कर रहा है। यह आवश्यक है कि विद्यमान विद्युत केन्द्रों को विद्युत की कमी को कम करने के लिए तथा विश्वसनीय आपूर्ति करने के लिए अपने निष्पादन तथा उपलब्धता में सुधार अवश्य करना चाहिए।

यह वार्षिक पुनर्वलोकन वर्ष 2013-14 के दौरान देश में जल विद्युत केन्द्रों के कार्य निष्पादन का विश्लेषण प्रस्तुत करता है तथा 188 जल विद्युत केन्द्रों पर 653 यूनितों के निष्पादन का विस्तृत विश्लेषण दर्शाता है। कोई भी एक सूचकांक जल विद्युत केन्द्रों के कार्य निष्पादन के लिए पर्याप्त रूप से मापक यूनित प्रदान नहीं कर सकता। जल विद्युत केन्द्रों के निष्पादन को योजनाबद्ध अनुरक्षण, गैर-निर्धारित पूर्ण / आंशिक कामबंदी, अंतर्प्रवाह की वास्तविक प्रवृत्ति आदि जैसे घटक प्रभावित करते हैं। अनुरक्षण में अद्यतन पद्धति अपनाने की आवश्यकता है ताकि परिहार्य कामबन्दियों का निराकरण किया जा सके।

नवीनीकरण तथा आधुनिकीकरण विषय से संबंधित अध्याय इसके लाभों का विस्तार से उल्लेख करता है तथा उर्जा उत्पादक यूटिलिटीज को अपने प्रचालाधीन पुरानी यूनितों में इस प्रकार के कार्य को हाथ में लेने की संभावनाओं को सुनिश्चित करने में प्रोत्साहित करेगा।

इस प्रकाशन का अध्ययन के.वि.प्रा.के जल विद्युत आयोजन एवं अन्वेषण (एच.पी.एण्ड आई.) प्रभाग के निदेशक श्री जानकी प्रसाद के संपूर्ण मार्गदर्शन में किया गया है।

मैं सभी विद्युत राज्य परिषदों, सरकारी/ निजी क्षेत्र के उपक्रमों और विद्युत केंद्र के अधिकारियों को हमें जरूरी आंकड़े उपलब्ध कराने के लिए हार्दिक धन्यवाद देना चाहता हूँ।

मैं सभी उर्जा उत्पादक यूटिलिटीज से अनुरोध करूंगा कि जल विद्युत केन्द्रों के संबंध में माहवार निष्पादन तथा आउटेज आंकड़े तुरंत तथा नियमित रूप से प्रस्तुत करते रहें ताकि भविष्य में भी विश्लेषण तथा निष्पादन पुनर्वलोकनों का प्रकाशन समय से हो सके।

के.वि.प्रा. इस रिपोर्ट की विषयवस्तु तथा प्रस्तुतीकरण में सुधार के लिए समन्वित प्रयास कर रहा है। इस संबंध में रचनात्मक सुझाव हर्षप्रद तथा सराहनीय होंगे।

(एस0 डी0 दुबे)

मुख्य अभियन्ता (एच0 पी0 एण्ड आई), के0 वि0 प्रा0

नई दिल्ली
अक्टूबर, 2014



PREFACE

Electric power is one of the most important infrastructure requirements for the development of any country. Hydel Power has been the most reliable source of renewable energy for the last more than 100 years in our country. As on 31.03.2014, out of a total installed generating capacity of 243029 MW, hydro capacity was 40531 MW (16.68%) (Above 25 MW station installed capacity).

Central Electricity Authority (CEA) is making concerted efforts for improving the performance of Hydro Power Stations in cooperation with the generating utilities through close monitoring of generation performance, analysis of causes for break downs, Renovation & Modernization works etc. It is imperative that the existing power stations must improve their performance and availability to reduce power shortage and deliver reliable supply.

This Annual Review provides an analysis of performance of Hydro Power Stations in the country during the year 2013-14 and provides an exhaustive analysis of performance of 653 units at 188 H.E. Stations. No single operating index can adequately provide a measuring unit for performance of Hydro Power Stations. The factors that influence the performance of hydro power stations are planned maintenance, unscheduled total/partial outages, pattern of actual inflows, etc. There is a need to adopt state-of-the-art practices in maintenance so that avoidable outages could be obviated.

The chapter on RM&U enumerates the advantages of RM&U and would motivate generating utilities to explore the possibilities of undertaking such works on older units under operation with them.

Studies for this publication have been carried out in Hydro Planning & Investigation (HP&I) Division of CEA under the overall guidance of Shri Janki Prasad, Director.

I wish to express my sincere thanks to various State Electricity Boards, Public Sector/Private Sector Enterprises and Power Station Authorities for furnishing the necessary data.

I would urge all generating utilities to readily and regularly continue to furnish month-wise performance & outage data in respect of all Hydro Electric Power Stations for analysis & timely publishing of performance reviews in future also.

CEA has been making concerted efforts to improve the contents and presentation of the report. Constructive suggestions in this regard are welcome and will be appreciated.

NEW DELHI
October, 2014


(S. D. Dubey)
Chief Engineer (HP&I), CEA

आभार

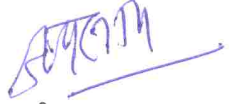
मैं निम्नलिखित अधिकारियों का जल विद्युत गृहों के कार्य का निष्पादन पुनर्विलोकन 2013-14 के प्रकाशन में सहयोग के लिए धन्यवाद देता हूँ।

मुख्य अभियन्ता (जल विद्युत निष्पादन प्रबोधन प्रभाग), के० वि० प्रा० को वर्ष 2013-14 के दौरान यूनिटों के प्रचालन के लिए टरबाइन तथा जेनरेटर निर्माताओं के विवरण समय पर उपलब्ध कराने के लिये धन्यवाद देता हूँ।

मुख्य अभियन्ता (एच०ई०एंड आर०एम० प्रभाग), के० वि० प्रा० का जल विद्युत यूनिटों के नवीनीकरण एवं आधुनिकीकरण एवं उन्नयन पर अध्याय तैयार करने के लिए धन्यवाद देता हूँ।

मैं सदस्य (जल विद्युत), के० वि० प्रा० तथा मुख्य अभियन्ता (एच.पी.एण्ड आई.) का इस पुनर्विलोकन के निर्माण में उनके अमूल्य सूझावों तथा मार्ग निर्देशन के लिये आभारी हूँ।

मैं सर्वश्री बलवान कुमार, उप निदेशक, भीम देव नेगी, वरिष्ठ अभियन्ता, एस जे वी एन एल व अन्य अधिकारियों तथा कर्मचारियों का भी इस पुनर्विलोकन के प्रकाशन में सहयोग के लिये धन्यवाद देता हूँ।



(जानकी प्रसाद)

निदेशक (एच०पी० एण्ड आई०), के० वि० प्रा०

ACKNOWLEDGEMENTS

I express my sincere thanks to the following officers in bringing out this Review of Performance of HE Stations 2013-14.

Chief Engineer (HPM), CEA for timely supplying the details of turbine and generator manufacturers, date of commissioning and type of turbine etc. for the units commissioned during the year 2013-14.

Chief Engineer (HE&RM), CEA for preparing the chapter on Renovation Modernisation & Upgrading of Hydro generating units.

I am grateful to Member (Hydro), CEA and Chief Engineer (HP&I), CEA, for their valuable suggestions and guidance in preparation of this Review.

I also express my thanks to S/Shri Balwan Kumar, Deputy Director, Bhim Dev Negi, Sr. Engineer, SJVNL and other officers/officials for their assistance in making it possible to bring out this Review.



(Janki Prasad)
Director (HP&I), CEA

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SUMMARY

SUMMARY

1.0 General

1.1 This review covers the performance of Hydro-Electric Stations having installed capacity of more than 25 MW. As on 31st March, 2014 there were 653 H.E. generating units installed in 188 Hydro-Electric Stations with an aggregate installed capacity of 40531.41 MW in operation. Performance of 31 important Reservoir based schemes has also been discussed separately in the report.

1.2 Region wise summary of the existing HE Stations in operation with installed capacity above 25 MW as on 31.3.2014 in the country vis-à-vis that on 31.3.2013 is given below in **Table S-1**.

TABLE S-1

**REGIONWISE SUMMARY OF HYDRO-ELECTRIC STATIONS
(2013-14 VIS-A-VIS 2012-13)**

Region	No of Stations as on		No of Units as on		Capacity (MW) as on	
	31.03.14	31.03.13	31.03.14	31.03.13	31.03.14	31.03.13
Northern	65	61	219	206	16386.26	15523.25
Western	28	28	101	101	7392.00	7392.00
Southern	68	67	243	240	11432.45	11387.45
Eastern	17	16	61	58	4078.70	3946.70
N-Eastern	10	10	29	29	1242.00	1242.00
All India	188	182	653	634	40531.41	39491.40

1.3 The report contains outage data of 188 H.E. Stations covering 653 units and having an aggregate installed capacity of 40531.41 MW which was made available by various utilities for the purpose of this Review. For outage data analysis during 2013-14, hydro stations above 25 MW installed capacity have been considered.

1.4 The performance review also analyses yearwise generation, planned maintenance, forced outages, operating availability and average PLF (%) for the last 10 years (viz 2004-05 to 2013-14)

1.5 This review also covers programme for renovation & modernization and uprating of HE Stations in the country. Information in respect of renovation & modernization, uprating and life extension of HE stations in the country (as on 31.03.2014), for the year of 2013-14, achievements during the year 2013-14 and programme for the year 2014-15 are also included in the report.

1.6 The report has been divided into nine chapters as under:

Chapter No.	Particulars
Chapter 1	Hydro Power Potential and Development
Chapter 2	Generation Performance
Chapter 3	Major Reservoir Based H.E. Schemes
Chapter 4	Planned Maintenance of H.E. Units
Chapter 5	Forced Outage of H.E. Units
Chapter 6	Operating Availability of H.E. Units
Chapter 7	Generation Programme for the year 2014-15
Chapter 8	Renovation & Modernisation of Hydro Electric Power Projects
Chapter 9	Definitions and Abbreviations

2.0 Generation Performance

The generation from the hydro electric power Stations in the country during 2013-14 was 134847.52 MU (excluding import from Bhutan) which was 10.29% more than target of 122263 MU.

2.1 Utility wise Performance of H.E. Stations

The utility wise target of energy generation vis-à-vis actual Generation and surplus /shortfall in respect of Hydro Electric stations are given below in **Table S-2**.

TABLE S-2

UTILITY WISE PERFORMANCE OF HYDRO ELECTRIC POWER STATIONS (2013-14 VIS-A-VIS 2012-13)

Utilities	Target		Actual		Surplus (+)/ Shortfall (-) in %	
	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13
CENTRAL SECTOR						
BBMB	9665	10023	12125.01	10944.67	25.45	9.20
NHPC	21107	19117	18360.49	18893.49	-13.01	-1.17
SJVNL	6548	6500	7190.55	6777.78	9.81	4.27
THDC	3952	3942	5582.28	4266.06	41.25	8.22
NHDC	3384	3384	5711.90	4203.92	68.79	24.23
DVC	283	256	225.63	199.33	-20.27	-22.14
NEEPCO	2392	2698	2199.87	2377.74	-8.03	-11.87
SUB TOTAL	47331	45920	51395.73	47662.99	8.59	3.80
PRIVATE SECTOR						
JPVL	7402	7414	6436.65	7173.82	-13.04	-3.24

MPCL	344	350	318.34	333.15	-7.46	-4.81
TATA	1450	1450	1596.92	1450.03	10.13	0.00
DLHP	65	55	90.80	95.98	39.69	74.51
EPPL	386	400	339.87	312.50	-11.95	-21.87
ADPL	720	750	700.24	681.32	-2.74	-9.16
LBPPL	291	277	221.17	156.79	-24.00	-43.40
SMHPCL	415	-	-	-	-	-
GVK INDIA	42	-	-	-	-	-
HSPL	21	-	-	-	-	-
CHUZACHEN	537	-	291.42	-	-45.73	-
SUB TOTAL	11673	10696	9995.41	10203.59	-14.37	-4.60
STATE SECTOR						
JKSPDC	3437	3423	3531.19	3700.00	2.74	8.09
HPSEB LTD.	1603	1708	1594.09	1460.22	-0.56	-14.51
RRVUNL	562	545	1059.98	845.34	88.61	55.11
PSPCL	3920	3852	3913.52	3925.85	-0.17	1.92
UPJVNL	1006	885	1241.73	1577.92	23.43	78.30
UJVNL	4574	4604	4338.34	4677.87	-5.15	1.60
SSNNL	3141	3141	5882.31	3698.29	87.28	17.74
GSECL	690	616	1223.98	880.02	77.39	42.86
MAHAGENCO	3873	3874	4567.31	4011.46	17.93	3.55
MPPGCL	2575	2389	3504.03	3023.79	36.08	26.57
CSPGC	250	250	251.51	301.51	0.60	20.60
APGENCO	6603	8187	7277.10	3456.75	10.21	-57.78
KPCL	11606	12205	12851.04	10169.78	10.73	-16.68
KSEB	6589	6909	7708.18	4650.08	16.99	-32.70
TANGEDCO	4656	5061	4994.74	2868.00	7.28	-43.33
JSEB	160	160	109.53	141.98	-31.54	-11.26
OHPC	5650	5497	6974.86	4373.80	23.45	-20.43
WBSEDCL	1078	1069	1208.61	1138.12	12.12	6.47
APGCL	390	425	422.14	343.04	8.24	-19.28
MePGCL	896	629	802.20	609.89	-10.47	-3.04
SUB TOTAL	63259	65429	73456.38	55853.71	16.12	-14.63
ALL INDIA	122263	122045	134847.52	113720.29	10.29	-6.82

During the year 2013-14, overall hydro generation was more than the target in respect of BBMB, SJVNL, THDC & NHDC in Central Sector and DLHP & TATA in Private Sector. As regards generation by State Electricity Boards/Corporations /Departments, hydro generation was more than the target in respect of all state utilities except HPSEBL, PSPCL, UJVNL, JSEB & MePGCL.

2.2 Sector wise Performance of H.E. Stations

Sector wise generation performance of H.E.Stations during 2013-14 is given in **Table S-3**. It would be seen that there was excess generation as compared to target in Central and State Sectors & less generation in Private Sector.

TABLE S-3

SECTOR WISE PERFORMANCE OF HYDRO ELECTRIC POWER STATIONS (2013-14 VIS-A-VIS 2012-13)

Sector/Board/ Corporation	Energy Generation (MU)					
	Target		Actual		Surplus(+)/ Deficit(-)in %	
	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13
Central	47331	45920	51395.73	47662.99	8.59	3.80
State	63259	65429	73456.38	55853.71	16.12	-14.63
Private	11673	10969	9995.41	10203.59	-14.37	-4.60
Total	122263	122045	134847.52	113720.29	10.29	-6.82

3.0 Outage Analysis

Outage data of 188 H.E. Stations covering 653 units and having an aggregate installed capacity of 40531.41 MW was made available by various utilities for the purpose of this Review. For outage data analysis during 2013-14, hydro stations above 25 MW installed capacity have been considered. Region wise details of these 188 hydro power stations are given below in **Table S-4**.

TABLE S-4

REGION WISE SUMMARY OF HE STATIONS ANALYSED (2013-14 VIS-A-VIS 2012-13)

Region	No of Stations		No of Units		Capacity(MW)as on	
	2013-14	2012-13	2013-14	2012-13	31.03.14	31.03.13
Northern	65	61	219	206	16386.26	15523.25
Western	28	28	101	101	7392.00	7392.00
Southern	68	67	243	240	11432.45	11387.45
Eastern	17	16	61	58	4078.70	3946.70
North Eastern	10	10	29	29	1242.00	1242.00
All India	188	182	653	634	40531.41	39491.40

3.1 Planned Maintenance

The number of H.E.Stations falling under various ranges of non-availability due to planned maintenance during the year 2013-14 is summarized below in **Table S-5**.

TABLE S-5
NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES
(2013-14 VIS-A-VIS 2012-13)

% Non availability due to planned maintenance	2013-14		2012-13	
	Nos of Stations	Capacity (MW) As on 31.03.14	Nos of Stations	Capacity (MW) As on 31.03.13
0	30	5812.01	23	5441.20
Up to 5	66	17844.25	67	14744.70
>5 to 10	45	9276.15	44	9028.85
>10 to 15	22	3610.00	19	4277.45
>15 to 20	9	1347.20	5	1330.00
>20 to 25	3	129.60	7	1930.00
>25 to 30	3	598.00	3	214.00
above 30	10	1914.20	14	2525.20
Total	188	40531.41	182	39491.40

It could be seen from above that no planned maintenance was carried out at 30 hydro electric stations during 2013-14 as compared to 23 hydro electric stations during 2012-13.

Non-availability due to planned maintenance was more than 30% at 10 H.E. Stations during 2013-14. Details of which are given below in **Table S-6**.

TABLE S-6
H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE
FOR THE PERIOD: (2013-14)

Sl. No	Name of Station	Capacity(MW)	P.M.N.A*(%)
1	RIHAND	300.00	55.13
2	BHADRA	39.20	49.34
3	VAITARNA	60.00	41.31
4	SUBERNREKHA-I	65.00	33.51
5	SUBERNREKHA-II	65.00	33.42
6	UPPER SINDH-II	105.00	33.30
7	BUDHIL	70.00	33.30
8	SHANAN	110.00	32.91
9	METTUR TUNNEL	200.00	30.96
10	SRISAILAM LB	900.00	30.51

* P.M.N.A -Non availability due to Planned Maintenance

The duration of various types of periodic planned maintenance varied considerably from station to station. Details of average time taken for various types of maintenance are given in **Table S-7**.

TABLE S-7
AVERAGE DURATION OF VARIOUS TYPES OF PLANNED
MAINTENANCE
PERIOD: (2013-14)

Sl. No	Type of Planned maintenance	Average duration at any unit (Hrs)
1	Capital	1659.58
2	Annual	778.23
3	Half Yearly	0.00
4	Quarterly	58.79
5	Monthly	105.32
6	Routine	47.95
7	Renovation & Modernisation	831.19
8	Up rating	2.50
9	Civil Structure	95.38
10	Turbine	103.38
11	Generator	58.66
12	Other Equipments	66.89
13	Miscellaneous	219.08

It has been observed that there were wide variations in the time taken at different hydro units for the same type of periodic maintenance. The reasons for this can be attributed to following factors.

- The nature and the extent of work involved may vary from unit to unit.
- Availability of spare parts could be a constraint at some units.
- The working of the agency entrusted with the maintenance work could be different.
- Administrative and procedural difficulties may be faced at some of the stations.

Summary of planned maintenance carried out on various equipments like generators, turbine and other equipments during 2013-14 vis-à-vis 2012-13 is given below in **Table S-8**.

TABLE S-8

**DURATION OF PLANNED MAINTENANCE FOR GENERATOR,
TURBINE & OTHER EQUIPMENTS
(2013-14 vis-à-vis 2012-13)**

S. No.	Equipments	Duration			
		Maximum Hours for any unit		Average Hours	
		2013-14	2012-13	2013-14	2012-13
1	Generator	1049.50	1463.98	58.66	63.03
2	Turbine	4962.08	7890.00	103.38	172.33
3	Other Equipment	1419.67	3823.35	66.89	134.75
4	Civil Structure	2050.50	1191.50	95.38	137.68

It could be seen that the average hours utilized for carrying out various repairs decreased for all equipments and Civil Structure during 2013-14 as compared to 2012-13.

3.2 Forced Outages

The summary of forced outages caused due to break-down of generator, turbine and other equipments during 2013-14 vis-à-Vis 2012-13 is given below in **Table S-9**.

TABLE S-9

**FORCED OUTAGES DUE TO GENERATOR, TURBINE & OTHER
EQUIPMENT. FAULTS
(2013-14 VIS-A-VIS 2012-13)**

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage	
		2013-14	2012-13	2013-14	2012-13
1	Generator	101045.89	50538.41	19.34	15.38
2	Turbine	133612.96	47745.02	25.58	14.53
3	Civil Structure	29198.02	7677.45	5.59	2.34
4	Other Equipments	55754.30	46974.58	10.67	14.30
5	Others	202809.35	175625.64	38.82	53.45
	Total	522420.52	328561.09	100.00	100.00

Region wise planned maintenance, forced outages and operating availability of H.E. Units for 2012-13 is indicated below in **Table S-10**.

TABLE S-10
AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2013-14

SL. No.	REGION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AVAILABILITY
1	NORTHERN	219	16386.26	6.08	6.25	87.67
2	WESTERN	101	7392.00	5.53	2.31	92.16
3	SOUTHERN	243	11432.45	6.63	5.94	87.43
4	EASTERN	61	4078.70	4.28	5.96	89.76
5	NORTH EASTERN	29	1242.00	6.65	10.64	82.71
	ALL INDIA	653	40531.41	5.97	5.55	88.48

On analyzing various types of planned shut downs, it may be concluded that:

- Generating units installed in North Eastern Region accounted for Maximum non-availability due to planned maintenance (6.65%) whereas generating units installed in Eastern Region accounted for the least non-availability due to planned maintenance (4.28%) as indicated in **Table S-10** above.

3.2 General Overview

General overview indicating generation, planned maintenance (PM), forced outage (FO) and operating availability (OP.AV.) of H.E. Stations during the past 10 years is given below:

OVERVIEW

YEAR	INSTALLED CAPACITY	GENERATION (MU)		VARIATION	UNITS ANALYSED		PM	FO	OP.AV	AVERAGE (PLF)
	(MW)	TARGET	ACTUAL	%	Nos	CAP (MW)	%	%	%	%
2013-14	40531.41	122263	134848	(+)10.29	653	40531.41	5.97	5.55	88.48	38.0
2012-13	39491.40	122045	113720	(-)6.82	634	39491.40	7.56	3.27	89.17	32.9
2011-12	38990.40	112050	130510	(+)16.47	620	38990.40	7.43	4.48	88.09	38.1
2010-11	37567.40	111352	114257	(+)2.61	609	37567.40	7.23	3.94	88.83	34.7
2009-10	36863.40	115468	103916	(-)10.00	589	36203.40	6.19	2.90	90.91	32.2
2008-09	36846.40	114841	109840	(-)4.35	572	35312.45	6.38	2.45	91.17	34.0
2007-08	37002.10	109450	123424	(+)12.80	641	31033.00	5.66	2.34	92.00	38.1
2006-07	34546.10	101000	113359	(+)12.24	684	32016.05	7.03	3.65	89.32	37.4
2005-06	32182.25	91480	101293	(+)10.73	639	30897.30	7.45	3.31	89.24	35.9
2004-05	30446.30	84000	84495	(+)0.59	636	29574.30	7.94	2.21	89.85	31.7

Average PLF (%):

$$= \frac{\text{Energy Generated (GWH)} \times 100}{\text{Installed Capacity (MW)} \times 8760 (\text{Total hours of year})}$$

CHAPTER 1

HYDRO POWER POTENTIAL AND DEVELOPMENT

CHAPTER-1

HYDRO-ELECTRIC POWER POTENTIAL AND DEVELOPMENT

1.1 Hydro-electric Potential

Reassessment studies of Hydro Electric Power Potential in various river basins of the country were carried out by Central Electricity Authority during the period 1978-87. As per these studies, total Hydro Electric Power potential in the country was assessed as 84044 MW (at 60% load factor) from a total of 845 number of identified H.E. Schemes. The hydro potential of 84044 MW at 60% load factor when fully developed would result in an installed capacity of about 150,000 MW on the basis of probable average load factor. The total energy potential is assessed as 600 billion units per year. The potential of hydro schemes above 25 MW installed capacity works out to be 145320 MW. As on 31.03.2014, H.E. Schemes having total installed capacity of 35745.81 MW (24.60%) excluding pumped storage stations of capacity of 4785.60 MW have already been developed and the schemes under development account for capacity of 13030 MW (8.97%). Region wise/state wise and basin wise summary of the status of Hydro Electric Capacity and Potential development in the country are indicated in **Tables 1.1, and 1.2** respectively as well as shown in **Exhibits 1.1 and 1.2**. It would be observed that about 66.44% in terms of Installed Capacity is yet to be harnessed.

TABLE 1.1

REGIONWISE/STATEWISE STATUS OF HYDRO ELECTRIC CAPACITY (In terms of Installed Capacity-above 25 MW)

As on 31.03.2014

Region/ State	Identified Capacity as per reassessment study (MW)		Capacity Developed		Capacity Under construction		Capacity yet to be developed	
	Total (MW)	Above 25 MW	(MW)	(%)	(MW)	(%)	(MW)	(%)
NORTHERN								
Jammu & Kashmir	14146	13543	2669.00	19.71	1630.00	12.04	9244.00	68.26
Himachal Pradesh	18820	18540	8172.01	44.08	3352.00	18.08	7015.99	37.84
Punjab	971	971	1206.30	100.00	206.00	21.22	0.00	0.00
Haryana	64	64	0.00	0.00	0.00	0.00	64.00	100.00
Rajasthan	496	483	411.00	85.09	0.00	0.00	72.00	14.91
Uttarakhand	18175	17998	3426.35	19.04	1640.00	9.11	12931.65	71.85
Uttar Pradesh	723	664	501.60	75.54	0.00	0.00	162.40	24.46
Sub Total(NR)	53395	52263	16386.26	31.35	6828.00	13.06	29048.74	55.58
WESTERN								
Madhya Pradesh	2243	1970	2395.00	100.00	400.00	20.30	0.00	0.00
Chhattisgarh	2242	2202	120.00	5.45	0.00	0.00	2082.00	94.55
Gujarat	619	590	550.00	93.22	0.00	0.00	40.00	6.78
Maharashtra	3769	3314	2487.00	75.05	0.00	0.00	827.00	24.95

Goa	55	55	0.00	0.00	0.00	0.00	55.00	100.00
Sub Total(WR)	8928	8131	5552.00	68.28	400.00	4.92	2179.00	26.80
SOUTHERN								
Andhra Pradesh	4424	4360	2177.75	49.95	410.00	9.40	1772.25	40.65
Karnataka	6602	6459	3585.40	55.51	0.00	0.00	2873.60	44.49
Kerala	3514	3378	1881.50	55.70	100.00	2.96	1396.50	41.34
TamilNadu	1918	1693	1782.20	100.00	0.00	0.00	0.00	0.00
Sub Total(SR)	16458	15890	9426.85	59.33	510.00	3.21	5953.15	37.46
EASTERN								
Jharkhand	753	582	170.00	29.21	0.00	0.00	412.00	70.79
Bihar	70	40	0.00	0.00	0.00	0.00	40.00	100.00
Odisha	2999	2981	2027.50	68.01	0.00	0.00	953.50	31.99
West Bengal	2841	2829	272.20	9.62	160.00	5.66	2396.80	84.72
Sikkim	4286	4248	669.00	15.75	2322.00	54.66	1257.00	29.59
Sub Total(ER)	10949	10680	3138.70	29.39	2482.00	23.24	5059.30	47.37
NORTH EASTERN								
Meghalaya	2394	2298	282.00	12.27	40.00	1.74	1976.00	85.99
Tripura	15	0	0.00	0.00	0.00	0.00	0.00	0.00
Manipur	1784	1761	105.00	5.96	0.00	0.00	1656.00	94.04
Assam	680	650	375.00	57.69	0.00	0.00	275.00	42.31
Nagaland	1574	1452	75.00	5.17	0.00	0.00	1377.00	94.83
Arunachal Pd	50328	50064	405.00	0.81	2710.00	5.41	46949.00	93.78
Mizoram	2196	2131	0.00	0.00	60.00	2.82	2071.00	97.18
Sub Total(NER)	58971	58356	1242.00	2.13	2810.00	4.82	54304.00	93.06
ALL INDIA	148701	145320	35745.81	24.60	13030.00	8.97	96544.19	66.44

Note:- 1. In addition to above 4785.60 MW PSS are under operation and 1080 MW PSS under construction.
2. In some states the total of the capacity developed and balance capacity is different from the potential assessed . This is due to change in actual installed capacity, load factors, etc. as compared to identified potential initially.

TABLE 1.2
BASINWISE STATUS OF H.E. POTENTIAL DEVELOPMENT-BASINWISE
(In terms of Installed Capacity-above 25 MW)

(AS ON 31.03.2014)

River Basin	Identified Capacity as per Reassessment Study (MW)		Capacity Developed		Capacity Under Construction		Capacity Yet to be Developed	
	Total (MW)	Above 25 MW	(MW)	(%)	(MW)	(%)	(MW)	(%)
NORTHERN								
Indus	33832	33028	11987.31	33.29	5077.00	15.37	15963.69	48.33
Ganga	20711	20252	4987.15	24.63	1751.00	8.65	13513.60	66.73
Central Indian River System	4152	3868	3147.50	81.37	400.00	10.34	320.50	8.29
West Flowing Rivers System	9430	8997	5660.70	62.92	100.00	1.11	3236.30	35.97
East Flowing Rivers System	14511	13775	7843.15	56.94	410.00	2.98	5521.85	40.09
Brahmaputra	66065	65400	2120.00	3.24	5292.00	8.09	57988.00	88.67
Total	148701	145320	35745.81	24.60	13030.00	8.97	96544.19	66.44

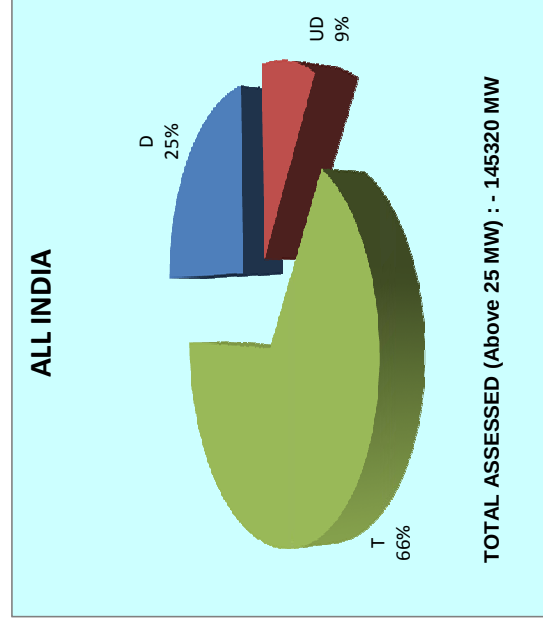
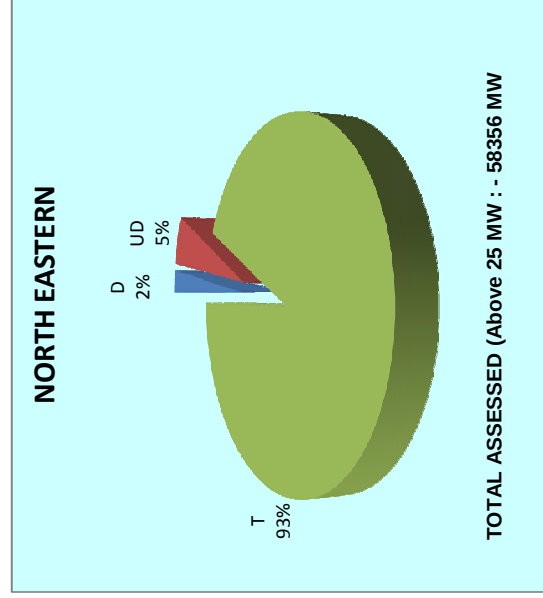
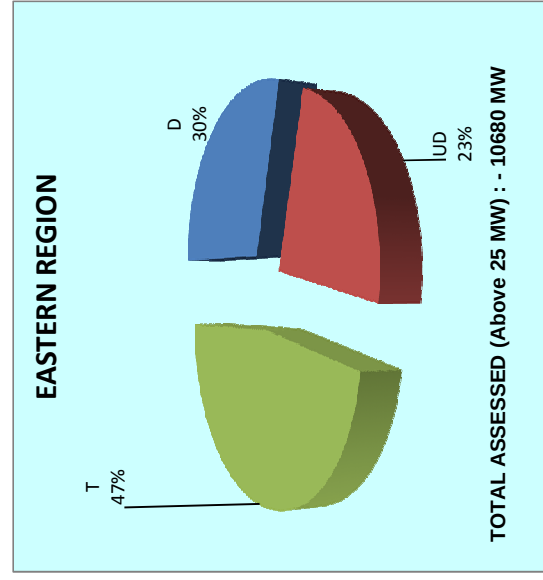
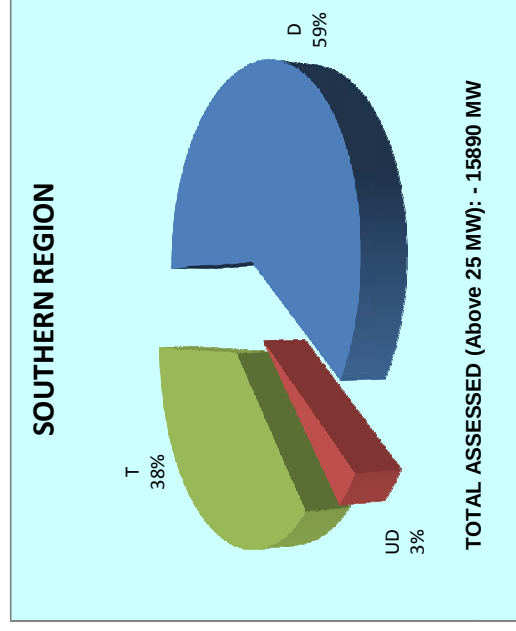
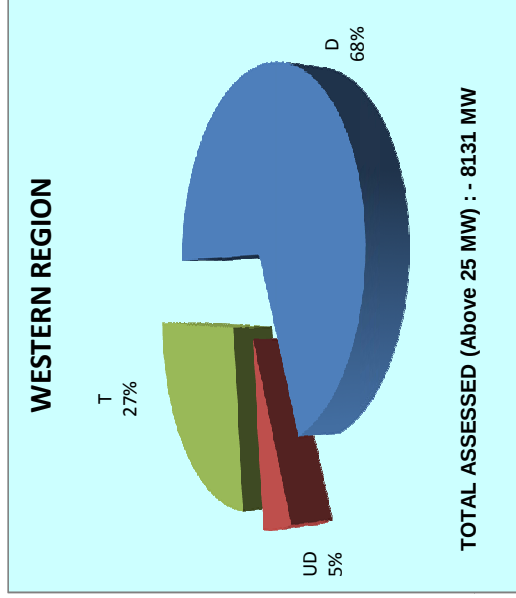
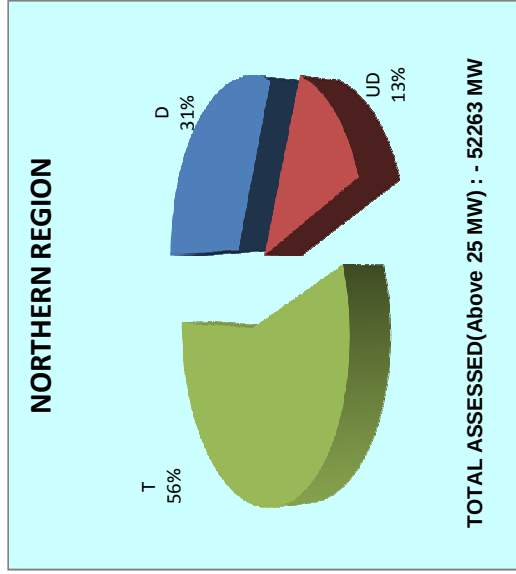
Note:- 1. In addition to above 4785.60 MW PSS are under operation and 1080 MW PSS under construction.

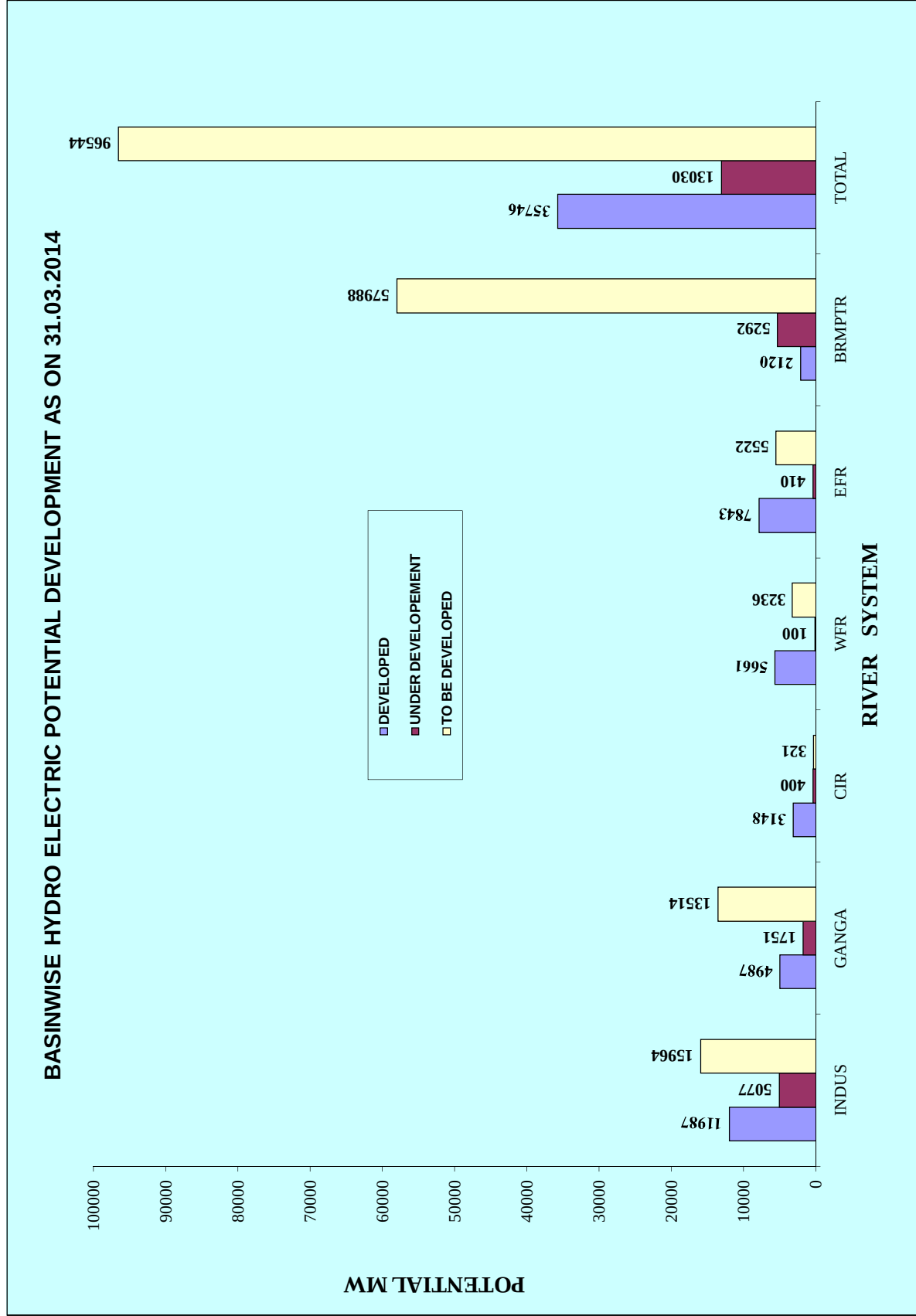
(REGIONWISE STATUS OF HYDRO ELECTRIC CAPACITY AS ON 31.03.2014)

D=DEVELOPED

U= UNDER DEVELOPMENT

T= YET TO BE DEVELOPED





1.2 Growth of Installed Capacity

A small Hydro-Electric Plant (130 kW) established near Darjeeling in 1897 ushered the beginning of hydro-electric power development in the country. Since then, development of hydro-electric power in the country has made rapid strides. The hydel installed capacity which was only 508 MW in 1947 with 12 H.E.Stations, 51 units and the maximum unit size of 22 MW at Bhira H.E.Project under Tata's, has risen to 40531.41 MW (as on 31.03.2014) which does not include station capacity 25 MW and below. The maximum unit size is now 250 MW at Koyna Stage-IV under MAHAGENCO, Nathpa Jhakri under SJVNL, Tehri under THDC and Karcham Wangtoo of JPVL.

Contribution of electricity generation from Hydro Electric Power Stations has risen from 2194 MU during 1947 to about 134847.52 MU in 2013-14. Generation during 2013-14 was 21127.23 MU more than the generation of 113720.29 MU during 2012-13. Conventional Hydro Electric Stations of run-of-river type, single purpose hydro electric stations with storage, multipurpose projects as well as pumped storage projects have been executed through-out the country.

1.3 Share of Hydro-electric Installed Capacity & Generation.

The installed capacity of Hydro-Electric Stations vis-à-vis total capacity, the contribution in generation by hydro electric plants and trend of hydro capacity & generation over the years are indicated in **Table-1.3** and at **Exhibits 1.3, 1.4 and 1.5**. From **Table 1.3**, it may be observed that the overall share of hydro in terms of installed capacity in the country has risen from 37.30% at the end of 1947 to 50.61% during 1962-63 and thereafter declined to 16.68% at the end of 2013-14. The generation from hydro stations during the year 2013-14, accounts for 14.02% of the total energy generation in the country.

TABLE 1.3
HYDRO-ELECTRIC CAPACITY & GENERATION
VIS-A-VIS TOTAL CAPACITY & GENERATION

Year	Installed Capacity			Generation		
	Total (MW)	Hydro (MW)	Hydro as % of Total	Total (MU)	Hydro (MU)	Hydro as % of Total
1947	1362	508	37.30	4072	2194	53.88
1950	1713	560	32.63	5106	2519	49.33
1955-56	2886	1061	36.76	9145	4295	46.97
1960-61	4653	1917	41.20	16937	7837	46.27

1962-63	5801	2936	50.61	22365	11805	52.78
1965-66	9027	4124	45.68	32890	15225	46.29
1968-69	12957	5907	45.59	47434	20723	43.69
1973-74	16664	6966	41.80	66689	28972	43.44
1978-79	26680	10833	40.60	102523	47159	46.00
1979-80	28448	11384	40.02	104627	45478	43.47
1984-85	42585	14460	33.96	156859	53948	34.39
1989-90	63636	18307	28.77	245437	62116	25.31
1991-92	69065	19194	27.79	287028	72757	25.35
1996-97	85795	21658	25.24	395889	68901	17.40
1997-98	89203	21904	24.58	421748	74582	17.68
1998-99	92269	22479	24.10	447464	82923	18.53
1999-00	97837	23857	24.37	481128	80755	16.78
2000-01	101450	25153	24.75	499429	74362	14.89
2001-02	105046	26269	25.01	515066	73759	14.32
2002-03	107877	26767	24.81	531607	63834	12.01
2003-04	112684	29507	26.19	558113	73775	13.22
2004-05	118419	30936	26.12	587416	84495	14.38
2005-06	124287	32326	26.01	624631	101293	16.22
2006-07	132321	34662	26.19	659513	113359	17.19
2007-08	143061	37002	25.86	704469	123424	17.52
2008-09*	147917	36846	24.91	714653	109840	15.37
2009-10*	159398	36863	23.13	763429	103916	13.61
2010-11*	173626	37567	21.64	805532	114257	14.18
2011-12*	199877	38990	19.51	871602	130510	14.97
2012-13*	223344	39491	17.68	907262	113720	12.53
2013-14*	243029	40531	16.68	961552	134848	14.02

*During 2008-09, 2009-10, 2010-11, 2011-12, 2012-13 & 2013-14 the station capacity of HEP above 25 MW has been considered.

1.4 Monitored Hydro Installed Capacity

For generation performance, the monitored hydro-electric installed capacity in the country as on 31st March, 2014 was 40531.41 MW. This includes stations with total station capacity above 25 MW only. Region-wise summary of the hydel installed capacity is indicated in Table 1.4. Regionwise, Sector wise/Utility wise and station-wise details of installed capacity are given in **Annex 1.1, 1.2 & 1.3** respectively.

EXHIBIT 1.3

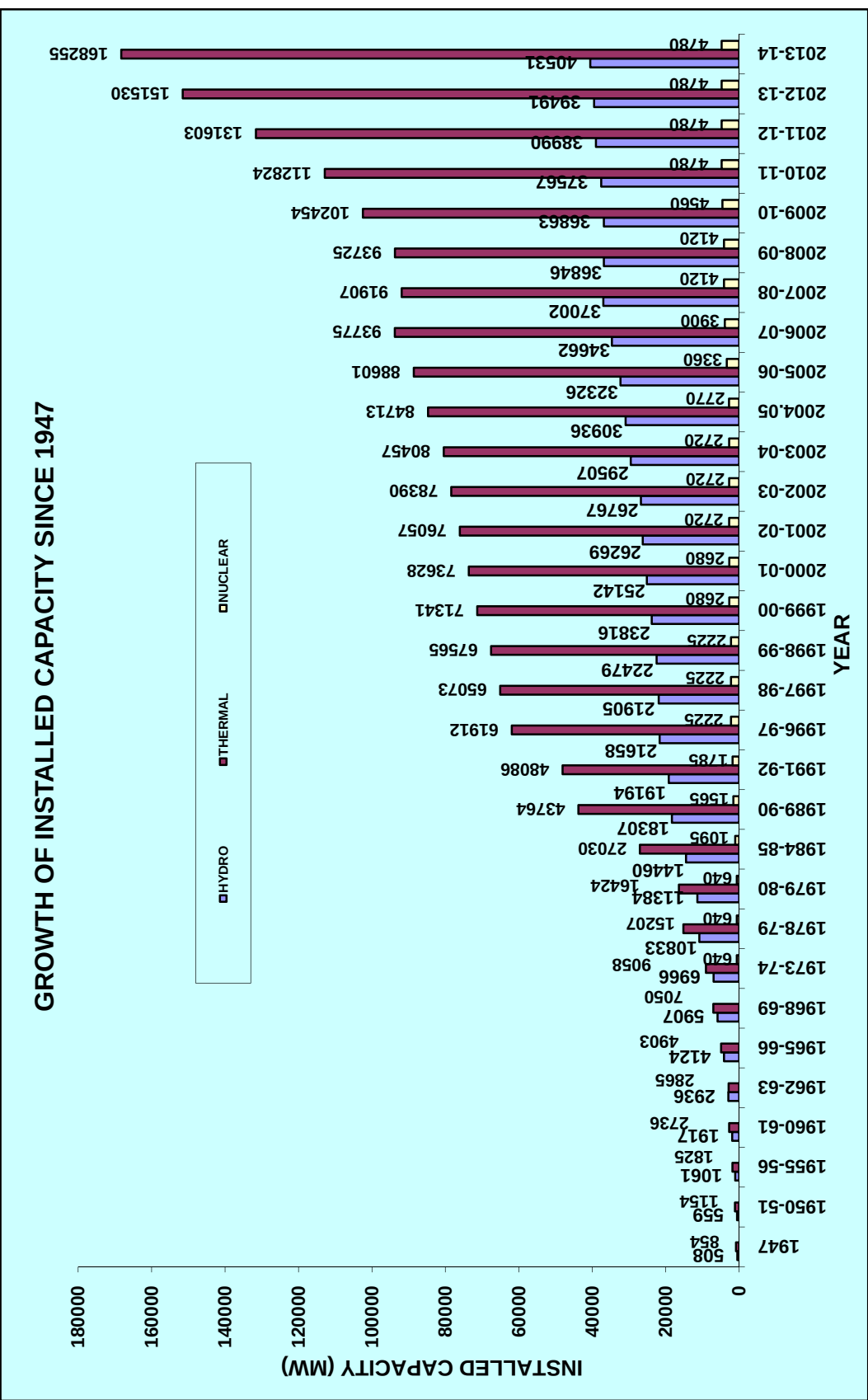
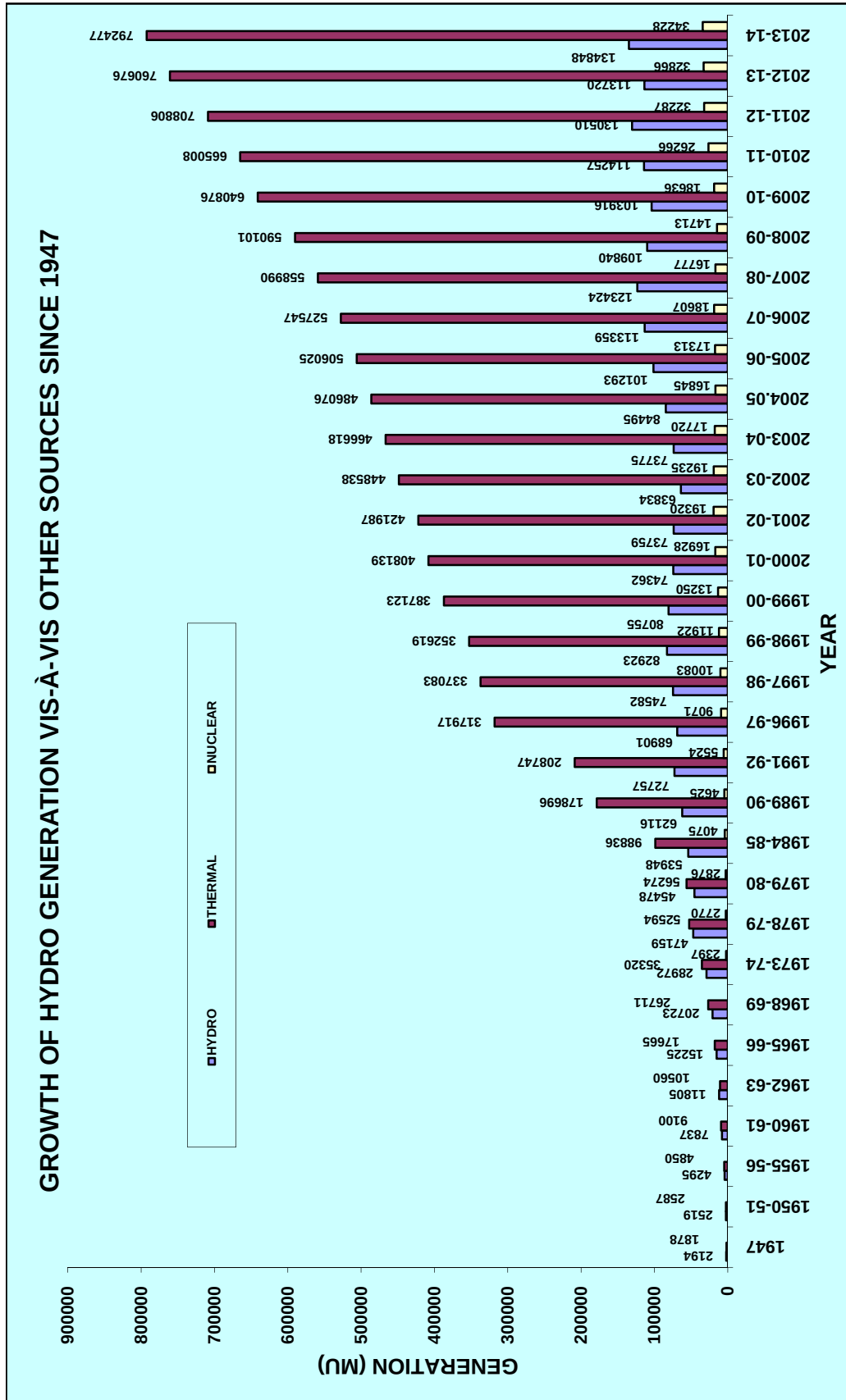


EXHIBIT 1.4



TREND OF HYDRO CAPACITY AND GENERATION SINCE 1947

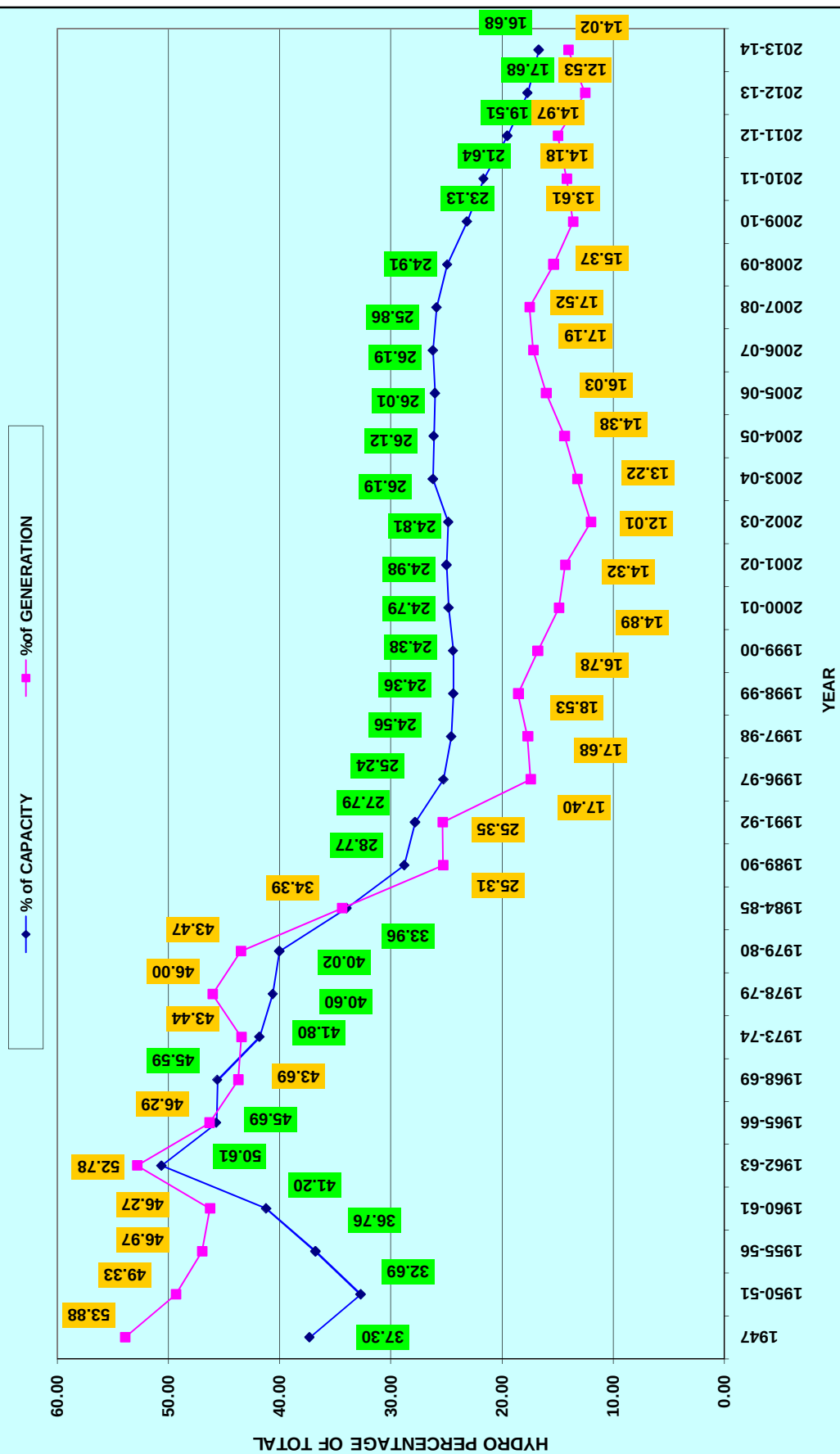


TABLE 1.4

**REGIONWISE SUMMARY OF HYDRO ELECTRIC INSTALLED CAPACITY
(Above 25 MW capacity as on 31.03.2014)**

S.No.	Region	Installed Capacity(MW)
1.	Northern	16386.26
2.	Western	7392.00
3.	Southern	11432.45
4.	Eastern	4078.70
5.	North - Eastern	1242.00
Total		40531.41

Station capacity wise grouping of H.E. Stations as on 31st March,2014 is given in **Annex- 1.4**.

Nineteen H.E. Generating units having installed capacity of 1058.01 MW were added during the year 2013-14. Details of these units are given in **Annex-1.5**.

Share of hydro installed capacity and hydro generation vis-a-vis total installed capacity and total generation in the Country as on 31.03.2014 was 16.68% and 14.02% respectively. These details are indicated in **Exhibits 1.6 and 1.7**. Sector-wise distribution of hydro installed capacity in Central, Private and State Sectors were 32.62%, 6.73% and 60.65% respectively. Sector wise contribution of hydro generation in Central, Private and State sectors were 38.11%, 7.42% and 54.47% respectively. These details are illustrated in **Exhibits 1.8 & 1.9**.

1.5 Hydro Generating Units : Indigenous and imported

As on 31.03.2014, there were 653 hydro generating units in operation comprising of indigenous and imported units at 188 stations. The details of 653 hydro units with total installed capacity of indigenous and imported turbine and generators are given at **Table 1.5** below. Among the imported Turbine generator sets, it is observed that Japan, UK and Canada have supplied largest number of sets but capacity-wise, Japan, Canada and Russia are the largest suppliers.

EXHIBIT-1.6

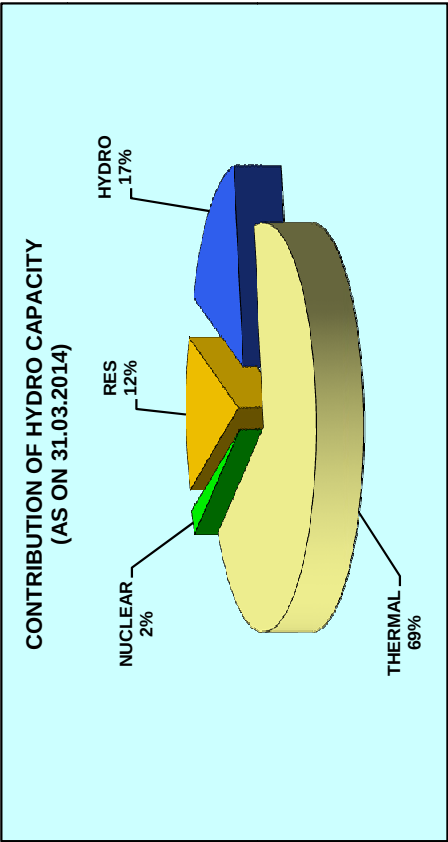


EXHIBIT-1.8

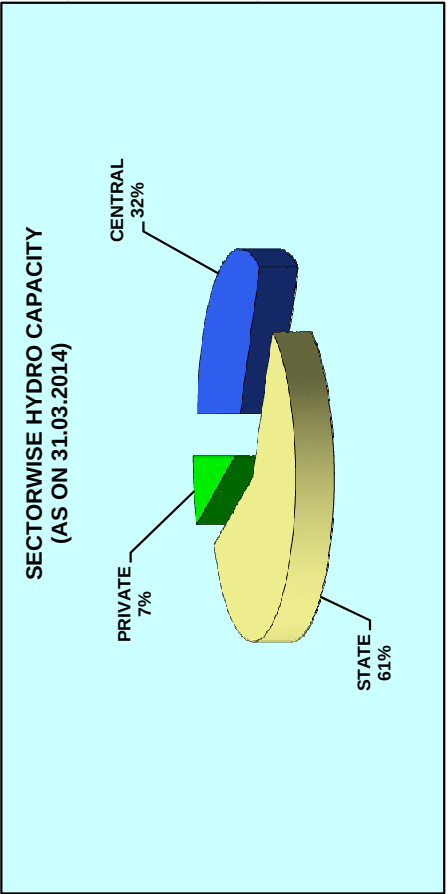


EXHIBIT-1.7

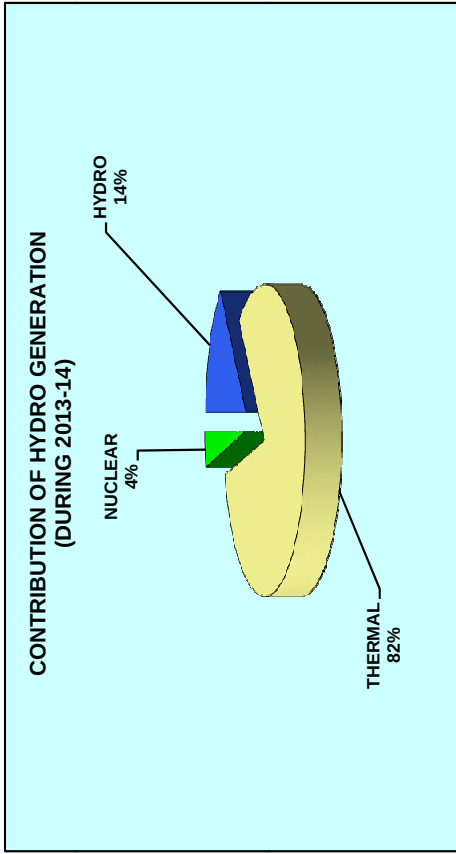


EXHIBIT-1.9

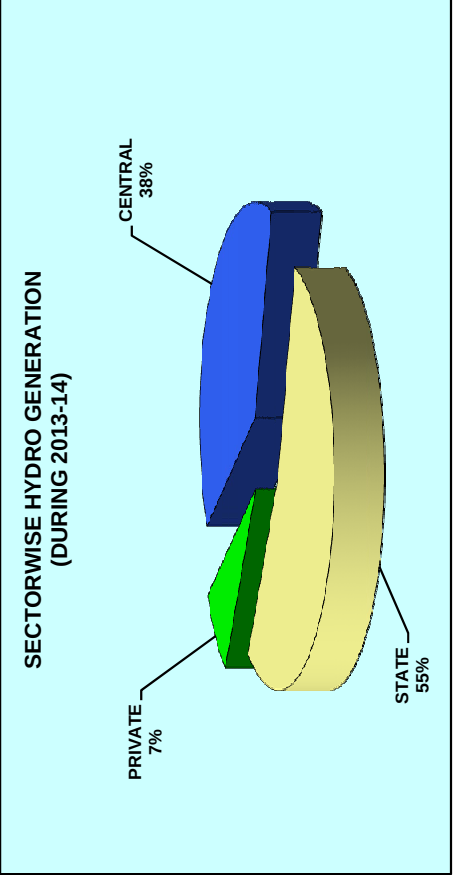


TABLE 1.5

**HYDRO GENERATING UNITS INDIGENOUS/IMPORTED
FROM VARIOUS COUNTRIES AS ON 31-03-2014**

Name of Country	Turbines supplied		Generators supplied	
	Numbers	Capacity (MW)	Numbers	Capacity (MW)
A-Indigenous				
BHEL	276	16820.01	273	16700.01
OTHERS	18	831.00	20	949.50
Sub Total	294	17651.01	293	17649.51
B-Imported				
CANADA	44	3132.00	44	3132.00
FRANCE	33	2186.40	17	1726.00
JAPAN	77	6544.20	75	6029.40
SWITZERLAND	21	790.20	11	219.00
U.K.	64	1257.10	59	1637.90
U.S.A.	9	351.00	26	543.15
USSR	26	2804.00	26	2804.00
OTHERS	85	5815.50	102	6790.45
SUB-TOTAL	359	22880.40	360	22881.90
TOTAL	653	40531.41	653	40531.41

Details of imported hydro generating sets commissioned during 2013-14 are given below in **Table 1.6**.

TABLE-1.6

IMPORTED GENERATING SETS COMMISSIONED DURING 2013-14

S. NO	STATION	STATE	COUNTRY OF IMPORT	UNIT NO.	CAPACITY (MW)
1	Bhawani Kattalai Barrage II	TamilNadu	Slovenia/ Croatia	1	15
				2	15
2	Bhawani Kattalai Barrage III	TamilNadu	Slovenia/ Croatia	1	15
	TOTAL			3	45

The details of region-wise/utility-wise indigenous and imported turbine and generators are given at **Table 1.7 and 1.8**.

TABLE 1.7

REGIONWISE/UTILITY WISE HYDRO GENERATING UNITS- INDIGENOUS & IMPORTED TURBINES

AS ON 31-3-2014

REGION/STATE/ ORGANISATION	INDIGENOUS				IMPORTED								TOTAL	
	BHEL		OTHERS		UK		JAPAN		USA		OTHERS		TOTAL	
	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW
<u>NORTHERN REGION</u>														
BBMB	16	1482.80	0	0.00	0	0.00	7	598.50	0	0.00	5	785.00	28	2866.30
NHPC (NR)	28	1769.21	7	471.00	0	0.00	0	0.00	0	0.00	17	1990.00	52	4230.21
UJVNL	25	1126.00	0	0.00	3	41.40	0	0.00	0	0.00	6	84.75	34	1252.15
JKSPDC	6	210.00	0	0.00	0	0.00	0	0.00	0	0.00	3	450.00	9	660.00
PSPCL	21	991.00	0	0.00	0	0.00	0	0.00	0	0.00	4	60.00	25	1051.00
HPSEBL	11	351.00	0	0.00	1	15.00	0	0.00	0	0.00	0	0.00	12	366.00
RRVUNL	4	140.00	0	0.00	0	0.00	0	0.00	0	0.00	7	271.00	11	411.00
UPJVNL	6	171.00	0	0.00	6	300.00	3	30.60	0	0.00	0	0.00	15	501.60
THDC	4	400.00	0	0.00	0	0.00	0	0.00	0	0.00	4	1000.00	8	1400.00
SJVNL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	6	1500.00	6	1500.00
MPCL	2	86.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	86.00
JPVL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	11	1700.00	11	1700.00
EPPL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00	2	100.00
ADHPL	2	192.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	192.00
LGPPL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	70.00	2	70.00
TOTAL (N.R.)	125	6919.01	7	471.00	10	356.40	10	629.10	0	0.00	67	8010.75	219	16386.26
<u>WESTERN REGION</u>														
CSPGCL	3	120.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	120.00
GSECL	6	420.00	0	0.00	0	0.00	0	0.00	0	0.00	2	120.00	8	540.00
MPPGCL	18	760.00	0	0.00	0	0.00	2	46.00	0	0.00	3	69.00	23	875.00
MAHAGENCO	9	960.00	0	0.00	0	0.00	2	250.00	0	0.00	13	1196.00	24	2406.00

REGION/STATE/ ORGANISATION	INDIGENOUS				IMPORTED								TOTAL			
	BHEL		OTHERS		UK		JAPAN		USA		OTHERS					
	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW		
TATA HYDRO	0	0.00	2	3.00	6	150.00	0	0.00	0	0.00	0	0.00	7	294.00	15	447.00
SSNNL	6	450.00	0	0.00	0	0.00	5	1000.00	0	0.00	0	0.00	0	0.00	11	1450.00
NHDC	8	1000.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	8	520.00	16	1520.00
DLHP	1	34.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	34.00
TOTAL (W.R.)	51	3744.00	2	3.00	6	150.00	9	1296.00	0	0.00	33	2199.00	101	7392.00		
SOUTHERN REGION																
APGENCO	16	1263.00	0	0.00	5	150.00	17	1641.60	3	51.00	16	677.75	57	3783.35		
TANGEDCO	6	450.00	0	0.00	12	218.00	9	150.00	0	0.00	43	1364.20	70	2182.20		
KSEB	10	430.00	0	0.00	11	102.50	5	105.00	6	300.00	16	944.00	48	1881.50		
KPCL	30	2224.00	0	0.00	18	181.20	6	455.00	0	0.00	14	725.20	68	3585.40		
TOTAL (S.R.)	62	4367.00	0	0.00	46	651.70	37	2351.60	9	351.00	89	3711.15	243	11432.45		
EASTERN REGION																
DVC	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	5	143.20	5	143.20		
NHPC (ER)	3	60.00	4	132.00	0	0.00	3	510.00	0	0.00	0	0.00	10	702.00		
OHPC	9	570.00	0	0.00	2	99.00	7	712.50	0	0.00	13	646.00	31	2027.50		
WBSEDCL	4	50.00	0	0.00	0	0.00	5	909.00	0	0.00	2	18.00	11	977.00		
JSEB	2	130.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	130.00		
GIPL	0	0.00	2	99.00	0	0.00	0	0.00	0	0.00	0	0.00	2	99.00		
TOTAL (E.R.)	18	810.00	6	231.00	2	99.00	15	2131.50	0	0.00	20	807.20	61	4078.70		
N-EASTERN REGION																
NHPC (N-ER)	3	105.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	105.00		
NEEPCO	13	755.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	13	755.00		
APGCL	0	0.00	0	0.00	0	0.00	2	100.00	0	0.00	0	0.00	2	100.00		
MeECL	4	120.00	3	126.00	0	0.00	4	36.00	0	0.00	0	0.00	8	282.00		
TOTAL (N-E.R.)	20	980.00	3	126.00	0	0.00	6	136.00	0	0.00	0	0.00	29	1242.00		
Total (All India)	276	16820.01	18	831.00	64	1257.10	77	6544.20	9	351.00	209	14728.10	653	40531.41		

TABLE 1.8

REGIONWISE/UTILITY WISE HYDRO GENERATING UNITS-INDIGENOUS & IMPORTED GENERATORS

AS ON 31-03-2014

REGION/STATE/ ORGANISATION	INDIGENOUS				IMPORTED								TOTAL	
	BHEL		OTHERS		UK		JAPAN		USA		OTHERS		TOTAL	
	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW
<u>NORTHERN REGION</u>														
BBMB	16	1482.80	0	0.00	5	540.00	2	58.50	0	0.00	5	785.00	28	2866.30
NHPC (NR)	28	1769.21	7	471.00	0	0.00	0	0.00	0	0.00	17	1990.00	52	4230.21
UJVNL	25	1126.00	0	0.00	3	41.40	0	0.00	0	0.00	6	84.75	34	1252.15
JKSPDC	6	210.00	0	0.00	0	0.00	0	0.00	0	0.00	3	450.00	9	660.00
PSPCL	21	991.00	0	0.00	4	60.00	0	0.00	0	0.00	0	0.00	25	1051.00
HPSEBL	11	351.00	0	0.00	1	15.00	0	0.00	0	0.00	0	0.00	12	366.00
RRVUNL	4	140.00	0	0.00	0	0.00	0	0.00	0	0.00	7	271.00	11	411.00
UPJVNL	6	171.00	0	0.00	6	300.00	3	30.60	0	0.00	0	0.00	15	501.60
THDC	4	400.00	0	0.00	0	0.00	0	0.00	0	0.00	4	1000.00	8	1400.00
SJVNL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	6	1500.00	6	1500.00
MPCIL	2	86.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	86.00
JPVL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	11	1700.00	11	1700.00
EPPL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00	2	100.00
ADHPL	2	192.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	192.00
LGPPL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	70.00	2	70.00
TOTAL (N.R.)	125	6919.01	7	471.00	19	956.40	5	89.10	0	0.00	63	7950.75	219	16386.26
<u>WESTERN REGION</u>														
CSPGCL	3	120.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	120.00
GSECL	6	420.00	0	0.00	0	0.00	0	0.00	0	0.00	2	120.00	8	540.00
MPPGCL	18	760.00	0	0.00	0	0.00	2	46.00	0	0.00	3	69.00	23	875.00
MAHAGENCO	9	960.00	0	0.00	0	0.00	2	250.00	0	0.00	13	1261.00	24	2406.00

REGION/STATE/ ORGANISATION	INDIGENOUS				IMPORTED								TOTAL			
	BHEL		OTHERS		UK		JAPAN		USA		OTHERS					
	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW
TATA HYDRO	0	0.00	1	1.50	0	0.00	0	0.00	0	0.00	0	0.00	14	445.50	15	447.00
SSNNL	6	450.00	0	0.00	0	0.00	5	1000.00	0	0.00	0	0.00	0	0.00	11	1450.00
NHDC	8	1000.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	8	520.00	16	1520.00
DLHP	1	34.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	34.00
TOTAL (W.R.)	51	3744.00	1	1.50	0	0.00	9	1296.00	0	0.00	40	2415.50	101	7392.00		
<u>SOUTHERN REGION</u>																
APGENCO	15	1257.00	0	0.00	5	150.00	15	1623.60	6	114.75	16	638.00	57	3783.35		
TANGEDCO	6	450.00	0	0.00	18	277.20	9	150.00	0	0.00	37	1305.00	70	2182.20		
KSEB	9	405.00	1	25.00	11	102.50	5	105.00	6	300.00	16	944.00	48	1881.50		
KPCL	29	2135.00	2	95.00	4	52.80	11	498.20	14	128.40	8	676.00	68	3585.40		
TOTAL (S.R.)	59	4247.00	3	120.00	38	582.50	40	2376.80	26	543.15	77	3563.00	243	11432.45		
<u>EASTERN REGION</u>																
DVC	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	5	143.20	5	143.20		
NHPC (ER)	3	60.00	4	132.00	0	0.00	3	510.00	0	0.00	0	0.00	10	702.00		
OHPC	9	570.00	0	0.00	2	99.00	7	712.50	0	0.00	13	646.00	31	2027.50		
WBSEDCL	4	50.00	0	0.00	0	0.00	5	909.00	0	0.00	2	18.00	11	977.00		
JSEB	2	130.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	130.00		
GIPL	0	0.00	2	99.00	0	0.00	0	0.00	0	0.00	0	0.00	2	99.00		
TOTAL (E.R.)	18	810.00	6	231.00	2	99.00	15	2131.50	0	0.00	20	807.20	61	4078.70		
<u>N-EASTERN REGION</u>																
NHPC (N-ER)	3	105.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	105.00		
NEEPCO	13	755.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	13	755.00		
APGCL	0	0.00	0	0.00	0	0.00	2	100.00	0	0.00	0	0.00	2	100.00		
MeECL	4	120.00	3	126.00	0	0.00	4	36.00	0	0.00	0	0.00	11	282.00		
TOTAL (N-E.R.)	20	980.00	3	126.00	0	0.00	6	136.00	0	0.00	0	0.00	29	1242.00		
Total (All India)	273	16700.01	20	949.50	59	1637.90	75	6029.40	26	543.15	200	14736.45	653	40531.41		

Annexure-1.1

AS ON 31.03.2014

REGION	NO.OF STATIONS	NO.OF UNITS	CAPACITY (MW)
NORTHERN	65	219	16386.26
WESTERN	28	101	7392.00
SOUTHERN	68	243	11432.45
EASTERN	17	61	4078.70
NORTH EASTERN	10	29	1242.00
ALL INDIA (TOTAL)	188	653	40531.41

SECTOR/UTILITYWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

			As on 31-03-2014
SECTOR/UTILITY	NO. OF STATIONS	NO. OF UNITS	CAPACITY (MW)
1 CENTRAL			
BBMB	6	28	2866.30
DVC	2	5	143.20
NEEPCO	4	13	755.00
NHDC	2	16	1520.00
NHPC	19	62	4831.20
SJVNL	2	9	1706.01
THDC	2	8	1400.00
SUB-TOTAL (CENTRAL)	37	141	13221.71
2 PRIVATE			
DLHP	1	1	34.00
JPVL	3	11	1700.00
LBHPPL	1	2	70.00
MPCL	1	2	86.00
EPPL	1	2	100.00
TATA MAH.	4	15	447.00
ADHPL	1	2	192.00
GIPL	1	2	99.00
SUB-TOTAL (PRIVATE)	13	37	2728.00

SECTOR/UTILITYWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

			As on 31-03-2014
SECTOR/UTILITY	NO. OF STATIONS	NO. OF UNITS	CAPACITY (MW)
3 STATE ELECTRICITY BOARDS/DEPARTMENTS			
APGENCO	14	57	3783.35
APGCL	1	2	100.00
CSPGCL	1	3	120.00
GSECL	2	8	540.00
HPSEB LTD.	4	12	366.00
JKSPDC	3	9	660.00
JSEB	2	2	130.00
KPCL	14	68	3585.40
KSEB	13	48	1881.50
MAHAGENCO	8	24	2406.00
MeECL	4	11	282.00
MPPGCL	8	23	875.00
OHPC	6	31	2027.50
PSPCL	8	25	1051.00
RRVUNL	4	11	411.00
SSNNL	2	11	1450.00
TANGEDCO	27	70	2182.20
UJVNL	10	34	1252.15
UPJVNL	4	15	501.60
WBSEDCL	3	11	977.00
SUB-TOTAL (STATE)	138	475	24581.70
ALL INDIA (TOTAL)	188	653	40531.41

STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

					As on 31.03.2014
S. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
NORTHERN					
BBMB					
HIMACHAL PRADESH					
1	BHAKRA HPS LEFT	(5X108)	S(MP)	540.00	1960-1961
2	BHAKRA HPS RIGHT	(5X157)	S(MP)	785.00	1966-1968
3	DEHAR HPS	(6X165)	R	990.00	1977-1983
4	PONG HPS	(6X66)	S(MP)	396.00	1978-1983
SUB-TOTAL HP				2711.00	
PUNJAB					
1	GANGUWAL HPS	(2X24.2)+(1X29.25)	R	77.65	1955-1962
2	KOTLA HPS	(2X24.2)+(1X29.25)	R	77.65	1956-1961
SUB-TOTAL PUNJAB				155.30	
TOTAL TOTAL BBMB				2866.30	
NHPC					
HIMACHAL PRADESH					
1	BAIRA SIUL HPS	(3X60)	R	180.00	1980-1981
2	CHAMERA- I HPS	(3X180)	R(UG)	540.00	1994
3	CHAMERA- II HPS	(3X100)	R(UG)	300.00	2003-2004
4	CHAMERA- III HPS	(3X77)	R(UG)	231.00	2012
5	PARBATI-III HPS	(3X130)	R(UG)	390.00	2014
SUB-TOTAL HP				1641.00	
JAMMU AND KASHMIR					
1	DULHASTI HPS	(3X130)	R(UG)	390.00	2007
2	SALAL HPS-I	(3X115)	R	345.00	1987
3	SALAL HPS-II	(3X115)	R	345.00	1993-95
4	URI-I HPS	(4X120)	R(UG)	480.00	1996-1997
5	URI-II HPS	(4X60)	R(UG)	240.00	2013-14
6	SEWA-II	(3X40)	R	120.00	2010-11
7	CHUTAK	(4X11)	R	44.00	2012-13
8	NIMOO BAZGO	(3X15)	R	45.00	2013
SUB-TOTAL J&K				2009.00	
UTTARAKHAND					
1	DHAULI GANGA HPS	(4X70)	R(UG)	280.00	2005
2	TANAKPUR HPS	(3X31.4)	R	94.20	1992
SUB-TOTAL UTTARAKHAND				374.20	
TOTAL NHPC				4024.20	

STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

					As on 31.03.2014
S. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
SJVNL					
HIMACHAL PRADESH					
1	NATHPA JHAKRI HPS	(6X250)	R(UG)	1500.00	2003-2004
2	RAMPUR HPS	(3X68.67)	R	206.01	2014
TOTAL SJVNL				1706.01	
THDC					
UTTARAKHAND					
1	TEHRI ST-1 HPS	(4X250)	S(UG)	1000.00	2006-2007
2	KOTESHWAR	(4X100)	S	400.00	2010-12
TOTAL THDC				1400.00	
TOTAL CENTRAL				9996.51	
PRIVATE					
HIMACHAL PRADESH					
MPCL					
1	MALANA HPS	(2X43)	R	86.00	2001
TOTAL MPCL				86.00	
LBHPPL(LANCO BUDHIL HYDRP POWER PVT. LTD.)					
1	BUDHIL	(2X35)	R	70.00	2012
TOTAL EPPL				70.00	
EPPL					
1	MALANA-II HPS	(2X50)	R	100.00	2011-12
TOTAL EPPL				100.00	
ADHPL					
1	ALLAIN DUHANGAN	2X96	R	192.00	2010-11
TOTAL ADHPL				192.00	
JPVL					
1	BASPA HPS	(3X100)	R(UG)	300.00	2003
2	KARCHAM WANGTOO	(4X250)	R(UG)	1000.00	2011-12
SUB TOTAL JPVL (HP)				1300.00	
JPVL					
UTTARAKHAND					
1	VISHNU PRAYAG HPS	(4X100)	R(UG)	400.00	2006
SUB TOTAL JPVL (UK)				400.00	
TOTAL JPVL				1700.00	
TOTAL PVT				2148.00	
HPSEBL					
1	BASSI HPS	(4X15)	R	60.00	1970-1981
2	GIRI BATA HPS	(2X30)	R	60.00	1978

STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

					As on 31.03.2014
S. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
3	LARJI HPS	(3X42)	R	126.00	2006
4	SANJAY HPS	(3X40)	R(UG)	120.00	1989
TOTAL HPSEBL				366.00	
JKSPDC					
JAMMU AND KASHMIR					
1	BAGLIHAR HPS	(3X150)	R	450.00	2008
2	LOWER JHELMUM HPS	(3X35)	R	105.00	1978-1979
3	UPPER SINDH-II HPS	(3X35)	R	105.00	2001-2002
TOTAL JKSPDC				660.00	
PSPCL					
PUNJAB					
1	ANANDPUR SAHIB-I HPS	(2X33.5)	R	67.00	1985
2	ANANDPUR SAHIB-II HPS	(2X33.5)	R	67.00	
3	MUKERIAN HPS-I	(3X15)	R	45.00	1983
4	MUKERIAN HPS-II	(3X15)	R	45.00	1988-89
5	MUKERIAN HPS-III	(3X19.5)	R	58.50	1989
6	MUKERIAN HPS-IV	(3X19.5)	R	58.50	1989
7	RANJIT SAGAR HPS	(4X150)	S(MP)	600.00	2000
8	SHANAN HPS	(1X50)+(4X15)	R	110.00	1932-1982
TOTAL PSPCL				1051.00	
RRVUNL					
RAJASTHAN					
1	JAWAHAR SAGAR HPS	(3X33)	S	99.00	1972-1973
2	MAHI BAJAJ HPS-I	(2X25)	R	50.00	1986
3	MAHI BAJAJ HPS-II	(2X45)	R	90.00	1989
4	R P SAGAR HPS	(4X43)	S(MP)	172.00	1968
TOTAL RRVUNL				411.00	
UJVNL					
UTTARAKHAND					
1	CHIBRO (YAMUNA) HPS	(4X60)	R(UG)	240.00	1975-1976
2	CHILLA HPS	(4X36)	R	144.00	1980-1981
3	DHAKRANI HPS	(3X11.25)	R	33.75	1965-1970
4	DHALIPUR HPS	(3X17)	R	51.00	1965-1970
5	KHATIMA HPS	(3X13.8)	R	41.40	1955-1956
6	KHODRI HPS	(4X30)	R(UG)	120.00	1984

STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

					As on 31.03.2014
S. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
7	KULHAL HPS	(3X10)	R	30.00	1975
8	MANERI BHALI - I HPS	(3X30)	R	90.00	1984
9	MANERI BHALI - II HPS	(4X76)	R	304.00	2008
10	RAMGANGA HPS	(3X66)	S(MP)	198.00	1975-1977
TOTAL UJVNL				1252.15	
UPJVNL					
UTTAR PRADESH					
1	KHARA HPS	(3X24)	R	72.00	1992
2	MATATILLA HPS	(3X10.2)	R	30.60	1965
3	OBRA HPS	(3X33)	R	99.00	1970-1971
4	RIHAND HPS	(6X50)	S	300.00	1961-1965
TOTAL UPJVNL				501.60	
TOTAL STATE SECTOR				4241.75	
TOTAL NORTHERN REGION				16386.26	
WESTERN					
NHDC					
MADHYA PRADESH					
1	INDIRA SAGAR HPS	(8X125)	S	1000.00	2004-2005
2	OMKARESHWAR HPS	(8X65)	R	520.00	2007
TOTAL NHDC				1520.00	
TOTAL CENTRAL				1520.00	
DODSON-LINDBLOM HYDRO POWER PVT. LTD. (DLHP)					
MAHARASHTRA					
1	BHANDARDHARA HPS ST-II	(1X34)	R	34.00	1996
TOTAL DLHP				34.00	
TATA POWER COMPANY (PVT.)					
MAHARASHTRA					
1	BHIRA HPS	(6X25)	S	150.00	1927-1949
2	BHIRA PSS HPS	(1X150)	PS	150.00	1995
3	BHIVPURI HPS	(3X24) + (2X1.5)	S	75.00	1997-1999
4	KHOPOLI HPS	(3X24)	S	72.00	2001-2003
TOTAL TATA				447.00	
TOTAL PVT (MAHARASHTRA)				481.00	
CSPGCL					
CHHATTISGARH					
1	HASDEOBANGO HPS	(3X40)	S(MP)	120.00	1994-1995
TOTAL CSPGCL				120.00	

STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

					As on 31.03.2014
S. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
GSECL					
GUJARAT					
1	KADANA PSS HPS	(4X60)	PS	240.00	1990-1998
2	UKAI HPS	(4X75)	S(MP)	300.00	1974-1976
TOTAL GSECL				540.00	
MAHAGENCO					
MAHARASHTRA					
1	BHIRA TAIL RACE HPS	(2X40)	R	80.00	1987-1988
2	GHATGHAR PSS HPS	(2X125)	PS(UG)	250.00	2008
3	KOYNA DPH HPS	(2X18)	S	36.00	1980-1981
4	KOYNA-I&II HPS	(4X70)+(4X80)	S(UG)	600.00	1962-1967
5	KOYNA-III HPS	(4X80)	S(UG)	320.00	1975-1978
6	KOYNA-IV HPS	(4X250)	S(UG)	1000.00	1999-2000
7	TILLARI HPS	(1X60)	S	60.00	1986
8	VAITARNA HPS	(1X60)	S(UG)	60.00	1976
TOTAL MAHAGENCO				2406.00	
MPPGCL					
MADHYA PRADESH					
1	BANSAGAR TONS-1 HPS	(3X105)	S(MP)	315.00	1991-1992
2	BANSAGAR TONS-II HPS	(2X15)	R	30.00	2002
3	BANSAGAR TONS-III HPS	(3X20)	R	60.00	2000-2002
4	BARGI HPS	(2X45)	S(MP)	90.00	1988
5	GANDHI SAGAR HPS	(5X23)	S(MP)	115.00	1960-1966
6	MADHIKHERA HPS	(3X20)	S	60.00	2006-2007
7	PENCH HPS	(2X80)	S(UG)	160.00	1986-1987
8	RAJGHAT HPS	(3X15)	S	45.00	1999
TOTAL MPPGCL				875.00	
SSNNL					
GUJARAT					
1	S SAROVAR CHPH HPS	(5X50)	R	250.00	2004
2	S SAROVAR RBPH HPS	(6X200)	PS	1200.00	2005-2006
TOTAL SSNNL				1450.00	
TOTAL STATE				5391.00	
TOTAL WESTERN REGION				7392.00	

STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

					As on 31.03.2014
S. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
SOUTHERN					
APGENCO					
ANDHRA PRADESH					
1	HAMPI HPS	(4X9)	S(MP)	36.00	1958-1964
2	LOWER SILERU HPS	(4X115)	S	460.00	1976-1978
3	MACHKUND HPS	(3X17)+(3X21.25)	S	114.75	1959
4	NAGARJUN SGR HPS	(1X110)+(7X100.8)	S	815.60	1978-1985
5	NAGARJUN SGR LBC HPS	(2X30)	R	60.00	1983
6	NAGARJUN SGR RBC HPS	(2X30)	R	60.00	1983-1990
7	NAGARJUN SGR RBC EXTN. HPS	(1X30)	R	30.00	
8	POCHAMPAD HPS	(3X9)	S(MP)	27.00	1987-1988
9	PRIYADARSHNI JURALA HPS	(6X39)	R	234.00	2008-2011
10	SRISAILAM HPS	(7X110)	S	770.00	1982-1987
11	SRISAILAM LB HPS	(6X150)	PS(UG)	900.00	2001-2003
12	T B DAM HPS	(4X9)	S	36.00	1957-1964
13	UPPER SILERU HPS -I	(2X60)	S	120.00	1967-1968
14	UPPER SILERU HPS -II	(2X60)	S	120.00	1994-1995
TOTAL APGENCO				3783.35	
KPCL					
KARNATAKA					
1	ALMATTI DPH HPS	(5X55)+(1X15)	S	290.00	2004-2005
2	BHADRA HPS	(2X12)+(1X6)+(1X2)+(1X7.2)	S	39.20	1962-1998
3	GERUSUPPA HPS	(4X60)	R	240.00	2001-2002
4	GHAT PRABHA HPS	(2X16)	S(MP)	32.00	1992
5	JOG HPS	(4X21.6)+(4X13.2)	S	139.20	1949-2002
6	KADRA HPS	(3X50)	S	150.00	1997-1999
7	KALINADI HPS	(3X135)+(3X150)	S	855.00	1979-1984
8	KALINADI SUPA HPS	(2X50)	S	100.00	1985
9	KODASALI HPS	(3X40)	S	120.00	1998-1999
10	LIGANAMAKKI HPS	(2X27.5)	S	55.00	1979-1980
11	MUNIRABAD HPS	(2X9)+(1X10)	S(MP)	28.00	1962-1965
12	SHARAVATHY HPS	(10X103.5)	S	1035.00	1965-1977
13	SIVASAMUNDRUM HPS	(4X6)+(6X3)	R	42.00	1922-1934
14	VARAHI HPS	(4X115)	S(UG)	460.00	1989-2009
TOTAL KPCL				3585.40	

STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

					As on 31.03.2014
S. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
KSEB					
KERALA					
1	IDAMALAYAR HPS	(2X37.5)	S	75.00	1987
2	IDUKKI HPS	(6X130)	S(UG)	780.00	1976-1986
3	KAKKAD HPS	(2X25)	S	50.00	1999
4	KUTTIYADI & K EXTN HPS	(3X25)+(1X50)	S	125.00	1972-2001
5	KUTTIYADI ADDN EXTN HPS	(2X50)	S	100.00	2010
6	LOWER PERIYAR HPS	(3X60)	R	180.00	1997
7	NARIAMANGLAM HPS	(3X15+1x25)	R	70.00	1961-63, 2008-09
8	PALLIVASAL HPS	(3X5)+(3X7.5)	R	37.50	1948-2001
9	PANNIAR HPS	(2X15)	S	30.00	1963-2001
10	PORINGALKUTTU HPS	(4X8)	R	32.00	1957-1960
11	SABARIGIRI HPS	(6X50)	S	300.00	1960-1967
12	SENGULAM HPS	(4X12)	R	48.00	1954-2001
13	SHOLAYAR HPS	(3X18)	S	54.00	1956-1968
TOTAL KSEB				1881.50	
TANGEDCO					
TAMIL NADU					
1	ALIYAR HPS	(1X60)	S	60.00	1970
2	BHAVANI KAT. BARRAGE	(2X15)	R	30.00	2006
3	BHAVANI KAT. BARRAGE II	(2X15)	R	30.00	2013
4	BHAVANI KAT. BARRAGE III	(1X15)	R	30.00	2012
5	KADAMPARI HPS	(4X100)	PS(UG)	400.00	1987-1989
6	KODAYAR HPS -I	(1X60)	S	60.00	1970
7	KODAYAR HPS -II	(1X40)	R	40.00	1971
8	KUNDAH HPS-I	(3X20)	S	60.00	1960-1964
9	KUNDAH HPS-II	(5X35)	S	175.00	1960-1965
10	KUNDAH HPS-III	(3X60)	S	180.00	1965-1978
11	KUNDAH HPS-IV	(2X50)	S	100.00	1966-1978
12	KUNDAH HPS-V	(2X20)	S	40.00	1964-1988
13	LOWER METTUR HPS-I	(2X15)	R	30.00	1988
14	LOWER METTUR HPS-II	(2X15)	R	30.00	1988
15	LOWER METTUR HPS-III	(2X15)	R	30.00	1987-1988
16	LOWER METTUR HPS-IV	(2X15)	R	30.00	1988-1999
17	METTUR DAM HPS	(4X12.5)	S	50.00	1937-1946
18	METTUR TUNNEL HPS	(4X50)	S	200.00	1965-1966
19	MOYAR HPS	(3X12)	R	36.00	1952-1953

STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

					As on 31.03.2014
S. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
20	PAPANASAM HPS	(4X8)	S	32.00	1944-1951
21	PARSON'S VALLEY HPS	(1X30)	S	30.00	2000
22	PERIYAR HPS	(4X35)	S	140.00	1958-1965
23	PYKARA HPS	(3X7)+(2X13.6)+(1X11)	S	59.20	1932-2005
24	PYKARA ULTMATE HPS	(3X50)	S(UG)	150.00	2005
25	SARKARPATHY HPS	(1X30)	R	30.00	1966
26	SHOLAYAR I&II HPS	(2X35) + (1X25)	S	95.00	1971
27	SURULIYAR HPS	(1X35)	R	35.00	1978
TOTAL TANGEDCO				2182.20	
TOTAL STATE SECTOR				11432.45	
TOTAL SOUTHERN REGION				11432.45	
EASTERN					
DVC					
WEST BENGAL					
1	MAITHON HPS	(1X23.2)+(2X20)	S(UG)	63.20	1957-1958
<u>JHARKHAND</u>					
1	PANCHET HPS	(2X40)	PS	80.00	1959-1990
TOTAL DVC				143.20	
NHPC					
WEST BENGAL					
1	TEESTA LOW DAM III	(4X33)	R	132	2013-14
SIKKIM					
1	RANGIT HPS	(3X20)	R	60.00	2000
2	TEESTA V HPS	(3X170)	R(UG)	510.00	2008
TOTAL NHPC				702.00	
TOTAL CENTRAL				845.20	
JSEB					
JHARKHAND					
1	SUBERNREKHA HPS-I	(1X65)	S	65.00	1977
2	SUBERNREKHA HPS-II	(1X65)	R	65.00	1980
TOTAL JSEB				130.00	
OHPC					
ODISHA					
1	BALIMELA HPS	(6X60)+(2X75)	S	510.00	1973-1977
2	HIRAKUD HPS(BURLA)	(3X37.5)+(2X49.5)+(2X32)	S	275.50	1956-1990
3	HIRAKUD HPS (CHIPLIMA)	(3X24)	S	72.00	1962-1964

STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)

					As on 31.03.2014
S. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
4	RENGALI HPS	(5X50)	S	250.00	1985-1992
5	UPPER INDRAVATI HPS	(4X150)	S	600.00	1999-2001
6	UPPER KOLAB HPS	(4X80)	S	320.00	1988-1993
	TOTAL OHPC			2027.50	
	WBSIEDCL				
	WEST BENGAL				
1	JALDHAKA HPS	(3X9)	R	27.00	1967-1972
2	PURULIA PSS HPS	(4X225)	PS	900.00	2007
3	RAMMAM HPS	(4X12.5)	R	50.00	1995-1996
	TOTAL WBSIEDCL			977.00	
	TOTAL STATE			3134.50	
	SIKKIM				
	GIPL(GATI INFRA PRIVATE LTD.)				
1	CHUJACHAN	(2*49.5)		99.00	
	TOTAL EASTERN REGION			4078.70	
	NORTH EASTERN				
	NEEPCO				
	ARUNACHAL PRADESH				
1	RANGANADI HPS	(3X135)	R	405	2002
	SUB-TOTAL Ar.P			405	
	ASSAM				
1	KOPILI HPS	(4X50)+(1X25)	S	225.00	1988-2003
2	KHONDONG HPS	(2X25)	S	50.00	1984
	SUB-TOTAL ASSAM			275.00	
	NAGALAND				
1	DOYANG HPS	(3X25)	S	75.00	2000
	SUB-TOTAL NAGALAND			75.00	
	TOTAL NEEPCO			755.00	
	NHPC				
	MANIPUR				
1	LOKTAK HPS	(3X35)	S	105.00	1983
	TOTAL			105.00	
	TOTAL CENTRAL			860.00	
	APGCL				
	ASSAM				
1	KARBI LANGPI HPS	(2X50)	R	100.00	2007
	TOTAL APGCL			100.00	
	MeECL				
	MEGHALAYA				
1	KYRDEMKULAI HPS	(2X30)	R	60.00	1979
2	UMIAM HPS ST-I	(4X9)	S	36.00	1965
3	UMIAM HPS ST-IV	(2X30)	R	60.00	1992
4	MYNTDU HPS ST-I	(3X42)	R	126.00	2012
	TOTAL MeECL			282.00	
	TOTAL STATE			382.00	
	TOTAL NE REGION			1242.00	
	TOTAL ALL INDIA			40531.41	

Note:- Uprated/Derated Capacities of units have been incorporated.

Abbreviations:-

R- Run of River Type

S- Storage Type

PS- Pumped Storage

UG- Underground

MP- Multipurpose

CAPACITYWISE GROUPING OF HYDRO - ELECTRIC STATIONS

AS ON 31.03.2014

Station Cap. Range (MW)	Number of stations	Number of units	Total capacity (MW)
> 25 - 50	45	128	1643.45
> 50 - 100	51	133	3741.90
>100 - 200	33	113	4663.95
>200 - 300	19	84	4951.51
>300 - 400	12	45	4325.00
>400 - 500	5	18	2255.00
>500 - 600	8	40	4420.00
>600 - 700	0	0	0.00
>700 - 800	3	18	2335.00
>800 - 900	4	26	3470.60
>900 - 1000	5	26	4990.00
>1000 - 1500	3	22	3735.00
Total	188	653	40531.41

HYDRO GENERATING UNITS ADDED DURING 2013-14

Sl. No.	Station	State	Unit No.	Capacity (MW)	Date of commissioning
<u>NORTHERN REGION</u>					
<u>CENTRAL SECTOR</u>					
1	Rampur (SJVN LTD.)	HP	1	68.67	23.03.2014
			2	68.67	21.03.2014
			3	68.67	29.03.2014
2	Parbati III (NHPC)	HP	1	130.00	18.02.2014
			2	130.00	27.02.2014
			3	130.00	15.03.2014
3	Uri II (NHPC)	J&K	1	60.00	25.09.2013
			2	60.00	16.11.2013
			3	60.00	27.09.2014
			4	60.00	02.02.2014
4	Nimoo Bazgo (NHPC)	J&K	1	15.00	02.11.2013
			2	15.00	31.10.2013
			3	15.00	30.10.2013
5	Teesta Low Dam III	WB	4	33.00	01.04.2013
SUB TOTAL(CENTRAL SECTOR)				914.01	
<u>PRIVATE SECTOR</u>					
	Chujachen (GIPL)	Sikkim	1	49.50	21.04.2013
			2	49.50	20.04.2013
SUB TOTAL(PVT. SECTOR)				99	
<u>STATE SECTOR</u>					
	Bhawani Kattalai Barrage II (TANGEDCO)	Tamil Nadu	1	15.00	27.08.2013
			2	15.00	06.09.2013
	Bhawani Kattalai Barrage III (TANGEDCO)	Tamil Nadu	2	15.00	25.09.2013
SUB TOTAL(STATE SECTOR)				45.00	
ALL INDIA TOTAL				1058.01	

CHAPTER 2

GENERATION PERFORMANCE

CHAPTER 2

GENERATION PERFORMANCE

2.1 Generation from hydro electric power stations (above 25 MW Installed Capacity) in the country during 2013-14 was 134847.52 MU, against the target of 122263 MU which was 10.29% more than the target.

2.2 Region-wise generation performance of hydro electric stations during 2013-14 is indicated in **Table 2.1**.

TABLE 2.1
GENERATION PERFORMANCE – REGIONWISE
(2013-14)

S. No.	Region	Installed Capacity as on 31.03.2014 (MW)	Generation During 2013-14		
			Target (MU)	Actual (MU)	Shortfall(-)/ Surplus (+) Over Target (%)
1	Northern	16386.26	61597	63472.70	3.05
2	Western	7392.00	15843	22828.76	44.09
3	Southern	11432.45	29454	32831.06	11.47
4	Eastern	4078.70	11191	11650.95	4.11
5	North-eastern	1242.00	4178	4064.05	-2.73
	Total(All India)	40531.41	122263	134847.52	10.29

Generation during 2013-14 has exceeded the target in Northern, Western, Southern and Eastern Region whereas it was less than the target in North-Eastern Region of the country.

Hydel generation during 2013-14 was 134847.52 MU against the target of 122263 MU viz more in generation by 12584.52 MU (10.29%). Actual generation of 134847.52 MU was also more than previous year generation of 113720.29 MU by 18.58%. Hydel generation was more than the generation target in Northern, Western, Southern and Eastern by 3.05%, 44.09%, 11.47% and 4.11% respectively. Whereas Hydel generation was less than target in North Eastern Region by 2.73%. There was less generation as compared to the target of HE Stations of MPCL, EPPL, JPVL, ADHPL, LBHPPL & GIPL in private sector, HPSEBL, PSPCL, UJVNL, JSEB & MeECL in state sector and NHPC, DVC & NEEPCO in central sector

Month wise generation performance and cumulative generation performance vis-a-vis targets have been shown at **Exhibit-2.1** and are given in **Table 2.2** below.

TABLE 2.2

**MONTHWISE & CUMULATIVE GENERATION VIS-À-VIS TARGET IN MU
PERIOD: 2013-14**

Month	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
TARGET	8531	10944	11248	13622	15543	14060	10580	7954	7297	7387	6866	8232
GEN.	8257	11025	12151	15886	19421	15024	12087	8779	8133	7497	7423	9164
CUM. TARGET	8531	19474	30722	44344	59887	73947	84527	92481	99778	107165	114031	122263
CUM. GEN.	8257	19282	31433	47319	66739	81763	93851	102629	110763	118260	125683	134848

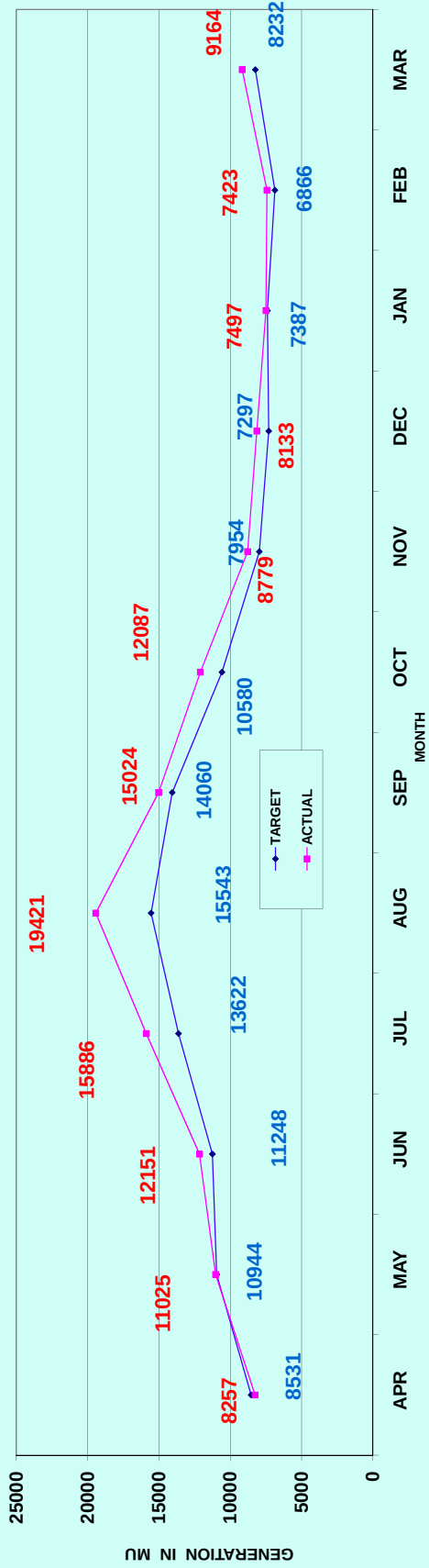
2.3 Sector wise generation performance during the year 2013-14 vis-à-vis target is given in **Table 2.3**. Generation from H.E. Stations under Central and State Sector was more than the target by 8.59% & 16.12% respectively and Private Sector was less than the target by 14.37%.

TABLE 2.3

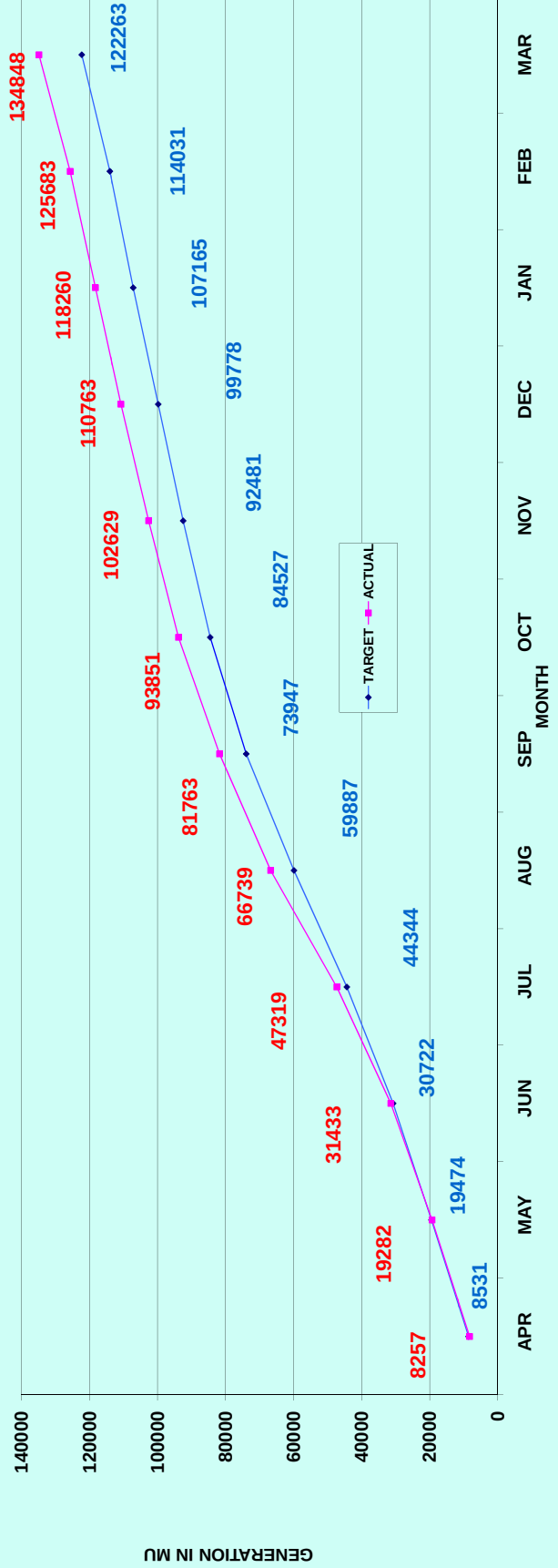
**SECTORWISE GENERATION PERFORMANCE
PERIOD: 2013-14**

Sl. No.	Sector	Installed Capacity as on 31.03.14 (MW)	Generation		
			Target (MU)	Actual (MU)	Shortfall(-) Surplus(+) Over Target (%)
1	Central	13221.71	47331	51395.73	8.59
2	State	24581.70	63259	73456.38	16.12
3	Private	2728.00	11673	9995.41	-14.37
	Total	40531.41	122263	134847.52	10.29

MONTHLY ALL INDIA HYDRO GENERATION VS TARGETS
DURING 2013-14



ALL INDIA CUMMULATIVE GENERATION VS TARGETS
DURING 2013-14



2.4 Generation performance of 31 major reservoir based H.E. Stations vis-à-vis other schemes is given in Table 2.4. It could be observed that the 31 major reservoir based Hydro Stations have generated 28.72% more than the target. Generation from other Stations was 2.11% less than the target.

TABLE 2.4

**RESERVOIR BASED STATIONS GENERATION PERFORMANCE VIS-À-VIS
OTHER HE STATIONS PERIOD: 2013-14**

S. No.	Type of Scheme	Installed Capacity as on 31.03.2014 (MW)	Generation in 2013-14		
			Target (MU)	Actual (MU)	Shortfall (-) / Surplus (+) over target (%)
1.	Reservoir Based Schemes (31Nos.)	19227.85	49171	63294.23	28.72
2.	Other schemes	21303.56	73092	71553.29	(-)2.11
	Total	40531.41	122263	134847.52	10.29

2.5 Details of actual generation during 2013-14 for all the hydro stations (Above 25 MW capacities) in the country are given in **Annex 2.1**. List of stations where generation exceeded the targets during 2013-14 is given in **Table 2.5**.

TABLE 2.5

**H.E. STATIONS ACHIEVING HIGHER GENERATION VIS-A-VIS TARGETS
PERIOD: 2013-14**

S. No.	Actual Generation as % of Generation Target	Hydro Electro Stations
1	150 & above	Pong, R P Sagar, Jawahar Sagar, Mahi Bajaj I&II, Sardar Sarovar RBPH, Ukai, Kadan PSS, Indira Sagar, Bargi, Madhikhera, Koyna St. I-II, Muchkund, N J Sagar RBC.
2	140 - 150	Bhakra L&R, Tehri, Bansagar Ton I, Koyna DPH, N J Sagar LBC, Pochampad, Kuttiadi & Kuttiadi Additional Extn., Kadamparai PSS, Rengali.

S. No.	Actual Generation as % of Generation Target	Hydro Electro Stations
3	130 - 140	Koteshwar, Giri Bata, Khara, Omkareshwar, Gandhi Sagar, Bansagar Ton II, Koyna-III, Bandardhara II, Jog, Balimela.
4	120 - 130	Rihand, Obra, Dhakrani, Dhalipur, Kulhal, Chhibro, Khodri, Khopoli, T B Dam & Hampi, Varahi, Sabarigiri, Bhawani Kattalai Barrage-II, Upper Indravati, Ramman II, Loktak.
5	110 – 120	Chamera I, Nathpa Jhakri, Baspa II, Sardar Sarovar CHPH, Bhira Tail Race, Lower Sileru, Sharavathy, Supa DPH, Gerusoppa, Idukki, Idamalayar, Lower Periyar, Kakkad, Moyar, Kundah I-V, Mettur Dam & Tunnel, Periyar, Papanasam, Sarkarpathy, Pykara Ultimate, Purulia PSS, Kyrdemkulai, Kopili
6	100 - 110	Dehar, Salal I&II, Dulhasti, Sanjay, Larji, Karcham Wangtoo, Lower Jheum, Baglihar, Mukerian I-IV, A P Sahib I&II, Ranjit Sagar, Matatilla, Pench, Bansagar Ton III, Hasdeo Bango, Tillari, Bhira & Bhira PSS, Bhivpuri, Upper Sileru I&II, N J Sagar PSS, Srisailem RB, Munirabad, Kalinadi, Bhadra, Lingmakki, Kadra, Sholayar, Nariamangalam, Panniar, Pykara, Suruliyar, Aliyar, Upper Kolab, Jaldhaka I, Rangit, Karbi Langpi, Doyang.

H.E. Stations where generation was less than the targets have been listed in **Table 2.6** below:

TABLE 2.6

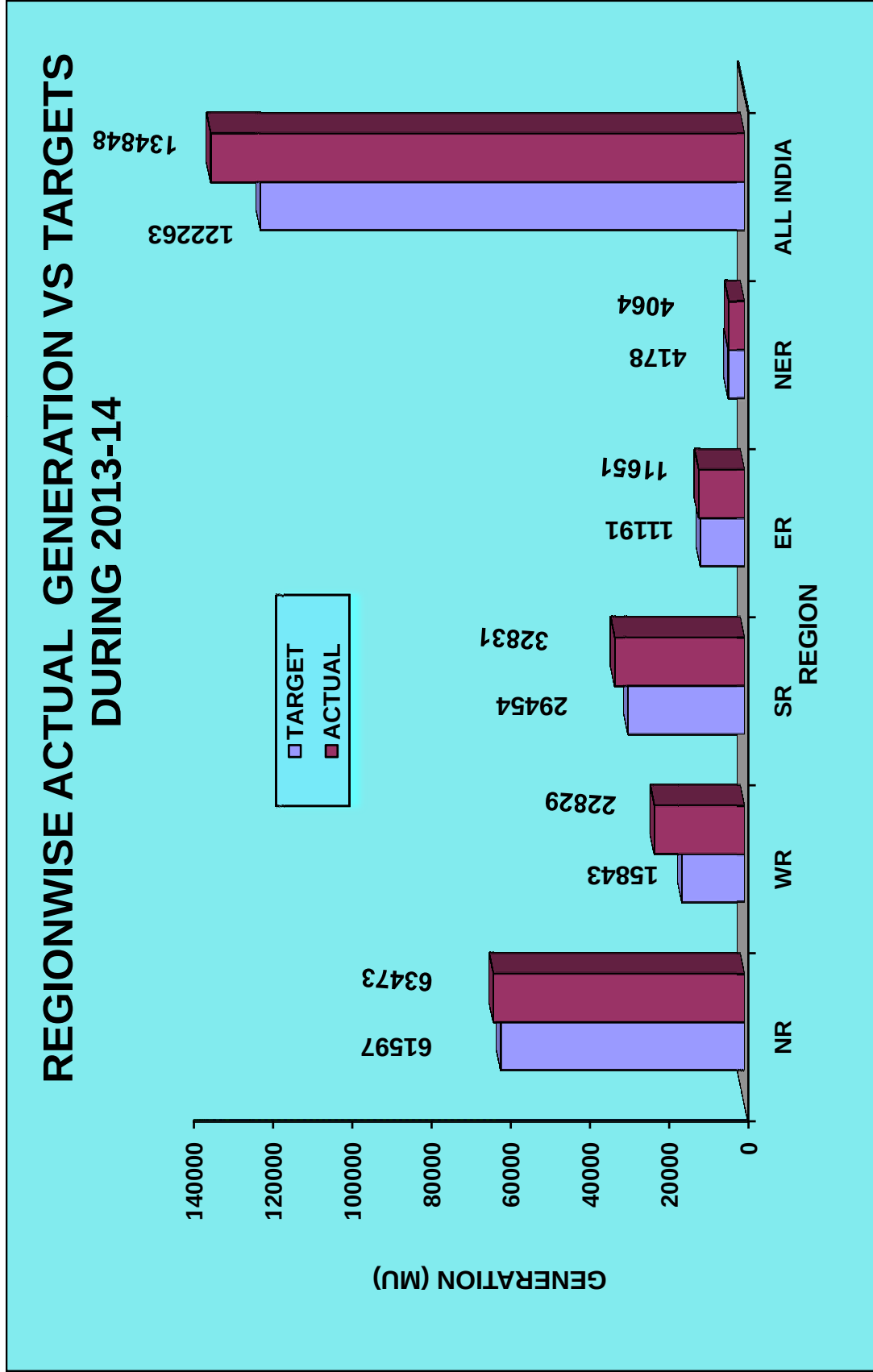
**H.E.STATIONS HAVING SHORTFALL IN GENERATION VIS-À-VIS TARGETS
PERIOD: 2013-14**

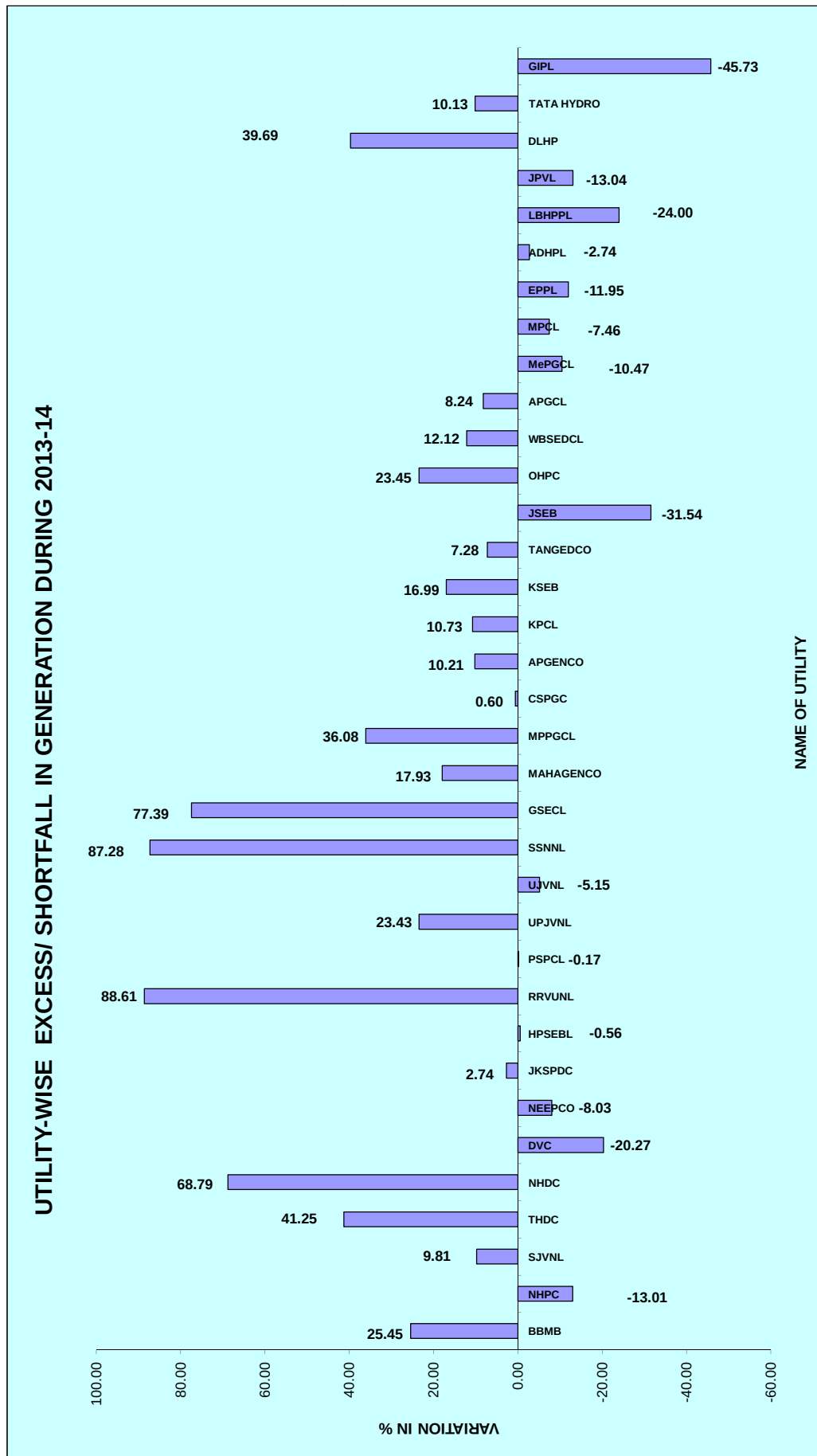
S. No.	Actual Generation as % of Generation Target	Hydro Electro Stations
1	90 -100	Chamera-II, Uri, Sewa II, Malana, Allain Duhangan, Chilla, Koyna St.IV, Vaitarana, Ghatghar PSS, Srisailem LB, Priyadarshni Jurala, Kodalasali, Almatti Dam, Parson's Valley, Lower Mettur I-V, Hirakud I&II, Teesta V, Umium St. IV.
2	80 -90	Ganguwal, Kotla, Baira Siul, Tanakpur, Chamera-III, Malana-II, Khatima, Ramganga, Maneri Bhali I, Ghatprabha, Shivasamudram, Sengulam, Pallivasal, Sholayar I&II, Panchet, Myntdu
3	70 -80	Chutak, Nimboo Bazgo, Budhil, Poringalkuttu, Maithon, Umium St. I, Khandong, Ranganadi.

S. No.	Actual Generation as % of Generation Target	Hydro Electro Stations
4	60 -70	Bassi, Upper Sindh-II, Shanan, Maneri Bhali II, Rajghat, Kodayar I&II, Subernrekha I&II.
5	50 -60	Bhawani Kattalai Barrage-I, Chuzachen.
6	40 -50	Bhawani Kattalai Barrage-III.
7	30 -40	Uri-II, Teesta Low Dam III.
8	10 -30	Dhauliganga, Vishnu Prayag.
9	0 -10	Parbati-III, Rampur, Sorang, Srinagar, Maheshwar, Lower Jurala, Teesta Low Dam IV.

2.6 Region wise generation targets vis-à-vis achievements are indicated at **Exhibit-2.2**. The states/utilities showing excess/short-fall in generation over the targets are indicated in **Exhibit-2.3**.

EXHIBIT-2.2





**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2013-14**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY	2013-14		ACTUAL AS % OF TARGET
			AS ON 31.03.2014 (MW)	TARGET (MU)	ACTUAL (MU)	
<u>NORTHERN REGION</u>						
<u>CENTRAL</u>						
<u>BBMB</u>						
1.	Bhakra L & R	5*108+5*157	1325.00	4400	6210.29	141.14
2.	Ganguwal	1*29.25+2.24.2	77.65	568	505.07	88.92
3.	Kotla	1*29.25+2.24.3	77.65	574	483.94	84.31
4.	Dehar	6*165	990.00	3000	3158.68	105.29
5.	Pong	6*66	396.00	1123	1767.03	157.35
Total BBMB			2866.30	9665	12125.01	125.45
<u>NHPC</u>						
1.	Baira Siul	3*60	180.00	730	638.04	87.40
2.	Salal-I	3*115	345.00	3082	3234.67	104.95
3.	Salal-II	3*115	345.00			
4.	Tanakpur	3*31.4	94.20	452	384.18	85.00
5.	Chamera-I	3*180	540.00	2065	2340.87	113.36
6.	Chamera-II	3*100	300.00	1485	1396.1	94.01
7.	Chamera-III	3*77	231.00	1098	937.86	85.42
8.	Uri	4*120	480.00	2587	2520.76	97.44
9.	Uri-II	4*60	240.00	1124	403.76	35.92
10.	Dhauliganga	4*70	280.00	1110	282.31	25.43
11.	Dulhasti	3*130	390.00	2050	2150.09	104.88
12.	Sewa-III	3*40	120.00	534	501.52	93.92
13.	Chutak	4*11	44.00	48	34.18	71.21
14.	Nimboo Bazdo	3*15	45.00	65	50.62	77.88
15.	Parbati III	3*130	390.00	694	4.78	0.69
Total NHPC			4024.20	17124	14879.74	86.89
<u>SJVNL</u>						
1.	Nathpa Jhakri	6*250	1500.00	6500	7190.53	110.62
2.	Rampur	3*68.67	206.01	48	0.02	0.04
Total SJVNL			1706.01	6548.00	7190.55	109.81
<u>THDC</u>						
1.	Tehri	4*250	1000.00	2797	4060.43	145.17
2.	Koteshwar	4*100	400.00	1155	1521.85	131.76
Total THDC			1400.00	3952	5582.28	141.25
Total Central			9996.51	37289	39777.58	106.67
<u>HPSEB LTD</u>						
1.	Giri Bata	2*30	60.00	170	230.22	135.42
2.	Bassi	4*15	60.00	328	228.65	69.71

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2013-14**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY AS ON 31.03.2014 (MW)	2013-14		ACTUAL AS % OF TARGET
				TARGET (MU)	ACTUAL (MU)	
3.	Sanjay	3*40	120.00	518	536.48	103.57
4.	Larji	3*42	126.00	587	598.74	102.00
Total HPSEB LTD			366.00	1603	1594.09	99.44
<u>PRIVATE</u>						
<u>MALANA POWER COMPANY LTD.</u>						
1.	Malana	2*43	86.00	344	318.34	92.54
<u>JAIPRAKASH VENTURE LTD.</u>						
1.	Baspa-II	3*100	300.00	1213	1345.49	110.92
2.	Karcham Wangtoo	4*250	1000.00	4414	4653.26	105.42
Total JPVL			1300.00	5627.00	5998.75	106.61
<u>EVEREST POWER COMPANY LTD.</u>						
1.	Malana-II	2*50	100.00	386	339.87	88.05
<u>ALLAIN DUHANGAN POWER LTD.</u>						
1.	Allain Duhangan	2*96	192.00	720	700.24	97.26
<u>HSPL</u>						
1.	Sorang			21	0.00	0.00
<u>LANCO BUDHIL POWER PVT. LTD.</u>						
1.	Budhil	2*35	70.00	291	221.17	76.00
Total Private			1748	7389	7578.37	102.56
Total HP			2114.00	8992	9172.46	102.01
<u>JAMMU & KASHMIR</u>						
<u>JKSPDC</u>						
1.	Lower Jhelum	3*35	105	484	516.5	106.71
2.	Upper Sindh II	3*35	105	310	214.89	69.32
3.	Baglihar	3*150	450	2643	2799.8	105.93
Total JKSPDC			660	3437	3531.19	102.74
Total J & K			660	3437	3531.19	102.74
<u>RAJASTHAN</u>						
<u>RRVUNL</u>						
1.	R P Sagar	4*43	172	250	510.45	204.18
2.	Jawahar Sagar	3*33	99	172	322.43	187.46
3.	Mahi Bajaj I & II	2*25+2*45	140	140	227.1	162.21
Total RRVUNL			411	562	1059.98	188.61
Total Rajasthan			411	562	1059.98	188.61
<u>PUNJAB</u>						
<u>PSPCL</u>						
1.	Shanan	4*15+1*50	110.00	525	355.89	67.79
2.	Mukerian I-IV	6*15+6*19.5	207.00	1175	1246.73	106.10

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2013-14**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY AS ON 31.03.2014 (MW)	2013-14		ACTUAL AS % OF TARGET
				TARGET (MU)	ACTUAL (MU)	
3.	A P Sahib I & II	4*33.5	134.00	720	735.01	102.08
4.	Ranjit Sagar	4*150	600.00	1500	1575.89	105.06
Total PSPCL			1051.00	3920	3913.52	99.83
Total Punjab			1051.00	3920	3913.52	99.83
<u>UTTAR PRADESH</u>						
<u>UPJVNL</u>						
1.	Rihand	6*50	300.00	415	503.98	121.44
2.	Obra	3*33	99.00	166	203.15	122.38
3.	Matatilla	3*10.2	30.60	110	115.98	105.44
4.	Khara	3*24	72.00	315	418.62	132.90
Total UPJVNL			501.60	1006	1241.73	123.43
Total UP			501.60	1006	1241.73	123.43
<u>UTTARAKHAND</u>						
<u>UJVNL</u>						
1.	Khatima	3*13.8	41.40	132	114.79	86.96
2.	Ram Ganga	3*66	198.00	278	233.59	84.03
3.	Dhakrani (Y.St.I)	3*11.25	33.75	139	170.62	122.75
4.	Dhalipur (Y.St.I)	3*17	51.00	206	255.16	123.86
5.	Kulhal (Y.St.IV)	3*10	30.00	142	178.52	125.72
6.	Chibro (Y.St.II)	4*60	240.00	764	949.80	124.32
7.	Chilla	4*36	144.00	805	784.61	97.47
8.	Khodri (Y.St.II)	4*30	120.00	351	435.94	124.20
9.	Maneri Bhali-I	3*30	90.00	457	382.18	83.63
10.	Maneri Bhali-II	4*76	304.00	1300	833.13	64.09
Total UJVNL			1252.15	4574	4338.34	94.85
<u>PRIVATE</u>						
<u>GVK</u>						
1.	Srinagar			42	0	0
<u>JPVL</u>						
1.	Vishnu Prayag	4*100	400.00	1775	437.9	24.67
Total Uttarakhand			1652.15	6391	4776.24	74.73
Total Northern Region			16386.26	61597.00	63472.70	103.05
<u>WESTERN REGION</u>						
<u>GUJARAT</u>						
<u>SSNNL</u>						
1.	Sardar Sarovar CHPH	5*50	250.00	597	660.52	110.64
2.	Sardar Sarovar RBPH	6*200	1200.00	2544	5221.79	205.26
Total SSNNL			1450.00	3141	5882.31	187.28

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2013-14**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY AS ON 31.03.2014 (MW)	2013-14		ACTUAL AS % OF TARGET
				TARGET (MU)	ACTUAL (MU)	
<u>GSECL</u>						
1.	Ukai	4*75	300	470	812.9	172.96
2.	Kadana PSS	4*60	240	220	411.08	186.85
Total GSECL			540	690	1223.98	177.39
Total Gujarat			1990.00	3831	7106.29	185.49
<u>MADHYA PRADESH</u>						
<u>NHDC</u>						
1.	Indira Sagar	8*125	1000.00	2200	4078.68	185.39
2.	Omkareshwar	8*65	520.00	1184	1633.22	137.94
Total NHDC			1520.00	3384	5711.9	168.79
<u>MPPGCL</u>						
1.	Gandhi Sagar	5*23	115.00	300	405.59	135.20
2.	Pench	2*80	160.00	400	427.29	106.82
3.	Bargi	2*45	90.00	315	547.41	173.78
4.	Madhikhera	3*20	60.00	1150	136.53	11.87
5.	Bansagar Tons-I	3*105	315.00	110	1658.76	1507.96
6.	Bansagar Tons-II	2*15	30.00	120	147.62	123.02
7.	Bansagar Tons-III	3*20	60.00	90	124.40	138.22
8.	Rajghat	3*15	45.00	90	56.43	62.70
Total MPPGCL			875.00	2575	3504.03	136.08
<u>SMHPCL (Pvt)</u>						
1.	Maheshwar			415	0	0.00
Total M P			2395.00	6374.00	9215.93	144.59
<u>CHHATISGARH</u>						
<u>CSPGC</u>						
1.	Hasdeo Bango		120	250	251.51	100.60
Total CSPGC			120	250	251.51	100.60
Total Chattisgarh			120	250	251.51	100.60
<u>MAHARASHTRA</u>						
<u>MAHAGENCO</u>						
1.	Koyna St.I&II	4*70+4*80	600.00	786	1264.32	160.85
2.	Koyna St.III	4*80	320.00	517	705.80	136.52
3.	Koyna IV	4*250	1000.00	1721	1694.89	98.48
4.	Koyna DPH	2*18	36.00	110	163.24	148.40
5.	Vaitarna & DAM PH.	1*60	60.00	144	132.97	92.34
6.	Tillari	1*60	60.00	115	116.68	101.46
7.	Bhira Tail Race	2*40	80.00	80	95.35	119.19
8.	Ghatghar PSS	2*125	250.00	400	394.06	98.52
Total MAHAGENCO			2406.00	3873	4567.31	117.93

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2013-14**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY	2013-14		ACTUAL AS % OF TARGET
			AS ON 31.03.2014 (MW)	TARGET (MU)	ACTUAL (MU)	
<u>DLHP</u>						
1.	Bhandardhara-II	1*34	34	65	90.80	139.69
Total DLHP			34	65	90.80	139.69
<u>TATA HYDRO</u>						
1.	Bhira	6*25	150.00	885	969.46	109.54
2.	Bhira PSS	1*150	150.00			
3.	Bhivpuri	3*24+2*1.5	75.00			
4.	Khopoli	3*24	72.00			
Total Tata			447.00	1450	1596.92	110.13
Total Maharashtra			2887.00	5388	6255.03	116.09
Total Western Region			7392.00	15843	22828.76	144.09
<u>SOUTHERN REGION</u>						
<u>ANDHRA PRADESH</u>						
<u>APGENCO</u>						
1.	Machkund	3*17+3*21.25	114.75	341	572.59	167.91
2.	T.B.Dam & Hampi	8*9	72.00	145	175.78	121.23
3.	Upper sileru I & II	4*60	240.00	448	460.14	102.71
4.	Lower Sileru	4*115	460.00	1070	1268.48	118.55
5.	N.J.Sagar PSS	1*110+7*100.8	815.60	1230	1315.16	106.92
6.	N.J.Sagar RBC	3*30	90.00	152	251.58	165.51
7.	N.J.Sagar LBC	2*30	60.00	69	98.23	142.36
8.	Srisaillam	7*110	770.00	1260	1314.85	104.35
9.	Pochampad	1*27	27.00	60	85.29	142.15
10.	Srisaillam LB	6*150	900.00	1540	1464.21	95.08
11.	Priyadarshni Jurala	6*39	234.00	288	270.79	94.02
Total APGENCO			3783.35	6603	7277.10	110.21
Total A P			3783.35	6603	7277.1	110.21
<u>KARNATAKA</u>						
<u>KPCL</u>						
1.	Sharavathy	10*103.5	1035.00	4830	5593.47	115.81
2.	Kalinadi	3*135+3*150	855.00	2565	2643.33	103.05
3.	Supa DPH	2*50	100.00	419	469.68	112.10
4.	Bhadra	1*2+2*12+1*7.2+1*6	39.20	63	63.76	101.21
5.	Lingnamakki	2*27.5	55.00	254	267.94	105.49
6.	Varahi	4*115	460.00	1060	1320.47	124.57
7.	Ghatprabha	2*16	32.00	95	82.16	86.48
8.	Kadra	3*50	150.00	350	366.91	104.83
9.	Kodasali	3*40	120.00	330	327.94	99.38
10.	Gerusoppa	4*60	240.00	540	619.18	114.66
11.	Amatti Dam	1*15+5*55	290.00	540	507.35	93.95

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2013-14**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY AS ON 31.03.2014 (MW)	2013-14		ACTUAL AS % OF TARGET
				TARGET (MU)	ACTUAL (MU)	
12.	Jog	4*13.2+4*21.6	139.20	200	267.39	133.70
13.	Shivasamudram	6*3+4*6	42.00	260	219.07	84.26
14.	Munirabad	2*9+1*10	28.00	100	102.39	102.39
Total KPCL			3585.40	11606	12851.04	110.73
Total Karnataka			3585.40	11606	12851.04	110.73
<u>KERALA</u>						
<u>KSEB</u>						
1.	Idukki	6*130	780.00	2287	2738.78	119.75
2.	Sabarigiri	6*50	300.00	1300	1635.21	125.79
3.	Kuttiadi & Extn.	3*25+1*50	125.00	575	849.81	147.79
4.	Kuttiadi Additional Extn.	2*50	100.00			
5.	Sholayar	3*18	54.00	233.00	233.33	100.14
6.	Sengulam	4*12	48.00	170	141.86	83.45
7.	Nariamangalam & Extn.	3*15+1*25	70.00	350	365.77	104.51
8.	Pallivasal	3*5+3*7.5	37.50	240	215.55	89.81
9.	Poringalkuthu	4*8	32.00	170	122.79	72.23
10.	Panniar	2*15	30.00	160	170.33	106.46
11.	Idamalayar	2*37.5	75.00	341	386.08	113.22
12.	Lower Periyar	3*60	180.00	543.00	601.01	110.68
13.	Kakkad	2*25	50.00	220	247.66	112.57
Total Kerala			1881.50	6589	7708.18	116.99
<u>TAMIL NADU</u>						
<u>TANGEDCO</u>						
1.	Pykara	3*7+1*11+2*13.6	59.20	64	64.69	101.08
2.	Moyar	3*12	36.00	132	148.43	112.45
3.	Kundah I - V	3*20+5*35+3*60 1*7*50+1*7*70	555.00	1387	1528.25	110.18
4.	Parson's Valley	1*30	30.00	45	42.71	94.91
5.	Suruliyar	1*35	35.00	92	100.45	109.18
6.	Aliyar	1*60	60.00	145	148.31	102.28
7.	Mettur Dam & Tunnel	4*12.5+4*50	250.00	413	461.37	111.71
8.	Lower Mettur I - IV	8*15	120.00	297	279.65	94.16
9.	Periyar	4*35	140.00	409	462.95	113.19
10.	Papanasam	4*8	32.00	120	137.70	114.75
11.	Sarkarpathy	1*30	30.00	125	137.99	110.39
12.	Sholayar I & II	2*35+1*25	95.00	305	267.09	87.57
13.	Kodayar I & II	1*60+1*40	100.00	232	158.83	68.46
14.	Kadamparai PSS	4*100	400.00	340	504.52	148.39
15.	Pykara Ultimate	3*50	150.00	360	399.34	110.93
16.	Bhawani Kattalai Barrage-I	2*15	30.00	69	41.30	59.86

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2013-14**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY AS ON 31.03.2014 (MW)	2013-14		ACTUAL AS % OF TARGET
				TARGET (MU)	ACTUAL (MU)	
17.	Bhawani Kattalai Barrage-II	2*15	30.00	69	86.12	-
18.	Bhawani Kattalai Barrage-III	2*15	30.00	52	25.04	-
Total TANGEDCO			2182.20	4656	4994.74	107.28
Total Southern Region			11432.45	29454	32831.06	111.47
<u>EASTERN REGION</u>						
<u>JHARKHAND</u>						
<u>JSEB</u>						
1.	Subernarekha I & II	2*65	130.00	160	109.53	68.46
Total Jharkhand			130.00	160	109.53	68.46
<u>DVC</u>						
1.	Maithon (WB)	2*20+1*23.2	63.20	137	97.93	71.48
2.	Panchet	2*40	80.00	146	127.7	87.47
Total DVC			143.20	283	225.63	79.73
<u>ODISHA</u>						
<u>OHPC</u>						
1.	Balimela	6*60+2*75	510.00	1184	1655.82	139.85
2.	Hirakud I & II	2*49.5+2*32+3*37.5+3*24	347.50	1029	1019.48	99.07
3.	Rengali	5*50	250.00	643	910.58	141.61
4.	Upper Kolab	4*80	320.00	832	871.91	104.80
5.	Upper Indravati	4*150	600.00	1962	2517.07	128.29
Total OHPC			2027.50	5650	6974.86	123.45
Total Odisha			2027.50	5650	6974.86	123.45
<u>WEST BENGAL</u>						
<u>WBSEDCL</u>						
1.	Jaldhaka I	3*9	27.00	158	158.51	100.32
2.	Ramman II	4*12.5	50.00	220	265.38	120.63
3.	Purulia PSS	4*225	900.00	700	784.72	112.10
Total WBSEDCL			977.00	1078	1208.61	112.12
<u>NHPC</u>						
1.	Teesta Low Dam-III	4*33	132.00	595	186.95	31.42
2.	Teesta Low Dam-IV			47	0.00	0.00
Total NHPC (WB)			132.00	642	186.95	
Total West Bengal			1109.00	1720	1395.56	81.14

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2013-14**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY	2013-14		ACTUAL AS % OF TARGET
			AS ON 31.03.2014 (MW)	TARGET (MU)	ACTUAL (MU)	
<u>SIKKIM</u>						
<u>NHPC</u>						
1.	Rangit	3*20	60.00	330	354.50	107.42
2.	Teesta-V	3*170	510.00	2511	2299.46	91.58
Sub total NHPC (Sikkim)			570.00	2841	2653.96	93.42
<u>GIPL</u>						
Chujachan		2*49.5	99.00	537	291.42	54.27
Total GIPL			99.00	537.00	291.42	54.27
Total Eastern Region			4078.70	11191	11650.96	104.11
<u>NORTH EASTERN REGION</u>						
<u>CENTRAL SECTOR</u>						
<u>NEEPCO</u>						
1.	Khandong (Assam)	2*25	50	235	179.41	76.34
2.	Kopili (Assam)	4*50+1*25	225	680	793.81	116.74
3.	Doyang (Nagaland)	3*25	75	227	245.71	108.24
4.	Ranganadi (Arunachal Pradesh)	3*135	405	1250	980.94	78.48
Total NEEPCO			755	2392	2199.87	91.97
<u>NHPC (NER)</u>						
1.	Loktak (Manipur)		105	500	639.84	127.97
Total NHPC (NER)			105	500	639.84	127.97
Total Central Sector (NER)			860	2892	2839.71	98.19
<u>ASSAM</u>						
<u>APGCL</u>						
1.	Karbi Langpi	2*50	100.00	390	422.14	108.24
Total APGCL			100.00	390	422.14	108.24
Total Assam			100.00	390	422.14	108.24
<u>MEGHALAYA</u>						
<u>MeECL</u>						
1.	Kyrdekulai	2*30	60.00	118	133.57	113.19
2.	Umium St.I	2*9+2*9	36.00	106	79.21	74.73
3.	Umium St.IV	2*30	60.00	186	175.01	94.09
4.	Myntdu	3*42	126.00	486	414.41	
Total MeECL			282.00	896	802.2	89.53
Total Meghalaya			282.00	896	802.2	89.53
Total North Eastern Region			1242.00	4178	4064.05	97.27
TOTAL ALL INDIA			40531.41	122263	134847.52	110.29
IMPORT FROM BHUTAN				4800	5597.90	116.62
TOTAL ALL INDIA INCLUDING BHUTAN IMPORTS			40531.41	127063	140445.42	110.53

CHAPTER 3

MAJOR RESERVOIR BASED HE SCHEMES

CHAPTER – 3

MAJOR RESERVOIR BASED H.E.SCHEMES

3.1 Introduction

Some of the hydro electric schemes are provided with regulating storage reservoirs. Water during monsoon and/or snowmelt period, is collected in these reservoirs. The regulated discharges from reservoirs are utilized for power generation, irrigation and other purposes. Reservoir based schemes are of two types i.e. single purpose and multipurpose. Single purpose schemes are operated only for power generation. Multipurpose storage schemes are operated for more than one purpose such as flood control, irrigation, water supply, pisciculture, navigation, tourist attraction and other recreational facilities besides power generation. Reservoir based schemes afford greater utilization of the available inflows approaching to long term average inflows resulting in greater firm power benefits. Reservoir based schemes are ideally suited to provide much needed peaking support to the system.

3.2 Major Reservoir Based Schemes

CEA is presently monitoring 31 major reservoirs based H. E. Schemes in the country as listed below:

S. No.	Name of Reservoir	H.E. Stations	Installed Capacity (MW)	State
Northern Region				
1	Bhakra	Bhakra (L)	540.00	Himachal Pradesh
		Bhakra (R)	785.00	Himachal Pradesh
		Kotla	77.65	Punjab
		Ganguwal	77.65	Punjab
2	Pong	Pong	396.00	Himachal Pradesh
3	Ranjit Sagar	Ranjit Sagar	600.00	Punjab
4	Tehri	Tehri	1000.00	Uttarakhand
		Koteswar	400.00	
5	Ram Ganga	Ram Ganga	198.00	Uttarakhand
6	Rihand	Rihand	300.00	Uttar Pradesh
		Obra	99.00	

S. No.	Name of Reservoir	H.E. Stations	Installed Capacity (MW)	State
7	RP Sagar	RP Sagar	172.00	Rajasthan
		Jawahar Sagar	99.00	
	Sub-Total(NR)		4744.30	
Western Region				
8	Ukai	Ukai	300.00	Gujarat
9	Sardar Sarovar	Sardar Sarovar(RBPH)	1200.00	Gujarat
		Sardar Sarovar(CHPH)	250.00	
10	Gandhi Sagar	Gandhi Sagar	115.00	Madhya Pradesh
11	Indira Sagar	Indira Sagar	1000.00	Madhya Pradesh
12	Koyna	Koyna I-IV and DPH	1956.00	Maharashtra
13	Bhira	Bhira	150.00	Maharashtra
		Bhira PSS	150.00	
	Sub-Total(WR)		5121.00	
Southern Region				
14	Machkund	Machkund	114.75	Andhra Pradesh
15	Srisaillam	Srisaillam RBPH	770.00	Andhra Pradesh
		Srisaillam LBPH	900.00	Telangana
16	Nagarjuna Sagar	NJ Sagar PSS	815.60	Telangana
		NJ SAGAR RBC & Ext.	90.00	Andhra Pradesh
		NJ SAGAR LBC	60.00	Telangana
17	Sharavathy	Sharavathy	1035.00	Karnataka
		Jog	139.20	
		Gerusoppa	240.00	
18	Supa & Kalinadi	Kalinadi	855.00	Karnataka
		Supa DPH	100.00	
19	Almatti Dam	Almatti Dam	290.00	Karnataka
20	Idukki	Idukki	780.00	Kerala
21	Sabarigiri	Sabarigiri	300.00	Kerala
22	Madhupatty	Nariamangalam	37.50	Kerala
		Pallivasal	70.00	
		Sengulam	48.00	

S. No.	Name of Reservoir	H.E. Stations	Installed Capacity (MW)	State
23	Idamalayar	Idamalayar	75.00	Kerala
24	Mettur	Mettur	370.00	Tamil Nadu
25	Periyar	Periyar	140.00	Tamil Nadu
	Sub-Total(SR)		7230.05	
Eastern Region				
26	Hirakud	Burla	275.50	Odisha
		Chiplima	72.00	
27	Balimela	Balimela	510.00	Odisha
28	Upper Indravati	Indravati	600.00	Odisha
29	Upper Kolab	Upper Kolab	320.00	Odisha
30	Rengali	Rengali	250.00	Odisha
31	Loktak	Loktak	105.00	Manipur
	Sub-Total(ER/NER)		2132.50	
	Total (All India)		19227.85	

Salient features of 31 Nos. reservoirs based H.E. Schemes are indicated in **Annex-3.1**. These schemes constitute about 47.44% of the total hydel installed capacity and generated about 46.94% of the total hydel generation during 2013-14 as briefly indicated in **Table-3.1**.

TABLE - 3.1

CONTRIBUTION BY IMPORTANT RESERVOIR BASED H.E. SCHEMES

	Description	Reservoir Schemes	Other Schemes	Total
1.	Installed Capacity (MW)	19227.85	21303.56	40531.41
2.	Percentage of Total (%)	47.44	52.56	100.00
3.	Energy Generation (MU)	63294.23	71553.29	134847.52
4.	Percentage of Total (%)	46.94	53.06	100.00

3.3 Inflows

Inflows to the reservoirs are primarily dependent on rainfall during monsoon in the catchment area of the reservoirs. However, in case of Bhakra, Pong, Ranjit Sagar and Tehri reservoirs, snow melt in the catchment area during summer also contributes to their inflows. The inflows into the reservoirs during 2013-14 vis-à-vis 2012-13 are given at **Exhibit 3.1**. Inflows into the reservoirs and generation during the year 2013-14 vis-a-vis 2012-13 is given below at **Table-3.2**.

TABLE 3.2

RESERVOIR SCHEMES-INFLOW & ENERGY GENERATION

S No	SCHEME/ Region	Inflows			Generation		
		2012-13 (MCM)	2013-14 (MCM)	2013-14 Inflow as % of 2012- 13 inflow	2012-13 (MU)	2013-14 (MU)	2013-14 generation as compared to 2012-13 (%)
1	2	3	4	5= (4/3*100)	6	7	8= (7/6*100)
	Northern Region						
1	Bhakra	16247.24	19358.98	119.15	5900.09	7199.30	122.02
2	Pong	9869.49	11273.88	114.23	1824.07	1767.03	96.87
3	Ranjit Sagar	6172.22	6380.31	103.37	1429.90	1575.89	110.21
4	Tehri	7381.02	9547.68	129.35	4266.06	5582.28	130.85
5	Ram Ganga	16534.19	68070.75	411.70	246.39	233.59	94.80
6	RP Sagar	3011.29	9115.33	302.71	641.15	832.88	129.90
7	Rihand	5433.03	4943.74	90.99	1084.99	707.13	65.17
Sub Total(NR)		64648.48	128690.67	199.06	15392.65	17898.10	116.28
	Western Region						
8	Ukai	10838.93	20417.00	188.37	628.45	812.90	129.35
9	Sardar Sarovar	37388.56	25923.81	69.34	3698.29	5882.31	159.05
10	Gandhi Sagar	5051.29	8396.19	166.22	274.64	405.59	147.68
11	Indira Sagar	35298.00	51399.00	145.61	2895.96	4078.68	140.84
12	Koyna	3612.69	4725.33	130.80	3385.05	3828.25	113.09
13	Bhira	853.00	1144.45	134.17	855.64	969.46	113.30
Sub Total(WR)		93042.47	112005.78	120.38	11738.03	15977.19	136.11

S No	SCHEME/ Region	Inflows			Generation		
		2012-13 (MCM)	2013-14 (MCM)	2013-14 Inflow as % of 2012-13 inflow	2012-13 (MU)	2013-14 (MU)	2013-14 generation as compared to 2012-13 (%)
1	2	3	4	5= (4/3*100)	6	7	8= (7/6*100)
	Southern Region						
14	Machkund	2452.10	1412.87	57.62	565.52	572.59	101.25
15	Srisaillam	4680.09	13456.68	287.53	828.74	2779.06	335.34
16	NJ Sagar	3669.18	22430.12	611.31	256.10	1664.97	650.12
17	Sharavathy	4106.84	5977.57	145.55	5317.27	6480.04	121.87
18	Supa	2472.33	3520.94	142.41	2313.40	3113.01	134.56
19	Almatti	8327.73	15117.79	181.54	420.84	507.35	120.56
20	Idukki	871.99	3295.40	377.92	1575.05	2738.78	173.89
21	Sabarigiri	456.08	1033.29	226.56	864.73	1635.21	189.10
22	Madhupatty	19.43	473.28	2435.82	516.94	723.18	139.90
23	Idamalayar	755.11	490.77	64.99	249.92	386.08	154.48
24	Mettur	2227.53	6505.75	292.06	362.78	741.02	204.26
25	Periyar	255.05	585.70	229.64	180.48	462.95	256.51
Sub Total(SR)		30293.46	74300.16	245.27	13451.77	21804.24	162.09
	Eastern Region						
26	Hirakud	29623.51	34274.75	115.70	973.94	1019.48	104.68
27	Balimela	3894.76	4612.99	118.44	546.72	1655.82	302.86
28	Upper Indravati	2739.76	3515.80	128.33	1688.88	2517.07	149.04
29	Upper Kolab	1979.19	6259.86	316.28	451.11	871.91	193.28
30	Rengali	11674.82	12856.06	110.12	713.15	910.58	127.68
Sub Total(ER)		49912.04	61519.46	123.26	4373.80	6974.86	159.47
	North Eastern Region						
31	Loktak	1543.03	2479.74	160.71	580.41	639.84	110.24
Sub Total(NER)		1543.03	2479.74	160.71	580.41	639.84	110.24
Total (All India)		239439.48	378995.81	158.28	45536.66	63294.23	139.00

3.4 Reservoir Levels

The maximum reservoir level attained during the year depends on the depleted reservoir level in the preceding year, besides the inflows during the current year. Water level touched FRL only at RP Sagar, Gandhi Sagar, Indira Sagar, Koyna, Bhira & Bhira PSS, NJ Sagar, Srisaillam, Sharavathy, Almatti Dam, Sabarigiri, Madhupatty, Idamalayar, Mettur, Hirakud, Balimela, Rengali, Upper Indravati and Loktak reservoirs during 2013-14. Month wise maximum levels of major reservoirs during 2013-14 vis-à-vis 2012-13 are indicated at **Exhibits 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8 and 3.9.**

3.5 Generation :

Generation from reservoir based H.E. Stations during the year depends on various factors such as water level of the reservoir at the end of the preceding year, inflows during the year, draw down level by the end of the year, availability of generating units etc. In 26 Nos. out of 31 Nos. reservoir based hydel schemes, annual generation during the year 2013-14 was more than the annual generation targets. Generation from 31 major reservoir schemes during the year 2013-14 has been 63294.23 MU showing increase of 39.00% over the 2012-13 generation of 45536.66 MU. Scheme wise generation of reservoir schemes during the year 2013-14 compared to that of last year 2012-13 is shown in **Table 3.2** above. The reservoir based schemes have been grouped in terms of percentage achievement of generation over targets in **Table-3.3** below:

TABLE -3.3

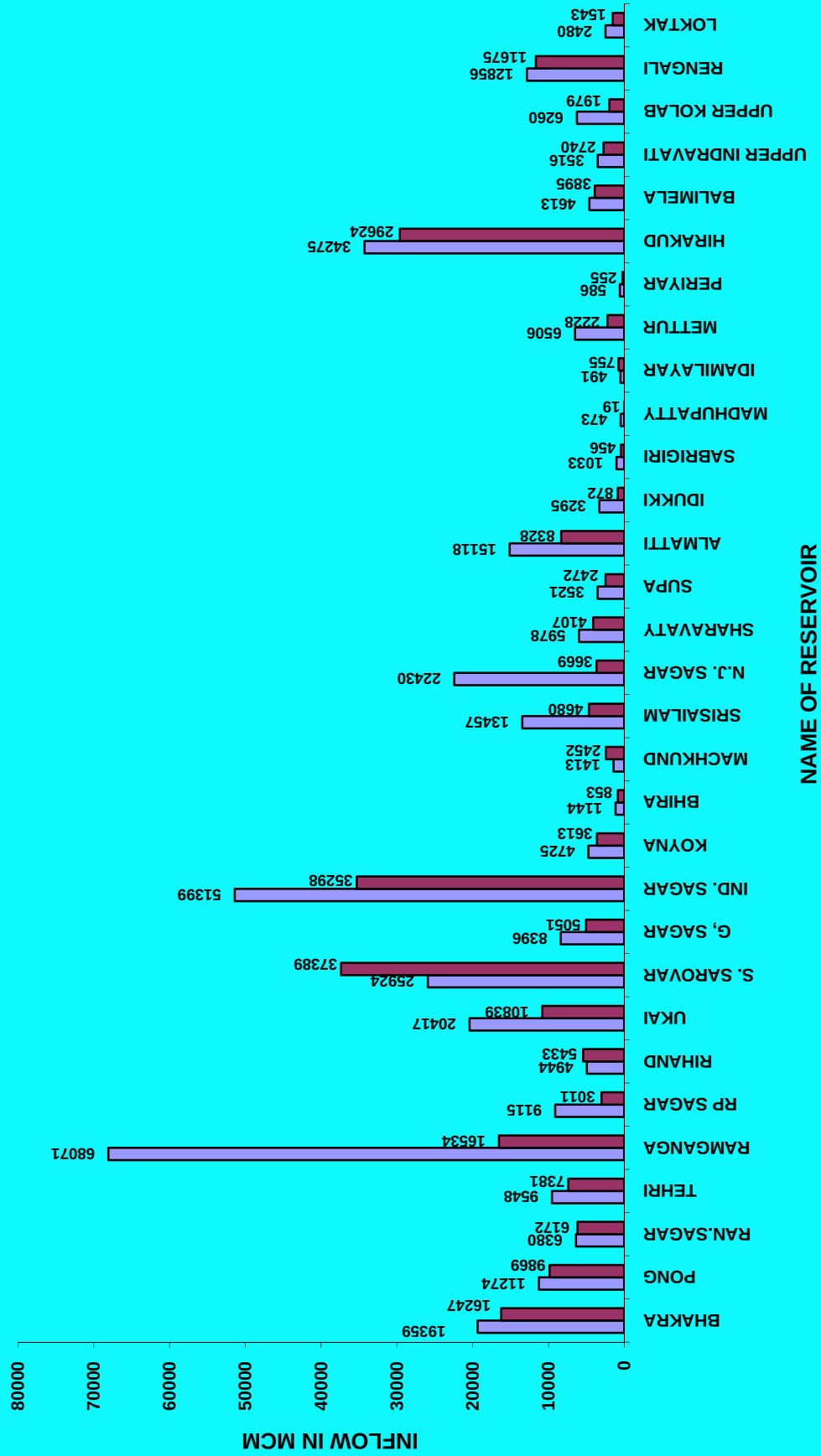
GENERATION PERFORMANCE OF MAJOR RESERVOIR BASED SCHEMES

S. No.	% of Actual Generation over Target	Name of the Reservoir Scheme
1	120 & Above	Bhakra, Pong, R P Sagar, Rihand, Tehri, Ukai, Sardar Sarovar, Gandhi Sagar, Indira Sagar, Koyna, Machkund, Sabarigiri, Balimela, Upper Indravati, Rengali, Loktak.
2	110 - 120	NJ Sagar, Sharavathy, Idukki, Idamalayar, Periyar.
3	100 - 110	Ranjit Sagar, Bhira & Bhira PSS, Supa, Mettur, Upper Kolab.
4	Below 100	Ramganga, Srisaillam, Almatti, Madhupatty, Hirakud.

Generation of major reservoir based H.E. Schemes during 2013-14 as compared to the generation during last year i.e. 2012-13 is also depicted at **Exhibit-3.10.**

EXHIBIT 3.1

INFLWS INTO MAJOR RESERVOIRS DURING 2013-14 VIS-A-VIS 2012-13



2013-14 2012-13

EXHIBIT 3.2

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

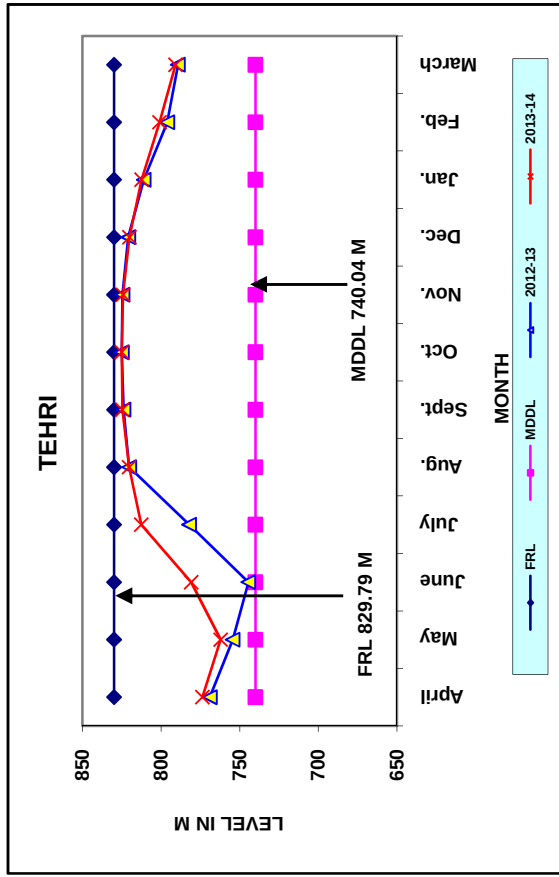
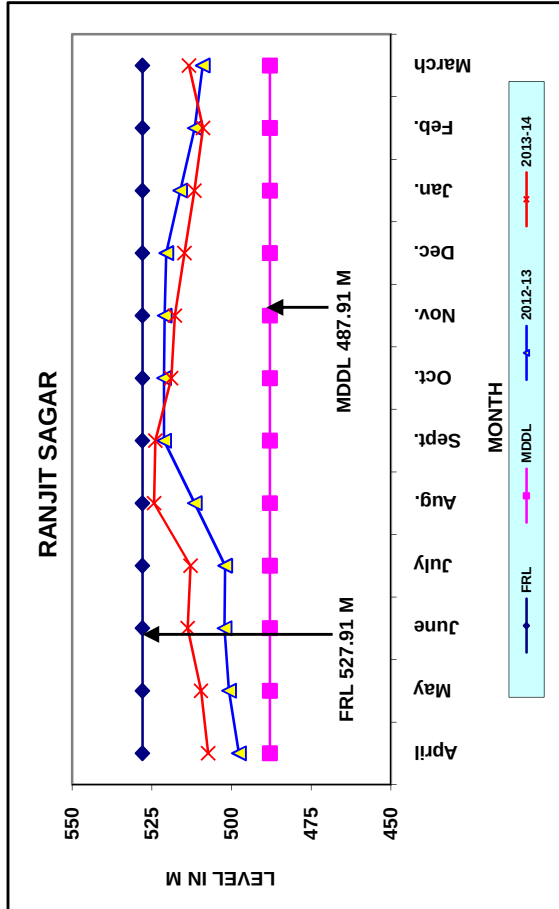
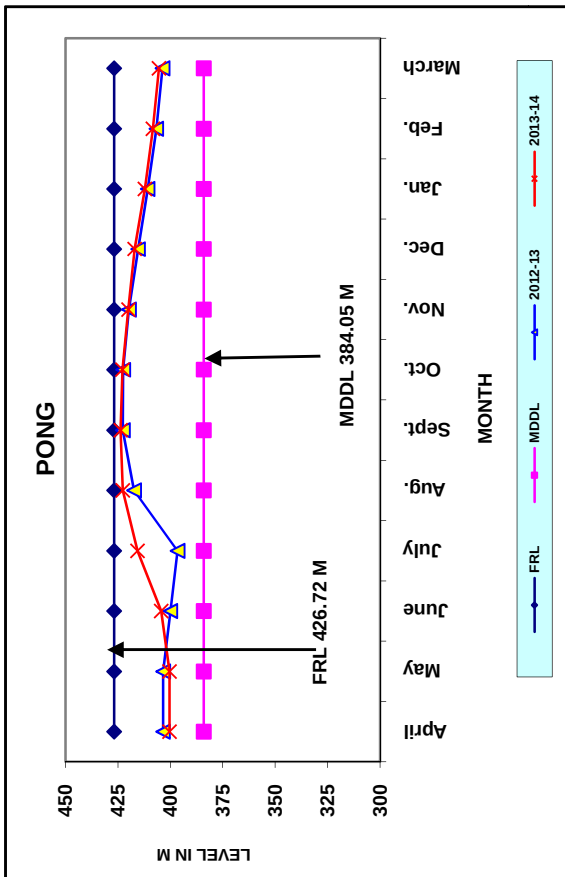
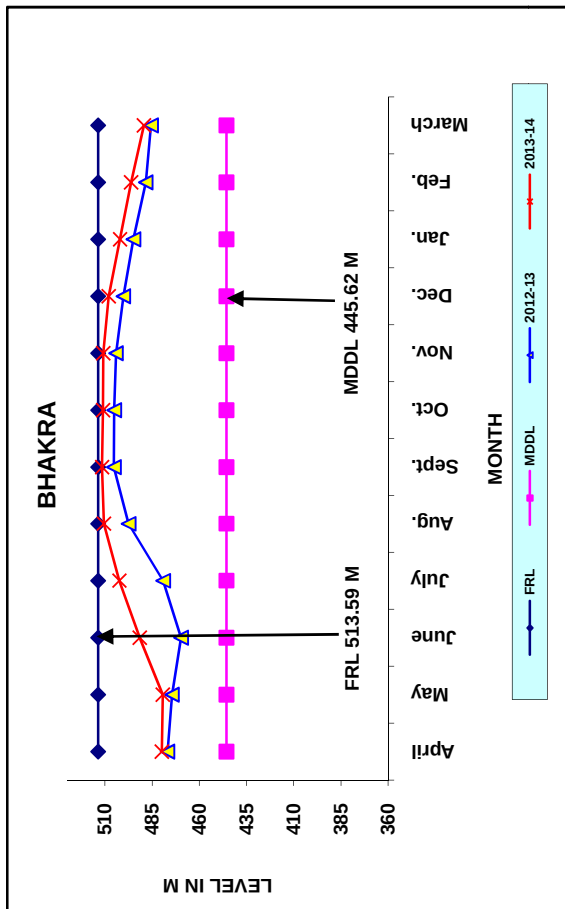


EXHIBIT 3.3

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

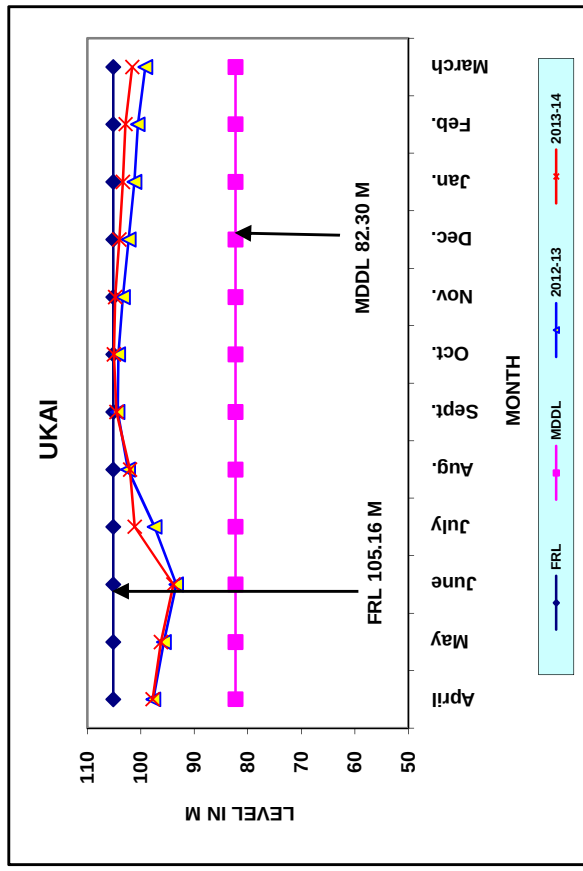
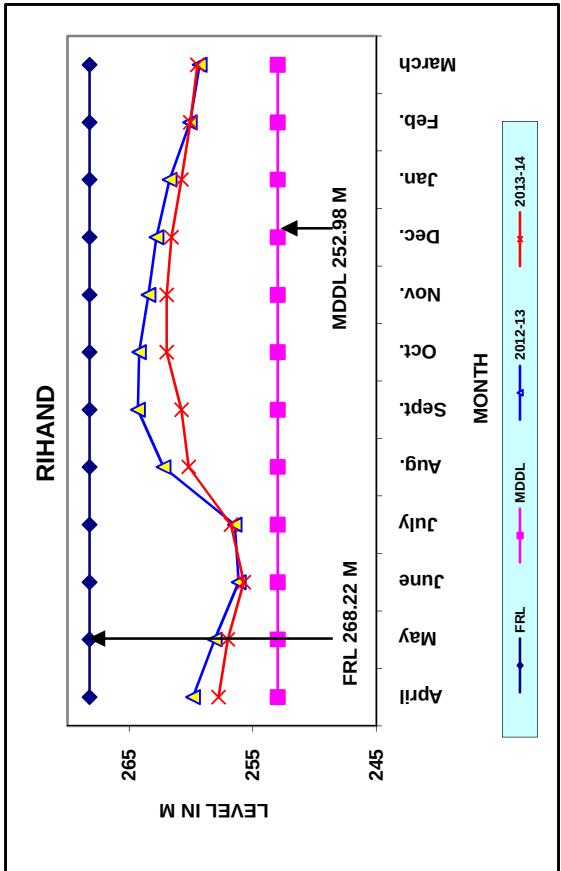
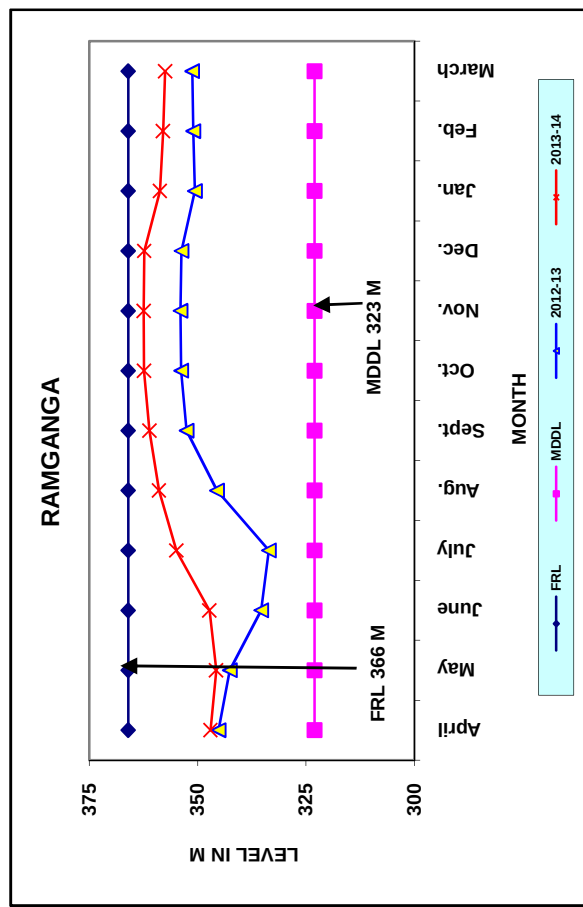
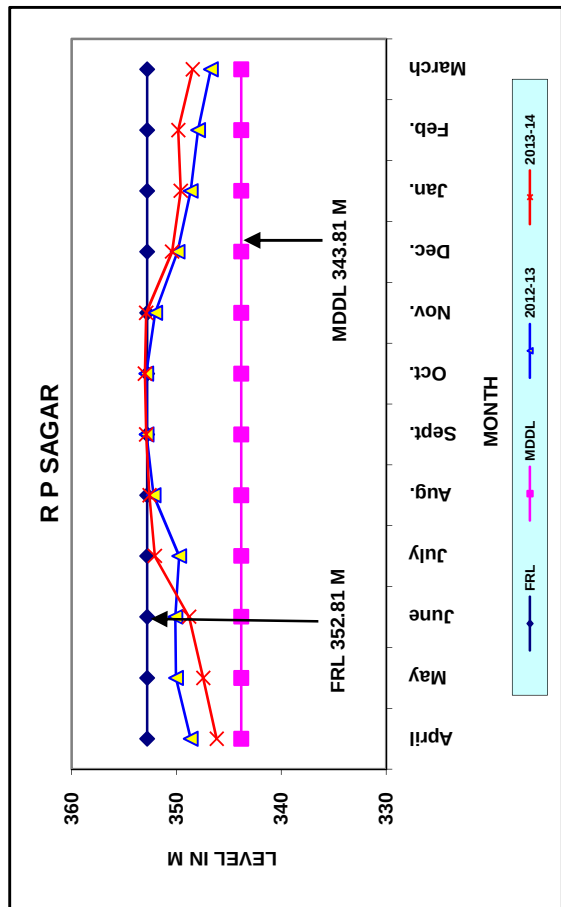


EXHIBIT 3.4

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

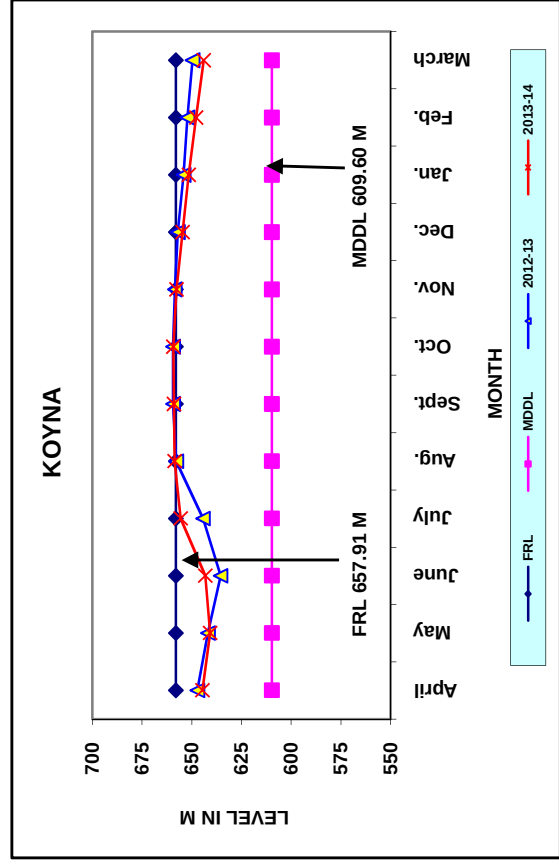
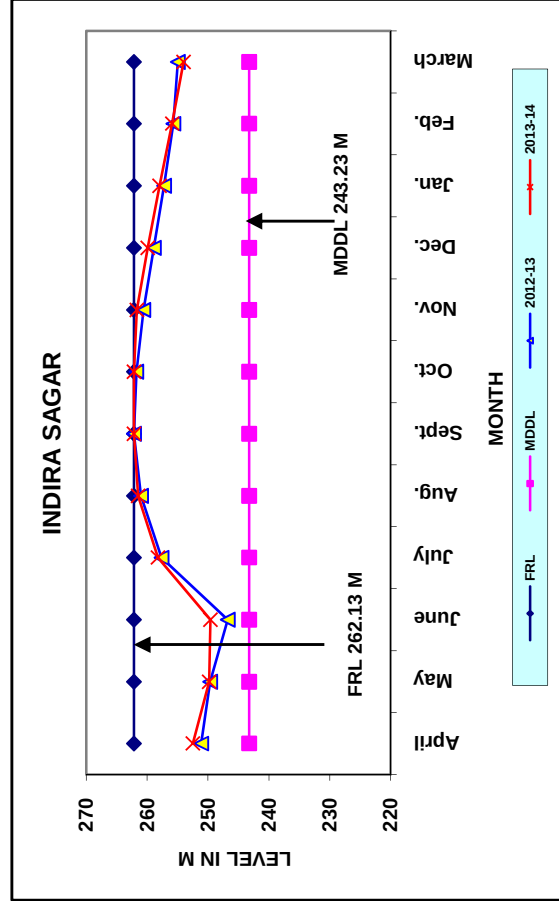
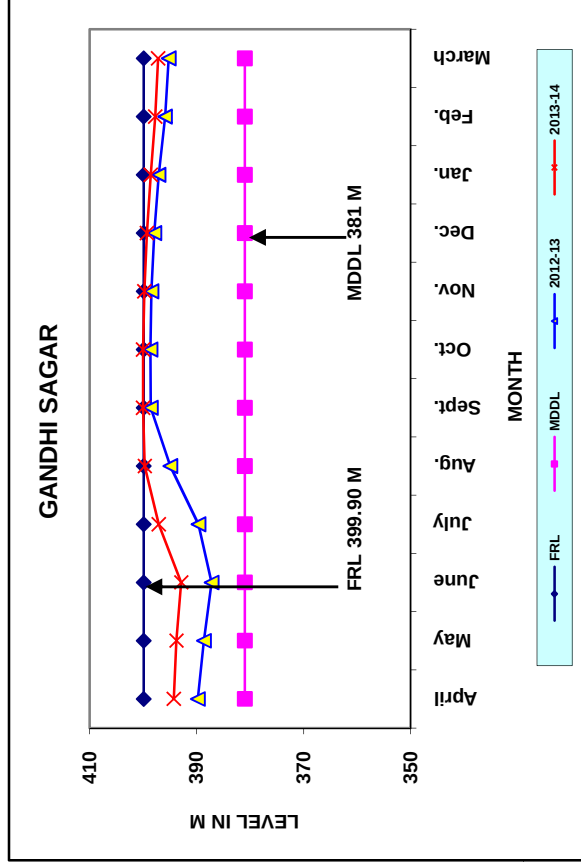
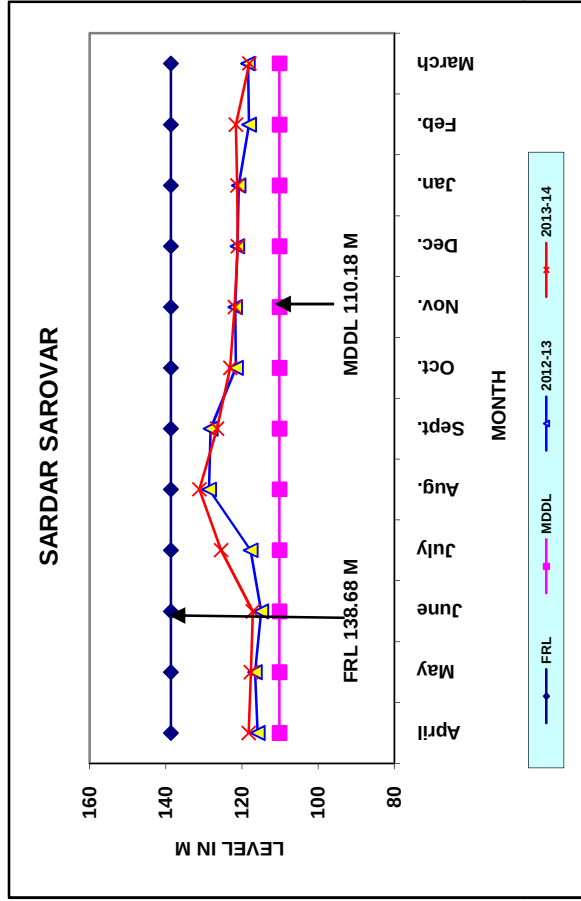


EXHIBIT 3.5

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

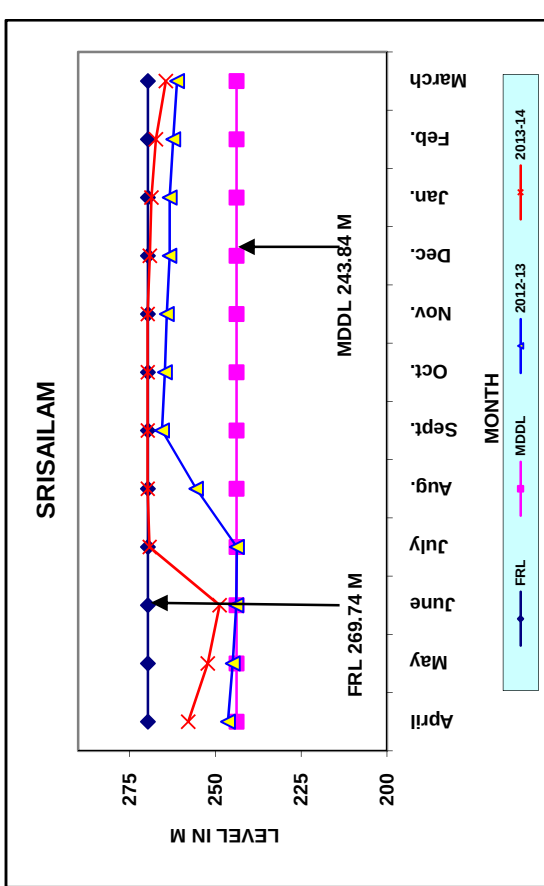
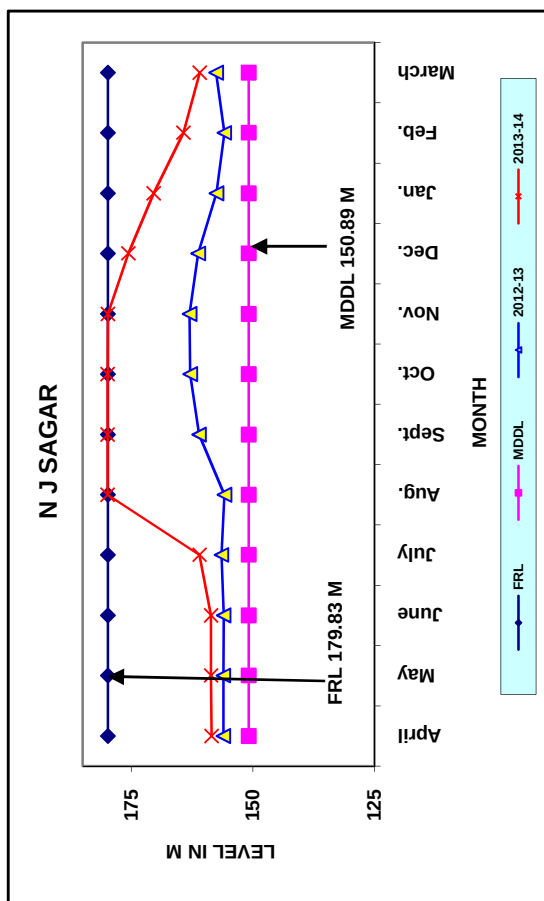
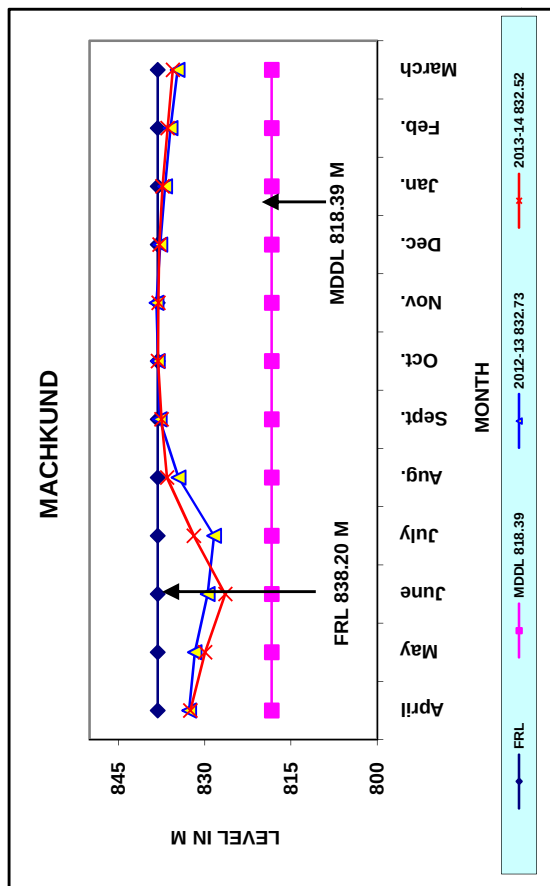
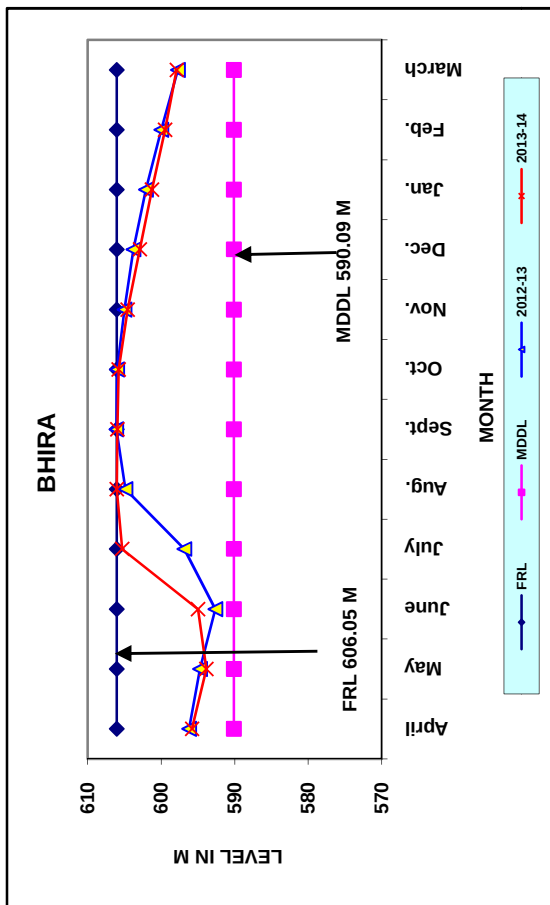


EXHIBIT 3.6

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

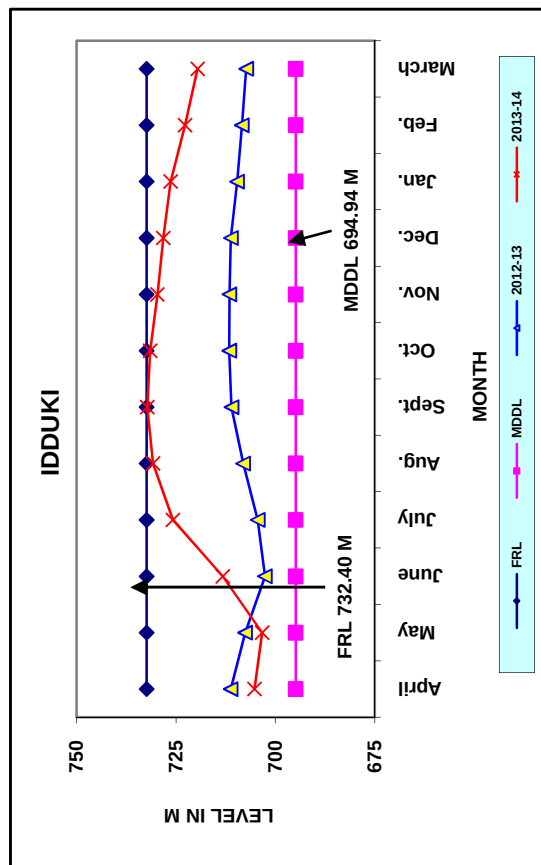
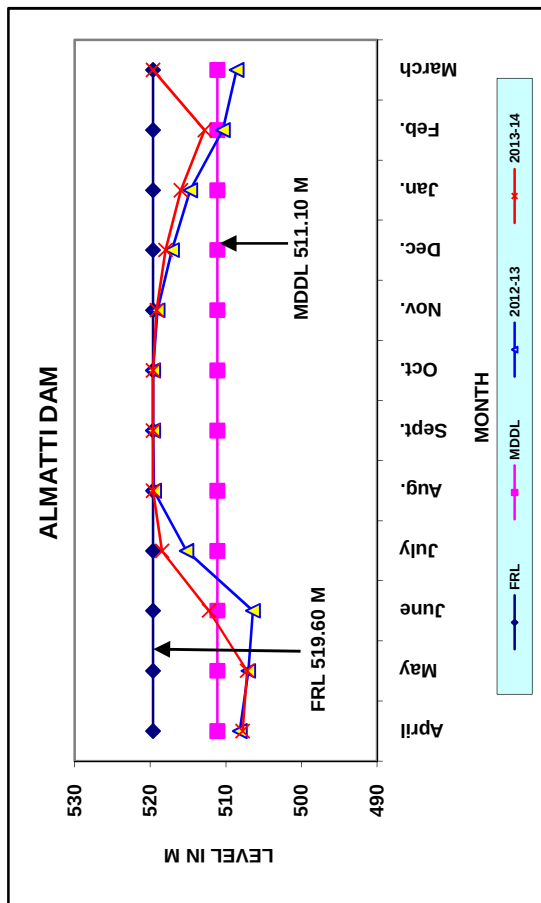
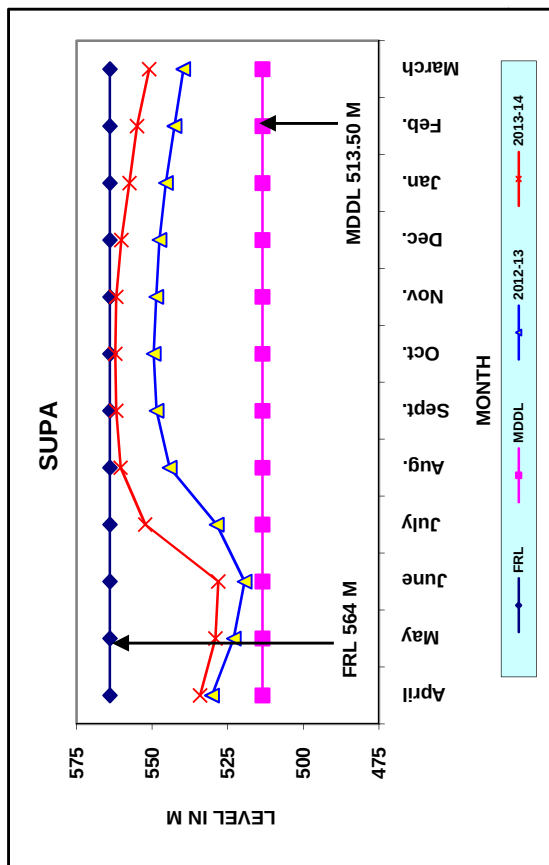
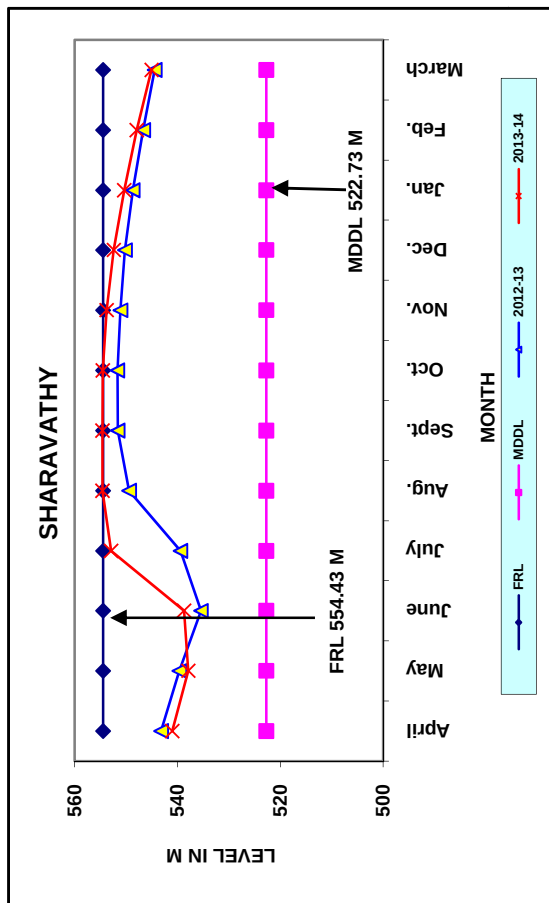


EXHIBIT 3.7

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

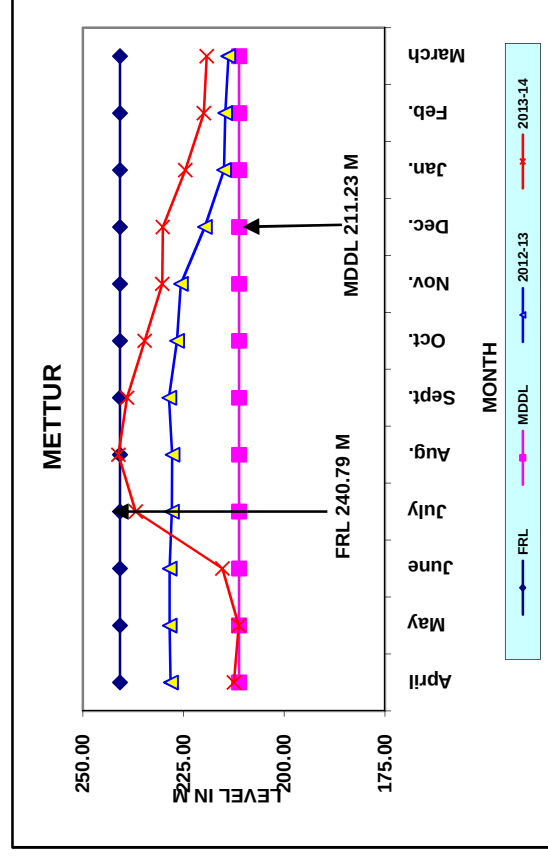
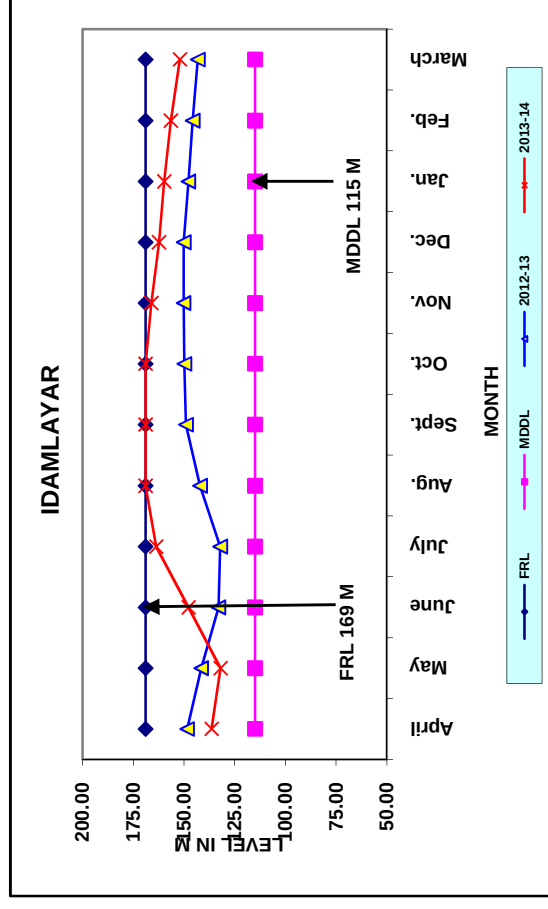
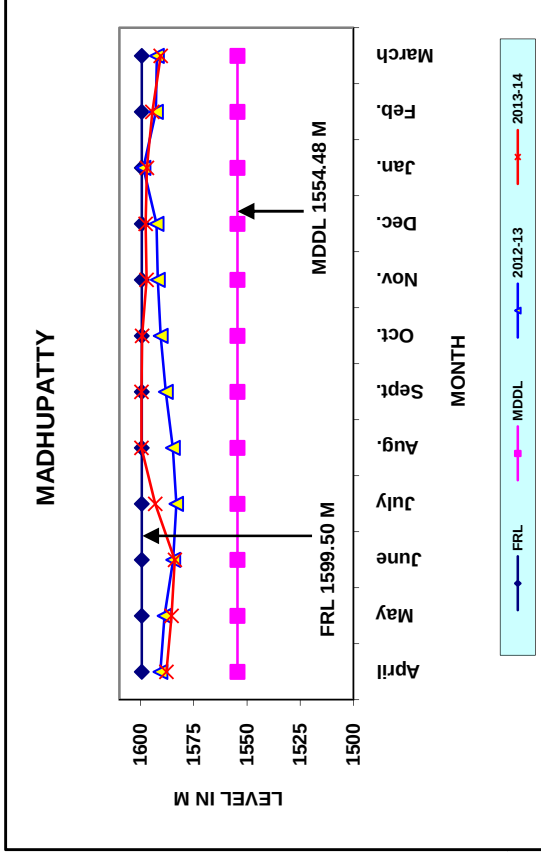
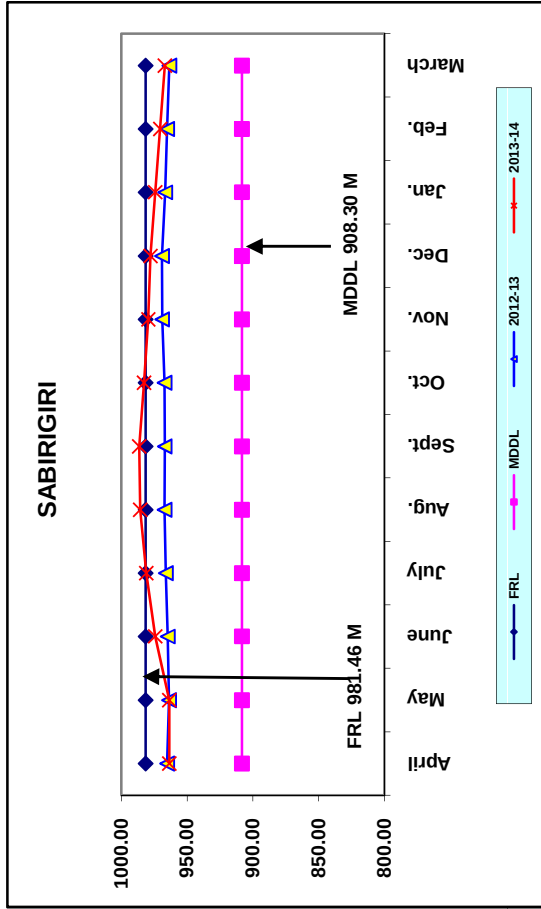


EXHIBIT 3.8

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

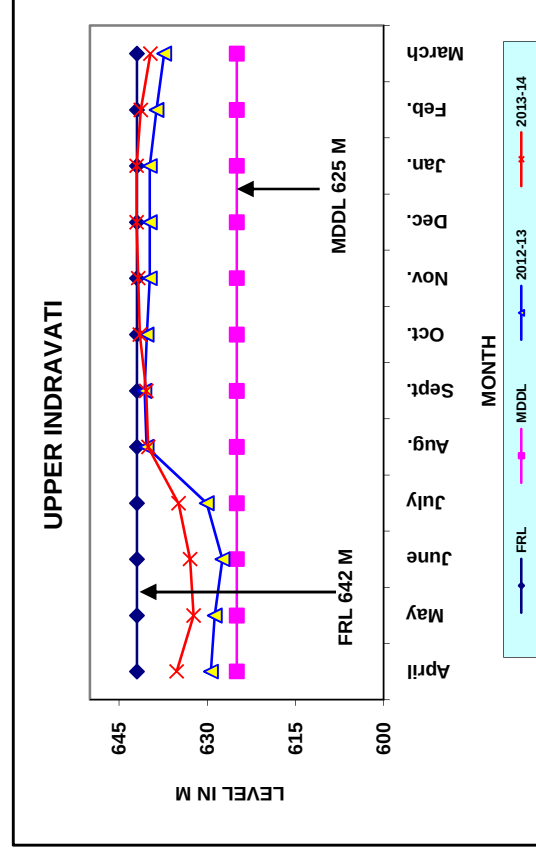
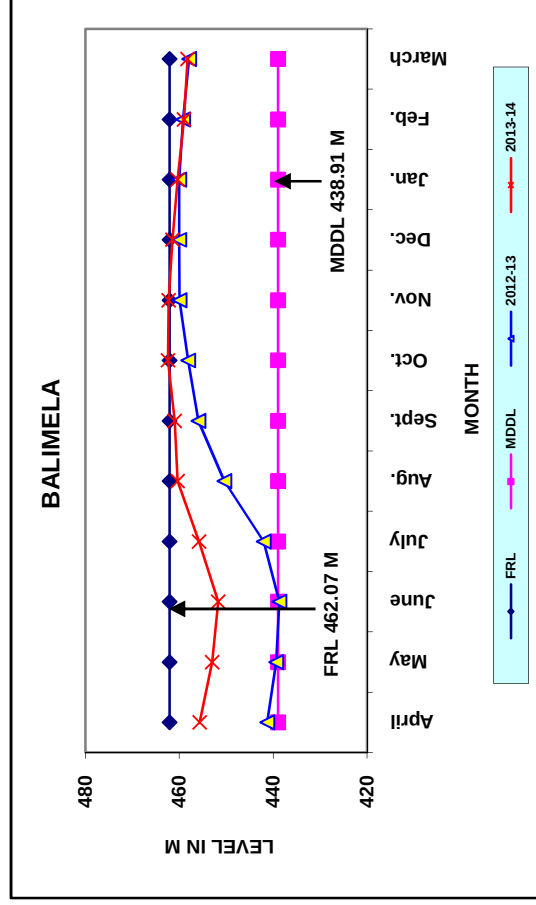
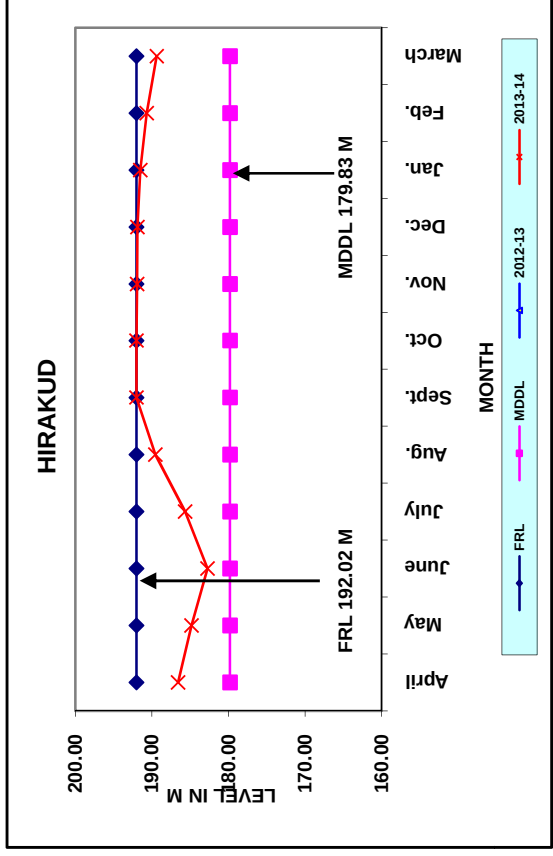
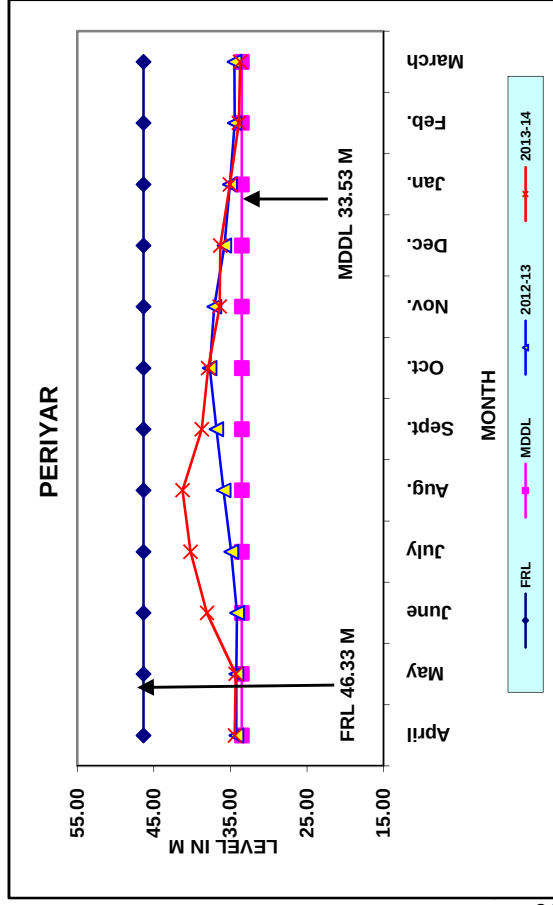
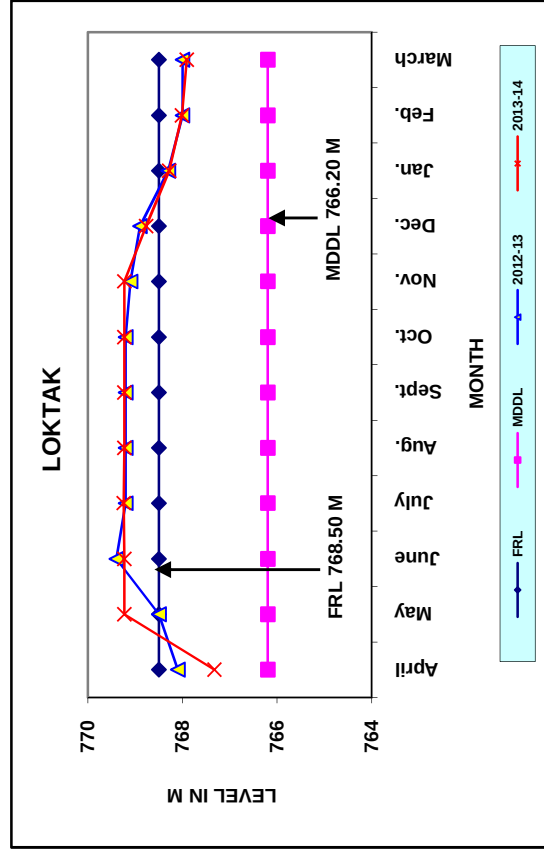
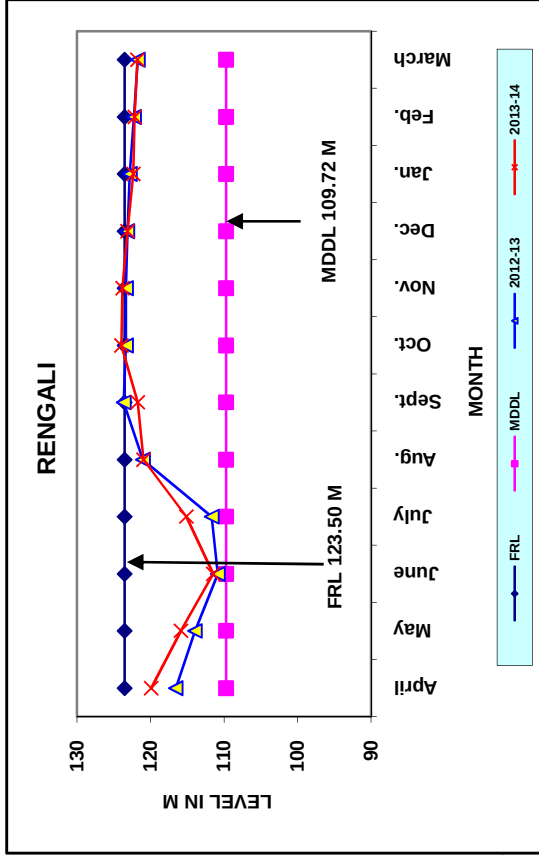
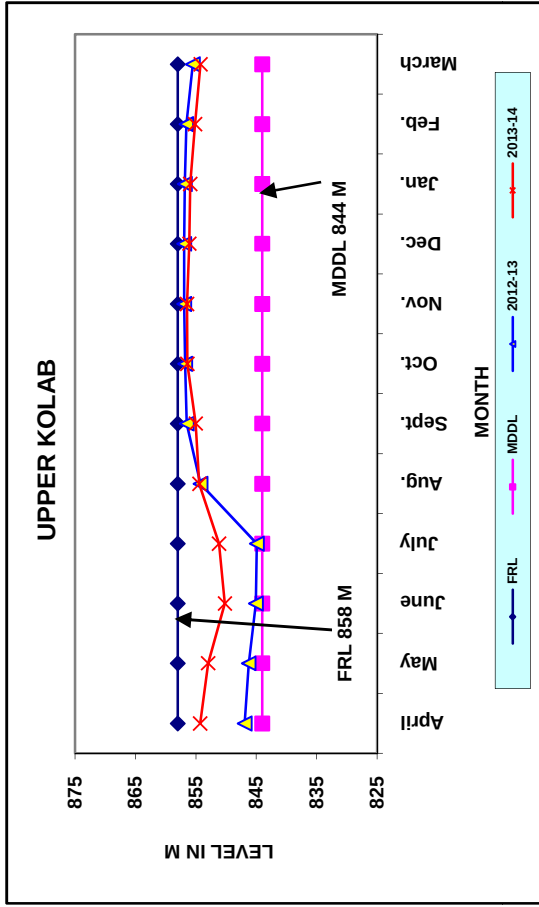
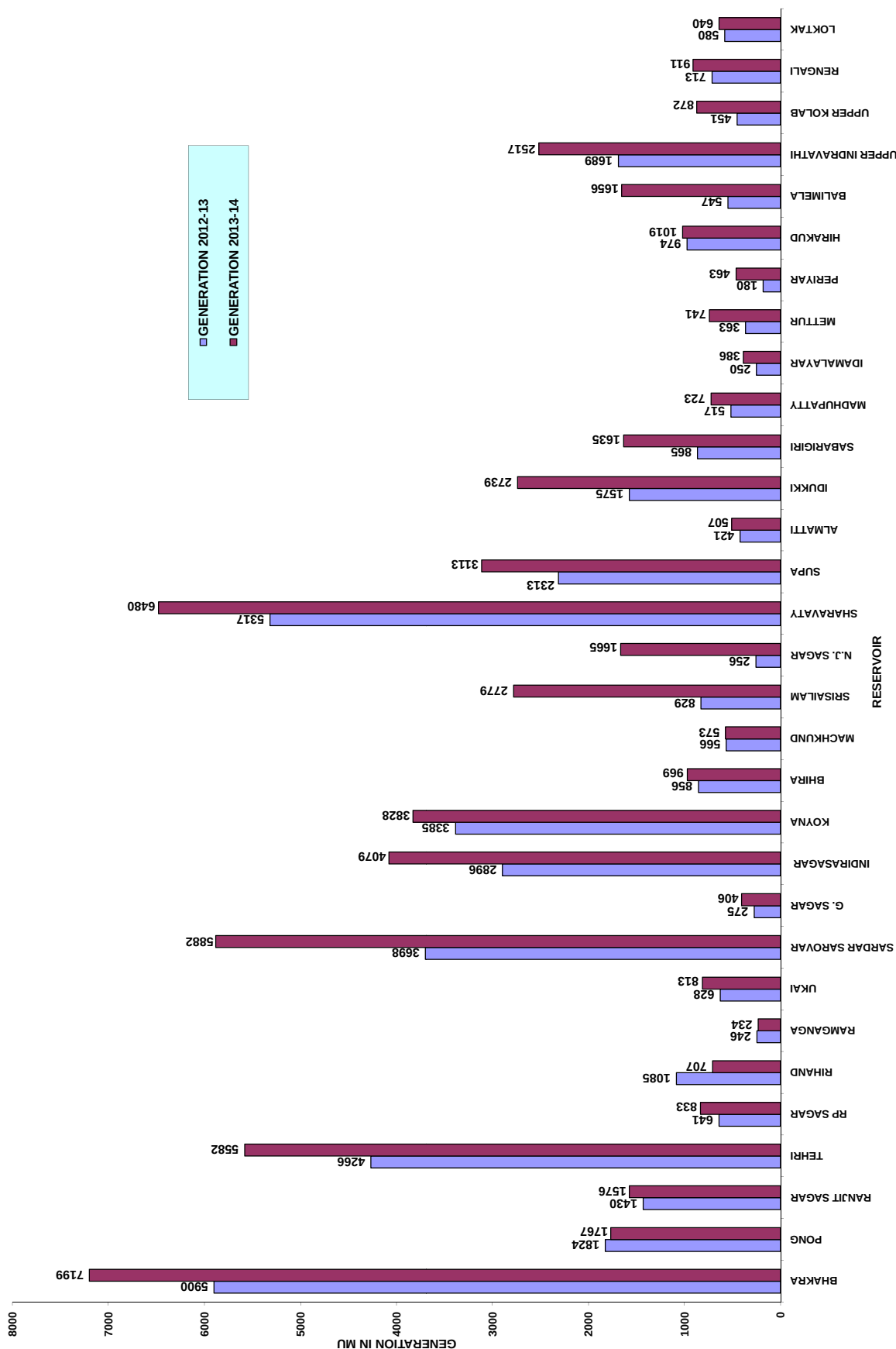


EXHIBIT 3.9

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



GENERATION FROM RESERVOIR BASED HYDROELECTRIC STATIONS DURING 2013-14 VIS-A-VIS 2012-13



SALIENT DATA OF IMPORTANT RESERVOIRS AND ASSOCIATED H.E. STATIONS

S. No	NAME OF RESERVOIR AND ASSOCIATED H.E. STATIONS	INSTALLED CAPACITY AS ON 31.03.2013	ANNUAL DESIGN ENERGY	FULL RESERVOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR		ENERGY CONTENT AT	LEVELS ATTAINED DURING 2013-14			
						CAP. AT			FRL	Max.	DATE	Minimum
						FRL						
						GROSS : LIVE		FRL				
(MCM)	(MCM)	(MU)										
NORTHERN REGION												
1	BHAKRA	1480.30	5282	513.59	445.62	8321	6516	1729.00	511.62	17.09.2013	474.67	18.05.2013
	a)BHAKRA LEFT	540.00	3924									
	b)BHAKRA RIGHT	785.00										
	c)GANGUWAL	77.65	1358									
	d)KOTLA	77.65										
2	PONG	396.00	1123	426.72	384.05	8053	6946	1084.00	423.80	15.09.2013	399.16	23.05.2013
3	RANJIT SAGAR	600.00	1507	527.91	487.91	3292	2191	390.00	524.30	22.08.2013	505.91	17.04.2013
4	TEHRI	1400.00	3952	829.79	740.04	3540	2615	1291.49	825.00	02.10.2013	746.40	09.06.2013
	a) TEHRI	1000.00	2797									
	b) KOTESHWAR	400.00	1155									
5	RAM GANGA	198.00	334	366	323	2504	2109.25	480.80	362.44	15.11.2013	342.38	08.06.2013
6	RP SAGAR	271.00	757	352.81	343.83	2901	1569	175.66	353.01	13.10.2013	345.68	01.04.2013
	a) RP SAGAR	172.00	459									
	b) JAWAHAR SAGAR	99.00	298									
7	RIHAND	399.00	1199	268.22	252.98	10605	5723	1177.00	261.98	01.11.2013	254.51	14.07.2013
	a)RIHAND	300.00	920									
	b)OBRA	99.00	279									
WESTERN REGION												
8	UKAI	300.00	1080	105.16	82.30	8515	6615	813.00	105.04	09.10.2013	93.32	15.06.2013
9	SARDAR SAROVAR	1450.00	3848	138.68	110.18	9460	5760	1817.553	131.18	24.08.2013	113.88	27.03.2014
	SARDAR SARO(CHPH)	250.00	213									
	SARDAR SARO(RBPH)	1200.00	3635									
10	GANDHI SAGAR	115.00	420	399.90	381.00	7743	6911	725.00	400.00	28.09.2013	392.26	26.06.2013
11	INDIRA SAGAR	1000.00	1980	262.13	243.23	12237	9706	1316.12	262.13	06.09.2013	246.25	25.06.2013
12	KOYNA	1956.00	3176	657.91	609.60	2797	2677	3126.00	659.30	07.10.2013	634.00	06.06.2013
	a)KOYNA-I&II	600.00	3030									
	b)KOYNA-III	320.00										
	c)KOYNA -IV	1000										
	d)KOYNA D.P.H.	36	146									
13	BHIRA	300	775	606.05	590.09	523	522	619	606.05	18.08.2013	590.77	13.06.2013
	a)BHIRA	150	775									
	a)BHIRA-PSS	150										

SALIENT DATA OF IMPORTANT RESERVOIRS AND ASSOCIATED H.E. STATIONS

S. No	NAME OF RESERVOIR	INSTALLED	ANNUAL	FULL	MINIMUM	RESERVOIR		ENERGY	LEVELS ATTAINED DURING 2012-13			
	AND ASSOCIATED H.E.	CAPACITY	DESIGN	RESER-	DRAW	CAP. AT		CONTENT				
	STATIONS	AS ON	ENERGY	VOIR	DOWN	FRL		AT				
		31.03.2013		LEVEL	LEVEL	GROSS: LIVE		FRL	Max.	DATE	MINIMUM	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)	(M)	dd.mm.yyyy	(M)	dd.mm.yyyy
SOUTHERN REGION												
14	MACHKUND	114.75	670	838.20	818.39	970	893	552.00	838.11	27.10.2013	826.07	07.07.2013
15	SRISAILAM	1670.00	4300	269.74	243.84	8723	7166	1548.00	269.82	20.10.2013	245.64	14.07.2013
	a) SRISAILAM RB	770.00	2900									
	b) SRISAILAM LBPH	900.00	1400									
16	NAGARJUNA SAGAR	965.60	2497	179.83	150.89	11560	6538	1398.00	179.88	22.10.2013	157.68	01.04.2013
	a) NAGARJUNA SAGAR	815.60	2237									
	b) NJ. SAGAR RBC	60.00	156									
	c) NJ. SAGAR RBC EXT.	30.00										
	d) NJ. SAGAR LBC EXT.	60.00	104									
17	SHARAVATHY	1414.20	5672	554.43	522.73	5310	4297	4394.00	554.57	18.09.2013	534.70	09.06.2013
	a) SHARAVATHY	1035.00	4932									
	b) JOG	139.20	118									
	c) GERUSUPA	240.00	622									
18	SUPA	955.00	3927	564.00	513.50	4178	3758	3927.00	562.21	09.10.2013	526.34	07.06.2013
	a) KALINADI	855.00	3385									
	b) SUPA DPH	100.00	542									
19	ALMATTI	290.00	483	519.60	511.10	2631.5	2628	175.30	519.60	11.10.2013	506.58	13.06.2013
20	IDUKKI	780.00	2398	732.40	694.94	1996	1459	2146.00	732.23	22.09.2013	701.92	30.05.2013
21	SABARAGIRI	300.00	1338	981.46	908.30	454	447	764.00	986.30	26.09.2013	963.30	22.04.2013
22	MADHUPATTY	155.50	703	1599.50	1554.48		55.32	77.40	1599.60	26.08.2013	1577.20	11.06.2013
	a) PALLIVASAL	37.50	284									
	b) NARIAMANGLAM	70.00	237									
	c) SENGULAM	48.00	182									
23	IDAMALAYAR	75.00	380	169.00	115.00		1017.8	254.45	169.24	17.09.2013	129.68	07.06.2013
24	METTUR	370.00	793	240.79	211.23	2708.8	2645.2	204.00	241.14	07.08.2013	208.94	25.06.2013
	a) LOWER METTUR I-IV	120.00	252									
	b) METTUR DAM & TUNNEL	250.00	541									
25	PERIYAR	140.00	409	46.33	33.53	443	299	216.00	41.22	09.08.2013	33.69	01.03.2014
EASTERN REGION												
26	HIRAKUD	347.50	1174	192.02	179.83	4823	4709	372.00	192.02	30.09.2013	180.93	18.06.2013
	a) BURLA. P.H.	275.50	684									
	b) CHIPLIMA. P.H.	72.00	490									
27	BALIMELA	510.00	1183	462.07	438.91	3929	2676	898.00	462.36	29.10.2013	449.74	10.07.2013
28	UPPER INDRAVATI	600.00	1962	642.00	625.00	2300	1485.50	1213.14	642.01	31.12.2013	627.60	11.06.2013
29	UPPER KOLAB	320.00	832	858.00	844.00	1215	935.00	540.00	856.44	05.11.2013	848.89	12.06.2013
30	RENGALI	250.00	525	123.50	109.72	3548	3167.81	275.00	123.96	22.10.2013	109.58	15.06.2013
NORTH EASTERN REGION												
31	LOKTAK	105	448	768.50	766.20	435.91	396.44	250	769.24	31.07.2013	761.91	31.03.2014

CHAPTER 4

PLANNED MAINTENANCE OF THE UNITS

CHAPTER-4

PLANNED MAINTENANCE OF HE UNITS

4.1 For purpose of studies and analysis of performance in respect of availability of H.E.Stations, outage data of 653 generating units installed in 188 Hydro Electric Stations was made available by various Organizations. The studies indicate that the average non-availability of hydro electric units due to planned maintenance during the year 2013-14 was 5.97% as compared to 7.56% during the previous year. A total of 382656 hours were utilized for carrying out various types of planned maintenance works to facilitate healthy running of generating units. Details of long duration planned outages (50 hours and above) are given in **Annex-4.1**.

4.2 Capital maintenance was carried out on 7 generating units whereas annual maintenance was carried out on 249 generating units out of a total of 653 units analyzed. Analysis of various types of planned maintenance indicates that while most of the planned outages were carried out for periodic maintenance, many of these outages were utilized for carrying out certain repairs/modification works also. The actual duration of periodic maintenance works were quite different for various types of maintenance works. Details of duration of periodic planned maintenance of generator, turbine, auxiliary equipments, and civil structures etc. are indicated below in **Table 4.1**.

TABLE 4.1

**DURATION OF PERIODIC PLANNED MAINTENANCE
PERIOD: 2013-14**

S. No.	TYPE OF MAINTENANCE	NO. OF UNITS	DURATION	
			MAX. HOUR FOR ANY UNIT	AVERAGE HOURS
1	CAPITAL/3 YEARLY MTCE.	7	5083.50	1659.58
2	ANNUAL MAINTENANCE	249	3775.75	778.23
3	HALF YEARLY MAINTENANCE	0	0.00	0.00
4	QUARTERLY MAINTENANCE	7	200.50	58.79
5	MONTHLY MAINTENANCE	123	3576.95	105.32
6	ROUTINE MAINTENANCE	32	778.25	47.95
7	RENOVATION/MODERNISATION	26	4424.77	831.19
8	UPRATING	1	2.50	2.50
9	CIVIL STRUCTURE	91	2050.50	95.38

S. No.	TYPE OF MAINTENANCE	NO. OF UNITS	DURATION	
			MAX. HOUR FOR ANY UNIT	AVERAGE HOURS
10	TURBINE	130	4962.08	103.38
11	GENERATOR	83	1049.50	58.66
12	OTHER EQUIPMENTS	102	1419.67	66.89
13	MISCELLANEOUS	147	2693.93	219.08

4.3 There were a total of 2585 planned outages during the Year 2013-14, out of which 1874 outages (about 72.50%) were of up to 12 hours of duration, 366 (14.16%) were of duration varying from 12 hours to 10 days and 345 outages (13.35%) were of duration more than 10 days. Details giving duration pattern of planned maintenance is indicated in **Table 4.2** and illustrated in **Exhibit 4.1**.

TABLE 4.2

**DURATION PATTERN OF PLANNED OUTAGE
PERIOD: 2013-14**

SL. NO.	DURATION	NUMBER OF OUTAGES	MAINTENANCE % To TOTAL NUMBER OF OUTAGES
1	Less Than 1 Hour	206	7.97
2	1 To 6 Hours	840	32.50
3	6 To 12 Hours	828	32.03
4	12 To 24 Hours	108	4.18
5	1 To 2 Days	71	2.75
6	2 To 5 Days	98	3.79
7	5 To 10 Days	89	3.44
8	10 To 15 Days	62	2.40
9	15 To 20 Days	68	2.63
10	More than 20 Days	215	8.32
	Total No. of Outages	2585	100.00

4.4 Planned Maintenance age-wise

Planned maintenance carried out for different age groups of hydro generating units during the year 2013-14 is indicated in **Table 4.3**. It is seen that the average non-availability of units due to planned maintenance for units commissioned during 2009-10 was nil and was maximum in case of units commissioned during 2002-03 (1721.45 Hrs/unit).

TABLE 4.3
PLANNED MAINTENANCE AGE-WISE
PERIOD: 2013-14

SL. NO.	YEAR OF COMMISSIONING	NO. OF UNITS	INSTALLED CAPACITY (MW)	PLANNED OUTAGE (HOURS)	NON AVAILABILITY PER UNIT (HOURS)
1	2013-14	19	1058.01	3648	192.00
2	2012-13	14	501.00	5928	423.43
3	2011-12	11	1423.00	2976	270.55
4	2010-11	11	690.00	5064	460.36
5	2009-10	1	39.00	0	0.00
6	2008-09	8	969.00	1584	198.00
7	2007-08	23	2443.00	7944	345.39
8	2006-07	21	2286.00	11376	541.71
9	2005-06	13	1340.00	10296	792.00
10	2004-05	13	1115.00	5568	428.31
11	2003-04	18	2690.00	6024	334.67
12	2002-03	11	740.60	18936	1721.45
13	2001-02	20	1092.20	11184	559.20
14	2000-01	13	1129.00	5184	398.77
15	1989-90 To 1999-00	87	5775.70	41184	473.38
16	1978-79 To 1988-89	124	7257.60	64896	523.35
17	1967-68 To 1977-78	82	5300.25	50136	611.41
18	Upto 1966-67	164	4682.05	130728	797.12
	TOTAL	653	40531.41	382656	586.00

4.5 Analysis based on Planned Maintenance of different types of Turbines:

The details regarding non-availability of generating units due to planned maintenance for different types of turbines are indicated in **Table 4.4** below:

The planned maintenance required by Bulb turbines was 688.80 Hrs/unit which was maximum amongst all other types of turbine. The planned maintenance required by Kaplan turbine was 676.64 Hrs/unit, Francis and Reversible turbine was 631.90 Hrs/unit followed by Pelton turbines (353.77 Hrs/unit).

TABLE 4.4

**PLANNED MAINTENANCE-TURBINE TYPE-WISE
PERIOD: 2013-14**

SL. NO.	TYPE OF TURBINE	NUMBER OF UNITS	INSTALLED CAPACITY (MU)	PLANNED OUTAGE (HOURS)	NON-AVAILABILITY PER UNIT (HOURS)
1	BULB	20	444.00	13776	688.80
2	FRANCIS AND REVERSIBLE	383	29554.31	242016	631.90
3	KAPLAN	119	4161.20	80520	676.64
4	PELTON	131	6371.90	46344	353.77
	TOTAL	653	40531.41	382656	586.00

4.6 Analysis Based on Make of Generating Units:

Non-availability due to planned maintenance has been analyzed for generating units both indigenous and imported based on their make/supplier. The details are given below in **Table 4.5:**

TABLE 4.5

**PLANNED MAINTENANCE-SUPPLIER WISE
PERIOD: - 2013-14**

NAME OF SUPPLIER	NO. OF UNITS	INSTALLED CAPACITY (MW)	NON- AVAILABILITY DUE TO PLANNED MAINTENANCE	
			TOTAL HOURS	HOURS / UNIT
A-Indigenous				
BHEL	276	16995.01	152880	553.91
Others	18	831.00	1872	104
SUB-TOTAL	294	17826.01	154752	526.37

NAME OF SUPPLIER	NO. OF UNITS	INSTALLED CAPACITY (MW)	NON- AVAILABILITY DUE TO PLANNED MAINTENANCE	
			TOTAL HOURS	HOURS / UNIT
B-Imported				
U.K.	64	1257.10	53712	839.25
CANADA	44	3132.00	21648	492.00
SWITZERLAND	22	815.20	4080	185.45
JAPAN	76	6344.20	64728	851.68
FRANCE	33	2186.40	23544	713.45
USSR	26	2804.00	16992	653.54
USA	9	351.00	1272	141.33
Other	85	5815.50	41928	493.27
SUB-TOTAL	359	22705.40	227904	634.83
TOTAL	653	40531.41	382656	586.00

Among indigenous manufacturers, BHEL is the main manufacturer/ supplier of major/medium hydro generating units in the country. During the year 2013-14, non-availability due to planned maintenance of the units supplied by BHEL was 553.91 hrs/unit.

Among the imported generating units, non-availability due to planned maintenance was the least for units supplied by USA (141.33 hrs/unit) and was maximum for units supplied by Japan (851.68 hrs/unit).

4.7 Planned Maintenance – Region wise:

Region-wise non-availability of units due to planned maintenance in respect of various hydro power stations is indicated below in **Table 4.6**.

TABLE 4.6
REGION-WISE PLANNED MAINTENANCE
PERIOD: 2013-14

S. NO.	REGION	NO. OF UNITS	INSTALLED CAPACITY (MW)	% NON-AVAILABILITY DUE TO PLANNED MAINTENANCE
1	NORTHERN	219	16386.26	6.08
2	WESTERN	101	7392.00	5.53
3	SOUTHERN	243	11432.45	6.63
4	EASTERN	61	4078.70	4.28
5	NORTH EASTERN	29	1242.00	6.65
	ALL INDIA	653	40531.41	5.97

Non-availability of generating unit due to planned maintenance was least in Eastern Region (4.28 %), whereas it was maximum in Northern Eastern Region (6.65 %).

4.8 Planned Maintenance - Board/ Corporation wise

Performance of hydro electric units under various utilities i.e. Central Sectors, State Electricity Boards, Corporations and Private Sector with respect to non-availability due to planned maintenance is indicated in Table 4.7. Among utilities, planned maintenance of the generating units was nil in case of hydro stations under ADHPL, DLHP, EPPL, MPCL & JPVL and maximum under LBHPPL (2916 Hrs/unit).

In case of Central Sector, non-availability due to planned maintenance was maximum under THDC (1035hrs/unit).

In case of State Sector, non-availability due to planned maintenance was maximum under JSEB (2904 hrs/unit).

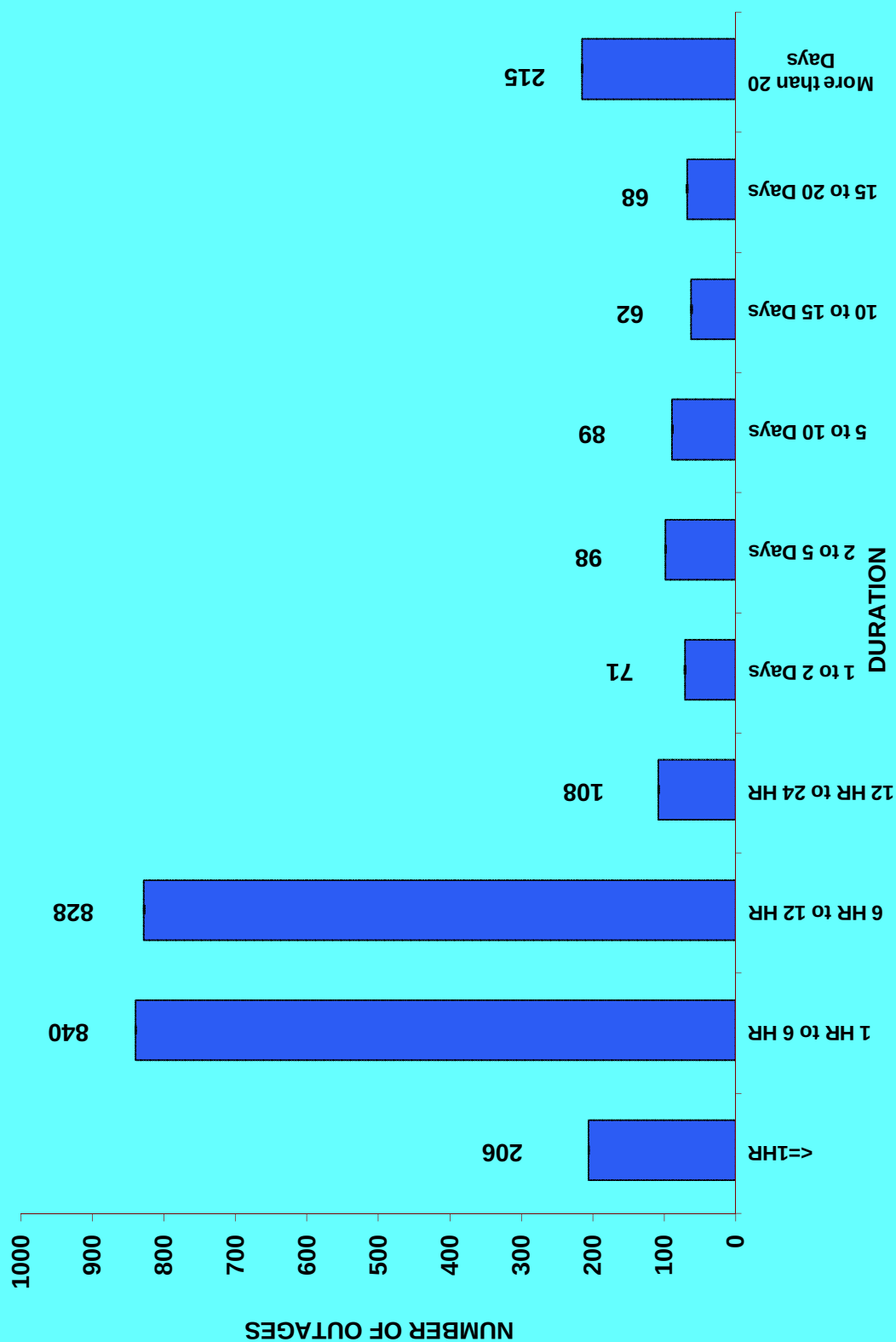
Table 4.7

**SECTORWISE/ UTILITYWISE PERFORMANCE PLANNED MAINTENANCE
PERIOD:-2013-14**

Sl. No.	ORGANIZATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (HOURS)	PLANNED MAINTENANCE PER UNIT (HOURS)
(A)	CENTRAL SECTOR				
1	BBMB	28	2866.30	12864	459.43
2	DVC	5	143.20	2424	484.80
3	NEEPCO	13	755.00	8616	662.77
4	NHDC	16	1520.00	2448	153.00
5	NHPC	62	4831.20	16272	262.45
6	SJVNL	9	1706.01	1176	130.67
7	THDC	8	1400.00	8280	1035.00
	SUB TOTAL(CS)	141	13221.71	52080	369.36
(B)	PRIVATE SECTOR				
1	ADHPL	2	192.00	0	0.00
2	DLHP	1	34.00	0	0.00
3	EPPL	2	100.00	0	0.00
4	GIPL	2	99.00	1728	864.00
5	JPVL	11	1700.00	0	0.00
6	LBHPPL	2	70.00	5832	2916.00
7	MPCL	2	86.00	0	0.00
8	TATA MAH.	15	447.00	600	40.00
	SUB TOTAL(PVT)	37	2728.00	8160	220.54
(C)	STATE SECTOR				
1	APGENCO	57	3783.35	23184	406.74
2	APGCL	2	100.00	1704	852.00
3	CSPGCL	3	120.00	1296	432.00
4	GSECL	8	540.00	5856	732.00
5	HPSEB Ltd.	12	366.00	8472	706.00
6	JKSPDC	9	660.00	10080	1120.00
7	JSEB	2	130.00	5808	2904.00
8	KPCL	68	3585.40	45528	669.53
9	KSEB	48	1881.50	32376	674.50

Sl. No.	ORGANIZATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (HOURS)	PLANNED MAINTENANCE PER UNIT (HOURS)
10	MAHAGENCO	24	2406.00	9096	379.00
11	MePGCL	11	282.00	3336	303.27
12	MPPGCL	23	875.00	15768	685.57
13	OHPC	31	2027.50	13776	444.39
14	PSPCL	25	1051.00	12144	485.76
15	RRVUNL	11	411.00	7776	706.91
16	SSNNL	11	1450.00	8016	728.73
17	TANGEDCO	70	2182.20	44328	633.26
18	UJVNL	34	1252.15	32112	944.47
19	UPJVNL	15	501.60	40296	2686.40
20	WBSEDCL	11	977.00	1464	133.09
	SUB TOTAL (State)	475	24581.70	322416	678.77
	ALL INDIA	653	40531.41	382656	586.00

DURATION PATTERN OF PLANNED MAINTENANCE DURING 2013-14



**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>NORTHERN REGION</u>							
<u>BBMB</u>							
1	BHAKRA LEFT	2	126	01/04/2013	19/07/2013	2627.5	RENOVATION/MODERNISATION
		3	108	01/04/2013	09/05/2013	925.83	TURBINE MISC/GOVERNOR
		5	108	01/04/2013	02/10/2013	4424.77	RENOVATION/MODERNISATION
2	GANGUWAL	1	29.25	04/02/2014	06/02/2014	58.67	PLANNED MAINTENANCE
		1	29.25	12/11/2013	20/11/2013	196	ANNUAL MAINTENANCE
		2	24.2	29/07/2013	31/07/2013	51.92	PLANNED MAINTENANCE
		3	24.2	02/09/2013	07/09/2013	119.08	PLANNED MAINTENANCE
		3	24.2	02/12/2013	05/12/2013	81.25	PLANNED MAINTENANCE
		3	24.2	11/03/2014	20/03/2014	227.5	ANNUAL MAINTENANCE
3	KOTLA	1	29.25	16/09/2013	24/09/2013	186.73	ANNUAL MAINTENANCE
		1	29.25	09/12/2013	12/12/2013	75.5	PLANNED MAINTENANCE
		2	24.2	10/02/2014	12/02/2014	56	PLANNED MAINTENANCE
		2	24.2	29/07/2013	31/07/2013	51.83	PLANNED MAINTENANCE
		2	24.2	21/11/2013	30/11/2013	220.08	ANNUAL MAINTENANCE
4	PONG	3	66	05/11/2013	11/11/2013	146.58	PLANNED MAINTENANCE
		4	66	12/11/2013	18/11/2013	149.5	PLANNED MAINTENANCE
<u>HPSEB</u>							
5	GIRI BATA	1	30	15/05/2013	31/05/2013	397.98	ANNUAL MAINTENANCE
		1	30	08/01/2014	13/03/2014	1540.25	ANNUAL MAINTENANCE
		2	30	01/06/2013	06/07/2013	860.5	ANNUAL MAINTENANCE
6	LARJI	1	42	26/02/2014	31/03/2014	781.5	ANNUAL MAINTENANCE
		1	42	01/04/2013	06/04/2013	137	ANNUAL MAINTENANCE
		3	42	01/04/2013	23/04/2013	545.17	ANNUAL MAINTENANCE
		3	42	10/01/2014	22/02/2014	1042.08	ANNUAL MAINTENANCE
7	SANJAY	1	40	25/02/2014	31/03/2014	805	ANNUAL MAINTENANCE
		1	40	01/04/2013	06/04/2013	137	ANNUAL MAINTENANCE
		2	40	21/06/2013	23/06/2013	56.5	TURBINE
		3	40	03/06/2013	06/06/2013	74.08	MONTHLY MAINTENANCE
		3	40	08/04/2013	23/04/2013	367.67	ANNUAL MAINTENANCE
		3	40	03/12/2013	16/02/2014	1805.33	ANNUAL MAINTENANCE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>JK, PDD</u>							
8	BAGLIHAR	1	150	15/01/2014	23/01/2014	201.27	ANNUAL MAINTENANCE
		1	150	17/03/2014	22/03/2014	127.07	ANNUAL MAINTENANCE
		2	150	28/01/2014	18/02/2014	503.83	ANNUAL MAINTENANCE
		3	150	18/02/2014	12/03/2014	534.43	ANNUAL MAINTENANCE
<u>LBPPL</u>							
9	BUDHIL	1	35	09/11/2013	04/03/2014	2758.4	ANNUAL MAINTENANCE
		2	35	09/11/2013	17/03/2014	3074.92	ANNUAL MAINTENANCE
<u>NHPC</u>							
10	BAIRA SIUL	1	66	01/01/2014	23/01/2014	533.2	ANNUAL MAINTENANCE
		2	66	05/01/2014	01/02/2014	662.77	PLANNED MAINTENANCE
		3	66	08/10/2013	23/10/2013	369	ANNUAL MAINTENANCE
11	CHAMERA- I	1	180	02/12/2013	11/12/2013	232.15	ANNUAL MAINTENANCE
		2	180	14/12/2013	24/12/2013	252.9	ANNUAL MAINTENANCE
		3	180	26/12/2013	08/01/2014	321.77	ANNUAL MAINTENANCE
12	CHAMERA- II	1	100	22/01/2014	31/01/2014	233.5	ANNUAL MAINTENANCE
		2	100	03/02/2014	02/03/2014	662.5	ANNUAL MAINTENANCE
13	CHUTAK	1	11	01/02/2014	03/02/2014	65	ANNUAL MAINTENANCE
14	DULHASTI	1	130	24/02/2014	09/03/2014	317.37	ANNUAL MAINTENANCE
		2	130	31/12/2013	29/01/2014	698	ANNUAL MAINTENANCE
		3	130	31/01/2014	21/02/2014	519.97	ANNUAL MAINTENANCE
15	NIMBOO BAZDO	1	15	24/03/2014	27/03/2014	75.33	GENERATOR
16	SALAL	2	115	11/12/2013	23/01/2014	1040.08	ANNUAL MAINTENANCE
		5	115	02/11/2013	20/12/2013	1143.5	ANNUAL MAINTENANCE
17	SEWA-II	1	40	01/12/2013	18/12/2013	408	PLANNED MAINTENANCE
		2	40	01/12/2013	16/12/2013	377.52	ANNUAL MAINTENANCE
		3	40	01/12/2013	16/12/2013	377.67	ANNUAL MAINTENANCE
18	TANAKPUR	1	31.4	15/05/2013	25/05/2013	248.15	PLANNED MAINTENANCE
		3	31.4	20/11/2013	31/03/2014	3122.67	PLANNED MAINTENANCE
		3	31.4	01/04/2013	01/05/2013	733.95	CAPITAL/3 YEARLY MTCE.
19	URI-I	1	120	07/10/2013	26/10/2013	460.08	ANNUAL MAINTENANCE
		3	120	11/11/2013	30/11/2013	464.98	ANNUAL MAINTENANCE
		4	120	07/01/2014	26/02/2014	1203.18	CAPITAL/3 YEARLY MTCE.

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>PSPCL</u>							
20	ANANDPUR SAHIB	1	33.5	19/11/2013	30/11/2013	269.4	ANNUAL MAINTENANCE
		2	33.5	10/10/2013	13/10/2013	58.3	ANNUAL MAINTENANCE
		4	33.5	18/11/2013	30/11/2013	298.32	ANNUAL MAINTENANCE
21	RANJIT SAGAR	4	150	01/04/2013	15/04/2013	346.83	ANNUAL MAINTENANCE
22	SHANAN	1	15	24/10/2013	17/11/2013	583.75	ANNUAL MAINTENANCE
		2	15	18/11/2013	31/03/2014	3179.42	ANNUAL MAINTENANCE
		3	15	01/01/2014	06/01/2014	137.08	ANNUAL MAINTENANCE
		4	15	06/01/2014	31/01/2014	602.58	ANNUAL MAINTENANCE
		5	50	01/04/2013	24/10/2013	4962.08	TURBINE
<u>RRVUNL</u>							
23	JAWAHAR SAGAR	1	33	01/04/2013	12/07/2013	2461.33	ANNUAL MAINTENANCE
		2	33	02/05/2013	07/06/2013	858.75	ANNUAL MAINTENANCE
24	R P SAGAR	1	43	01/04/2013	03/05/2013	772.22	ANNUAL MAINTENANCE
		2	43	03/07/2013	31/07/2013	663.7	ANNUAL MAINTENANCE
		3	43	18/05/2013	22/07/2013	1565.33	ANNUAL MAINTENANCE
		4	43	16/04/2013	16/06/2013	1468.8	ANNUAL MAINTENANCE
<u>SJVNL</u>							
25	NATHPA JHAKRI	1	250	19/01/2014	30/01/2014	269	ANNUAL MAINTENANCE
		3	250	30/12/2013	10/01/2014	263	PLANNED MAINTENANCE
		4	250	31/12/2013	06/01/2014	149	ANNUAL MAINTENANCE
		5	250	07/12/2013	22/12/2013	376.98	ANNUAL MAINTENANCE
		6	250	09/12/2013	15/12/2013	149	ANNUAL MAINTENANCE
<u>THDC</u>							
26	KOTESHWAR	1	100	04/12/2013	08/01/2014	849.25	ANNUAL MAINTENANCE
		2	100	20/07/2013	10/08/2013	513	GENERATOR
		2	100	20/01/2014	22/03/2014	1470.13	ANNUAL MAINTENANCE
		3	100	10/04/2013	22/06/2013	1738.5	MISCELLANROUS
		4	100	14/10/2013	26/11/2013	1035.5	ANNUAL MAINTENANCE
27	TEHRI ST-1	1	250	17/04/2013	12/05/2013	609	ANNUAL MAINTENANCE
		1	250	03/03/2014	21/03/2014	442.25	ANNUAL MAINTENANCE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	250	01/04/2013	16/04/2013	360	ANNUAL MAINTENANCE
		2	250	17/04/2013	13/05/2013	645	TRI/TRC/DRAFT TUBE
		2	250	24/03/2014	31/03/2014	158	ANNUAL MAINTENANCE
		4	250	16/05/2013	31/05/2013	368.75	ANNUAL MAINTENANCE
<u>UJVNL</u>							
28	CHIBRO (YAMUNA)	1	60	08/01/2014	13/02/2014	866.5	ANNUAL MAINTENANCE
		1	60	22/04/2013	09/05/2013	409.92	PLANNED MAINTENANCE
		2	60	01/04/2013	18/04/2013	427.5	PLANNED MAINTENANCE
		2	60	08/11/2013	07/01/2014	1446.83	PLANNED MAINTENANCE
		3	60	19/11/2013	22/11/2013	72.25	ANNUAL MAINTENANCE
		3	60	17/02/2014	31/03/2014	999.5	ANNUAL MAINTENANCE
		4	60	01/04/2013	07/07/2013	2349.92	ANNUAL MAINTENANCE
29	CHILLA	1	36	06/03/2014	31/03/2014	588.75	ANNUAL MAINTENANCE
		2	36	30/08/2013	10/09/2013	254.92	TRI/TRC/DRAFT TUBE
		2	36	01/04/2013	13/05/2013	1029.17	ANNUAL MAINTENANCE
		2	36	16/01/2014	27/02/2014	1017.58	ANNUAL MAINTENANCE
		4	36	26/11/2013	31/03/2014	3000	ANNUAL MAINTENANCE
30	DHAKRANI	1	11.25	01/04/2013	16/04/2013	378.08	PLANNED MAINTENANCE
		2	11.25	08/02/2014	31/03/2014	1214.42	ANNUAL MAINTENANCE
		3	11.25	25/04/2013	09/05/2013	342.75	PLANNED MAINTENANCE
31	DHALIPUR	2	17	26/03/2014	31/03/2014	108.25	ANNUAL MAINTENANCE
		3	17	03/02/2014	28/02/2014	614.98	ANNUAL MAINTENANCE
		3	17	02/12/2013	27/01/2014	1349.75	ANNUAL MAINTENANCE
32	KHATIMA	2	13.8	27/11/2013	11/01/2014	1084.33	ANNUAL MAINTENANCE
		3	13.8	23/03/2014	31/03/2014	170.58	ANNUAL MAINTENANCE
33	KHODRI	1	30	02/01/2014	01/02/2014	721.67	ANNUAL MAINTENANCE
		2	30	02/02/2014	03/03/2014	697.83	ANNUAL MAINTENANCE
		3	30	01/04/2013	20/04/2013	473.17	ANNUAL MAINTENANCE
		3	30	04/03/2014	31/03/2014	636.83	ANNUAL MAINTENANCE
		4	30	22/04/2013	14/05/2013	528	PLANNED MAINTENANCE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
34	KULHAL	1	10	02/12/2013	08/01/2014	896	ANNUAL MAINTENANCE
		2	10	12/02/2014	14/03/2014	727.25	ANNUAL MAINTENANCE
		3	10	27/04/2013	11/05/2013	333.58	ANNUAL MAINTENANCE
		3	10	10/01/2014	06/02/2014	653	ANNUAL MAINTENANCE
35	MANERI BHALI - I	2	30	09/12/2013	30/12/2013	514.67	ANNUAL MAINTENANCE
		3	30	31/12/2013	31/03/2014	2149.9	ANNUAL MAINTENANCE
36	MANERI BHALI - II	2	76	03/12/2013	12/03/2014	2392	ANNUAL MAINTENANCE
		3	76	13/03/2014	31/03/2014	422	ANNUAL MAINTENANCE
		3	76	01/04/2013	31/05/2013	1463.98	ANNUAL MAINTENANCE
37	RAMGANGA	1	66	12/07/2013	06/08/2013	600.08	ANNUAL MAINTENANCE
		2	66	08/10/2013	27/10/2013	461.98	ANNUAL MAINTENANCE
		3	66	23/09/2013	27/10/2013	822.98	ANNUAL MAINTENANCE
<u>UPJVNL</u>							
38	KHARA	2	24	03/12/2013	13/01/2014	990.67	ANNUAL MAINTENANCE
		3	24	24/03/2014	31/03/2014	158.42	ANNUAL MAINTENANCE
		3	24	13/01/2014	19/01/2014	150.75	ANNUAL MAINTENANCE
39	MATATILA	1	10.2	20/05/2013	22/05/2013	59.08	SWITCHING EQUIPMENT
		1	10.2	26/09/2013	09/10/2013	312.42	RENOVATION/MODERNISATION
		1	10.2	02/01/2014	24/01/2014	528.5	RENOVATION/MODERNISATION
		1	10.2	01/04/2013	16/05/2013	1097	ANNUAL MAINTENANCE
		2	10.2	02/01/2014	09/01/2014	170.5	RENOVATION/MODERNISATION
		2	10.2	13/09/2013	26/09/2013	311.17	RENOVATION/MODERNISATION
		2	10.2	01/07/2013	17/07/2013	393.5	RENOVATION/MODERNISATION
		3	10.2	15/06/2013	17/07/2013	766.5	ANNUAL MAINTENANCE
		3	10.2	02/01/2014	24/01/2014	528.5	RENOVATION/MODERNISATION
40	OBRA	1	33	25/09/2013	27/10/2013	778.25	ROUTINE MAINTENANCE
		1	33	02/03/2014	31/03/2014	681.83	OTHER EQUIPMENT
		2	33	23/04/2013	05/06/2013	1049.5	STATOR
		3	33	29/07/2013	03/08/2013	124.42	CAPITAL/3 YEARLY MTCE.
		3	33	01/07/2013	16/07/2013	364	ROUTINE MAINTENANCE
		3	33	12/12/2013	09/02/2014	1419.67	OTHER EQUIPMENT

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
41	RIHAND	1	50	20/05/2013	28/06/2013	943.25	ANNUAL MAINTENANCE
		5	50	05/04/2013	11/05/2013	869.42	ANNUAL MAINTENANCE
		5	50	20/03/2014	31/03/2014	246.33	ANNUAL MAINTENANCE
		6	50	10/07/2013	06/08/2013	656.33	ANNUAL MAINTENANCE
<u>WESTERN REGION</u>							
<u>CSPGCL</u>							
42	HASDEOBANGO	2	40	01/04/2013	25/05/2013	1303.5	ANNUAL MAINTENANCE
<u>GSECL</u>							
43	KADANA	1	60	21/12/2013	23/01/2014	795	MISCELLANROUS
		3	60	01/04/2013	29/10/2013	5083.5	CAPITAL/3 YEARLY MTCE.
<u>MAHAGENCO</u>							
44	BHIRA TAIL RACE	1	40	08/06/2013	11/06/2013	67.92	MISCELLANROUS
		1	40	15/06/2013	17/06/2013	57.25	MISCELLANROUS
		2	40	08/06/2013	11/06/2013	67.92	MISCELLANROUS
45	KOYNA-I	1	70	10/02/2014	01/03/2014	474	B.F.VALVE
		2	70	10/02/2014	01/03/2014	472.42	B.F.VALVE
		4	70	01/09/2013	05/09/2013	106.33	TURBINE MISC/GOVERNOR
46	KOYNA-III	1	80	18/11/2013	02/12/2013	359	ANNUAL MAINTENANCE
		1	80	13/01/2014	18/01/2014	141	ANNUAL MAINTENANCE
		1	80	17/02/2014	21/02/2014	115.42	ANNUAL MAINTENANCE
		2	80	01/12/2013	15/12/2013	355	ANNUAL MAINTENANCE
		4	80	01/04/2013	29/05/2013	1408	CAPITAL/3 YEARLY MTCE.
47	KOYNA-IV	3	250	09/01/2014	31/03/2014	1944	ANNUAL MAINTENANCE
48	VAITARNA	1	60	18/10/2013	17/03/2014	3618.45	ANNUAL MAINTENANCE
<u>MPPGCL</u>							
49	BANSAGAR TONS-1	1	105	27/01/2014	05/02/2014	219.5	GENERATOR
		2	105	23/05/2013	19/06/2013	657.83	ANNUAL MAINTENANCE
50	BANSAGAR TONS-II	2	15	20/05/2013	11/06/2013	534.33	ANNUAL MAINTENANCE
51	BANSAGAR TONS-III	1	20	01/05/2013	18/05/2013	410.33	ANNUAL MAINTENANCE
		2	20	18/05/2013	05/06/2013	435.08	ANNUAL MAINTENANCE
		3	20	06/06/2013	22/06/2013	389.08	ANNUAL MAINTENANCE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
52	BARGI	2	45	17/04/2013	27/05/2013	969.67	ANNUAL MAINTENANCE
53	GANDHI SAGAR	3	23	24/04/2013	30/04/2013	158.48	ANNUAL MAINTENANCE
		3	23	01/05/2013	15/05/2013	352	ANNUAL MAINTENANCE
		4	23	20/05/2013	11/06/2013	535	ANNUAL MAINTENANCE
		5	23	01/04/2013	24/04/2013	560.3	PLANNED MAINTENANCE
54	MADHIKHERA	1	20	06/05/2013	25/05/2013	461.5	MISCELLANROUS
		1	20	01/06/2013	13/06/2013	305	ANNUAL MAINTENANCE
		2	20	16/04/2013	06/05/2013	480	PLANNED MAINTENANCE
		3	20	20/05/2013	20/07/2013	1463.83	MISCELLANROUS
55	PENCH	1	80	15/05/2013	10/06/2013	631.75	ANNUAL MAINTENANCE
		2	80	12/06/2013	29/08/2013	1880.37	ANNUAL MAINTENANCE
56	RAJGHAT	1	15	24/06/2013	28/07/2013	799.75	ANNUAL MAINTENANCE
		2	15	01/07/2013	05/07/2013	113.42	ANNUAL MAINTENANCE
		2	15	03/06/2013	25/06/2013	522.5	ANNUAL MAINTENANCE
		2	15	24/07/2013	29/07/2013	121.08	MISCELLANROUS
		3	15	22/06/2013	26/11/2013	3775.75	ANNUAL MAINTENANCE
<u>NHDC</u>							
57	INDIRA SAGAR	2	125	12/03/2014	28/03/2014	391	ANNUAL MAINTENANCE
		2	125	19/04/2013	29/04/2013	247	ANNUAL MAINTENANCE
		3	125	01/04/2013	17/04/2013	392	ANNUAL MAINTENANCE
		4	125	14/05/2013	24/05/2013	247	ANNUAL MAINTENANCE
		5	125	02/05/2013	11/05/2013	225	PLANNED MAINTENANCE
		6	125	05/06/2013	14/06/2013	226.5	PLANNED MAINTENANCE
		7	125	01/03/2014	11/03/2014	246.75	ANNUAL MAINTENANCE
		8	125	25/05/2013	04/06/2013	248	ANNUAL MAINTENANCE
58	OMKARESHWAR	8	65	01/04/2013	10/04/2013	233	ANNUAL MAINTENANCE
59	S SAROVAR CHPH	3	50	11/11/2013	23/11/2013	288.92	ANNUAL MAINTENANCE
		4	50	09/12/2013	23/12/2013	342.5	ANNUAL MAINTENANCE
		4	50	05/04/2013	19/04/2013	341.75	ANNUAL MAINTENANCE
		4	50	19/04/2013	27/04/2013	195.08	TURBINE MISC/GOVERNOR
		5	50	24/04/2013	13/05/2013	457.75	GENERATOR

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
60	S SAROVAR RBPH	1	200	01/04/2013	18/04/2013	427.08	ANNUAL MAINTENANCE
		3	200	01/12/2013	14/12/2013	322.67	ANNUAL MAINTENANCE
		3	200	17/05/2013	07/09/2013	2714.42	ANNUAL MAINTENANCE
		5	200	24/04/2013	14/05/2013	489.92	ANNUAL MAINTENANCE
<u>TATA MAH.</u>							
61	BHIRA	4	25	18/04/2013	24/04/2013	151.67	ANNUAL MAINTENANCE
62	KHOPOLI	3	24	21/12/2013	09/01/2014	453.9	ANNUAL MAINTENANCE
<u>SOUTHERN REGION</u>							
<u>APGENCO</u>							
63	HAMPI	1	9	13/06/2013	16/06/2013	83.47	OTHER EQUIPMENT
		1	9	06/06/2013	12/06/2013	150.67	OTHER EQUIPMENT
		1	9	28/06/2013	23/07/2013	608.5	MISCELLANROUS
		3	9	25/12/2013	30/12/2013	127.33	TURBINE MISC/GOVERNOR
		3	9	30/05/2013	14/06/2013	370	MISCELLANROUS
		4	9	10/06/2013	12/06/2013	54.58	OTHER EQUIPMENT
		4	9	09/12/2013	11/12/2013	58	MISCELLANROUS
		4	9	23/05/2013	27/05/2013	99.25	STATOR
64	LOWER SILERU	4	115	04/04/2013	20/04/2013	383.08	MISCELLANROUS
65	NAGARJUN SGR	3	100.8	07/06/2013	08/07/2013	750.65	ANNUAL MAINTENANCE
66	SRISAILAM	4	110	20/12/2013	31/03/2014	2415	MISCELLANROUS
		5	110	02/04/2013	11/04/2013	217.83	TRI/TRC/DRAFT TUBE
67	SRISAILAM LB	1	150	12/04/2013	31/07/2013	2630	MISCELLANROUS
		2	150	12/04/2013	31/07/2013	2630	MISCELLANROUS
		3	150	12/04/2013	31/07/2013	2630	MISCELLANROUS
		4	150	12/04/2013	31/07/2013	2630	MISCELLANROUS
		5	150	12/04/2013	31/07/2013	2630	MISCELLANROUS
		6	150	12/04/2013	31/07/2013	2630	MISCELLANROUS
68	T B DAM	1	9	01/05/2013	10/05/2013	229.42	MISCELLANROUS
		2	9	29/05/2013	02/06/2013	99.58	STATOR
		3	9	09/04/2013	18/04/2013	217.58	STATOR
		3	9	22/05/2013	03/06/2013	290	OTHER EQUIPMENT

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	9	17/06/2013	30/06/2013	314.58	MISCELLANROUS
		4	9	24/05/2013	29/05/2013	123.75	OTHER EQUIPMENT
		4	9	02/04/2013	27/04/2013	595.08	STATOR
KPCL							
69	ALMATTI DPH	2	55	15/05/2013	17/06/2013	794.08	ANNUAL MAINTENANCE
		2	55	05/03/2014	08/03/2014	72.93	ANNUAL MAINTENANCE
		2	55	02/04/2013	05/04/2013	78.17	ANNUAL MAINTENANCE
		3	55	01/04/2013	12/04/2013	268.5	ANNUAL MAINTENANCE
		3	55	05/03/2014	08/03/2014	72.93	ANNUAL MAINTENANCE
		4	55	04/05/2013	15/05/2013	266.25	ANNUAL MAINTENANCE
		5	55	17/04/2013	30/04/2013	325.48	ANNUAL MAINTENANCE
		5	55	01/05/2013	27/05/2013	635.08	ANNUAL MAINTENANCE
		6	55	01/04/2013	27/05/2013	1355	ANNUAL MAINTENANCE
		6	55	03/03/2014	08/03/2014	121.1	ANNUAL MAINTENANCE
70	BHADRA	5	6	01/04/2013	08/04/2013	184.5	TURBINE MISC/GOVERNOR
		5	6	01/09/2013	04/09/2013	86.5	B.F.VALVE
71	GERUSUPPA	1	60	11/05/2013	26/05/2013	360	ANNUAL MAINTENANCE
		1	60	26/05/2013	29/05/2013	69.58	ANNUAL MAINTENANCE
		2	60	03/06/2013	18/06/2013	371.35	MISCELLANROUS
		3	60	16/06/2013	19/06/2013	66.83	MISCELLANROUS
		4	60	16/06/2013	19/06/2013	66.83	MISCELLANROUS
72	GHAT PRABHA	1	16	29/07/2013	04/08/2013	149	ANNUAL MAINTENANCE
		1	16	26/08/2013	28/08/2013	53.08	MISCELLANROUS
		1	16	20/10/2013	11/11/2013	525.42	ANNUAL MAINTENANCE
		2	16	01/06/2013	08/06/2013	177	ANNUAL MAINTENANCE
		2	16	26/07/2013	04/08/2013	216.5	ANNUAL MAINTENANCE
		2	16	09/12/2013	19/12/2013	241.92	MISCELLANROUS
73	JOG	1	13.2	18/02/2014	06/03/2014	378.75	TURBINE MISC/GOVERNOR
		1	13.2	01/07/2013	04/07/2013	77.08	OTHER EQUIPMENT
		2	13.2	18/02/2014	06/03/2014	387.08	TURBINE MISC/GOVERNOR
		2	13.2	11/03/2014	16/03/2014	124.25	SWITCHING EQUIPMENT

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	13.2	07/03/2014	19/03/2014	293.58	TURBINE MISC/GOVERNOR
		4	13.2	07/03/2014	21/03/2014	341.42	TURBINE MISC/GOVERNOR
		4	13.2	21/05/2013	27/05/2013	146	OTHER EQUIPMENT
		5	21.6	12/06/2013	22/06/2013	245.5	ANNUAL MAINTENANCE
		5	21.6	10/01/2014	16/01/2014	149.92	TURBINE MISC/GOVERNOR
		6	21.6	17/05/2013	11/06/2013	607.33	ANNUAL MAINTENANCE
		7	21.6	24/03/2014	31/03/2014	156.75	SWITCHING EQUIPMENT
		8	21.6	24/03/2014	31/03/2014	154.67	TURBINE MISC/GOVERNOR
		8	21.6	08/04/2013	16/05/2013	918.42	ANNUAL MAINTENANCE
74	KADRA	2	50	05/02/2014	09/02/2014	87.55	MISCELLANROUS
75	KALINADI	1	135	12/04/2013	16/04/2013	97.18	GENERATOR
		1	135	15/11/2013	19/11/2013	99.22	MISCELLANROUS
		1	135	23/10/2013	27/10/2013	103.67	TURBINE MISC/GOVERNOR
		2	135	18/01/2014	09/02/2014	529.83	MISCELLANROUS
		2	135	12/04/2013	16/04/2013	92.62	GENERATOR
		3	135	20/04/2013	25/04/2013	131.53	GENERATOR
		3	135	18/02/2014	01/03/2014	265.88	MISCELLANROUS
		4	150	20/04/2013	25/04/2013	132.07	GENERATOR
		4	150	16/03/2014	19/03/2014	65.28	MISCELLANROUS
		4	150	18/02/2014	16/03/2014	614.55	MISCELLANROUS
		5	150	04/01/2014	07/01/2014	66.42	MISCELLANROUS
		5	150	27/03/2014	30/03/2014	83.72	MISCELLANROUS
76	KALINADI SUPA	1	50	22/07/2013	30/07/2013	193.17	ANNUAL MAINTENANCE
		1	50	29/12/2013	05/01/2014	165.12	MISCELLANROUS
		1	50	01/10/2013	09/10/2013	199.63	OTHER EQUIPMENT
		2	50	22/08/2013	30/08/2013	194.38	ANNUAL MAINTENANCE
77	KODASALI	3	40	22/11/2013	03/12/2013	270.42	MISCELLANROUS
78	LIGANAMAKKI	1	27.5	08/07/2013	25/07/2013	402.17	ANNUAL MAINTENANCE
		2	27.5	03/06/2013	12/06/2013	218.25	OTHER EQUIPMENT
		2	27.5	04/04/2013	15/04/2013	268.17	ANNUAL MAINTENANCE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
79	MUNIRABAD	1	9	01/04/2013	30/06/2013	2183.98	RENOVATION/MODERNISATION
		2	9	01/04/2013	30/06/2013	2183.98	RENOVATION/MODERNISATION
		3	10	01/04/2013	30/06/2013	2183.98	RENOVATION/MODERNISATION
		3	10	06/12/2013	09/12/2013	73.17	TURBINE MISC/GOVERNOR
80	SHARAVATHI	10	103.5	03/09/2013	05/09/2013	54.93	PRESSURE SHAFT/PENSTOCK
		10	103.5	13/11/2013	30/11/2013	423.07	GENERATOR
		10	103.5	08/03/2014	10/03/2014	53.82	PRESSURE SHAFT/PENSTOCK
		3	103.5	07/06/2013	15/06/2013	204.98	OTHER EQUIPMENT
		5	103.5	03/08/2013	16/08/2013	312.52	TURBINE MISC/GOVERNOR
		6	103.5	03/06/2013	09/06/2013	152.77	PRESSURE SHAFT/PENSTOCK
		6	103.5	13/09/2013	19/09/2013	152.27	SWITCHING EQUIPMENT
		7	103.5	15/03/2014	17/03/2014	53.42	TURBINE MISC/GOVERNOR
81	SIVASAMUNDRUM	10	6	11/11/2013	14/11/2013	80.33	PRESSURE SHAFT/PENSTOCK
		6	3	01/04/2013	25/06/2013	2050.5	PRESSURE SHAFT/PENSTOCK
82	VARAHI	1	115	18/09/2013	02/10/2013	341.98	ANNUAL MAINTENANCE
		3	115	30/06/2013	08/07/2013	195.12	ANNUAL MAINTENANCE
<u>KSEB</u>							
83	IDAMALAYAR	1	37.5	10/05/2013	08/06/2013	696.28	ANNUAL MAINTENANCE
		1	37.5	01/07/2013	11/07/2013	258.35	ANNUAL MAINTENANCE
		2	37.5	01/01/2014	09/01/2014	210.12	ANNUAL MAINTENANCE
		2	37.5	10/05/2013	15/05/2013	123.25	B.F.VALVE
		2	37.5	09/12/2013	31/12/2013	543.47	ANNUAL MAINTENANCE
84	IDUKKI	1	130	01/04/2013	12/04/2013	280.2	ANNUAL MAINTENANCE
		1	130	01/12/2013	05/12/2013	111.68	ANNUAL MAINTENANCE
		1	130	01/06/2013	29/06/2013	673.38	ANNUAL MAINTENANCE
		2	130	01/07/2013	31/07/2013	716.67	ANNUAL MAINTENANCE
		3	130	07/12/2013	09/12/2013	60.1	ANNUAL MAINTENANCE
		4	130	13/12/2013	04/01/2014	537.37	ANNUAL MAINTENANCE
		5	130	02/08/2013	12/08/2013	247.88	ANNUAL MAINTENANCE
85	KAKKAD	1	25	01/02/2014	27/02/2014	641.52	ANNUAL MAINTENANCE
		2	25	08/01/2014	30/01/2014	536.83	ANNUAL MAINTENANCE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
86	KUTTIYADI	1	25	04/11/2013	01/12/2013	655.63	ANNUAL MAINTENANCE
		1	25	09/08/2013	14/08/2013	122.32	MISCELLANROUS
		2	25	04/12/2013	31/12/2013	664.48	ANNUAL MAINTENANCE
		3	25	06/01/2014	31/01/2014	611.08	ANNUAL MAINTENANCE
		3	25	01/04/2013	03/04/2013	64.5	ANNUAL MAINTENANCE
		4	50	04/04/2013	01/06/2013	1395.42	ANNUAL MAINTENANCE
87	KUTTIYADI ADDL. EXTN.	5	50	17/10/2013	24/10/2013	179.1	MISCELLANROUS
		6	50	20/10/2013	22/10/2013	59.9	MONTHLY MAINTENANCE
		6	50	26/08/2013	30/08/2013	107.57	MONTHLY MAINTENANCE
		6	50	01/02/2014	28/02/2014	655.67	ANNUAL MAINTENANCE
88	LOWER PERIYAR	1	60	02/04/2013	30/04/2013	682.27	PLANNED MAINTENANCE
		2	60	06/01/2014	03/02/2014	679.77	ANNUAL MAINTENANCE
		3	60	07/02/2014	01/03/2014	546.4	ANNUAL MAINTENANCE
89	NARIAMANGLAM HPS	1	15	01/02/2014	28/02/2014	658.6	ANNUAL MAINTENANCE
		2	15	01/04/2013	29/04/2013	674.92	ANNUAL MAINTENANCE
		2	15	02/01/2014	31/01/2014	704.8	PLANNED MAINTENANCE
90	PALLIVASAL	1	5	08/05/2013	31/05/2013	565.3	ANNUAL MAINTENANCE
		2	5	01/05/2013	06/05/2013	138.07	ANNUAL MAINTENANCE
		3	5	03/02/2014	01/03/2014	629.05	ANNUAL MAINTENANCE
		4	7.5	03/03/2014	31/03/2014	662.92	PLANNED MAINTENANCE
		5	7.5	02/01/2014	30/01/2014	680.67	ANNUAL MAINTENANCE
		6	7.5	05/12/2013	30/12/2013	608.83	PLANNED MAINTENANCE
91	PANNIAR	1	15	01/02/2014	28/02/2014	656.55	ANNUAL MAINTENANCE
92	PORINGALKUTTU	2	8	06/05/2013	23/05/2013	407.82	RENOVATION/MODERNISATION
		3	8	06/05/2013	23/05/2013	407.18	RENOVATION/MODERNISATION
		4	8	06/05/2013	23/05/2013	406.75	RENOVATION/MODERNISATION
93	SABARIGIRI	2	50	19/06/2013	30/06/2013	274.93	MONTHLY MAINTENANCE
		3	50	08/01/2014	25/01/2014	411.45	ANNUAL MAINTENANCE
		5	50	01/09/2013	12/09/2013	277.37	MONTHLY MAINTENANCE
		5	50	25/06/2013	28/06/2013	84.28	PRESSURE SHAFT/PENSTOCK
		5	50	21/08/2013	31/08/2013	254.97	ANNUAL MAINTENANCE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
94	SENGULAM	1	12	20/02/2014	15/03/2014	565.87	ANNUAL MAINTENANCE
		1	12	02/05/2013	04/05/2013	59.72	ANNUAL MAINTENANCE
		2	12	18/03/2014	31/03/2014	290.28	ANNUAL MAINTENANCE
		2	12	01/06/2013	05/06/2013	115.53	ANNUAL MAINTENANCE
		2	12	06/05/2013	31/05/2013	615.48	ANNUAL MAINTENANCE
		3	12	01/10/2013	09/10/2013	199.63	MONTHLY MAINTENANCE
		3	12	01/04/2013	30/04/2013	705.92	ANNUAL MAINTENANCE
		4	12	01/01/2014	19/02/2014	1184.42	PLANNED MAINTENANCE
95	SHOLAYAR	1	18	01/06/2013	30/06/2013	707.98	ANNUAL MAINTENANCE
		2	18	08/02/2014	18/03/2014	921.87	ANNUAL MAINTENANCE
		3	18	01/07/2013	22/11/2013	3460.65	ANNUAL MAINTENANCE
<u>TNGDCL</u>							
96	ALIYAR	1	60	15/05/2013	10/06/2013	633.65	ANNUAL MAINTENANCE
97	BHAWANI BARRAGE-II	1	15	14/03/2014	31/03/2014	398.83	ANNUAL MAINTENANCE
		1	15	08/11/2013	13/11/2013	121.5	TRI/TRC/DRAFT TUBE
		1	15	01/02/2014	24/02/2014	551	ANNUAL MAINTENANCE
		1	15	24/02/2014	28/02/2014	111.48	ANNUAL MAINTENANCE
		1	15	03/09/2013	05/09/2013	62.38	MISCELLANROUS
		2	15	01/02/2014	20/02/2014	465.5	ANNUAL MAINTENANCE
		2	15	22/10/2013	25/10/2013	73.67	TURBINE MISC/GOVERNOR
98	BHAWANI KATTAL	1	15	21/02/2014	12/03/2014	463.25	ANNUAL MAINTENANCE
		1	15	01/02/2014	20/02/2014	464.33	ANNUAL MAINTENANCE
		2	15	01/04/2013	05/04/2013	110	ANNUAL MAINTENANCE
		2	15	21/02/2014	12/03/2014	463.25	ANNUAL MAINTENANCE
		2	15	13/03/2014	31/03/2014	423	ANNUAL MAINTENANCE
99	KODAYAR	1	60	14/09/2013	17/09/2013	66.25	OTHER EQUIPMENT
		1	60	11/09/2013	13/09/2013	52	PRESSURE SHAFT/PENSTOCK
		1	60	02/12/2013	15/12/2013	311.58	TURBINE MISC/GOVERNOR
		1	60	27/04/2013	30/04/2013	87.32	MISCELLANROUS
		1	60	01/05/2013	05/05/2013	103	B.F.VALVE
		1	60	17/07/2013	19/07/2013	61.03	TURBINE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
100	KUNDAH	1	60	21/10/2013	26/10/2013	125.5	SWITCHING EQUIPMENT
		2	40	01/09/2013	30/09/2013	704.13	ANNUAL MAINTENANCE
		2	40	05/03/2014	30/03/2014	602.17	MONTHLY MAINTENANCE
		1	20	20/01/2014	28/01/2014	200.5	QUATERLY MAINTENANCE
		10	60	09/12/2013	23/12/2013	343.92	ANNUAL MAINTENANCE
		10	60	13/01/2014	17/01/2014	97.33	B.F.VALVE
		11	60	13/01/2014	17/01/2014	96.92	B.F.VALVE
		11	60	01/04/2013	21/04/2013	496.75	ANNUAL MAINTENANCE
		11	60	11/11/2013	14/11/2013	74.45	TURBINE MISC/GOVERNOR
		12	50	01/02/2014	07/02/2014	150	ANNUAL MAINTENANCE
		13	50	25/08/2013	28/08/2013	78	MONTHLY MAINTENANCE
		13	50	21/12/2013	29/01/2014	944	ANNUAL MAINTENANCE
		15	20	30/11/2013	04/12/2013	104	MONTHLY MAINTENANCE
		15	20	18/05/2013	30/05/2013	294	ANNUAL MAINTENANCE
		2	20	15/12/2013	24/12/2013	224.58	ANNUAL MAINTENANCE
		4	35	17/12/2013	24/12/2013	171.25	MONTHLY MAINTENANCE
		4	35	14/01/2014	16/01/2014	63.1	B.F.VALVE
		5	35	14/01/2014	16/01/2014	62.75	QUATERLY MAINTENANCE
		5	35	21/07/2013	13/08/2013	563.12	MONTHLY MAINTENANCE
		6	35	28/05/2013	05/06/2013	201.38	MONTHLY MAINTENANCE
		6	35	14/01/2014	17/01/2014	63.88	MISCELLANROUS
		7	35	14/01/2014	17/01/2014	63.83	MONTHLY MAINTENANCE
		8	35	14/01/2014	25/01/2014	262.57	MONTHLY MAINTENANCE
		9	60	25/04/2013	05/05/2013	250.75	ANNUAL MAINTENANCE
		9	60	13/01/2014	17/01/2014	90.08	B.F.VALVE
101	LOWER METTUR	1	15	21/03/2014	31/03/2014	230.83	ANNUAL MAINTENANCE
		1	15	01/04/2013	09/04/2013	208	ANNUAL MAINTENANCE
		2	15	12/04/2013	30/07/2013	2620.83	ANNUAL MAINTENANCE
		3	15	23/04/2013	11/05/2013	440.58	ANNUAL MAINTENANCE
		3	15	01/04/2013	20/04/2013	466.5	MONTHLY MAINTENANCE
		4	15	23/04/2013	19/09/2013	3576.95	MONTHLY MAINTENANCE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	15	01/04/2013	04/04/2013	86.83	ANNUAL MAINTENANCE
		6	15	25/03/2014	31/03/2014	136	ANNUAL MAINTENANCE
		6	15	01/04/2013	21/04/2013	498.5	ANNUAL MAINTENANCE
		7	15	01/02/2014	20/02/2014	462.5	ANNUAL MAINTENANCE
		7	15	13/03/2014	31/03/2014	424	ANNUAL MAINTENANCE
		8	15	04/04/2013	23/04/2013	464	ANNUAL MAINTENANCE
		8	15	21/02/2014	12/03/2014	463.5	ANNUAL MAINTENANCE
		1	12.5	01/02/2014	06/03/2014	801.5	ANNUAL MAINTENANCE
102	METTUR DAM	3	12.5	08/03/2014	29/03/2014	508.42	PLANNED MAINTENANCE
103	METTUR TUNNEL	1	50	01/04/2013	09/07/2013	2387.78	ANNUAL MAINTENANCE
		1	50	01/02/2014	28/02/2014	662.65	ANNUAL MAINTENANCE
		1	50	01/03/2014	21/03/2014	489.5	ANNUAL MAINTENANCE
		2	50	01/04/2013	09/07/2013	2389.8	ANNUAL MAINTENANCE
		2	50	21/02/2014	12/03/2014	472.75	PLANNED MAINTENANCE
		3	50	01/04/2013	08/07/2013	2368.43	ANNUAL MAINTENANCE
		3	50	13/03/2014	31/03/2014	432	PLANNED MAINTENANCE
		4	50	01/04/2013	08/06/2013	1645.07	ANNUAL MAINTENANCE
104	MOYAR	1	12	28/05/2013	31/05/2013	79.33	ANNUAL MAINTENANCE
		1	12	26/10/2013	08/11/2013	330.83	TURBINE
		3	12	26/05/2013	03/06/2013	208.08	ANNUAL MAINTENANCE
		3	12	12/02/2014	19/02/2014	173.67	ANNUAL MAINTENANCE
105	PAPANASAM	1	8	17/03/2014	25/03/2014	192.75	RENOVATION/MODERNISATION
		1	8	05/06/2013	10/06/2013	126.5	TRI/TRC/DRAFT TUBE
		2	8	05/06/2013	10/06/2013	126.5	TRI/TRC/DRAFT TUBE
		3	8	05/06/2013	10/06/2013	126.5	TRI/TRC/DRAFT TUBE
		4	8	07/05/2013	10/05/2013	79.83	ANNUAL MAINTENANCE
		4	8	06/12/2013	11/12/2013	124	RENOVATION/MODERNISATION
		4	8	19/10/2013	21/10/2013	54.25	MONTHLY MAINTENANCE
		4	8	05/06/2013	10/06/2013	126.5	TRI/TRC/DRAFT TUBE
		4	8	08/04/2013	28/04/2013	477.5	ANNUAL MAINTENANCE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
106	PERIYAR	1	35	01/04/2013	20/04/2013	473	MISCELLANROUS
		2	35	22/04/2013	10/05/2013	440	RENOVATION/MODERNISATION
		3	35	11/09/2013	15/09/2013	97.92	RENOVATION/MODERNISATION
		3	35	11/10/2013	10/11/2013	721.92	RENOVATION/MODERNISATION
		4	35	01/04/2013	04/04/2013	89	MISCELLANROUS
107	PYKARA ULTMATE	1	50	07/02/2014	21/02/2014	338	MONTHLY MAINTENANCE
		1	50	24/04/2013	28/04/2013	103.58	MONTHLY MAINTENANCE
		2	50	07/02/2014	21/02/2014	338	MONTHLY MAINTENANCE
		3	50	19/01/2014	21/01/2014	55.67	MONTHLY MAINTENANCE
		3	50	07/02/2014	21/02/2014	338	MONTHLY MAINTENANCE
108	SARKARPATHY	1	30	01/04/2013	23/05/2013	1264.17	ANNUAL MAINTENANCE
	SHOLAYAR	1	35	06/04/2013	15/05/2013	945	ANNUAL MAINTENANCE
		3	25	01/04/2013	07/05/2013	868.5	ANNUAL MAINTENANCE
		3	25	03/03/2014	21/03/2014	424.25	MISCELLANROUS
109	SURULIYAR	1	35	18/04/2013	30/04/2013	302.98	ANNUAL MAINTENANCE
		1	35	07/06/2013	10/06/2013	74.33	RENOVATION/MODERNISATION
		1	35	25/10/2013	30/10/2013	112	RENOVATION/MODERNISATION
		1	35	14/02/2014	16/02/2014	51.08	RENOVATION/MODERNISATION
<u>EASTERN REGION</u>							
<u>DVC</u>							
110	MAITHON	1	23.2	01/01/2014	06/03/2014	1528	ANNUAL MAINTENANCE
		2	20	01/04/2013	08/05/2013	883.13	ANNUAL MAINTENANCE
<u>GIPL</u>							
111	CHUZACHEN	1	49.5	23/02/2014	31/03/2014	860.75	ANNUAL MAINTENANCE
<u>JSEB</u>							
112	SUBERNREKHA	1	65	01/04/2013	31/07/2013	2927.98	ANNUAL MAINTENANCE
		2	65	01/04/2013	31/07/2013	2927.98	ANNUAL MAINTENANCE
<u>NHPC</u>							
113	RANGIT	1	20	08/01/2014	31/01/2014	572.97	ANNUAL MAINTENANCE
		2	20	03/02/2014	05/03/2014	737.97	ANNUAL MAINTENANCE
		3	20	05/12/2013	02/01/2014	692	ANNUAL MAINTENANCE

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>OHPC</u>							
114	BALIMELA	4	60	06/12/2013	09/12/2013	85	TURBINE MISC/GOVERNOR
		5	60	20/11/2013	17/12/2013	652	ANNUAL MAINTENANCE
		6	60	26/09/2013	29/09/2013	79.8	MONTHLY MAINTENANCE
		7	75	23/12/2013	04/03/2014	1709.03	ANNUAL MAINTENANCE
		8	75	20/01/2014	29/01/2014	216	MONTHLY MAINTENANCE
115	HIRAKUD	1	49.5	03/12/2013	11/01/2014	943.83	ANNUAL MAINTENANCE
		1	49.5	01/04/2013	12/04/2013	275.67	ANNUAL MAINTENANCE
		2	49.5	17/01/2014	25/03/2014	1616	ANNUAL MAINTENANCE
		3	32	27/01/2014	29/01/2014	57.08	MONTHLY MAINTENANCE
		8	24	28/01/2014	01/03/2014	762.33	ANNUAL MAINTENANCE
116	RENGALI	1	50	22/05/2013	08/06/2013	413.83	TURBINE
		2	50	10/06/2013	17/06/2013	177.42	NEW UNIT RESIDUAL WORKS
		2	50	01/04/2013	20/04/2013	478.03	RENOVATION/MODERNISATION
		4	50	06/12/2013	24/12/2013	442.17	ANNUAL MAINTENANCE
		5	50	06/11/2013	05/12/2013	706	ANNUAL MAINTENANCE
117	UPPER INDRAVATI	1	150	05/11/2013	26/11/2013	507.92	ANNUAL MAINTENANCE
		2	150	06/12/2013	23/12/2013	419.05	ANNUAL MAINTENANCE
118	UPPER KOLAB	1	80	03/12/2013	02/01/2014	728	ANNUAL MAINTENANCE
		2	80	28/01/2014	04/03/2014	843.58	ANNUAL MAINTENANCE
		3	80	01/04/2013	13/07/2013	2489.5	CAPITAL/3 YEARLY MTCE.
		4	80	26/03/2014	28/03/2014	55.08	MONTHLY MAINTENANCE
<u>WBSEDCL</u>							
119	JALDHAKA HPS ST-I	1	9	01/04/2013	15/05/2013	1068.08	ANNUAL MAINTENANCE
		1	9	13/06/2013	19/06/2013	146.17	MISCELLANROUS
		2	9	03/10/2013	05/10/2013	51.67	ROUTINE MAINTENANCE
		2	9	19/05/2013	21/05/2013	50.5	MISCELLANROUS
120	PURULIA PSS	1	225	07/12/2013	11/12/2013	101.67	CAPITAL/3 YEARLY MTCE.
		2	225	11/12/2013	14/12/2013	68.75	CAPITAL/3 YEARLY MTCE.
		3	225	03/11/2013	08/03/2014	3008	CAPITAL/3 YEARLY MTCE.

**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>NORTH EASTERN REGION</u>							
<u>APGPCL</u>							
121	KARBI LANGPI	2	50	08/01/2014	20/03/2014	1705.72	CAPITAL/3 YEARLY MTCE.
<u>MeECL</u>							
122	KYRDEMKULAI	2	30	01/04/2013	21/06/2013	1965.83	TURBINE
123	UMIAM HPS ST-I	3	9	03/12/2013	05/12/2013	62	B.F.VALVE
		3	9	17/02/2014	20/02/2014	80.08	AUXILIARY SYSTEM
		4	9	03/12/2013	05/12/2013	62	B.F.VALVE
		4	9	17/02/2014	20/02/2014	80.08	AUXILIARY SYSTEM
124	UMIAM HPS ST-IV	8	30	01/04/2013	10/04/2013	227.25	ANNUAL MAINTENANCE
		8	30	27/02/2014	31/03/2014	759	OTHER EQUIPMENT
<u>NEEPCO.</u>							
125	DOYANG	1	25	10/03/2014	29/03/2014	467	ANNUAL MAINTENANCE
126	KHONDONG	1	25	17/04/2013	01/05/2013	352.5	PLANNED MAINTENANCE
		2	25	01/04/2013	13/04/2013	306.63	ANNUAL MAINTENANCE
		2	25	27/04/2013	28/05/2013	760.5	TRI/TRC/DRAFT TUBE
127	KOPILI	1	50	16/12/2013	31/03/2014	2514	PLANNED MAINTENANCE
		2	50	02/01/2014	31/03/2014	2112	RENOVATION/MODERNISATION
		4	50	01/04/2013	25/04/2013	594.43	ANNUAL MAINTENANCE
128	RANGANADI	1	135	21/02/2014	10/03/2014	414.25	ANNUAL MAINTENANCE
		2	135	16/01/2014	28/01/2014	296.25	ANNUAL MAINTENANCE
		3	135	09/12/2013	27/12/2013	442.13	ANNUAL MAINTENANCE
<u>NHPC</u>							
129	LOKTAK	1	35	20/01/2014	19/02/2014	730.85	ANNUAL MAINTENANCE
		1	35	04/04/2013	12/05/2013	915.8	ANNUAL MAINTENANCE
		3	35	11/11/2013	30/11/2013	473.63	ANNUAL MAINTENANCE

CHAPTER 5

FORCED OUTAGES OF THE UNITS

CHAPTER-5

FORCED OUTAGES OF HE UNITS

5.1 Based on the analysis carried out for 653 generating units installed in 188 Hydro Electric Power Stations, non-availability of hydro-electric units in the country due to forced outages during the year 2013-14 (excluding the causes not attributable to the power plant) was 5.55% as compared to 3.27% during 2012-13. Unit-wise details of forced outages of duration 24 hours and above are given in **Annex- 5.1**.

5.2 Forced outages of generating units were due to various problems in generating equipments, auxiliary systems, civil structures and also due to external reasons not attributable to the power plant equipment/civil structures etc. The external reasons are non-availability of water, transmission constraints, system disturbances, flood and also due to high silt in the river, etc.

The forced outages have been analysed component wise. The turbine and generator faults accounted for 25.58% and 19.34% respectively whereas forced outages due to system constraints accounted for 1.28% of total forced outages. Category wise forced outages of Hydro Electric Generating units are given in **Table 5.1** below.

TABLE 5.1

**EQUIPMENT/SYSTEM WISE FORCED OUTAGES
FOR PERIOD: 2013-14**

S.No.	CAUSES OF FORCED OUTAGE	DURATION OF OUTAGE (HOURS)	% OF TOTAL FORCED OUTAGE
A	RELATED WITH EQUIPMENT AND CIVIL STRUCTURE		
1	GENERATOR FAULTS	101045.89	19.34
2	TURBINE FAULTS	133612.96	25.58
3	CIVIL STRUCTURE FAULTS	29198.01	5.59
4	OTHER EQUIPMTNT FAULTS	55754.30	10.67
	SUB-TOTAL(A):	319611.16	61.18
B	NOT ASSOCIATED WITH THE EQUIPMENT AND CIVIL		
5	WATER CONSTRAINT	177745.74	34.02
6	SYSTEM CONSTRAINT	6680.22	1.28
7	OTHER MISC	18383.39	3.52
	SUB-TOTAL(B):	202809.35	38.82
	GRAND TOTAL (A+B):	522420.51	100.00

5.3 FORCED OUTAGE DUE TO GENERATOR COMPONENTS

Among the forced outages of various generator components, outage due to fault in rotor was 19.55% followed by excitation system fault 18.53%, stator faults 15.26%, vibration/sound/ alingment fault 12.32%, thrust bearing faults 11.56% and other faults accounted for 10.33%.

The details of forced outages due to various generator faults and associated systems are given in **Table 5.2** below:

TABLE 5.2
FORCED OUTAGE HOURS DUE TO BREAK DOWN OF
GENERATOR COMPONENTS
PERIOD: 2013-14

S.No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
1	STATOR	15415.98	15.26
2	ROTOR	19750.30	19.55
3	EXCITATION SYSTEM	18719.60	18.53
4	AUTOMATIC VOLTAGE REGULATOR	1020.92	1.01
5	PROTECTION SYSTEM	4795.48	4.75
6	GENERATOR COOLING SYSTEM	712.92	0.71
7	THRUST BEARING	11679.75	11.56
8	UPPER GUIDE BEARING	5469.05	5.41
9	LOWER GUIDE BEARING	530.54	0.53
10	VIBRATION/ SOUND / ALIGNMENT	12448.80	12.32
11	BRAKE AND JACKS	59.93	0.06
12	OTHERS	10442.62	10.33
	TOTAL	101045.89	100.00

Performance of generating units under different category as per their unit size has been analyzed for failure of generator components. These are listed in **Table 5.3** for unit size up to 50 MW, in Table 5.4 for unit size above 50 MW & Upto 100 MW and in **Table 5.5** for unit size above 100 MW.

TABLE 5.3

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF GENERATOR COMPONENTS
(UNIT SIZE UPTO 50 MW)
PERIOD: 2013-14**

S. No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
1	STATOR	50.28	0.37
2	ROTOR	692.65	5.03
3	EXCITATION SYSTEM	9230.50	67.03
4	AUTOMATIC VOLTAGE REGULATOR	134.33	0.98
5	PROTECTION SYSTEM	1720.40	12.49
6	GENERATOR COOLING SYSTEM	154.20	1.12
7	THRUST BEARING	28.63	0.21
8	UPPER GUIDE BEARING	50.50	0.37
9	LOWER GUIDE BEARING	183.65	1.33
10	VIBRATION/ SOUND / ALIGNMENT	1392.17	10.11
11	BRAKE AND JACKS	0.00	0.00
12	OTHERS	132.38	0.96
	TOTAL	13769.69	100.00

TABLE 5.4

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF GENERATOR COMPONENTS
(UNIT SIZE ABOVE 50 MW AND UPTO 100 MW)
PERIOD: 2013-14**

S. No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
1	STATOR	5372.28	15.35
2	ROTOR	6416.03	18.34
3	EXCITATION SYSTEM	7891.85	22.55
4	AUTOMATIC VOLTAGE REGULATOR	507.52	1.45
5	PROTECTION SYSTEM	149.83	0.43
6	GENERATOR COOLING SYSTEM	16.45	0.05

S. No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
7	THRUST BEARING	1376.30	3.93
8	UPPER GUIDE BEARING	1313.07	3.75
9	LOWER GUIDE BEARING	11.43	0.03
10	VIBRATION/ SOUND / ALIGNMENT	10443.42	29.85
11	BRAKE AND JACKS	4.43	0.01
12	OTHERS	1488.82	4.25
	TOTAL	34991.43	100.00

TABLE 5.5

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF GENERATOR COMPONENTS
(UNIT SIZE ABOVE 100 MW)
PERIOD: 2013-14**

S. No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	STATOR	9993.42	19.11
2	ROTOR	12641.62	24.18
3	EXCITATION SYSTEM	1597.25	3.05
4	AUTOMATIC VOLTAGE REGULATOR	379.07	0.73
5	PROTECTION SYSTEM	2925.25	5.59
6	GENERATOR COOLING SYSTEM	542.27	1.04
7	THRUST BEARING	10274.82	19.65
8	UPPER GUIDE BEARING	4105.48	7.85
9	LOWER GUIDE BEARING	335.46	0.64
10	VIBRATION/ SOUND / ALIGNMENT	613.21	1.17
11	BRAKE AND JACKS	55.50	0.11
12	OTHERS	8821.42	16.87
	TOTAL	52284.77	100.00

From the tables above, it is observed that forced outage due to Generator Excitation System faults was 67.03%, highest amongst the generator faults for unit size Upto 50 MW and Vibration/Sound/ Alignment fault was 29.85% highest amongst the generator faults for unit

size above 50 MW and Upto 100 MW. In unit size above 100 MW, forced outages due to problems of Rotor fault accounted for 24.18%.

5.4 FORCED OUTAGE DUE TO TURBINE COMPONENTS

Out of various forced outages of turbine components, maximum forced outage of 67.63% was due to miscellaneous faults. As far as component wise outages are concerned, 13.21% was due to faults in Governor System followed by 7.50% due to problem in Guide Vanes, 4.57% due to problem in Shaft Vibration/Alignment/Sound and 4.50% due to Problem in Bearing etc. The forced outage due to problems in Runner/Under Water Parts was the least at 0.20% as can be seen in **Table 5.6**.

TABLE 5.6
FORCED OUTAGE HOURS DUE TO BREAK DOWN OF
TURBINE COMPONENTS
PERIOD: 2013-14

S. No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	6008.46	4.50
2	RUNNER/UNDER WATER PARTS	261.25	0.20
3	MAIN INLET VALVE	3214.85	2.41
4	GOVERNOR SYSTEM	17651.66	13.21
5	GUIDE VANES	10016.96	7.50
6	SHAFT VIBRATION / ALIGNMENT /SOUND	6103.14	4.57
7	MISCELLANEOUS	90356.65	67.63
	TOTAL	133612.97	100.00

Performance of generating units under different category as per their unit size has been analyzed for failure of various turbine components. These are listed in **Table 5.7** for unit size up to 50 MW, in **Table 5.8** for unit size above 50 MW & Upto 100 MW and in **Table 5.9** for unit size above 100 MW.

TABLE 5.7

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF TURBINE COMPONENTS
(UNIT SIZE UPTO 50 MW)
PERIOD: 2013-14**

S. No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	1470.33	7.62
2	RUNNER/UNDER WATER PARTS	222.82	1.15
3	MAIN INLET VALVE	101.37	0.53
4	GOVERNOR SYSTEM	3534.90	18.32
5	GUIDE VANES	4837.93	25.07
6	SHAFT VIBRATION /ALIGNMENT /SOUND	4772.17	24.73
7	MISCELLANEOUS	4354.95	22.57
	TOTAL	19294.47	100.00

TABLE 5.8

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF TURBINE COMPONENTS
(UNIT SIZE ABOVE 50 MW AND UPTO 100 MW)
PERIOD: 2013-14**

S. No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	1083.17	18.66
2	RUNNER/UNDER WATER PARTS	0.00	0.00
3	MAIN INLET VALVE	671.88	11.58
4	GOVERNOR SYSTEM	2235.74	38.52
5	GUIDE VANES	581.35	10.02
6	SHAFT VIBRATION /ALIGNMENT /SOUND	10.75	0.19
7	MISCELLANEOUS	1221.67	21.05
	TOTAL	5804.56	100.00

TABLE 5.9

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF TURBINE COMPONENTS
(UNIT SIZE ABOVE 100 MW)
PERIOD: 2013-14**

S.No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	3454.96	3.18
2	RUNNER/UNDER WATER PARTS	38.43	0.04
3	MAIN INLET VALVE	2441.60	2.25
4	GOVERNOR SYSTEM	11881.02	10.95
5	GUIDE VANES	4597.68	4.24
6	SHAFT VIBRATION /ALIGNMENT /SOUND	1320.22	1.22
7	MISCELLANEOUS	84780.03	78.13
	TOTAL	108513.94	100.00

5.5 ANALYSIS BASED ON TYPE OF TURBINE:

The analysis of forced outages caused by turbine components as per type of turbines is given in **Table 5.10**. Forced outage rate was observed to be the highest in case of Kaplan turbines (250.46 Hrs/unit) and lowest in case of Bulb turbines (5.04 hrs/unit)

TABLE 5.10

**FORCED OUTAGES TURBINE TYPE WISE
PERIOD: 2013-14**

S.No.	Type of Turbine	Number of Units	Installed Capacity MW	Forced Outage Hours	Avg. Forced Outage per Unit Hours
1	BULB	20	444.00	100.88	5.04
2	FRANCIS AND REVERSIBLE	383	29554.31	72107.09	188.27
3	KAPLAN	119	4161.20	29804.45	250.46
4	PELTON	131	6371.90	31600.55	241.23
	TOTAL	653	40531.41	133612.97	204.61

5.6 ANALYSIS BASED ON MAKE OF UNITS:

The comparative performance of generating units of different makes is indicated in **Table 5.11**. The outage figures in the table relate to faults in turbine and generator only. Generating units from Switzerland (39.49 Hrs/unit) followed by units from USA (79.83 Hrs/unit) registered the best performance. Average forced outage for BHEL units was 254.81 Hrs/unit as against 426.86 Hrs/unit for imported units.

TABLE 5.11

FORCED OUTAGES DUE TO FAULT IN TURBINE & GENERATOR (SUPPLIER WISE)PERIOD: 2013-14

S.No.	NAME OF SUPPLIER/ COUNTRY OF MAKE	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED FAULT IN TOTAL HOURS	OUTAGES DUE TO GENERATING UNIT AVERAGE HOURS/UNIT
A-Indigenous					
1	BHEL	276	16995.01	70328.44	254.81
2	Others	18	831.00	11086.05	615.89
	SUB TOTAL	294	17826.01	81414.49	276.92
B-Imported					
1	U.K	64	1257.10	20545.62	321.03
2	CANADA	44	3132.00	5917.6	134.49
3	SWITZERLAND	22	815.20	868.73	39.49
4	JAPAN	76	6344.00	17405.47	229.02
5	USSR	26	2804.00	10582.45	407.02
6	U.S.A	9	351.00	718.47	79.83
7	FRANCE	33	2186.00	57448.65	1740.87
8	Other	85	5816.00	39757.38	467.73
	SUB TOTAL	359	22705.40	153244.36	426.86
	Total	653	40531.41	234658.85	359.36

5.7 ANALYSIS AGE-WISE:

Details of forced outages of generating units commissioned during different years are indicated in **Table 5.12**. Forced outages caused by equipment failure i.e. the fault relating to generator, turbine, and auxiliary system equipments have been taken into account for the purpose of computation. Per unit forced outage rate in respect of generating units

commissioned during 2009-10 was observed to be the least (1.08 Hrs/unit) and was maximum in the case of units commissioned during 2005-06 (2254.43 Hrs/unit).

TABLE - 5.12

**FORCED OUTAGES DUE TO EQUIPMENT BREAK DOWN:
(AGE-WISE)PERIOD: 2013-14**

S.NO.	YEAR OF COMMISSIONING	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED OUTAGE (HOURS)	NON AVAILABILITY PER UNIT (HOURS)
1	2013-14	19	1058.01	2575.07	143.06
	2012-13	15	501.00	12928.75	861.92
2	2011-12	11	1423.00	1043.58	94.87
3	2010-11	11	690.00	265.18	24.11
4	2009-10	1	39.00	1.08	1.08
5	2008-09	8	969.00	1192.43	149.05
6	2007-08	23	2443.00	2559.83	111.30
7	2006-07	21	2286.00	28270.52	1346.22
8	2005-06	13	1340.00	29307.53	2254.43
9	2004-05	13	1115.00	2610.40	200.80
10	2003-04	18	2690.00	3237.68	179.87
11	2002-03	11	740.60	900.04	81.82
12	2001-02	20	1092.20	7336.25	366.81
13	2000-01	13	1129.00	10591.25	814.71
14	1989-90 To 1999-00	87	5775.70	18213.37	209.35
15	1978-79 To 1988-89	124	7257.60	26615.65	214.64
16	1967-68 To 1977-78	82	5300.25	38858.03	473.88
17	Upto 1966-67	164	4682.05	103906.50	633.58
	TOTAL	653	40531.41	290413.14	444.74

5.8 REGIONWISE PERFORMANCE:

The region wise summary of performance of the hydel generating units is indicated in **Table 5.13**. For the purpose of computation, all types of forced outages/tripping due to faults in generator, turbine, auxiliary system & other equipments and civil structure faults (excluding misc.) have been included. Performance of hydro generating equipments installed in Western Region was the best as the non-availability due to forced outages was least (2.31%). The non-availability of the units installed in the North-Eastern Region was observed to be on the higher side (10.64%).

TABLE 5.13
FORCED OUTAGES - REGION WISE
PERIOD: 2013-14

S. NO.	REGION	NO. OF UNITS	INSTALLED CAPACITY (MW)	% NON AVAILABILITY DUE TO FORCED OUTAGES
1	NORTHERN	219	16386.26	6.25
2	WESTERN	101	7392.00	2.31
3	SOUTHERN	243	11432.45	5.94
4	EASTERN	61	4078.70	5.96
5	NORTH EASTERN	29	1242.00	10.64
	ALL INDIA	653	40531.41	5.55

5.9 FORCED OUTAGE - UTILITY WISE:

The forced outages of hydro electric units under various Central Sector Utilities, Private Sector and State Electricity Boards/Power Generation Corporations are indicated in **Table 5.14**.

All types of forced outages/tripping due to problems in generating units, auxiliary equipments and civil structure have been taken into account for the analysis. Per unit forced outages for generating units under CSPGCL was nil followed by MPCL (1.18 Hr/unit). It was maximum in respect of hydro electric stations under JPVL (2535.60 Hr/unit).

Table 5.14
FORCED OUTAGES- BOARD /CORPORATION WISE
PERIOD:-2012-13

S.NO.	ORGANISATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED OUTAGE (HOURS)	FORCED OUTAGE PER UNIT (HOURS)
CENTRAL SECTOR					
1	BBMB	28	2866.30	10479.62	374.27
2	DVC	5	143.20	8707.58	1741.52
3	NEEPCO.	13	755.00	15456.35	1188.95
4	NHDC	16	1520.00	39.47	2.47
5	NHPC	62	4831.20	45214.21	729.26

S.NO.	ORGANISATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED OUTAGE (HOURS)	FORCED OUTAGE PER UNIT (HOURS)
6	SJVNL	9	1706.01	257.9	28.66
7	THDC	8	1400.00	100.4	12.55
	SUB TOTAL	141	13221.71	80255.53	569.19
PRIVATE SECTOR					
1	ADHPL	2	192.00	66.88	33.44
2	DLHP	1	34.00	41.33	41.33
3	EPPL	2	100.00	107.33	53.67
	GIPL	2	99.00	64.48	32.24
4	JPVL	11	1700.00	27891.55	2535.60
5	LGPPPL	2	70.00	364.58	182.29
6	MPCL	2	86.00	2.35	1.18
7	TATA	15	447.00	770.37	51.36
	SUB TOTAL	37	2728.00	29308.87	792.13
STATE SECTOR					
1	APGENCO	57	3783.35	42315.25	742.37
2	APGPCL	2	100.00	671.28	335.64
3	CSPGCL	3	120.00	0.00	0.00
4	GSECL	8	540.00	4944.07	618.01
5	HPSEB LTD.	12	366.00	1764.35	147.03
6	JKPDC	9	660.00	5935.62	659.51
7	JSEB	2	130.00	178.83	89.42
8	KPCL	68	3585.40	36188.56	532.18
9	KSEB	48	1881.50	3844.68	80.10
10	MAHAGENCO	24	2406.00	7639.55	318.31
11	MeECL	11	282.00	12000.47	1090.95
12	MPPGCL	23	875.00	3017.32	131.19
13	OHPC	31	2027.50	20461.22	660.04
14	PSPCL	25	1051.00	12970.72	518.83
15	RRVUNL	11	411.00	1473.50	133.95
16	SSNNL	11	1450.00	1999.17	181.74
17	TANGEDCO	70	2182.20	27631.70	394.74
18	UJVNL	34	1252.15	16984.33	499.54
19	UPJVNL	15	501.60	1703.95	113.60
20	WBSEDCL	11	977.00	8322.18	756.56
	SUB TOTAL	475	24581.70	210046.75	442.20
	ALL INDIA	653	40531.41	319611.16	489.45

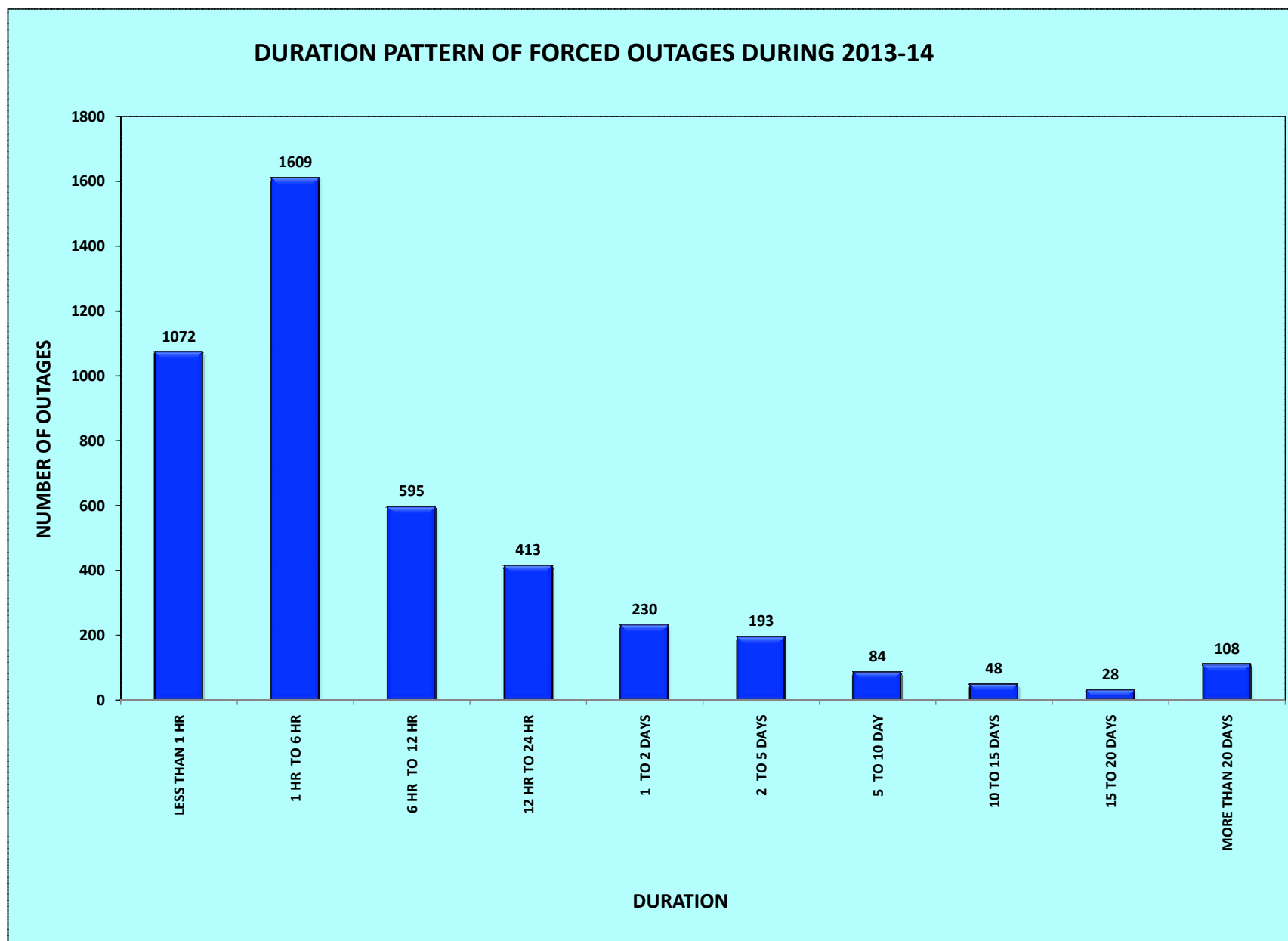
5.10 DURATION OF FORCED OUTAGES:

There were total 4380 forced outages/tripping during the year 2013-14. Duration of individual outage varied widely from a few minutes to the maximum of full year.

The duration pattern of forced outages is indicated in **Table 5.15** and **Exhibit 5.1**. It could be seen that about 84.22% of the total forced shutdown were of duration Upto 24 hours. 13.31% of outages were of duration varying from 1 to 20 days and only 2.47% of shutdowns were for more than 20 days.

TABLE 5.15
DURATION PATTERN OF FORCED OUTAGES
PERIOD:-2013-14

S.NO.	DURATION IN HOURS	NUMBER OF OUTAGES	% OF TOTAL OUTAGES
1	Less than 1 hour	1072	24.47
2	1 TO 6 hours	1609	36.74
3	6 TO 12 hours	595	13.58
4	12 TO 24 hours	413	9.43
5	1 TO 2 days	230	5.25
6	2 TO 5 days	193	4.41
7	5 TO 10 days	84	1.92
8	10 TO 15 days	48	1.10
9	15 TO 20 days	28	0.64
10	More than 20 days	108	2.47
	TOTAL NO. OF OUTAGES	4380	100



DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>NORTHERN REGION</u>							
<u>ADHPL</u>							
1	ALLAIN DUHANGAN	1	96	28/07/2013	29/07/2013	27.7	NEEDLE PROBLEM
<u>BBMB</u>							
2	DEHAR	3	165	20/08/2013	26/08/2013	143.67	FORCED OUTAGE
		6	165	08/08/2013	09/01/2014	3692.2	FORCED OUTAGE
		6	165	02/03/2014	21/03/2014	460.98	FORCED OUTAGE
3	KOTLA	2	24.2	06/09/2013	07/09/2013	30.67	EXCITATION OTHERS
4	PONG	2	66	04/08/2013	10/08/2013	140.42	FORCED OUTAGE
<u>E.P.P.L.</u>							
5	MALANA-II	2	50	01/05/2013	16/05/2013	342.8	PR. SHAFT/PENSTOCK/B.F.V
		2	50	12/06/2013	13/06/2013	27.95	NEEDLE PROBLEM
<u>HPSEB</u>							
6	BASSI	1	15	22/08/2013	23/08/2013	26.08	PENSTOCK
		2	15	12/08/2013	15/08/2013	74.08	PENSTOCK
7	LARJI	3	42	24/04/2013	27/04/2013	71.33	AUTO. VOLTAGE REGULATOR
8	SANJAY	1	40	05/02/2014	06/02/2014	29.5	GENERATOR COOLING SYSTEM
		1	40	20/11/2013	02/12/2013	294.67	EHG/GOV. FAULTS, MISC.
		1	40	09/11/2013	16/11/2013	172.67	AUTO. VOLTAGE REGULATOR
		1	40	16/06/2013	18/06/2013	38.75	MISCELLANEOUS
		2	40	08/02/2014	10/02/2014	49.83	MISCELLANEOUS
		2	40	16/06/2013	18/06/2013	38.92	MISCELLANEOUS
		3	40	24/04/2013	27/04/2013	71.33	AUTO. VOLTAGE REGULATOR
		3	40	16/06/2013	19/06/2013	62.75	MISCELLANEOUS
<u>JK, PDD</u>							
9	BAGLIHAR	2	150	26/11/2013	19/12/2013	548.43	OTHER (D/T,GUIDE/STAY VANES
		3	150	22/11/2013	29/11/2013	162.83	OTHER (D/T,GUIDE/STAY VANES
10	LOWER JHELMUM	1	35	03/06/2013	05/06/2013	52.33	THRUST BEARING
11	UPPER SINDH-II	3	35	13/03/2014	16/03/2014	64.42	MISCELLANEOUS
		3	35	21/06/2013	25/11/2013	3777.33	ROTOR
<u>JPVL</u>							
12	KARCHAM WANGTOO	1	250	26/11/2013	29/11/2013	72.25	OTHERS
		1	250	01/08/2013	04/08/2013	71.35	LOWER GUIDE BEARING
		2	250	21/09/2013	22/09/2013	25.83	OTHERS

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
13	VISHNU PRAYAG	3	250	21/09/2013	22/09/2013	26.35	OTHERS
		4	250	21/09/2013	22/09/2013	26.42	OTHERS
		1	100	16/06/2013	31/03/2014	6910.58	TURBINE OTHERS
		2	100	16/06/2013	31/03/2014	6910.5	TURBINE OTHERS
		3	100	16/06/2013	31/03/2014	6910.42	TURBINE OTHERS
		4	100	16/06/2013	31/03/2014	6910.33	TURBINE OTHERS
<u>LBPPL</u>							
14	BUDHIL	2	35	25/05/2013	31/05/2013	156.3	TURBINE FAULTS
		2	35	01/06/2013	19/06/2013	442.67	SHAFT VIBRS./ALIGNM/SOUND
		2	35	09/10/2013	12/10/2013	64.25	ROTOR
		2	35	18/08/2013	20/08/2013	50.65	POWER HOUSE MISC.
		2	35	17/08/2013	18/08/2013	33.6	PROTECTION OPERATION
<u>MPCL</u>							
15	MALANA	1	43	25/06/2013	27/06/2013	31.45	MISCELLANEOUS
<u>NHPC</u>							
16	BAIRA SIUL	1	66	22/03/2014	31/03/2014	210.92	THRUST BEARING
		1	66	16/02/2014	19/02/2014	77.43	SHAFT VIBRS./ALIGNM/SOUND
		2	66	02/01/2014	05/01/2014	72	DAM/SPILL WAYS
		3	66	02/01/2014	17/01/2014	369	DAM/SPILL WAYS
17	CHAMERA- I	3	180	23/04/2013	02/05/2013	219.48	SHAFT SEAL
18	CHAMERA- II	1	100	01/01/2014	02/01/2014	29.68	OTHER (D/T,GUIDE/STAY VANES
19	CHAMERA-III	1	77	06/11/2013	10/11/2013	106.73	ALIGNMENT
		1	77	02/04/2013	17/04/2013	357.88	INTAKE STRICT./TRASH RACK
		2	77	02/04/2013	17/04/2013	358.07	INTAKE STRICT./TRASH RACK
		3	77	02/04/2013	17/04/2013	358.2	INTAKE STRICT./TRASH RACK
20	CHUTAK	3	77	11/11/2013	13/11/2013	57.18	ALIGNMENT
		1	11	01/11/2013	30/11/2013	719.98	TURBINE
		2	11	10/11/2013	29/11/2013	463.75	TURBINE
		3	11	01/04/2013	30/04/2013	719.98	LINE BREAKER
21	DHAULI GANGA	3	11	01/05/2013	08/09/2013	3141	VIBRATION/SOUND/ ALIGNMENT
		4	11	25/11/2013	30/11/2013	126.67	OTHER (D/T,GUIDE/STAY VANES
		1	70	17/06/2013	31/03/2014	6886.5	TURBINE OTHERS
		2	70	17/06/2013	31/03/2014	6886.58	TURBINE OTHERS
		3	70	17/06/2013	31/03/2014	6886.42	TURBINE OTHERS

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	70	17/06/2013	31/03/2014	6886.33	TURBINE OTHERS
22	DULHASTI	1	130	12/12/2013	13/12/2013	36.45	VIBRATION/SOUND/ ALIGNMENT
		2	130	04/12/2013	08/12/2013	96	VIBRATION/SOUND/ ALIGNMENT
		3	130	12/08/2013	14/08/2013	50.02	TURBINE OTHERS
23	PARBATI-III	1	130	26/03/2014	31/03/2014	100.22	ROTOR
		2	130	26/03/2014	31/03/2014	107.02	EXCITATION OTHERS
24	TANAKPUR	1	31.4	17/09/2013	19/09/2013	27.85	ROTOR
		1	31.4	23/12/2013	24/12/2013	38.15	ROTOR
		1	31.4	08/10/2013	10/10/2013	62.48	ROTOR
		2	31.4	23/12/2013	27/12/2013	105.22	SHEAR PIN
		2	31.4	08/05/2013	11/05/2013	60.25	FORCED OUTAGE
		3	31.4	30/10/2013	09/11/2013	226.97	FORCED OUTAGE
		3	31.4	31/08/2013	13/09/2013	314.93	U.A.T
		3	31.4	20/05/2013	21/05/2013	24.05	EHG/GOV. FAULTS, MISC.
25	URI-I	2	120	01/09/2013	29/09/2013	683.13	GOVERNOR SYSTM
		4	120	29/07/2013	01/08/2013	82.67	PROTECTION OPERATION
26	URI-II	1	60	22/03/2014	24/03/2014	42.87	COOLING WATER SYSTEM
		1	60	26/03/2014	30/03/2014	99.42	EHT/ISOLATOR
		1	60	20/10/2013	21/10/2013	25.5	OTHER (D/T,GUIDE/STAY VANES
		2	60	19/03/2014	21/03/2014	43.63	OTHER (D/T,GUIDE/STAY VANES
		2	60	04/01/2014	17/03/2014	1733.23	COOLING WATER SYSTEM
		3	60	26/03/2014	31/03/2014	106.98	EHT/L.A.
		3	60	18/11/2013	20/11/2013	51.75	EHT/ISOLATOR
		4	60	24/03/2014	26/03/2014	45.77	COOLING WATER SYSTEM
<u>PSPCL</u>							
27	ANANDPUR SAHIB	1	33.5	23/01/2014	28/01/2014	138.75	TURBINE OTHERS
		1	33.5	13/10/2013	19/10/2013	162.92	HRI/HRC/SURGF SHAFT PROPS
		1	33.5	22/02/2014	23/02/2014	32.08	THRUST BEARING
		2	33.5	13/10/2013	19/10/2013	163	HRI/HRC/SURGF SHAFT PROPS
		2	33.5	23/01/2014	28/01/2014	138.75	TURBINE OTHERS
		2	33.5	18/11/2013	19/11/2013	25.75	PROTECTION OPERATION
		3	33.5	09/09/2013	18/09/2013	203.83	PROTECTION OPERATION
		4	33.5	17/09/2013	18/09/2013	25.75	GOVERNOR SYSTM
		4	33.5	27/07/2013	28/07/2013	24.83	LT AC PANELS

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
28	MUKERIAN	10	19.5	26/11/2013	01/12/2013	109.83	EHT/L.A.
		2	15	09/07/2013	10/07/2013	33.75	ROTOR
29	RANJIT SAGAR	1	150	01/09/2013	29/03/2014	5028.42	TRANSFORMER PROTECTION
		2	150	01/08/2013	19/08/2013	446.08	MISCELLANEOUS
		3	150	01/08/2013	15/08/2013	356.45	MISCELLANEOUS
		4	150	19/10/2013	23/10/2013	103.42	EHG/GOV. FAULTS, MISC.
		4	150	15/09/2013	25/09/2013	231	GUIDE VANES
		4	150	01/08/2013	10/08/2013	229.58	MISCELLANEOUS
		4	150	27/10/2013	31/03/2014	3697.98	EHG/GOV. FAULTS, MISC.
30	SHANAN	5	50	25/10/2013	29/10/2013	102	SHAFT VIBRS./ALIGNM/SOUND
<u>RRVUNL</u>							
31	JAWAHAR SAGAR	1	33	07/10/2013	09/10/2013	50.5	OIL PROBLEMS
		2	33	24/08/2013	29/08/2013	120	SHAFT SEAL
		2	33	07/10/2013	09/10/2013	51.83	OIL PROBLEMS
		3	33	07/10/2013	11/10/2013	84.67	OIL PROBLEMS
32	MAHI BAJAJ	1	25	01/02/2014	03/02/2014	42.75	POWER HOUSE MISC.
<u>SJVNL</u>							
33	NATHPA JHAKRI	5	250	08/09/2013	13/09/2013	123.15	SHAFT SEAL
<u>UJVNL</u>							
34	CHIBRO (YAMUNA)	4	60	08/12/2013	10/12/2013	41.33	FORCED OUTAGE
		4	60	26/12/2013	28/12/2013	44.83	FORCED OUTAGE
35	CHILLA	1	36	16/06/2013	19/06/2013	76.75	FORCED OUTAGE
		1	36	01/07/2013	03/07/2013	44.58	SHAFT SEAL
		1	36	11/09/2013	16/09/2013	111	TURBINE
		1	36	17/08/2013	19/08/2013	48.25	SHAFT SEAL
		1	36	08/07/2013	09/07/2013	32.75	MISCELLANEOUS
		1	36	14/02/2014	17/02/2014	82.5	SHAFT SEAL
		2	36	08/07/2013	09/07/2013	33.67	MISCELLANEOUS
		2	36	25/06/2013	26/06/2013	33.75	GOVERNOR SYSTM
		2	36	16/06/2013	19/06/2013	76.33	FORCED OUTAGE
		2	36	24/07/2013	26/07/2013	37.33	SHAFT SEAL
		3	36	17/07/2013	21/07/2013	81.58	SHAFT SEAL
		3	36	08/07/2013	09/07/2013	33.92	MISCELLANEOUS
		3	36	19/05/2013	29/05/2013	249.33	SHAFT SEAL

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
36	DHAKRANI	3	36	16/06/2013	21/06/2013	111.83	FORCED OUTAGE
		4	36	08/07/2013	09/07/2013	34.67	MISCELLANEOUS
		4	36	16/06/2013	21/06/2013	115.25	FORCED OUTAGE
		4	36	14/05/2013	16/05/2013	52.25	SHAFT SEAL
		2	11.25	01/06/2013	11/06/2013	258.33	ROTOR
		3	11.25	31/07/2013	07/08/2013	175.92	EHG/GOV. FAULTS, MISC.
37	DHALIPUR	3	11.25	03/12/2013	05/02/2014	1541.33	EHG/GOV. FAULTS, MISC.
		1	17	23/07/2013	29/08/2013	885.58	FORCED OUTAGE
		1	17	09/11/2013	10/11/2013	25.33	FORCED OUTAGE
		1	17	02/11/2013	03/11/2013	25.58	FORCED OUTAGE
38	KHATIMA	1	17	14/11/2013	23/11/2013	201.42	FORCED OUTAGE
		2	13.8	11/01/2014	18/03/2014	1575.83	MISCELLANEOUS
		2	13.8	24/10/2013	27/11/2013	811.65	HRI/HRC/SURGF SHAFT PROPS
		2	13.8	09/07/2013	11/07/2013	62.5	MISCELLANEOUS
		2	13.8	17/06/2013	20/06/2013	84.17	FORCED OUTAGE
		2	13.8	30/06/2013	01/07/2013	26	HRI/HRC/SURGF SHAFT PROPS
		3	13.8	24/10/2013	28/11/2013	832.67	HRI/HRC/SURGF SHAFT PROPS
		3	13.8	07/07/2013	08/07/2013	35.8	ALIGNMENT
		3	13.8	30/06/2013	01/07/2013	27.5	HRI/HRC/SURGF SHAFT PROPS
		3	13.8	17/06/2013	20/06/2013	84.83	FORCED OUTAGE
		3	13.8	31/01/2014	03/02/2014	69.33	SHAFT VIBRS./ALIGNM/SOUND
		3	13.8	09/07/2013	11/07/2013	60.83	MISCELLANEOUS
		3	13.8	17/07/2013	19/07/2013	40.5	OIL PROBLEMS
39	KHODRI	4	30	01/07/2013	06/07/2013	121.83	GEN./TR.BREAKER
40	KULHAL	1	10	17/11/2013	19/11/2013	40.75	FORCED OUTAGE
		3	10	15/10/2013	18/10/2013	72.73	FORCED OUTAGE
		3	10	12/11/2013	17/11/2013	106.83	FORCED OUTAGE
		3	10	19/11/2013	28/11/2013	234.08	FORCED OUTAGE
41	MANERI BHALI - I	1	30	19/08/2013	22/08/2013	76.17	OTHER (D/T,GUIDE/STAY VANES
		2	30	19/08/2013	22/08/2013	73.42	OTHER (D/T,GUIDE/STAY VANES
		3	30	19/12/2013	31/12/2013	286.42	MISCELLANEOUS
		3	30	12/11/2013	27/11/2013	361.15	EHG/GOV. FAULTS, MISC.
		3	30	19/08/2013	22/08/2013	75.08	OTHER (D/T,GUIDE/STAY VANES
		3	30	09/12/2013	12/12/2013	70.42	MISCELLANEOUS

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
42	MANERI BHALI - II	1	76	19/07/2013	31/07/2013	291.9	EXCITATION OTHERS
		2	76	26/05/2013	30/05/2013	89.88	SHAFT VIBRS./ALIGNM/SOUND
		2	76	06/08/2013	08/08/2013	62.98	PENSTOCK
		3	76	12/08/2013	14/08/2013	58.95	TURBINE
		4	76	13/11/2013	15/11/2013	49.08	SHAFT SEAL
<u>UPJVNL</u>							
43	KHARA	2	24	12/08/2013	13/08/2013	24.53	GEN./TR.BREAKER
		2	24	05/09/2013	07/09/2013	47.75	AUTO. VOLTAGE REGULATOR
		3	24	15/03/2014	16/03/2014	29.92	GENERATOR FAULTS
44	MATATILA	1	10.2	08/07/2013	12/07/2013	98.58	MISCELLANEOUS
		2	10.2	18/08/2013	20/08/2013	39.75	SHEAR PIN
45	OBRA	1	33	21/11/2013	28/11/2013	175.58	ROTOR
		2	33	25/11/2013	07/12/2013	286.83	SHAFT SEAL
46	RIHAND HPS	5	50	04/12/2013	07/12/2013	77.67	LINE BREAKER
		5	50	09/12/2013	18/12/2013	222.33	EHG/GOV. FAULTS, MISC.
		6	50	31/08/2013	20/09/2013	493.92	LT AC PANELS
<u>WESTERN REGION</u>							
<u>DLHP</u>							
47	BHANDARDHARA HPS ST-II	2	34	23/09/2013	25/09/2013	37.75	HRI/HRC/SURGF SHAFT PROPS
<u>GSECL</u>							
48	UKAI HPS	2	75	08/06/2013	30/06/2013	544.98	SWITCHYARD MISC.
		4	75	23/09/2013	23/03/2014	4352.25	ROTOR
<u>MAHAGENCO</u>							
49	BHIRA TAIL RACE HPS	1	40	12/01/2014	09/02/2014	677.58	LINE BREAKER
		1	40	24/07/2013	02/08/2013	219.17	T.B.OIL SYSTEM PROBLEM
		2	40	26/07/2013	31/07/2013	116.75	UPPER GUIDE BEARING
50	GHATGHAR PSS HPS	1	125	15/11/2013	19/11/2013	118.25	MISCELLANEOUS
		1	125	17/08/2013	23/08/2013	163.17	LINE BREAKER
		1	125	24/11/2013	28/11/2013	80	MISCELLANEOUS
		1	125	16/04/2013	06/05/2013	488.63	PENSTOCK
		2	125	17/04/2013	06/05/2013	464.22	PENSTOCK
51	KOYNA DPH HPS	1	18	18/04/2013	20/04/2013	63.25	EHT/ISOLATOR
		2	18	22/04/2013	24/04/2013	63.25	EHT/ISOLATOR

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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
52	KOYNA-I HPS	1	70	21/10/2013	29/10/2013	202.83	GUIDE VANES
		1	70	09/01/2014	25/01/2014	402.42	EHG/GOV. FAULTS, MISC.
53	KOYNA-II HPS	1	80	01/07/2013	05/07/2013	106.33	TURBINE OTHERS
		2	80	30/09/2013	10/10/2013	253.87	GUIDE VANES
54	KOYNA-III HPS	3	80	29/06/2013	11/10/2013	2501.47	GENERATOR FAULTS
55	KOYNA-IV HPS	1	250	07/10/2013	10/10/2013	90	GENEREATOR COOLING SYSTEM
		1	250	10/02/2014	17/02/2014	181.17	SERVO MOTORS
		1	250	10/03/2014	16/03/2014	165.08	SERVO MOTORS
		1	250	09/01/2014	11/01/2014	70	GENEREATOR COOLING SYSTEM
		2	250	20/08/2013	31/08/2013	276.08	SERVO MOTORS
		2	250	20/07/2013	31/07/2013	283.6	SERVO MOTORS
		3	250	21/10/2013	27/10/2013	162	GENEREATOR COOLING SYSTEM
		3	250	23/09/2013	29/09/2013	162.08	MISCELLANEOUS
		3	250	12/08/2013	17/08/2013	130.42	MISCELLANEOUS
		56	VAITARNA	1	60	22/08/2013	23/08/2013
1	60			04/08/2013	05/08/2013	26.88	GEN./TR.BREAKER
<u>MPPGCL</u>							
57	BANSAGAR TONS-1	1	105	21/06/2013	08/07/2013	397	OTHERS
		1	105	01/04/2013	02/04/2013	41.75	EXCITATION OTHERS
		2	105	23/06/2013	26/06/2013	72.97	EXCITATION PROBLEMS
		3	105	31/07/2013	01/08/2013	36.08	COOLING SYSTEM
		3	105	04/01/2014	18/01/2014	344	ROTOR
58	BANSAGAR TONS-II	1	15	30/06/2013	18/07/2013	428.17	ROTOR
		2	15	12/05/2013	13/05/2013	24.25	EHT/CT/PT
59	GANDHI SAGAR	3	23	14/06/2013	20/06/2013	142.5	MISCELLANEOUS
		5	23	11/09/2013	12/09/2013	26.17	LOWER GUIDE BEARING
60	MADHIKHERA	1	20	03/10/2013	10/10/2013	171.83	MISCELLANEOUS
		1	20	23/08/2013	25/08/2013	27.42	EXCITATION OTHERS
		3	20	22/09/2013	23/09/2013	24.75	EHG/GOV. FAULTS, MISC.
		3	20	30/07/2013	02/08/2013	62.92	ROTOR
		3	20	09/10/2013	10/10/2013	24.5	EHG/GOV. FAULTS, MISC.
61	PENCH	1	80	14/01/2014	17/01/2014	77.02	MISCELLANEOUS
		2	80	05/02/2014	06/02/2014	37.47	ROTOR
62	RAJGHAT	1	15	28/07/2013	31/07/2013	89.17	SERVO MOTORS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>NHDC</u>							
63	INDIRA SAGAR	1	125	06/04/2013	07/04/2013	29	BRAKE AND JACKS
<u>SSNNL</u>							
64	S SAROVAR CHPH	2	50	11/08/2013	21/08/2013	241.5	ROTOR
		3	50	01/05/2013	21/06/2013	1231.83	ROTOR
		3	50	10/04/2013	25/04/2013	355.5	ROTOR
		5	50	09/06/2013	12/06/2013	79.92	TRANSFORMER PROTECTION
65	S SAROVAR RBPH	4	200	04/04/2013	06/04/2013	45.65	TRANSFORMER PROTECTION
<u>TATA MAH.</u>							
66	BHIRA	1	25	08/03/2014	10/03/2014	25.58	TRT/TRC/SURGE CHAMBER PROBLEM
		2	25	08/03/2014	10/03/2014	24.58	TRT/TRC/SURGE CHAMBER PROBLEM
		3	25	08/03/2014	10/03/2014	24.58	TRT/TRC/SURGE CHAMBER PROBLEM
		4	25	08/03/2014	10/03/2014	24.58	TRT/TRC/SURGE CHAMBER PROBLEM
		5	25	08/03/2014	10/03/2014	24.58	TRT/TRC/SURGE CHAMBER PROBLEM
		5	25	31/08/2013	04/09/2013	94.37	EXCITATION OTHERS
67	BHIRA PSS	6	25	08/03/2014	10/03/2014	24.58	TRT/TRC/SURGE CHAMBER PROBLEM
		1	150	26/02/2014	04/03/2014	141.17	TRT/TRC/SURGE CHAMBER PROBLEM
<u>SOUTHERN REGION</u>							
<u>APGENCO</u>							
68	HAMPI	1	9	06/03/2014	08/03/2014	48.5	EXCITATION PROBLEMS
		2	9	13/11/2013	14/11/2013	25.17	EHG/GOV. FAULTS, MISC.
		2	9	10/03/2014	12/03/2014	47.25	EXCITATION OTHERS
		4	9	10/04/2013	13/04/2013	74	OTHER (D/T,GUIDE/STAY VANES
69	LOWER SILERU	1	115	26/07/2013	31/07/2013	106	EXCITATION OTHERS
		2	115	14/06/2013	17/06/2013	65.67	MISCELLANEOUS
		2	115	20/03/2014	29/03/2014	211.25	TURBINE OTHERS
		3	115	12/05/2013	21/05/2013	234.33	MISCELLANEOUS
		3	115	28/07/2013	30/07/2013	55	OTHERS
		3	115	15/01/2014	17/01/2014	48.8	OTHERS
		3	115	30/07/2013	31/07/2013	27.4	SHAFT SEAL
		4	115	12/05/2013	18/05/2013	159.5	OTHER (D/T,GUIDE/STAY VANES
4	115	15/06/2013	22/06/2013	170.38	SHAFT SEAL		

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(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
70	MACHKUND	1	17	22/07/2013	23/07/2013	25.22	EXCITATION PROBLEMS
		1	17	20/04/2013	22/06/2013	1526.03	OTHERS
		2	17	24/03/2014	31/03/2014	153.75	OTHER EQUIPMENT FAULTS
		3	17	04/06/2013	08/06/2013	98.08	EHG/GOV. FAULTS, MISC.
		3	17	12/06/2013	13/06/2013	31.08	OTHERS
		3	17	13/06/2013	14/06/2013	33.58	PROTECTION OPERATION
		3	17	01/08/2013	25/03/2014	5686.42	SWITCHYARD MISC.
		4	21.25	20/03/2014	21/03/2014	27.75	GENERATOR FAULTS
		4	21.25	26/02/2014	19/03/2014	515.08	THRUST BEARING
		4	21.25	06/11/2013	08/11/2013	59.75	PROTECTION OPERATION
		4	21.25	18/10/2013	21/10/2013	77.17	OTHER EQUIPMENT FAULTS
		4	21.25	13/10/2013	15/10/2013	48.75	OTHER EQUIPMENT FAULTS
		4	21.25	22/08/2013	23/08/2013	32.08	EHG/GOV. FAULTS, MISC.
		4	21.25	06/04/2013	18/04/2013	292.75	OTHERS
		4	21.25	19/04/2013	04/05/2013	365.62	EXCITATION OTHERS
		5	21.25	25/09/2013	27/09/2013	48.75	UPPER GUIDE BEARING
		5	21.25	03/06/2013	18/08/2013	1823.33	OTHERS
		5	21.25	20/08/2013	21/08/2013	38.92	LT AC PANELS
		5	21.25	21/09/2013	23/09/2013	55	UPPER GUIDE BEARING
		5	21.25	24/09/2013	25/09/2013	26.33	EHG/GOV. FAULTS, MISC.
		6	21.25	12/06/2013	13/06/2013	30.92	OTHERS
		6	21.25	21/04/2013	22/04/2013	28.17	TURBINE OTHERS
		6	21.25	16/06/2013	14/03/2014	6499.17	GENERATOR FAULTS
71	NAGARJUN SGR	3	100.8	24/12/2013	25/12/2013	30.57	GENERATOR FAULTS
		4	100.8	21/06/2013	26/07/2013	842.7	PROTECTION OPERATION
		4	100.8	30/09/2013	02/10/2013	51.8	ROTOR
		4	100.8	28/10/2013	29/10/2013	40.92	ROTOR
		5	100.8	23/01/2014	05/02/2014	308.5	EHG/GOV. FAULTS, MISC.
		6	100.8	22/04/2013	11/05/2013	458.67	PENSTOCK
		7	100.8	25/06/2013	03/08/2013	941.02	PROTECTION OPERATION
72	NAGARJUN SGR LBC	1	30	01/11/2013	10/11/2013	230.58	EXCITATION OTHERS
		1	30	12/11/2013	13/11/2013	30.83	EHG/GOV. FAULTS, MISC.
73	NAGARJUN SGR RBC	3	30	28/12/2013	03/01/2014	137.5	EHG/GOV. FAULTS, MISC.

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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
74	PRIYADARSHNI JURALA	1	39	23/08/2013	24/08/2013	33.08	SHAFT VIBRS./ALIGNM/SOUND
		2	39	26/08/2013	29/03/2014	5164.05	EXCITATION OTHERS
		3	39	26/08/2013	30/03/2014	5165.18	EXCITATION OTHERS
		5	39	26/08/2013	29/03/2014	5157.63	EXCITATION OTHERS
		6	39	26/08/2013	10/09/2013	352.63	EXCITATION OTHERS
75	SRISAILAM	1	110	27/11/2013	29/11/2013	49.5	MISCELLANEOUS
		2	110	05/10/2013	10/10/2013	116.62	EHG/GOV. FAULTS, MISC.
		3	110	06/10/2013	10/10/2013	112.53	OTHERS
		4	110	06/10/2013	10/10/2013	109.87	OTHERS
		5	110	11/09/2013	15/09/2013	78.07	TRANSFORMER PROTECTION
		5	110	05/10/2013	10/10/2013	114.58	OTHERS
		6	110	05/10/2013	10/10/2013	114.32	GOVERNOR SYSTM
		7	110	05/10/2013	10/10/2013	118.83	EHG/GOV. FAULTS, MISC.
		7	110	05/04/2013	06/04/2013	27.25	GENRATOR OTHERS
76	SRISAILAM LB	1	150	01/04/2013	05/04/2013	113.62	GENRATOR OTHERS
		2	150	01/04/2013	05/04/2013	106.77	GENRATOR OTHERS
		3	150	01/04/2013	05/04/2013	113.62	GENRATOR OTHERS
		4	150	01/04/2013	05/04/2013	113.62	GENRATOR OTHERS
		5	150	01/04/2013	05/04/2013	113.62	GENRATOR OTHERS
		6	150	01/04/2013	05/04/2013	113.62	GENRATOR OTHERS
77	T B DAM	1	9	14/08/2013	16/08/2013	39.42	EHG/GOV. FAULTS, MISC.
		1	9	03/09/2013	04/09/2013	33.47	DRAINAGE DEWATERING SYSTEM
		1	9	24/07/2013	28/07/2013	88.17	EXCITATION OTHERS
		2	9	08/10/2013	10/10/2013	51.58	DC/BATTARY
		3	9	03/09/2013	31/10/2013	1392.17	VIBRATION/SOUND/ ALIGNMENT
		4	9	30/07/2013	18/09/2013	1184.17	ABNORMAL SOUND
		4	9	07/11/2013	09/11/2013	43.83	EXCITATION OTHERS
78	UPPER SILERU	2	60	21/11/2013	23/11/2013	57.75	OTHERS
KPCL							
79	ALMATTI DPH	2	55	21/01/2014	22/01/2014	26.33	GOVERNOR SYSTM
		3	55	10/11/2013	06/12/2013	627.8	SPEED RUNAWAY/OVER /UNDER
		3	55	19/02/2014	26/02/2014	169.92	DESILTING SYSTEM
		6	55	19/02/2014	26/02/2014	169.92	DESILTING SYSTEM

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
80	BHADRA	5	6	01/05/2013	02/05/2013	33	EXCITATION OTHERS
		5	6	28/10/2013	30/10/2013	56.25	AUTO. VOLTAGE REGULATOR
		5	6	20/10/2013	22/10/2013	49.25	AUTO. VOLTAGE REGULATOR
81	GHAT PRABHA	1	16	09/12/2013	19/12/2013	243.25	MISCELLANEOUS
		1	16	19/01/2014	10/02/2014	531.42	MISCELLANEOUS
		2	16	18/05/2013	31/05/2013	317.83	GUIDE VANES
		2	16	15/05/2013	16/05/2013	24.58	GUIDE VANES
		2	16	19/01/2014	10/02/2014	529.33	MISCELLANEOUS
82	JOG	1	13.2	12/06/2013	14/06/2013	36.08	STATION SERVICE TRANSFORM
		1	13.2	01/12/2013	21/12/2013	494.75	MISCELLANEOUS
		1	13.2	09/06/2013	10/06/2013	32.5	GENERATOR FAULTS
		1	13.2	10/11/2013	30/11/2013	492.82	MISCELLANEOUS
		1	13.2	28/01/2014	29/01/2014	27.25	MISCELLANEOUS
		1	13.2	29/04/2013	14/05/2013	360.33	ROTOR
		3	13.2	08/05/2013	19/05/2013	264.5	DC/BATTARY
		4	13.2	16/07/2013	17/07/2013	26.67	GOVERNOR SYSTM
		6	21.6	07/04/2013	08/04/2013	28.58	LT AC PANELS
		6	21.6	11/07/2013	31/03/2014	6292.92	MISCELLANEOUS
		7	21.6	01/04/2013	23/12/2013	6396.92	MISCELLANEOUS
83	KALINADI	1	135	08/01/2014	12/02/2014	840.35	SHAFT VIBRS./ALIGNM/SOUND
		1	135	01/03/2014	03/03/2014	49.18	OTHERS
		1	135	02/09/2013	08/09/2013	142.75	OTHERS
		2	135	02/09/2013	20/11/2013	1907.1	RUNNER BLADE CONTROLPROBLEM
		3	135	10/04/2013	12/04/2013	43.88	OTHER EQUIPMENT FAULTS
		4	150	20/08/2013	22/08/2013	56.83	UGB ALIGNMENT/MISC.
		4	150	03/06/2013	11/06/2013	209.5	COOLING WATER SYSTEM
		5	150	20/08/2013	23/08/2013	72.62	PROTECTION OPERATION
		5	150	16/06/2013	17/06/2013	29.25	MISCELLANEOUS
84	KALINADI SUPA	2	50	28/03/2014	30/03/2014	39.87	MISCELLANEOUS
		2	50	17/06/2013	19/06/2013	44.47	EHG/GOV. FAULTS, MISC.
		2	50	15/05/2013	18/05/2013	91.83	BUS COUPLER BREAKER
85	KODASALI	2	40	06/07/2013	08/07/2013	52.5	MISCELLANEOUS
86	LIGANAMAKKI	1	27.5	03/09/2013	30/09/2013	642.85	TRANSFORMER PROTECTION
		1	27.5	01/10/2013	05/10/2013	111.5	TRANSFORMER PROTECTION

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	27.5	19/07/2013	27/07/2013	192.17	EHT/CT/PT
87	MUNIRABAD	3	10	30/12/2013	31/12/2013	31.07	DAM/SPILL WAYS
88	SHARAVATHI	10	103.5	28/04/2013	05/08/2013	2376.85	UPPER GUIDE BEARING
		10	103.5	29/08/2013	30/08/2013	33.6	PROTECTION OPERATION
		10	103.5	01/12/2013	19/12/2013	452.27	VIBRATION/SOUND/ ALIGNMENT
		10	103.5	19/12/2013	21/12/2013	33.47	VIBRATION/SOUND/ ALIGNMENT
		4	103.5	13/01/2014	14/01/2014	30.13	PROTECTION OPERATION
		5	103.5	26/09/2013	27/09/2013	33.67	EXCITATION PROBLEMS
		9	103.5	03/09/2013	05/09/2013	52.32	ROTOR
		9	103.5	12/08/2013	17/08/2013	132.53	PROTECTION OPERATION
89	SIVASAMUNDRUM	10	6	23/10/2013	26/10/2013	76.75	SHAFT SEAL
		7	6	17/10/2013	18/10/2013	40.17	TURBINE OTHERS
90	VARAHI	2	115	08/12/2013	19/12/2013	275.18	ROTOR
<u>KSEB</u>							
91	IDUKKI	1	130	27/12/2013	29/12/2013	45.6	EXCITATION OTHERS
		2	130	08/12/2013	12/12/2013	98.72	EXCITATION OTHERS
		3	130	29/01/2014	31/01/2014	41.73	VIBRATION/SOUND/ ALIGNMENT
		5	130	03/11/2013	13/11/2013	238.83	LINE BREAKER
92	KUTTIYADI ADDL. EXTN.	6	50	09/07/2013	12/07/2013	64	OTHERS
93	LOWER PERIYAR	3	60	05/08/2013	10/08/2013	123.7	ROTOR
94	NARIAMANGLAM	2	15	21/02/2014	23/02/2014	48.5	FIRE /CO2 SYSTEM
95	PORINGALKUTTU	2	8	23/05/2013	24/05/2013	24.6	GENERATOR COOLING SYSTEM
		2	8	25/08/2013	28/08/2013	58.82	EHG/GOV. FAULTS, MISC.
		3	8	23/05/2013	24/05/2013	24.85	GENERATOR COOLING SYSTEM
		3	8	01/11/2013	03/11/2013	53.87	EXCITATION PROBLEMS
		4	8	01/06/2013	04/06/2013	63.22	OIL PROBLEMS
		4	8	03/10/2013	04/10/2013	27.33	GENERATOR COOLING SYSTEM
		4	8	10/04/2013	12/04/2013	56.65	PROTECTION OPERATION
		4	8	23/05/2013	25/05/2013	47.77	PROTECTION OPERATION
		4	8	03/05/2013	06/05/2013	72.18	PROTECTION OPERATION
		4	8	26/04/2013	27/04/2013	28.15	PROTECTION OPERATION
96	SABARIGIRI	1	50	01/11/2013	17/11/2013	374.3	PENSTOCK
		2	50	14/11/2013	17/11/2013	62.4	PENSTOCK
		3	50	23/02/2014	24/02/2014	32.43	ROTOR

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		6	50	20/11/2013	21/11/2013	25.95	GOVERNOR SYSTM
		6	50	16/10/2013	22/10/2013	154.03	PROTECTION OPERATION
		6	50	16/08/2013	18/08/2013	59.95	MISCELLANEOUS
97	SENGULAM	2	12	18/02/2014	02/03/2014	296.88	FORCED OUTAGE
98	SHOLAYAR	1	18	01/12/2013	02/12/2013	32.27	ROTOR
		1	18	09/12/2013	20/12/2013	275.48	OTHER (D/T,GUIDE/STAY VANES
		2	18	01/04/2013	03/04/2013	64.87	EXCITATION PROBLEMS
		3	18	08/05/2013	10/05/2013	52.63	DRAINAGE DEWATERING SYSTEM
<u>TNGDCL</u>							
99	BHAWANI BARRAGE-II	1	15	30/10/2013	31/10/2013	41.75	MISCELLANEOUS
		2	15	28/10/2013	30/10/2013	47.82	OTHER (D/T,GUIDE/STAY VANES
100	KADAMPARI	1	100	01/07/2013	29/07/2013	691.75	RUNNER/UNDER WATER PARTS
		3	100	16/03/2014	31/03/2014	350	TURBINE
		4	100	23/08/2013	24/08/2013	29.08	GEN./TR.BREAKER
101	KODAYAR	1	60	06/01/2014	10/01/2014	85.95	GOVERNOR SYSTM
		2	40	01/07/2013	29/07/2013	689.58	THRUST BEARING
		2	40	01/06/2013	20/06/2013	457.58	SHEAR PIN
		2	40	27/06/2013	30/06/2013	71.3	THRUST BEARING
		2	40	19/11/2013	04/01/2014	1123.5	MISCELLANEOUS
102	KUNDAH	11	60	02/10/2013	05/10/2013	72.42	OIL PROBLEMS
		12	50	13/02/2014	26/02/2014	324.33	DAM/SPILL WAYS
		13	50	09/05/2013	10/05/2013	32.08	SHEAR PIN
		14	20	25/08/2013	12/11/2013	1881.75	SHEAR PIN
		15	20	07/12/2013	08/12/2013	33.42	SWITCHYARD MISC.
		5	35	17/01/2014	18/01/2014	33.5	MISCELLANEOUS
		5	35	20/05/2013	21/05/2013	26.42	PENSTOCK
		6	35	18/05/2013	24/05/2013	151.25	GEN./TR.BREAKER
		6	35	19/08/2013	21/08/2013	56.55	PENSTOCK
		7	35	09/11/2013	20/11/2013	270.5	GEN./TR.BREAKER
		7	35	18/02/2014	20/02/2014	50.33	MISCELLANEOUS
		9	60	20/01/2014	22/01/2014	45.87	MISCELLANEOUS
103	LOWER METTUR	3	15	09/09/2013	24/09/2013	372.25	GENERATOR FAULTS
		4	15	01/11/2013	10/11/2013	230.83	GENERATOR FAULTS
		5	15	07/08/2013	29/08/2013	507.97	UGB ALIGNMENT/MISC.

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
104	METTUR DAM	5	15	04/08/2013	07/08/2013	79.25	UGB ALIGNMENT/MISC.
		6	15	04/08/2013	07/08/2013	81.67	MISCELLANEOUS
		2	12.5	08/03/2014	29/03/2014	508.42	PENSTOCK
		1	50	14/08/2013	01/02/2014	4103.75	HRI/HRC/SURGF SHAFT PROPS
105	METTUR TUNNEL	1	50	14/08/2013	01/02/2014	4103.75	HRI/HRC/SURGF SHAFT PROPS
106	MOYAR	1	12	20/11/2013	23/11/2013	71.18	PENSTOCK
		1	12	11/07/2013	18/07/2013	176.58	PROTECTION OPERATION
		1	12	11/06/2013	15/06/2013	96.67	PROTECTION OPERATION
		1	12	30/04/2013	01/05/2013	26.92	STATION SERVICE TRANSFORM
		1	12	21/07/2013	30/07/2013	224.17	PROTECTION OPERATION
		3	12	07/12/2013	13/12/2013	154	PROTECTION OPERATION
		3	12	19/11/2013	20/11/2013	37.58	PENSTOCK
		1	8	21/01/2014	27/01/2014	146.03	LGB OIL SYSTEMS PROBLEMBS
		3	8	10/09/2013	14/09/2013	85.5	GOVERNOR SYSTM
		4	8	22/01/2014	17/03/2014	1293	EHG/GOV. FAULTS, MISC.
107	PAPANASAM	4	8	03/07/2013	14/07/2013	247	FOREBAY/RES./INSEPCION/REPAIR/PR ORIFM
		1	30	12/04/2013	27/07/2013	2540.25	MISCELLANEOUS
108	PARSON'S VALLEY	1	7	03/07/2013	18/07/2013	360.25	PENSTOCK
		1	7	11/06/2013	15/06/2013	105.92	PENSTOCK
		2	7	21/12/2013	23/12/2013	59.83	PROTECTION OPERATION
		2	7	11/06/2013	15/06/2013	116.55	PENSTOCK
		2	7	09/08/2013	10/08/2013	25.42	EHG/GOV. FAULTS, MISC.
		3	7	15/07/2013	26/07/2013	267.42	PENSTOCK
		3	7	26/06/2013	12/07/2013	397.33	STATION SERVICE TRANSFORM
		3	7	16/06/2013	17/06/2013	24.5	PENSTOCK
		3	7	11/06/2013	15/06/2013	105.92	PENSTOCK
		3	7	05/10/2013	07/10/2013	54.75	PENSTOCK
109	PYKARA	5	13.6	03/06/2013	05/06/2013	52.25	PENSTOCK
		5	13.6	05/10/2013	07/10/2013	54.75	PENSTOCK
		5	13.6	16/06/2013	17/06/2013	24.5	PENSTOCK
		1	50	19/05/2013	11/06/2013	558.83	OTHER (D/T,GUIDE/STAY VANES
		2	50	17/11/2013	24/11/2013	170.47	PENSTOCK
		2	50	23/02/2014	28/02/2014	120.42	MISCELLANEOUS
		3	50	19/05/2013	11/06/2013	558.83	OTHER (D/T,GUIDE/STAY VANES
		1	35	30/11/2013	07/02/2014	1649.72	COOLING SYSTEM
		1	35	22/08/2013	23/08/2013	25.08	OIL PROBLEMS
110	PYKARA ULTMATE	1	50	19/05/2013	11/06/2013	558.83	OTHER (D/T,GUIDE/STAY VANES
		2	50	17/11/2013	24/11/2013	170.47	PENSTOCK
		2	50	23/02/2014	28/02/2014	120.42	MISCELLANEOUS
		3	50	19/05/2013	11/06/2013	558.83	OTHER (D/T,GUIDE/STAY VANES
111	SHOLAYAR	1	35	30/11/2013	07/02/2014	1649.72	COOLING SYSTEM
		1	35	22/08/2013	23/08/2013	25.08	OIL PROBLEMS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>EASTERN REGION</u>							
<u>DVC</u>							
111	MAITHON	1	23.2	05/07/2013	10/07/2013	123.38	THRUST BEARING
		1	23.2	10/08/2013	12/08/2013	63.75	THRUST BEARING
		2	20	12/06/2013	13/06/2013	25.8	MISCELLANEOUS
		2	20	24/09/2013	28/09/2013	111.58	EXCITATION OTHERS
		2	20	03/10/2013	27/10/2013	570.22	OTHERS
		3	20	22/06/2013	23/06/2013	24.8	THRUST BEARING
		3	20	07/12/2013	09/12/2013	49.5	SWITCHYARD MISC.
		3	20	15/07/2013	16/07/2013	29.93	OTHERS
		3	20	07/10/2013	08/10/2013	35.72	DAM/SPILL WAYS
		3	20	06/11/2013	16/11/2013	248.25	COOLING SYSTEM
112	PANCHET	1	40	01/04/2013	30/09/2013	4391.98	GENERATOR FAULTS
		1	40	14/10/2013	17/10/2013	80.57	TURBINE OTHERS
		2	40	01/04/2013	07/05/2013	885.5	GENERATOR FAULTS
		2	40	25/07/2013	27/07/2013	50.95	EHG/GOV. FAULTS, MISC.
		2	40	13/08/2013	27/08/2013	343.92	EHG/GOV. FAULTS, MISC.
		2	40	03/12/2013	16/12/2013	317.63	MISCELLANEOUS
		2	40	06/01/2014	24/01/2014	443.5	AUTO. VOLTAGE REGULATOR
<u>JSEB</u>							
113	SUBERNREKHA	1	65	03/11/2013	09/11/2013	153.83	GENERATOR FAULTS
<u>NHPC</u>							
114	RANGIT	1	20	26/02/2014	27/02/2014	41.97	OTHER (D/T,GUIDE/STAY VANES
		3	20	26/02/2014	27/02/2014	42.15	OTHER (D/T,GUIDE/STAY VANES
		3	20	17/10/2013	25/10/2013	204.75	FORCED OUTAGE
115	TEESTA LOW DAM-III	1	33	11/07/2013	23/07/2013	291.35	SHAFT SEAL
		1	33	17/08/2013	21/08/2013	103.6	SHAFT SEAL
		1	33	22/08/2013	31/08/2013	218.32	SHAFT SEAL
		1	33	23/10/2013	25/10/2013	62.18	SHAFT SEAL
		1	33	11/12/2013	13/12/2013	46.75	FORCED OUTAGE
		1	33	28/12/2013	31/03/2014	2225.3	FORCED OUTAGE
		1	33	09/07/2013	10/07/2013	26.67	PROTECTION OPERATION
		1	33	30/05/2013	31/05/2013	25.97	DAM/SPILL WAYS
		1	33	27/05/2013	28/05/2013	24.6	EXCITATION OTHERS
		1	33	27/07/2013	01/08/2013	131.48	SHAFT SEAL

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	33	05/05/2013	31/03/2014	7901.18	SHAFT SEAL
		3	33	20/07/2013	21/07/2013	28.47	DAM/SPILL WAYS
		3	33	23/07/2013	01/08/2013	223.38	SHAFT SEAL
		3	33	13/10/2013	15/10/2013	41.03	TURBINE OTHERS
		3	33	28/12/2013	31/03/2014	2225.3	FORCED OUTAGE
		3	33	30/05/2013	31/05/2013	25.9	DAM/SPILL WAYS
		4	33	30/05/2013	31/05/2013	25.8	DAM/SPILL WAYS
		4	33	01/07/2013	02/07/2013	33.9	EXCITATION OTHERS
		4	33	02/07/2013	04/07/2013	48.9	SHAFT SEAL
		4	33	04/07/2013	01/08/2013	677.27	SHAFT SEAL
		4	33	01/11/2013	02/11/2013	39.52	GUIDE VANES
		4	33	28/12/2013	31/03/2014	2225.3	FORCED OUTAGE
		116	TEESTA V	3	170	11/10/2013	13/10/2013
<u>OHPC</u>							
117	BALIMELA	3	60	09/12/2013	28/12/2013	459.97	PENSTOCK
		3	60	08/01/2014	10/01/2014	58	LGB OIL SYSTEMS PROBLEMBS
		3	60	30/11/2013	04/12/2013	99	DESILTING SYSTEM
		3	60	06/08/2013	10/11/2013	2313.03	PADS
		4	60	10/12/2013	12/12/2013	52.97	LINE BREAKER
		4	60	16/12/2013	17/12/2013	31.17	LGB ALIGNMENT/MISC
		4	60	01/04/2013	06/05/2013	852.27	GENRATOR OTHERS
		5	60	01/10/2013	05/10/2013	107.5	OIL PROBLEMS
		5	60	16/09/2013	17/09/2013	24.63	OIL PROBLEMS
		5	60	17/01/2014	20/01/2014	76.08	PENSTOCK
		6	60	10/12/2013	13/12/2013	53.58	LINE BREAKER
		7	75	14/05/2013	28/05/2013	334.67	EHG/GOV. FAULTS, MISC.
		7	75	10/12/2013	13/12/2013	61.67	LINE BREAKER
		7	75	25/10/2013	26/10/2013	29	EHG/GOV. FAULTS, MISC.
		7	75	01/10/2013	06/10/2013	133.17	EHG/GOV. FAULTS, MISC.
		7	75	16/09/2013	30/09/2013	338.98	EHG/GOV. FAULTS, MISC.
		7	75	30/06/2013	08/07/2013	193.25	EHG/GOV. FAULTS, MISC.
		8	75	30/06/2013	19/07/2013	453	EHG/GOV. FAULTS, MISC.
		8	75	25/12/2013	30/12/2013	119.67	EHG/GOV. FAULTS, MISC.
		8	75	10/12/2013	13/12/2013	61.67	LINE BREAKER

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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
118	HIRAKUD	8	75	25/10/2013	26/10/2013	28.67	EHG/GOV. FAULTS, MISC.
		1	49.5	23/08/2013	26/08/2013	71.92	EHG/GOV. FAULTS, MISC.
		1	49.5	17/08/2013	21/08/2013	88.48	EHG/GOV. FAULTS, MISC.
		10	24	09/08/2013	10/08/2013	33.38	EXCITATION PROBLEMS
		10	24	29/09/2013	30/09/2013	26.42	EHG/GOV. FAULTS, MISC.
		10	24	01/08/2013	02/08/2013	42.5	EXCITATION PROBLEMS
		10	24	15/07/2013	31/07/2013	385.73	SHEAR PIN
		10	24	25/06/2013	27/06/2013	38.25	EHG/GOV. FAULTS, MISC.
		10	24	04/04/2013	14/06/2013	1708.5	TURBINE OTHERS
		2	49.5	26/09/2013	28/09/2013	39.92	EHG/GOV. FAULTS, MISC.
		2	49.5	10/06/2013	18/06/2013	182.83	EHG/GOV. FAULTS, MISC.
		2	49.5	30/06/2013	02/07/2013	41.28	EHG/GOV. FAULTS, MISC.
		2	49.5	12/09/2013	16/09/2013	84.33	EHG/GOV. FAULTS, MISC.
		3	32	08/04/2013	11/04/2013	72.08	EHG/GOV. FAULTS, MISC.
		3	32	03/09/2013	04/09/2013	34	SHEAR PIN
		5	37.5	14/08/2013	16/08/2013	40.58	MISCELLANEOUS
		5	37.5	18/07/2013	20/07/2013	48.25	PENSTOCK
		5	37.5	15/07/2013	18/07/2013	69.42	PENSTOCK
		5	37.5	14/09/2013	27/09/2013	301.15	EHG/GOV. FAULTS, MISC.
		5	37.5	27/09/2013	30/09/2013	83.83	PENSTOCK
		5	37.5	01/10/2013	12/10/2013	281.67	OTHER EQUIPMENT FAULTS
		6	37.5	10/04/2013	26/11/2013	5510.75	TURBINE OTHERS
		7	37.5	25/08/2013	02/09/2013	200.08	THRUST BEARING
		7	37.5	08/09/2013	09/09/2013	28.08	EHG/GOV. FAULTS, MISC.
		8	24	30/05/2013	07/07/2013	906.17	EHG/GOV. FAULTS, MISC.
119	RENGALI	2	50	29/09/2013	30/09/2013	27.58	DESILTING SYSTEM
		3	50	23/12/2013	04/01/2014	288.17	DESILTING SYSTEM
		4	50	18/09/2013	19/09/2013	33.33	GOVERNOR SYSTM
120	UPPER INDRAVATI	1	150	28/04/2013	30/04/2013	47.25	GUIDE VANES
		1	150	02/05/2013	06/05/2013	104.37	GUIDE VANES
121	UPPER KOLAB	1	80	15/07/2013	16/07/2013	30.83	SHEAR PIN
		1	80	03/09/2013	06/09/2013	76.17	GEN./TR.BREAKER
		1	80	07/10/2013	21/10/2013	339.83	PENSTOCK
		2	80	17/06/2013	19/06/2013	46.5	GEN./TR.BREAKER

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	80	11/03/2014	14/03/2014	81.75	DESILTING SYSTEM
		3	80	01/08/2013	23/08/2013	547.73	PROTECTION OPERATION
		3	80	02/09/2013	03/09/2013	25.97	ROTOR
		3	80	26/07/2013	31/07/2013	126.98	PROTECTION OPERATION
		4	80	27/07/2013	29/07/2013	26.05	PROTECTION OPERATION
<u>WBSEDCL</u>							
122	JALDHAKA I	1	9	01/10/2013	31/03/2014	4325.58	SERVO MOTORS
		1	9	13/09/2013	15/09/2013	51.33	MISCELLANEOUS
		1	9	30/07/2013	01/09/2013	778.5	PROTECTION OPERATION
		1	9	09/07/2013	10/07/2013	26.42	MISCELLANEOUS
		1	9	30/05/2013	31/05/2013	30.83	OTHERS
		1	9	07/09/2013	08/09/2013	33.33	MISCELLANEOUS
		2	9	27/12/2013	31/12/2013	98.48	OTHERS
		2	9	21/03/2014	22/03/2014	24.48	MISCELLANEOUS
		2	9	13/09/2013	15/09/2013	40.17	MISCELLANEOUS
		2	9	06/09/2013	07/09/2013	28.98	MISCELLANEOUS
		2	9	30/07/2013	01/09/2013	779.28	MISCELLANEOUS
		2	9	05/04/2013	13/04/2013	170.08	OTHERS
		2	9	09/07/2013	10/07/2013	26.73	MISCELLANEOUS
		2	9	27/07/2013	28/07/2013	30.7	MISCELLANEOUS
		3	9	24/04/2013	25/04/2013	26.83	UPPER GUIDE BEARING
		3	9	09/07/2013	10/07/2013	26.05	MISCELLANEOUS
		3	9	27/07/2013	28/07/2013	30.83	MISCELLANEOUS
		3	9	31/07/2013	01/09/2013	751.73	MISCELLANEOUS
		3	9	29/11/2013	30/11/2013	27.58	EXCITATION PROBLEMS
<u>NORTH EASTERN REGION</u>							
<u>APGPCL</u>							
123	KARBI LANGPI	2	50	16/05/2013	17/05/2013	25.97	MISCELLANEOUS
		2	50	27/07/2013	28/07/2013	39.93	OIL HANDLING SYSTEM
		2	50	04/12/2013	28/12/2013	559.75	MISCELLANEOUS
<u>MeECL</u>							
124	KYRDEMKULAI	1	30	14/05/2013	15/05/2013	34.92	EXCITATION OTHERS
		1	30	07/05/2013	11/05/2013	102.17	POWER HOUSE MISC.
125	MYNTDU(LESHKA) St-1	1	42	25/04/2013	27/04/2013	42.87	SHAFT SEAL
		1	42	07/05/2013	10/05/2013	78.5	EXCITATION OTHERS

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		1	42	16/05/2013	18/05/2013	44.33	NEEDLE PROBLEM
		1	42	25/05/2013	27/05/2013	44.17	SHAFT SEAL
		1	42	07/06/2013	09/06/2013	44.33	THRUST BEARING
		1	42	23/01/2014	25/01/2014	43.75	MISCELLANEOUS
		1	42	17/03/2014	19/03/2014	46.58	TURBINE FAULTS
		1	42	16/04/2013	18/04/2013	47.17	OTHERS
		2	42	25/08/2013	27/08/2013	42.17	EXCITATION PROBLEMS
		2	42	13/05/2013	15/05/2013	43.33	EXCITATION PROBLEMS
		2	42	10/04/2013	12/04/2013	45.25	OTHERS
		3	42	16/04/2013	18/04/2013	46.08	OTHERS
		3	42	06/05/2013	08/05/2013	46.67	MISCELLANEOUS
		3	42	02/04/2013	04/04/2013	45.5	TURBINE OTHERS
		3	42	05/04/2013	07/04/2013	45.22	EXCITATION OTHERS
		3	42	26/05/2013	28/05/2013	45.33	MISCELLANEOUS
		3	42	21/05/2013	22/05/2013	43.83	EXCITATION OTHERS
126	UMIAM HPS ST-I	4	9	12/04/2013	11/06/2013	1442.33	MISCELLANEOUS
		4	9	10/10/2013	11/10/2013	25.75	COOLING WATER SYSTEM
127	UMIAM HPS ST-IV	7	30	21/05/2013	22/05/2013	32	TURBINE OTHERS
		7	30	29/08/2013	31/08/2013	57	THRUST BEARING
		7	30	12/12/2013	29/12/2013	419.83	PADS
		7	30	30/12/2013	06/01/2014	150.65	PADS
		7	30	06/01/2014	07/01/2014	28.08	PADS
		8	30	28/10/2013	16/12/2013	1192.5	UPPER GUIDE BEARING
<u>NEEPCO.</u>							
128	DOYANG	3	25	20/10/2013	22/10/2013	44.33	FORCED OUTAGE
129	KHONDONG	1	25	25/11/2013	31/03/2014	3014	PENSTOCK
		1	25	15/10/2013	16/10/2013	27.77	OIL PROBLEMS
		1	25	10/08/2013	23/08/2013	320.08	FORCED OUTAGE
		1	25	28/07/2013	31/07/2013	72.88	MISCELLANEOUS
		2	25	05/01/2014	06/01/2014	27.23	TURBINE OTHERS
		2	25	22/11/2013	23/11/2013	24.72	LOWER GUIDE BEARING
		2	25	10/08/2013	23/08/2013	324.62	FORCED OUTAGE
		2	25	14/06/2013	15/06/2013	42.87	OIL PROBLEMS
		2	25	08/06/2013	09/06/2013	43.15	SHAFT SEAL

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
130	KOPILI	2	25	22/01/2014	23/01/2014	32	OTHER (D/T,GUIDE/STAY VANES
		1	50	12/09/2013	14/09/2013	44.53	OTHER (D/T,GUIDE/STAY VANES
		1	50	24/09/2013	25/09/2013	24.75	COOLING SYSTEM
		1	50	30/09/2013	01/10/2013	31	TURBINE OTHERS
		1	50	13/10/2013	17/10/2013	96.1	TURBINE OTHERS
		1	50	28/10/2013	01/11/2013	109.47	MISCELLANEOUS
		1	50	04/12/2013	07/12/2013	77.43	ROTOR
		1	50	09/04/2013	10/04/2013	31.98	OTHER (D/T,GUIDE/STAY VANES
		1	50	10/05/2013	13/05/2013	77.68	COOLING WATER SYSTEM
		1	50	16/05/2013	17/05/2013	40.05	GOVERNOR SYSTM
		1	50	06/06/2013	12/06/2013	158.28	SHAFT SEAL
		1	50	13/06/2013	19/06/2013	156.1	TURBINE
		1	50	02/07/2013	03/07/2013	26.67	COOLING SYSTEM
		1	50	22/07/2013	24/07/2013	53.82	GUIDE VANES
		1	50	02/08/2013	06/08/2013	96.65	THRUST BEARING
		1	50	20/08/2013	26/08/2013	154.3	UPPER GUIDE BEARING
		1	50	04/09/2013	10/09/2013	149.08	FORCED OUTAGE
		2	50	10/11/2013	25/11/2013	365.37	MISCELLANEOUS
		2	50	09/04/2013	10/04/2013	38.08	OTHER (D/T,GUIDE/STAY VANES
		2	50	14/04/2013	15/04/2013	28.33	MISCELLANEOUS
		2	50	24/04/2013	29/06/2013	1582.48	GUIDE VANES
		2	50	25/07/2013	27/07/2013	67.1	SHAFT SEAL
		2	50	20/08/2013	22/08/2013	52.23	PENSTOCK
		2	50	03/08/2013	05/08/2013	57.47	FORCED OUTAGE
		2	50	30/10/2013	01/11/2013	58.83	FORCED OUTAGE
		2	50	24/10/2013	25/10/2013	30.35	SHAFT SEAL
		2	50	30/08/2013	16/09/2013	409.8	T.B.OIL SYSTEM PROBLEM
		2	50	28/08/2013	30/08/2013	47.28	GUIDE VANES
		2	50	28/07/2013	31/07/2013	80.42	GUIDE VANES
		3	50	11/01/2014	13/01/2014	49.3	OIL PROBLEMS
		3	50	22/01/2014	23/01/2014	27.35	COOLING SYSTEM
		3	50	23/08/2013	04/09/2013	299.72	GUIDE VANES
		3	50	23/09/2013	26/09/2013	85.58	SHAFT SEAL
		3	50	07/10/2013	09/10/2013	57.1	FORCED OUTAGE

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2013-2014
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	50	31/07/2013	14/08/2013	334.88	SHAFT SEAL
		3	50	03/11/2013	05/11/2013	47.48	MISCELLANEOUS
		3	50	26/10/2013	28/10/2013	46.92	SHAFT SEAL
		3	50	28/07/2013	30/07/2013	58.55	GUIDE VANES
		3	50	15/07/2013	17/07/2013	63.57	OTHER (D/T,GUIDE/STAY VANES
		3	50	03/07/2013	05/07/2013	44.55	GUIDE VANES
		3	50	06/06/2013	10/06/2013	94.85	SHAFT SEAL
		3	50	20/05/2013	23/05/2013	90.83	MISCELLANEOUS
		3	50	01/05/2013	08/05/2013	184.7	MISCELLANEOUS
		3	50	04/04/2013	19/04/2013	365.75	PENSTOCK
		4	50	11/07/2013	13/07/2013	55.6	MISCELLANEOUS
		4	50	08/06/2013	13/06/2013	129.93	SHAFT SEAL
		4	50	31/05/2013	07/06/2013	178.58	MISCELLANEOUS
		4	50	08/05/2013	15/05/2013	172.12	FORCED OUTAGE
		4	50	15/07/2013	16/07/2013	39.52	OTHER (D/T,GUIDE/STAY VANES
		4	50	24/01/2014	12/03/2014	1133.37	MISCELLANEOUS
		4	50	08/08/2013	11/08/2013	65.88	FORCED OUTAGE
		4	50	13/08/2013	06/10/2013	1300.72	SHAFT SEAL
		4	50	25/10/2013	26/10/2013	36.23	FORCED OUTAGE
		4	50	05/12/2013	10/12/2013	129.45	TURBINE OTHERS
		4	50	09/01/2014	11/01/2014	47.52	TURBINE OTHERS
		4	50	27/07/2013	02/08/2013	145.17	SHAFT SEAL
		5	25	18/12/2013	31/03/2014	2455.33	TURBINE OTHERS
		5	25	12/10/2013	25/11/2013	1058.75	LOWER GUIDE BEARING
		5	25	20/07/2013	04/08/2013	366.05	COOLING WATER SYSTEM
		5	25	07/07/2013	08/07/2013	24.93	LOWER GUIDE BEARING
		5	25	06/06/2013	07/06/2013	29	LOWER GUIDE BEARING
		5	25	21/06/2013	22/06/2013	32.15	COOLING WATER SYSTEM
131	RANGANADI HPS.	1	135	23/11/2013	04/12/2013	276.37	GEN./TR.BREAKER
		3	135	12/06/2013	14/06/2013	38.48	ROTOR
<u>NHPC</u>							
132	LOKTAK HPS.	3	35	03/04/2013	04/04/2013	26	BRAKE AND JACKS
		3	35	21/04/2013	28/04/2013	186.15	COOLING WATER SYSTEM

CHAPTER 6

OPERATING AVAILABILITY OF THE UNITS

CHAPTER-6

OPERATING AVAILABILITY OF HE UNITS

6.1 On the basis of planned maintenance undertaken and forced outages caused at 653 Hydro Electric Generating units of 188 HE Stations comprising of 40531.41 MW for which data has been received & analyzed, operating availability of various units and stations has been computed. During the year 2013-14, the average availability of generating units on all India basis was 88.48% as compared to 89.17% during 2012-13.

6.2 Twenty eight H.E. Stations achieved operating availability of more than 99%. The details of these stations are given in **Table 6.1**.

TABLE 6.1

HYDRO-ELECTRIC POWER STATIONS WHICH PROVIDED HIGHEST OPERATING AVAILABILITY DURING 2013-14

Sl. No.	NAME OF POWER STATION	UTILITY	CAPACITY (MW)	% OPERATING AVAILABILITY OF STATION
1	BHAKRA RIGHT	BBMB	785.00	100.00
2	RAMPUR	SJVN	206.01	100.00
3	POCHAMPAD	APGENCO	27.00	100.00
4	UPPER SILERU-II	APGENCO	120.00	100.00
5	BHAWANI BARRAGE III	TANGEDCO	30.00	99.99
6	BASPA	JPVL	300.00	99.98
7	MAHI BAJAJ-II	RRUVNL	90.00	99.94
8	BHIVPURI	TATA	75.00	99.92
9	MUKERIAN-III	PSPCL	58.50	99.89
10	MALANA	MPCL	86.00	99.78
11	TILLARI	MAHAGENCO	60.00	99.78
12	RAMMAM	WBSEDCL	50.00	99.77
13	MAHI BAJAJ-I	RRUVNL	50.00	99.69
14	NAGARJUN SGR RBC	APGENCO	60.00	99.67

Sl. No.	NAME OF POWER STATION	UTILITY	CAPACITY (MW)	% OPERATING AVAILABILITY OF STATION
15	UPPER SILERU-I	APGENCO	120.00	99.67
16	OMKARESHWAR	NHDC	520.00	99.66
17	MUKERIAN-I	PSPCL	45.00	99.63
18	MUKERIAN-II	PSPCL	45.00	99.63
19	NIMBOO BAZDO	NHPC	45.00	99.61
20	ALLAIN DUHANGAN	ADHPL	192.00	99.56
21	BHANDARDHARA ST-II	DLHP	34.00	99.53
22	MUKERIAN-IV	PSPCL	58.50	99.50
23	LOWER JHELM	JKSPDC	105.00	99.48
24	KARCHAM WANGTOO	JPVL	1000.00	99.29
25	KOYNA DPH	MAHAGENCO	36.00	99.28
26	KADRA	KPCL	150.00	99.24
27	PONG	BBMB	396.00	99.17
28	PARBATI-III	NHPC	390.00	99.12

6.3 OPERATING AVAILABILITY - REGIONWISE

Region wise operating availability of hydro-electric units during 2013-14 is indicated in **Table 6.2**. It would be seen that the operating availability of hydel generating units in Western Region was the highest (92.16%). This was mainly due to comparatively less planned maintenance and forced outages.

The operating availability was the lowest in case of units in North Eastern Region (82.71%).

The station wise/unit wise non-availability due to Planned Maintenance (P.M) and Forced Outages (F.O) and overall operating availability of various H.E. Stations in the country is indicated in Annex-6.1. Station wise details are shown in **Exhibits from 6.1 to 6.14**.

TABLE 6.2
AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2013-14

SL. No.	REGION	NO.OF UNITS	INSTALLED CAPACITY MW	PLANNED MAINTENANCE %	FORCED OUTAGE %	OPERATING AVAILABILITY
1	NORTHERN	219	16386.26	6.08	6.25	87.67
2	WESTERN	101	7392.00	5.53	2.31	92.16
3	SOUTHERN	243	11432.45	6.63	5.94	87.43
4	EASTERN	61	4078.70	4.28	5.96	89.76
5	NORTH EASTERN	29	1242.00	6.65	10.64	82.71
	ALL INDIA	653	40531.41	5.97	5.55	88.48

6.4 OPERATING AVAILABILITY: AGE-WISE

The average operating availability during 2013-14 of hydro units commissioned in various years has been indicated in **Table 6.3**. It is seen that unit commissioned during 2013-14 have achieved the highest operating availability of 96.74%. Operating availability was less than 90% for the units commissioned during the period 2012-13, 2009-10, 2006-07, 2005-06, 2002-03, 2000-2001, 1978-79 to 1988-89, 1967-68 to 1977-78 and those commissioned up to 1966-67. Operating availability was more than 90% for all the other years.

TABLE - 6.3
OPERATING AVAILABILITY - AGE-WISE
PERIOD: 2013-14

SL. NO	YEAR OF COMMISSIONING	NUMBER OF UNITS	INSTALLED CAPACITY (MW)	OPERATING AVAILABILITY
1	2013-2014	19	1058.01	96.74
2	2012-2013	14	501.00	79.37
3	2011-2012	11	1423.00	96.68
4	2010-2011	11	690.00	90.13
5	2009-2010	1	39.00	0.00
6	2008-2009	8	969.00	91.69
7	2007-2008	23	2443.00	96.23

SL. NO	YEAR OF COMMISSIONING	NUMBER OF UNITS	INSTALLED CAPACITY (MW)	OPERATING AVAILABILITY
8	2006-2007	21	2286.00	80.40
9	2005-2006	13	1340.00	70.50
10	2004-2005	13	1115.00	94.23
11	2003-2004	18	2690.00	95.14
12	2002-2003	11	740.60	75.41
13	2001-2002	20	1092.20	86.45
14	2000-2001	13	1129.00	78.17
15	1989-90 TO 1999-2000	87	5775.70	92.46
16	1978-79 TO 1988-89	124	7257.60	89.77
17	1967-68 TO 1977-78	82	5300.25	88.44
18	UP TO 1966-67	164	4682.05	82.70
	TOTAL	653	40531.41	88.48

6.5 OPERATING AVAILABILITY - UTILITY WISE

Sector wise/State Electricity Board/Power Generating Corporation wise operating availability of HE units is indicated in **Table 6.4**.

It has been observed that operating availability of generating units among the utilities was the highest 99.78% for MPCL.

6.6 MISCELLANEOUS NON AVAILABILITY

Non-availability of hydel generating units due to reasons other than planned maintenance and forced outages of unit components, auxiliary and other equipments and civil structures has been defined as “Miscellaneous Non availability”. This may be due to shortage of water, high silt content in the river, system disturbance, low system demand, disaster/natural calamity, reserve shutdown, transmission constraints & power evacuation problems, low head or high tailrace level, strikes and other misc. reasons etc. It was highest i.e. 26.44%) in case of RRUVNL.

TABLE 6.4

**SECTOR WISE OPERATING AVAILABILITY & MISCELLANEOUS
NON-AVILABILITY OF BOARDS / CORPORATIONS FOR PERIOD: 2013-14**

S. NO.	ORGANISATION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AV. PER UNIT (%)	MISC. NON AVAILABILITY (%)
CENTRAL							
1	BBMB	28	2866.30	5.28	3.86	90.86	11.55
2	DVC	5	143.20	4.26	25.37	70.37	0.00
3	NEEPCO	13	755.00	7.10	11.87	81.03	0.02
4	NHDC	16	1520.00	2.20	0.02	97.78	0.00
5	NHPC	62	4831.20	2.50	7.19	90.31	1.77
6	SJVNL	9	1706.01	1.97	0.56	97.47	25.45
7	THDC	8	1400.00	9.86	0.05	90.09	0.00
	SUB TOTAL	141	13221.71	4.06	4.50	91.44	6.44
STATE							
1	APGENCO	57	3783.35	8.53	7.41	84.06	3.38
2	APGPCL	2	100.00	9.73	3.70	86.57	18.36
3	CSPGCL	3	120.00	4.93	0.00	95.07	0.00
4	GSECL	8	540.00	7.43	7.76	84.81	0.00
5	HPSEB LTD.	12	366.00	9.84	1.49	88.67	4.23
6	JKPDC	9	660.00	8.78	4.95	86.27	23.95
7	JSEB	2	130.00	33.15	0.96	65.89	0.00
8	KPCL	68	3585.40	4.32	5.11	90.57	6.93
9	KSEB	48	1881.50	6.36	3.52	90.12	5.21
10	MAHAGENCO	24	2406.00	4.60	3.87	91.53	0.00
11	MPPGCL	23	875.00	7.10	1.93	90.97	0.00
12	MeECL	11	282.00	3.86	13.42	82.72	0.00
13	OHPC	31	2027.50	5.32	6.01	88.67	0.00
14	PSPCL	25	1051.00	6.84	19.15	74.01	5.81
15	RRVUNL	11	411.00	8.37	1.37	90.26	26.44

S. NO.	ORGANISATION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AV. PER UNIT (%)	MISC. NON AVAILABILITY (%)
16	SSNNL	11	1450.00	10.67	0.83	88.50	0.00
17	TANGEDCO	70	2182.20	7.34	6.82	85.84	0.70
18	UJVNL	34	1252.15	12.06	3.94	84.00	0.49
19	UPJVNL	15	501.60	38.28	1.33	60.39	2.12
20	WBSEDCL	11	977.00	0.34	1.26	98.40	1.53
	SUB TOTAL	475	24581.70	7.52	5.37	87.11	3.59
PVT							
1	ADHPL	2	192.00	0.00	0.44	99.56	0.00
2	DLHP	1	34.00	0.00	0.47	99.53	0.06
3	EPPL	2	100.00	0.05	3.28	96.67	0.17
4	GIPL	2	99.00	9.84	0.38	89.78	0.37
5	JPVL	11	1700	0.00	18.93	81.07	0.25
6	LBPPL	2	70.00	33.30	4.63	62.07	0.05
7	MPCL	2	86.00	0.00	0.22	99.78	0.20
8	TATA	15	447.00	0.37	1.44	98.19	0.00
	SUB TOTAL	37	2728.00	1.27	12.27	86.46	0.63
	ALL INDIA TOTAL	653	40531.41	5.97	5.55	88.48	4.32

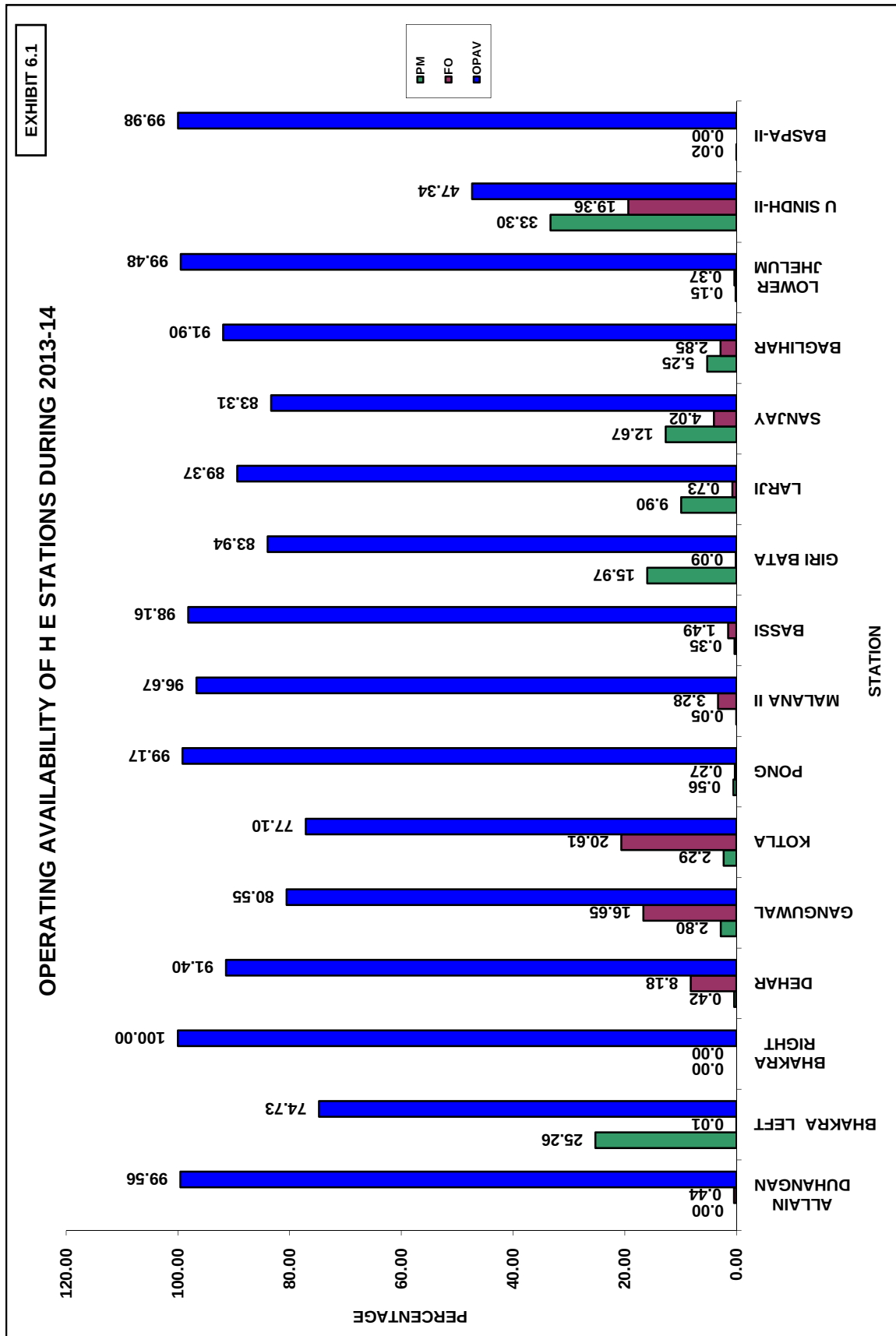


EXHIBIT 6.2

OPERATING AVAILABILITY OF H E STATIONS DURING 2013-14

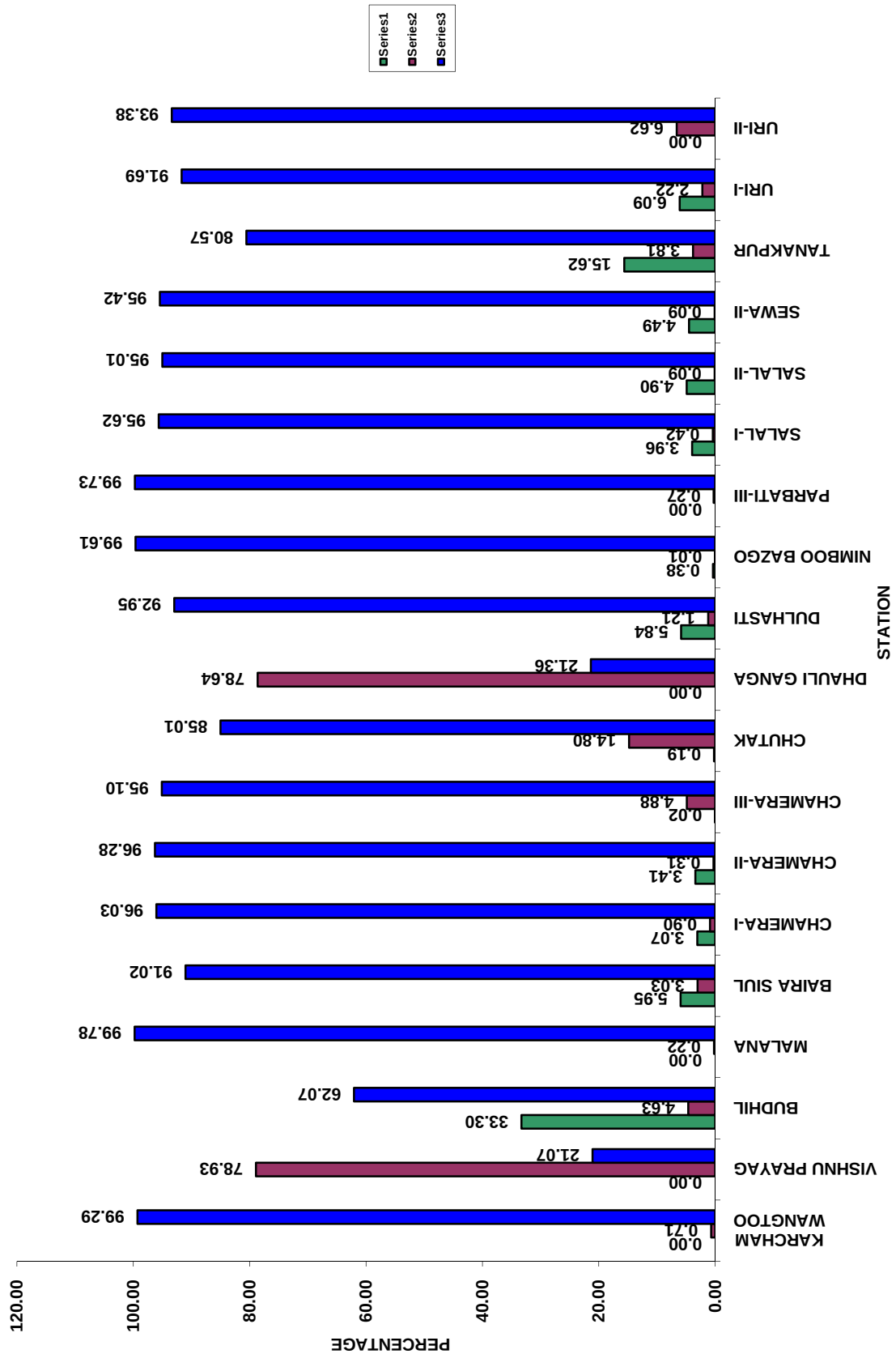
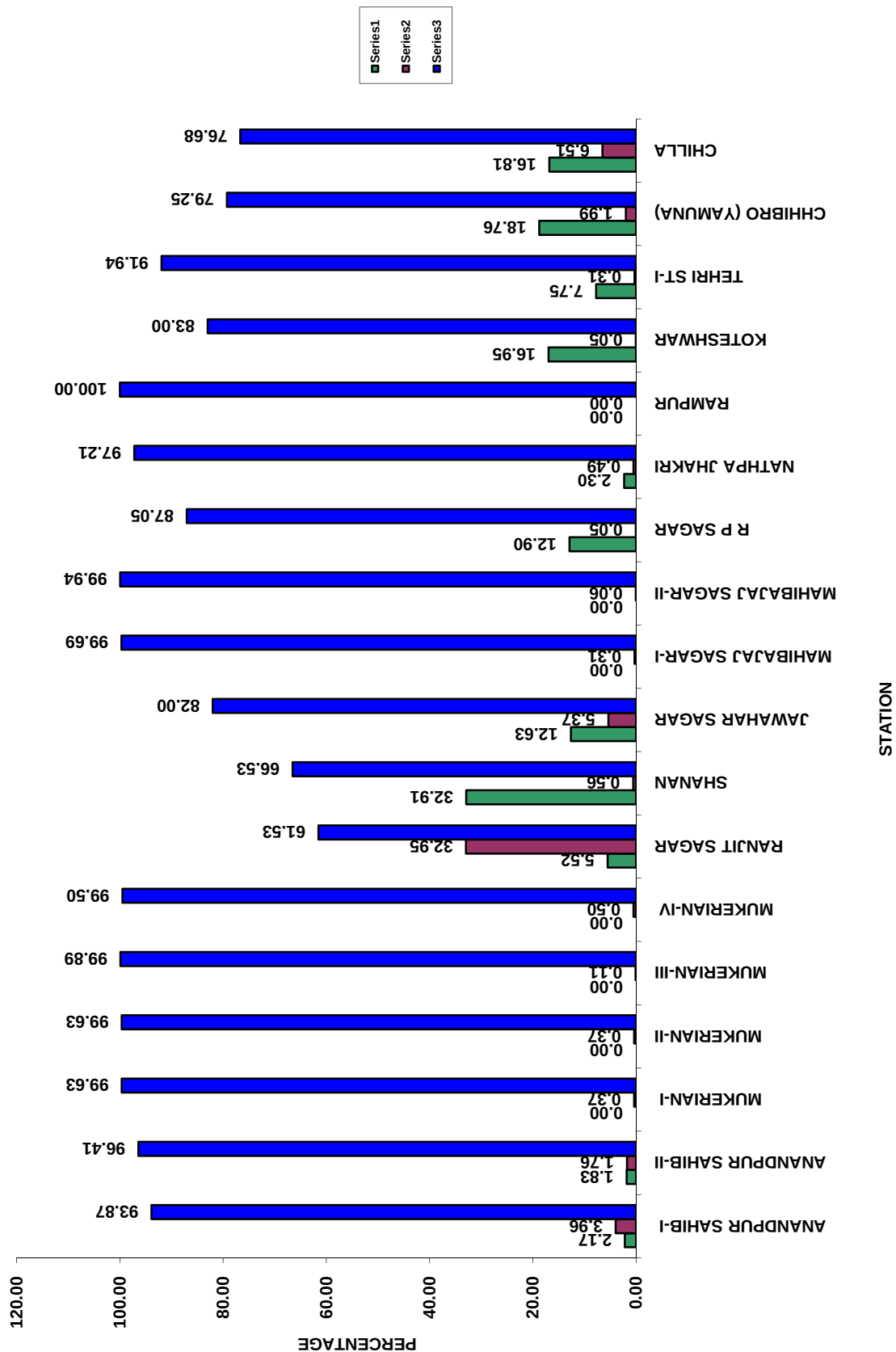


EXHIBIT 6.3

OPERATING AVAILABILITY OF H E STATIONS DURING 2013-14



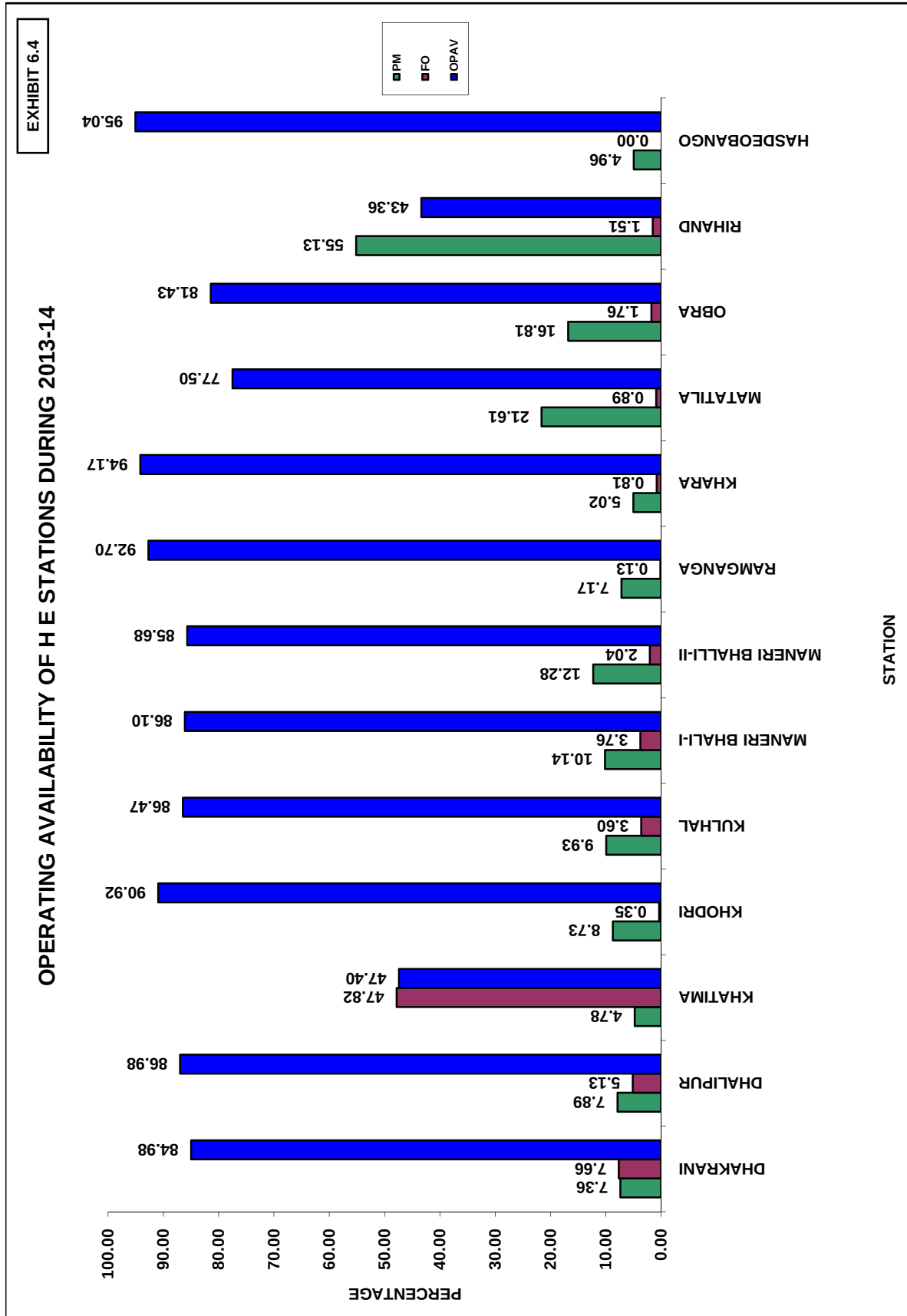
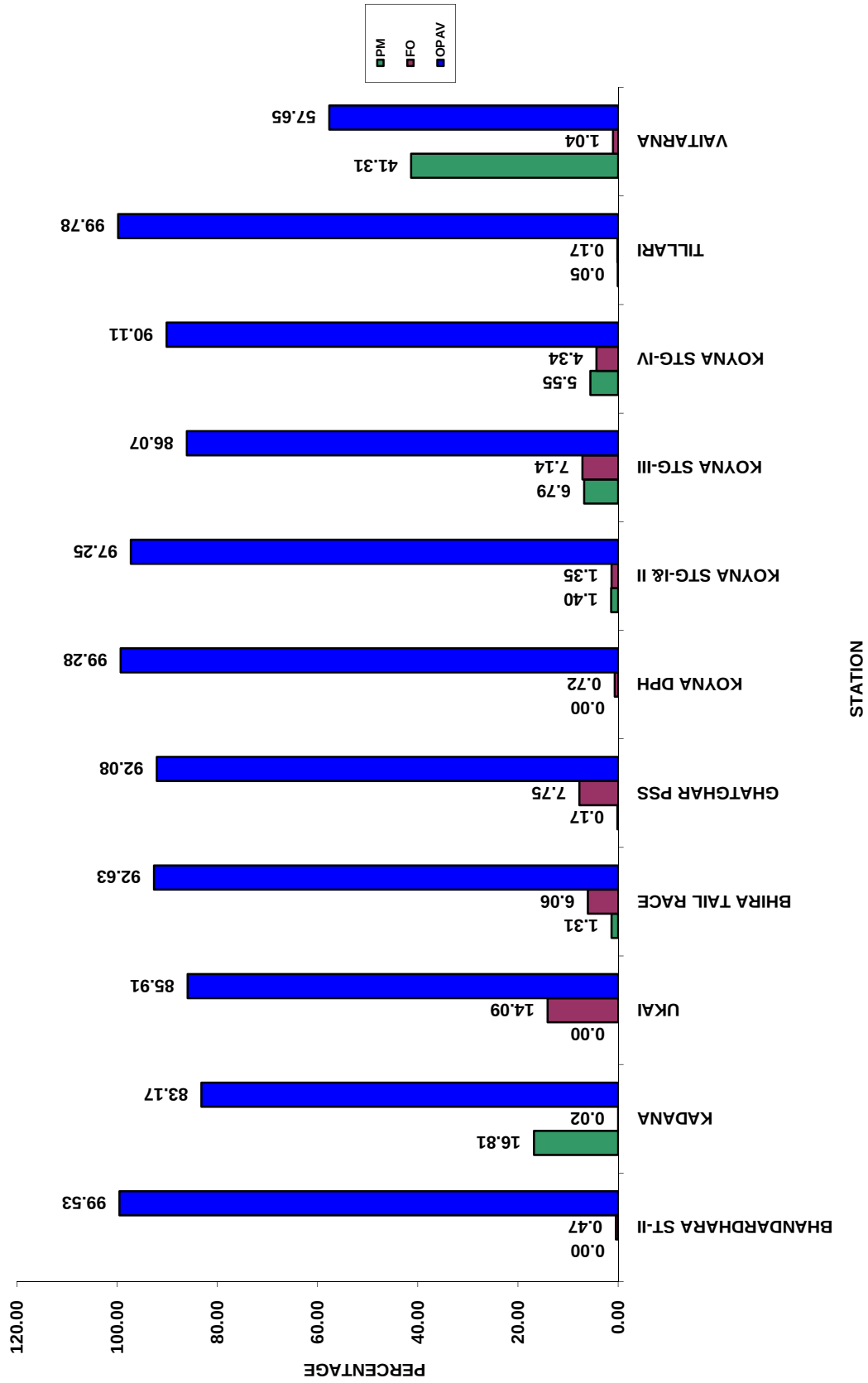
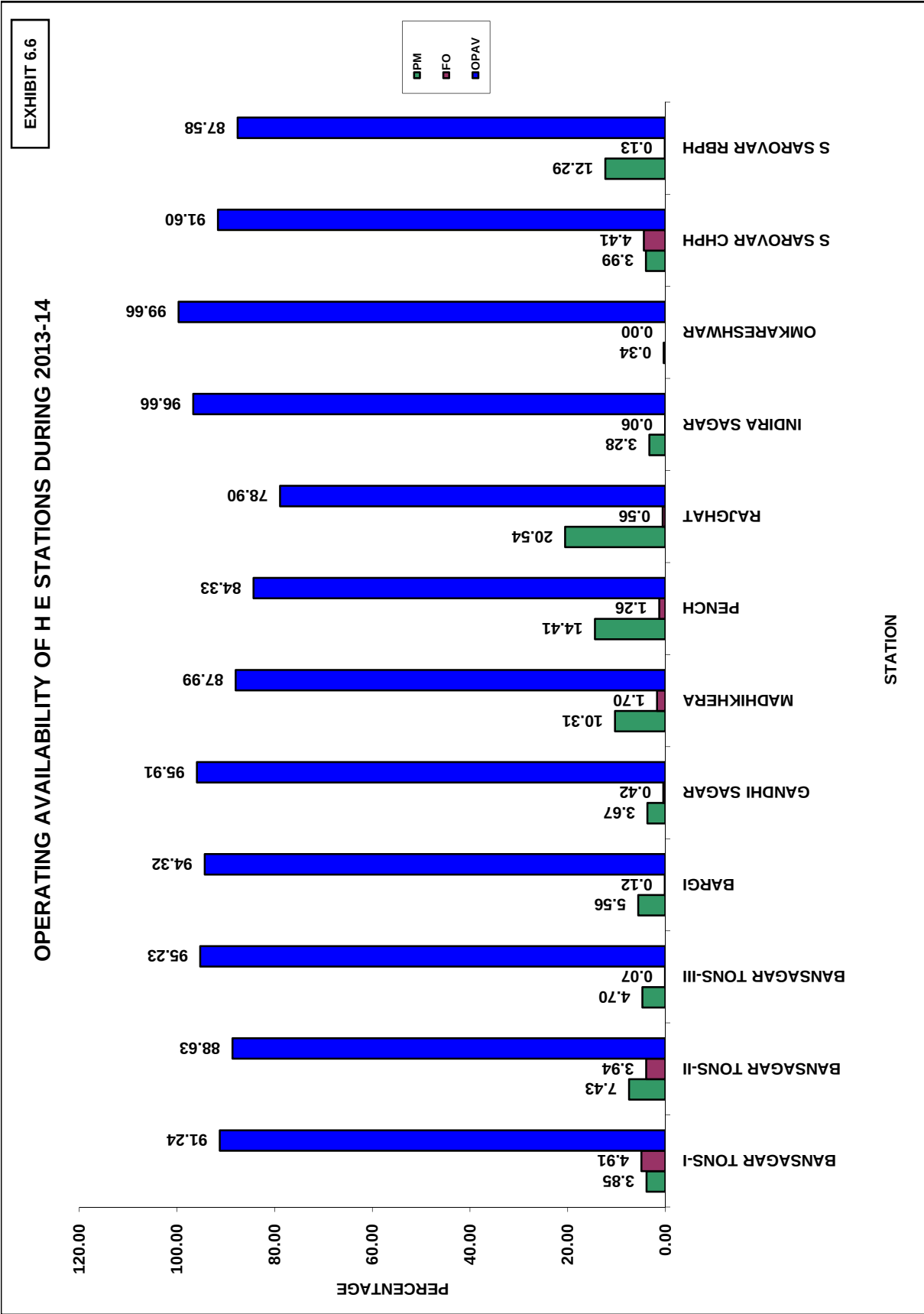
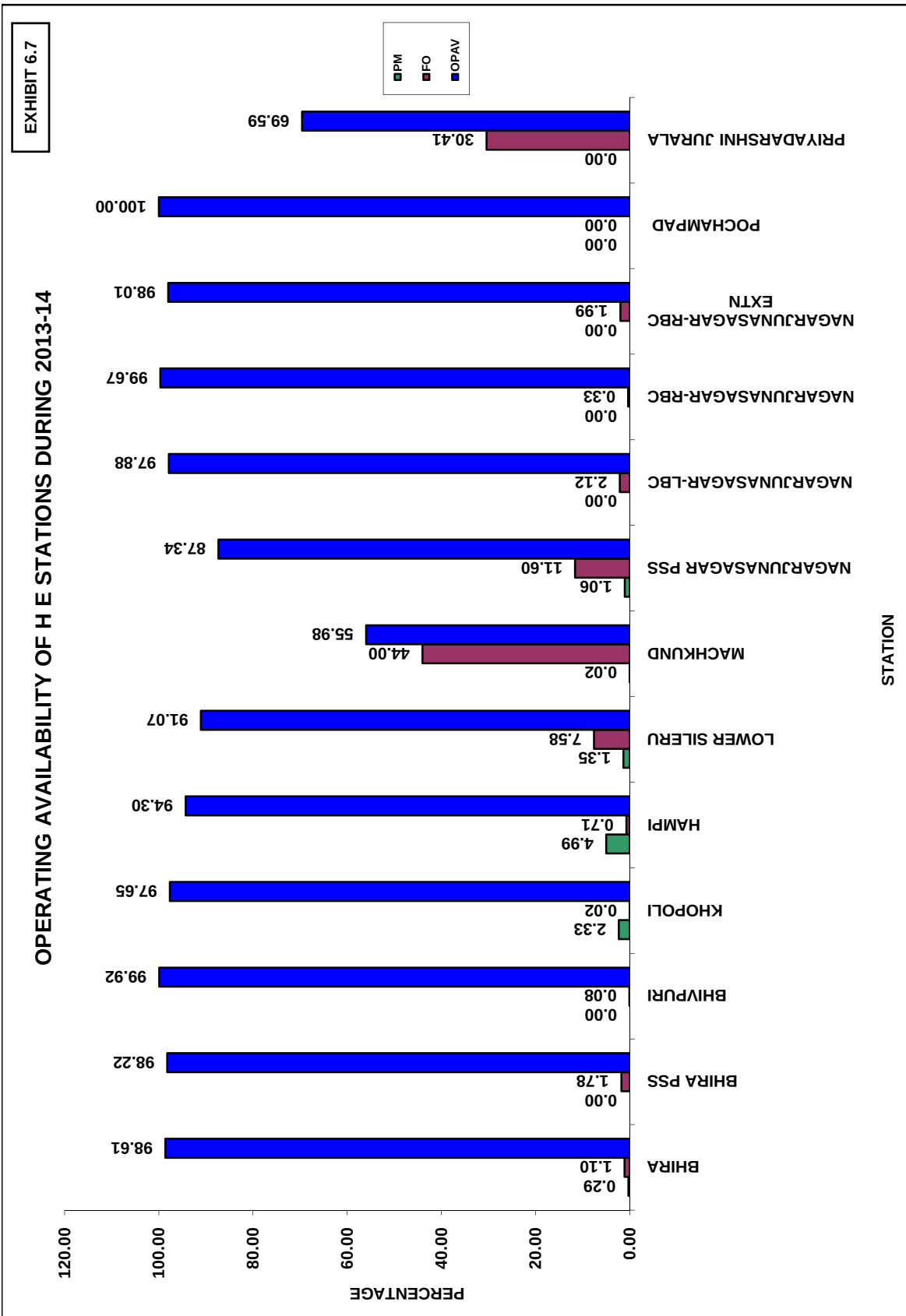


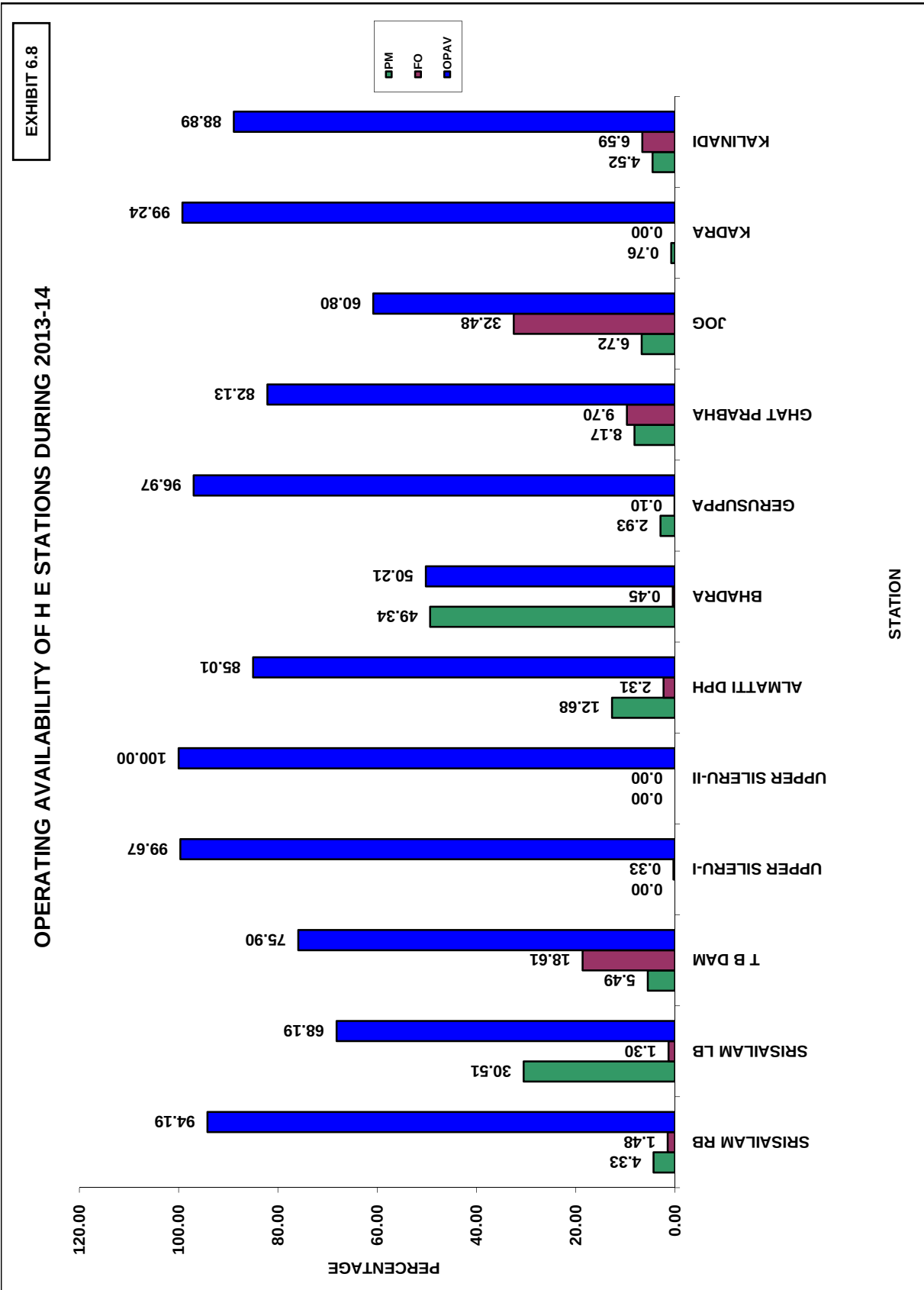
EXHIBIT 6.5

OPERATING AVAILABILITY OF H E STATIONS DURING 2013-14









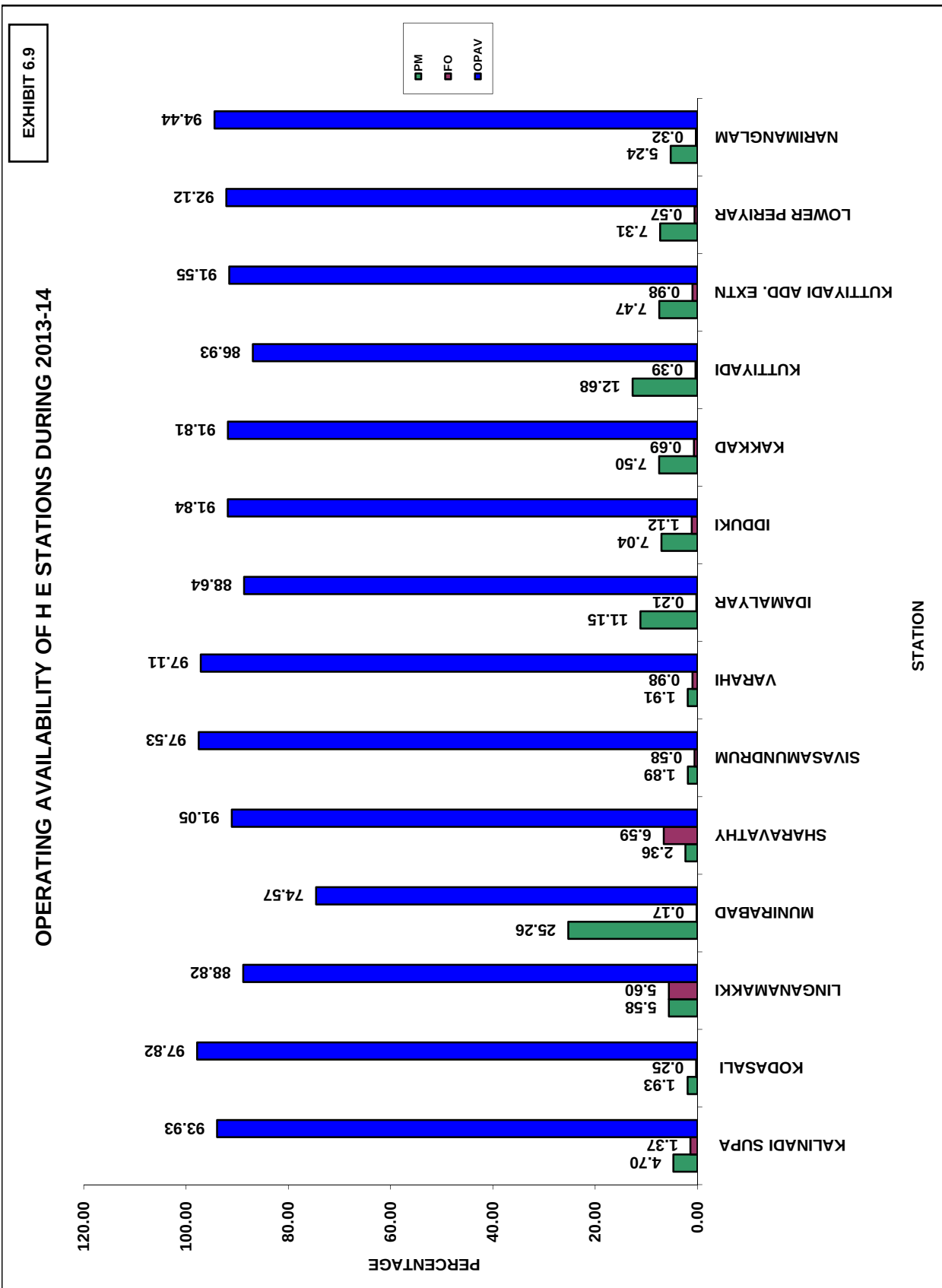
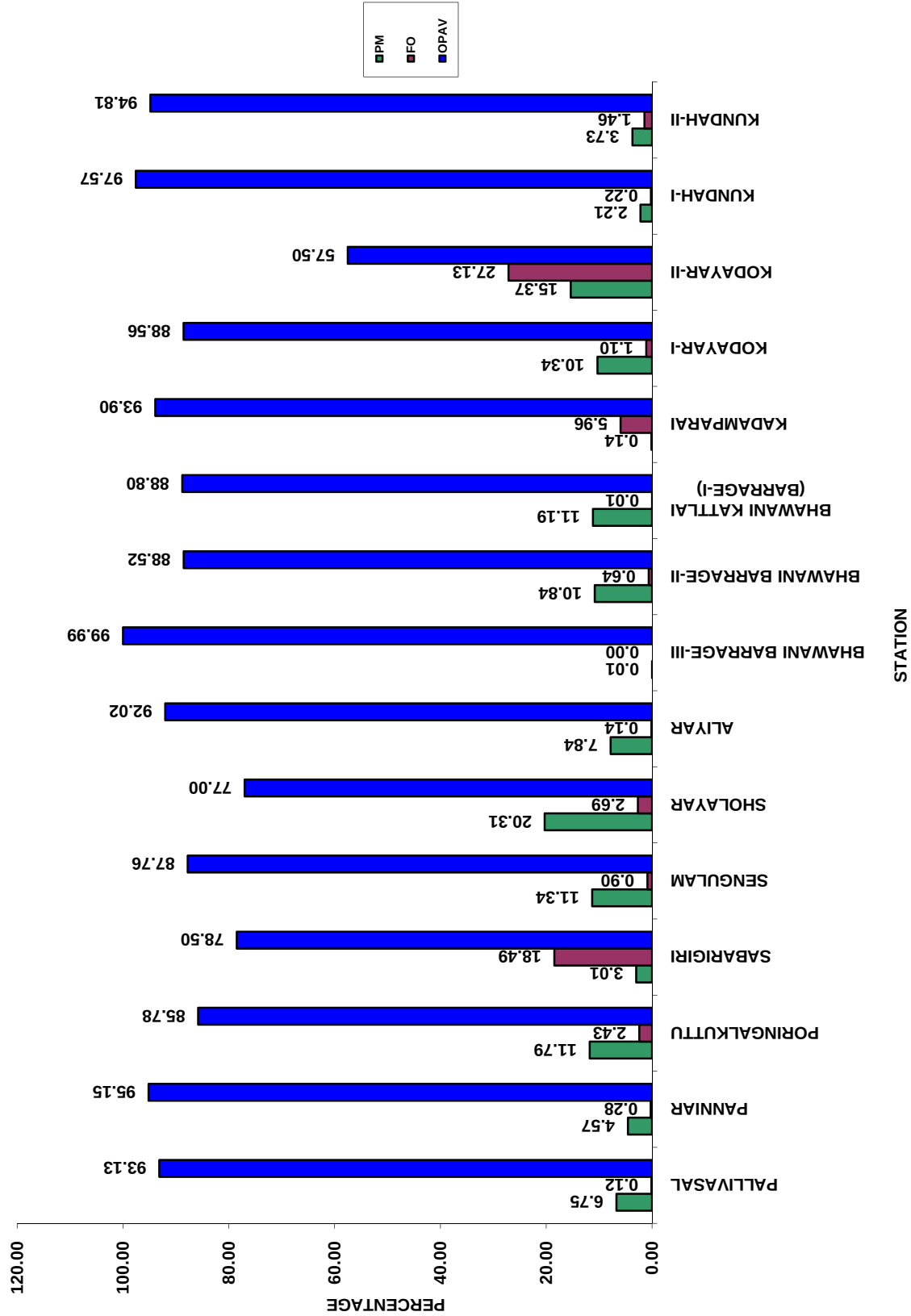
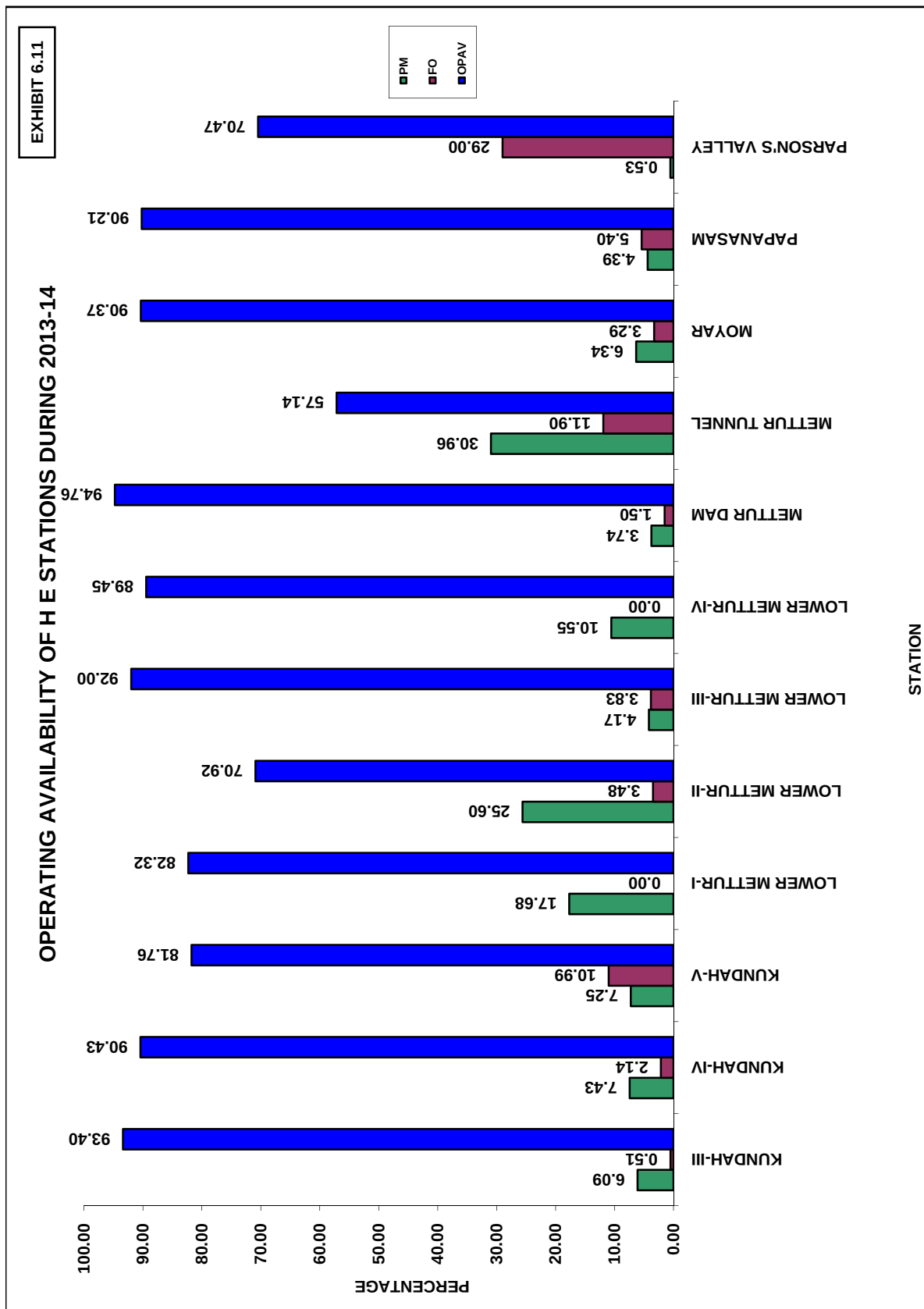
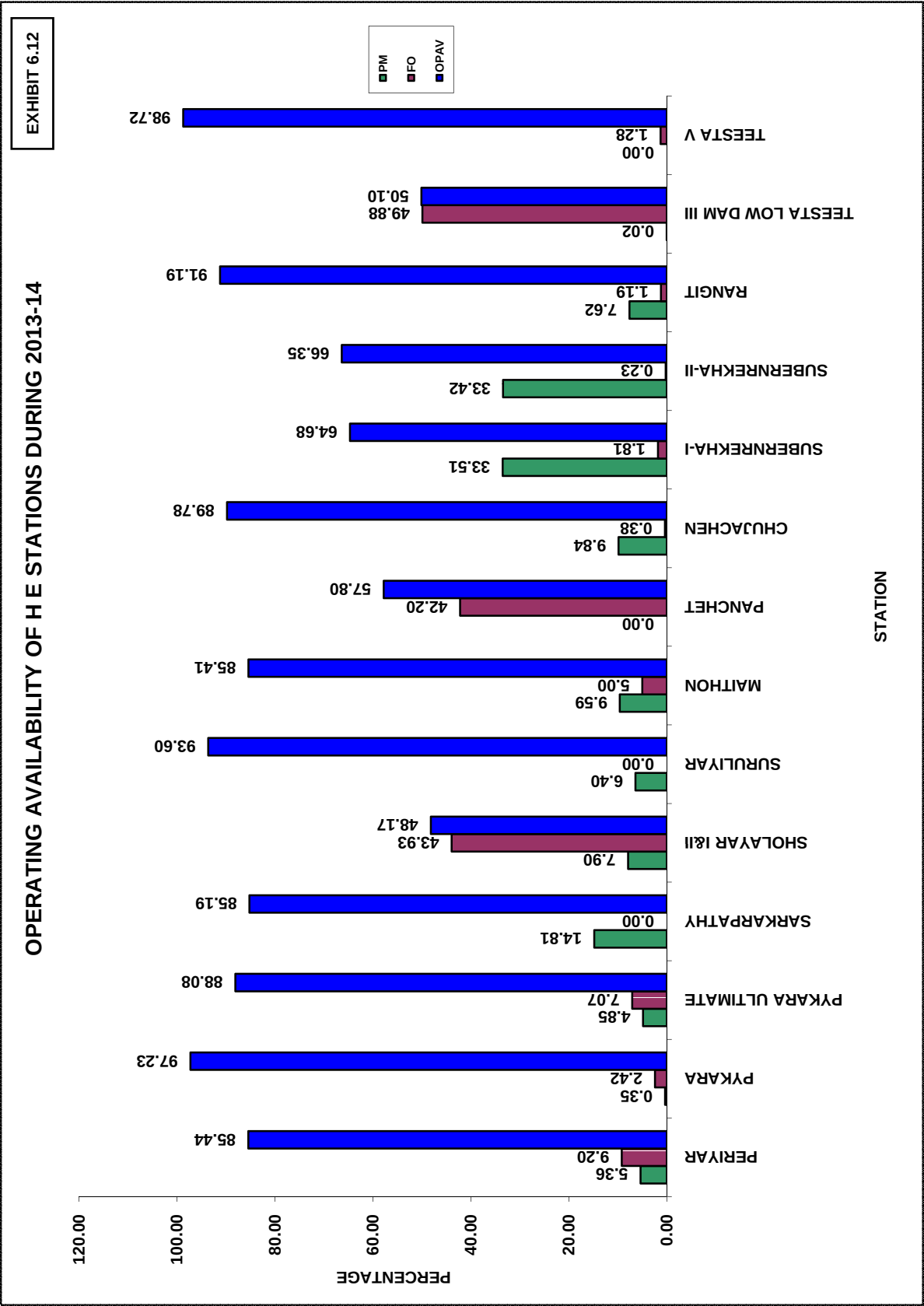


EXHIBIT 6.10

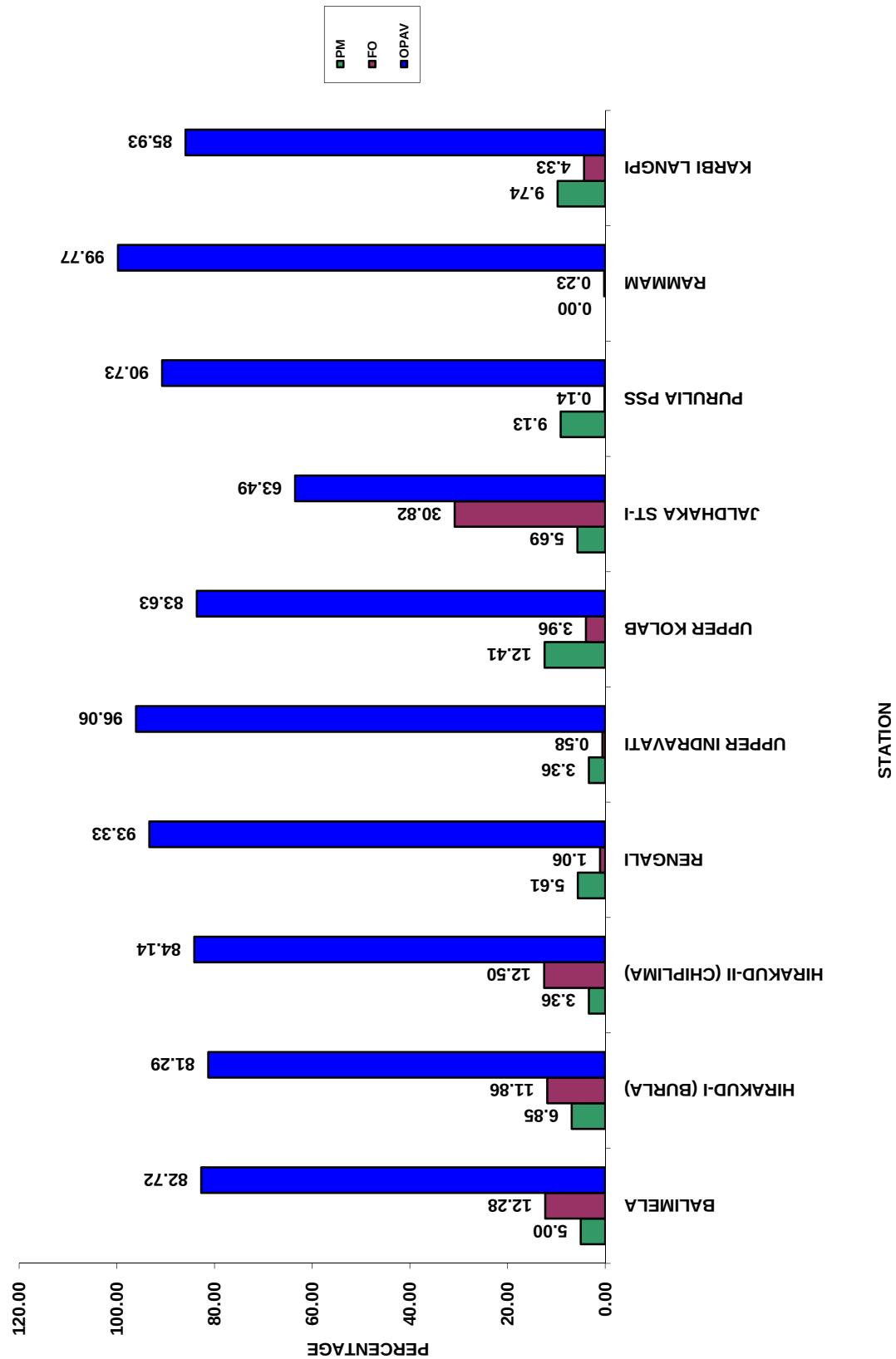
OPERATING AVAILABILITY OF H E STATIONS DURING 2013-14

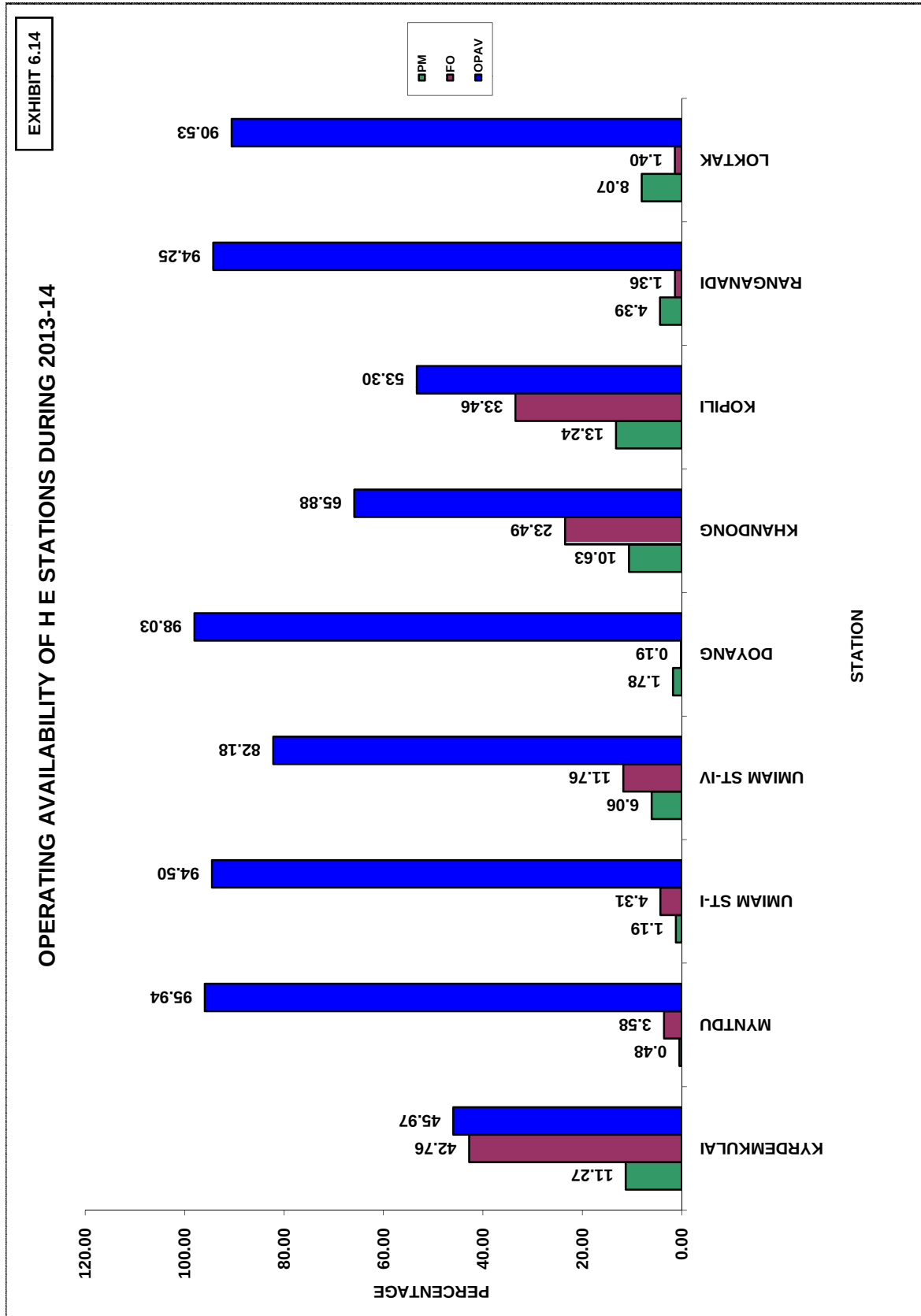






OPERATING AVAILABILITY OF H E STATIONS DURING 2013-14





OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
<u>NORTHERN REGION</u>							
<u>ADHPL</u>							
1	ALLAIN DUHANGAN	1	96.00	0.00	0.45	99.55	0.00
		2	96.00	0.00	0.43	99.57	0.00
	TOTAL :		192.00	0.00	0.44	99.56	0.00
<u>BBMB</u>							
2	BHAKRA LEFT	1	108.00	0.00	0.00	100.00	10.36
		2	108.00	29.99	0.01	69.99	0.00
		3	108.00	10.57	0.04	89.39	0.00
		4	108.00	35.23	0.00	64.77	10.25
		5	108.00	50.51	0.00	49.49	0.00
	TOTAL :		540.00	25.26	0.01	74.73	4.12
3	BHAKRA RIGHT	1	157.00	0.00	0.00	100.00	6.71
		2	157.00	0.02	0.00	99.98	5.29
		3	157.00	0.00	0.00	100.00	4.43
		4	157.00	0.00	0.00	100.00	48.32
		5	157.00	0.00	0.00	100.00	11.61
	TOTAL :		785.00	0.00	0.00	100.00	15.27
4	DEHAR	1	165.00	0.00	0.00	100.00	42.43
		2	165.00	0.00	0.00	100.00	35.16
		3	165.00	0.00	1.64	98.36	12.24
		4	165.00	0.00	0.00	100.00	1.23
		5	165.00	0.00	0.00	100.00	0.00
		6	165.00	2.53	47.41	50.05	15.27
	TOTAL :		990.00	0.42	8.18	91.40	17.72
5	GANGUWAL	1	29.25	2.91	0.00	97.09	0.00
		2	24.20	0.59	53.43	45.98	1.97
		3	24.20	4.88	0.00	95.12	2.79
	TOTAL :		77.65	2.80	16.65	80.55	1.48
6	KOTLA	1	29.25	2.99	0.00	97.01	0.00
		2	24.20	3.74	0.37	95.89	1.74
		3	24.20	0.00	65.78	34.22	2.16
	TOTAL :		77.65	2.29	20.61	77.10	1.21
7	PONG	1	66.00	0.00	0.00	100.00	2.98
		2	66.00	0.00	1.60	98.40	5.65
		3	66.00	1.67	0.00	98.33	4.65
		4	66.00	1.71	0.00	98.29	0.56

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
		5	66.00	0.00	0.00	100.00	3.05
		6	66.00	0.00	0.00	100.00	7.24
	TOTAL :		396.00	0.56	0.27	99.17	4.02
	<u>E.P.P.L.</u>						
8	MALANA-II	1	50.00	0.11	1.42	98.47	0.17
		2	50.00	0.00	5.15	94.85	0.17
	TOTAL :		100.00	0.05	3.28	96.67	0.17
	<u>HPSEB</u>						
9	BASSI	1	15.00	0.43	1.65	97.92	1.95
		2	15.00	0.53	2.63	96.84	4.27
		3	15.00	0.45	1.70	97.85	2.59
		4	15.00	0.00	0.00	100.00	83.01
	TOTAL :		60.00	0.35	1.49	98.16	22.96
10	GIRI BATA	1	30.00	22.13	0.04	77.84	0.82
		2	30.00	9.82	0.14	90.04	0.93
	TOTAL :		60.00	15.97	0.09	83.94	0.88
11	LARJI	1	42.00	10.89	0.28	88.83	0.79
		2	42.00	0.16	0.36	99.48	0.72
		3	42.00	18.65	1.56	79.79	1.96
	TOTAL :		126.00	9.90	0.73	89.37	1.16
12	SANJAY	1	40.00	11.07	7.18	81.75	1.88
		2	40.00	0.78	2.87	96.36	2.58
		3	40.00	26.17	2.02	71.81	4.43
	TOTAL :		120.00	12.67	4.02	83.31	2.96
	<u>JK, PDD</u>						
13	BAGLIHAR	1	150.00	3.88	0.10	96.02	0.67
		2	150.00	5.76	6.26	87.98	29.60
		3	150.00	6.11	2.20	91.69	27.65
	TOTAL :		450.00	5.25	2.85	91.90	19.31
14	LOWER JHELMUM	1	35.00	0.15	0.66	99.19	59.78
		2	35.00	0.15	0.09	99.76	59.65
		3	35.00	0.15	0.36	99.49	55.56
	TOTAL :		105.00	0.15	0.37	99.48	58.33
15	UPPER SINDH-II	3	35.00	0.02	44.59	55.39	2.70
		4	35.00	0.15	13.50	86.36	28.11
		5	35.00	99.73	0.00	0.27	0.00
	TOTAL :		105.00	33.30	19.36	47.34	10.27

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
<u>JPVL</u>							
16	BASPA	1	100.00	0.02	0.00	99.98	0.45
		2	100.00	0.02	0.00	99.98	0.45
		3	100.00	0.02	0.00	99.98	0.45
TOTAL :			300.00	0.02	0.00	99.98	0.45
17	KARCHAM WANGTOO	1	250.00	0.00	1.81	98.19	1.54
		2	250.00	0.00	0.41	99.59	1.65
		3	250.00	0.00	0.31	99.69	1.53
		4	250.00	0.00	0.32	99.68	1.56
TOTAL :			1000.00	0.00	0.71	99.29	1.57
18	VISHNU PRAYAG	1	100.00	0.00	79.00	21.00	0.18
		2	100.00	0.00	78.91	21.09	0.18
		3	100.00	0.00	78.91	21.09	0.17
		4	100.00	0.00	78.91	21.09	0.17
TOTAL :			400.00	0.00	78.93	21.07	0.17
<u>LBPPL</u>							
19	BUDHIL	1	35.00	31.49	0.29	68.22	0.09
		2	35.00	35.10	8.96	55.94	0.01
TOTAL :			70.00	33.30	4.63	62.07	0.05
<u>MPCL</u>							
20	MALANA	1	43.00	0.00	0.38	99.62	0.37
		2	43.00	0.00	0.06	99.94	0.04
TOTAL :			86.00	0.00	0.22	99.78	0.20
<u>NHPC</u>							
21	BAIRA SIUL	1	66.00	6.09	3.75	90.16	0.13
		2	66.00	7.57	1.00	91.44	0.22
		3	66.00	4.21	4.33	91.45	0.21
TOTAL :			198.00	5.95	3.03	91.02	0.19
22	CHAMERA- I	1	180.00	2.65	0.00	97.35	0.00
		2	180.00	2.89	0.16	96.95	0.00
		3	180.00	3.67	2.55	93.77	0.00
TOTAL :			540.00	3.07	0.90	96.03	0.00
23	CHAMERA- II	1	100.00	2.67	0.34	97.00	0.24
		2	100.00	7.56	0.46	91.98	0.00
		3	100.00	0.00	0.13	99.87	0.32
TOTAL :			300.00	3.41	0.31	96.28	0.18

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
24	CHAMERA-III	1	77.00	0.01	5.50	94.50	0.30
		2	77.00	0.06	4.18	95.76	0.61
		3	77.00	0.00	4.96	95.04	0.05
		TOTAL :	231.00	0.02	4.88	95.10	0.32
25	CHUTAK	1	11.00	0.74	8.27	90.99	0.41
		2	11.00	0.00	5.37	94.63	0.41
		3	11.00	0.00	44.09	55.91	0.41
		4	11.00	0.00	1.48	98.52	0.41
		TOTAL :	44.00	0.19	14.80	85.01	0.41
26	DHAULI GANGA HPS	1	70.00	0.00	78.61	21.39	0.00
		2	70.00	0.00	78.61	21.39	0.00
		3	70.00	0.00	78.72	21.28	0.00
		4	70.00	0.00	78.61	21.39	0.00
		TOTAL :	280.00	0.00	78.64	21.36	0.00
27	DULHASTI HPS	1	130.00	3.62	1.40	94.98	0.86
		2	130.00	7.97	1.51	90.52	0.26
		3	130.00	5.94	0.72	93.34	0.52
		TOTAL :	390.00	5.84	1.21	92.95	0.55
28	NIMBOO BAZDO	1	15.00	0.86	0.00	99.14	0.00
		2	15.00	0.00	0.02	99.98	0.00
		3	15.00	0.28	0.00	99.72	0.00
		TOTAL :	45.00	0.38	0.01	99.61	0.00
29	PARBATI-III	1	130.00	0.00	1.14	98.86	0.00
		2	130.00	0.00	1.22	98.78	0.00
		3	130.00	0.00	0.27	99.73	0.00
		TOTAL :	390.00	0.00	0.88	99.12	0.00
30	SALAL-I	1	115.00	0.00	0.79	99.21	0.62
		2	115.00	11.87	0.27	87.85	0.88
		3	115.00	0.00	0.21	99.79	0.00
		TOTAL :	345.00	3.96	0.42	95.62	0.50
31	SALAL-II	1	115.00	0.00	0.17	99.83	0.06
		2	115.00	14.70	0.07	85.23	0.09
		3	115.00	0.00	0.03	99.97	0.00
		TOTAL :	345.00	4.90	0.09	95.01	0.05
32	SEWA-II	1	40.00	4.66	0.14	95.20	0.00
		2	40.00	4.31	0.00	95.69	0.26
		3	40.00	4.49	0.13	95.38	0.00
		TOTAL :	120.00	4.49	0.09	95.42	0.09

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
33	TANAKPUR	1	31.40	2.83	1.81	95.36	31.42
		2	31.40	0.00	2.98	97.02	33.46
		3	31.40	44.03	6.63	49.34	6.41
	TOTAL :		94.20	15.62	3.81	80.57	23.76
34	URI-I	1	120.00	5.25	0.04	94.70	0.00
		2	120.00	0.00	7.87	92.13	0.00
		3	120.00	5.31	0.01	94.68	0.00
		4	120.00	13.82	0.94	85.24	0.00
	TOTAL :		480.00	6.09	2.22	91.69	0.00
35	URI-II	1	60.00	0.00	2.42	97.58	0.31
		2	60.00	0.00	20.55	79.45	0.22
		3	60.00	0.00	2.66	97.34	0.26
		4	60.00	0.00	0.85	99.15	0.00
	TOTAL :		240.00	0.00	6.62	93.38	0.20
	<u>PSPCL</u>						
36	ANANDPUR SAHIB-I	1	33.50	3.50	4.01	92.49	12.18
		2	33.50	0.83	3.95	95.23	9.24
	TOTAL :		67.00	2.17	3.96	93.87	1071.00
37	ANANDPUR SAHIB-II	1	33.50	0.16	2.48	97.36	7.72
		2	33.50	3.49	1.03	95.48	17.29
	TOTAL :		67.00	1.83	1.76	96.41	12.51
38	MUKERIAN-I	1	15.00	0.00	0.31	99.69	20.10
		2	15.00	0.00	0.53	99.47	23.55
		3	15.00	0.00	0.28	99.72	21.03
	TOTAL :		45.00	0.00	0.37	99.63	21.56
39	MUKERIAN-II	1	15.00	0.00	0.27	99.73	27.30
		2	15.00	0.00	0.41	99.59	24.14
		3	15.00	0.00	0.44	99.56	20.31
	TOTAL :		45.00	0.00	0.37	99.63	21.92
40	MUKERIAN-III	1	19.50	0.00	0.02	99.98	21.15
		2	19.50	0.00	0.29	99.71	17.73
		3	19.50	0.00	0.03	99.97	33.19
	TOTAL :		58.50	0.00	0.11	99.89	24.02
41	MUKERIAN-IV	1	19.50	0.00	1.35	98.65	23.75
		2	19.50	0.00	0.08	99.92	23.48
		3	19.50	0.00	0.08	99.92	24.24
	TOTAL :		58.50	0.00	0.50	99.50	23.82

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
42	RANJIT SAGAR	1	150.00	0.00	57.40	42.60	0.00
		2	150.00	0.00	21.46	78.54	0.00
		3	150.00	18.12	4.17	77.71	0.00
		4	150.00	3.96	48.76	47.28	0.00
	TOTAL :		600.00	5.52	32.95	61.53	0.00
43	SHANAN	1	15.00	6.80	0.05	93.15	0.00
		2	15.00	36.37	0.00	63.63	0.00
		3	15.00	2.32	0.16	97.51	0.00
		4	15.00	7.03	0.00	92.97	0.00
		5	50.00	56.64	1.16	42.19	0.00
	TOTAL :		110.00	32.91	0.56	66.53	0.00
	<u>RRVUNL</u>						
44	JAWAHAR SAGAR	1	33.00	28.10	0.58	71.33	0.00
		2	33.00	9.80	2.09	88.11	0.00
		3	33.00	0.00	13.45	86.55	0.00
	TOTAL :		99.00	12.63	5.37	82.00	0.00
45	MAHI BAJAJ-I	1	25.00	0.00	0.49	99.51	52.84
		2	25.00	0.00	0.12	99.88	45.02
	TOTAL :		50.00	0.00	0.31	99.69	48.93
46	MAHI BAJAJ-II	1	45.00	0.00	0.12	99.88	92.50
		2	45.00	0.00	0.00	100.00	94.15
	TOTAL :		90.00	0.00	0.06	99.94	93.33
47	R P SAGAR	1	43.00	9.01	0.00	90.99	0.00
		2	43.00	7.77	0.21	92.01	0.00
		3	43.00	17.96	0.00	82.04	0.00
		4	43.00	16.86	0.00	83.14	0.00
	TOTAL :		172.00	12.90	0.05	87.05	0.00
	<u>SJVNL</u>						
48	NATHPA JHAKRI	1	250.00	3.08	0.44	96.48	30.92
		2	250.00	0.01	0.31	99.68	29.28
		3	250.00	3.00	0.21	96.78	23.01
		4	250.00	1.70	0.48	97.82	26.13
		5	250.00	4.30	1.51	94.19	23.84
		6	250.00	1.70	0.00	98.30	25.29
	TOTAL :		1500.00	2.30	0.49	97.21	26.41

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
49	RAMPUR	1	68.67	0.00	0.00	100.00	0.00
		2	68.67	0.00	0.00	100.00	0.00
		5	68.67	0.00	0.00	100.00	0.00
	TOTAL :		206.01	0.00	0.00	100.00	0.00
	<u>THDC</u>						
50	KOTESHWAR	1	100.00	10.69	0.03	89.28	0.00
		2	100.00	23.61	0.02	76.37	0.00
		3	100.00	20.69	0.11	79.20	0.00
		4	100.00	12.80	0.06	87.15	0.00
	TOTAL :		400.00	16.95	0.05	83.00	0.00
51	TEHRI ST-1	1	250.00	12.07	0.37	87.57	0.07
		2	250.00	13.28	0.20	86.53	0.07
		3	250.00	0.75	0.13	99.12	0.00
		4	250.00	4.89	0.55	94.55	0.07
	TOTAL :		1000.00	7.75	0.31	91.94	0.05
	<u>UJVNL</u>						
52	CHIBRO (YAMUNA)	1	60.00	14.57	0.00	85.43	0.48
		2	60.00	21.40	0.01	78.60	0.87
		3	60.00	12.23	2.66	85.10	0.43
		4	60.00	26.83	5.30	67.87	0.52
	TOTAL :		240.00	18.76	1.99	79.25	0.58
53	CHILLA	1	36.00	6.72	7.55	85.73	0.15
		2	36.00	26.28	4.59	69.12	0.23
		3	36.00	0.00	8.26	91.74	0.18
		4	36.00	34.25	5.64	60.11	0.07
	TOTAL :		144.00	16.81	6.51	76.68	0.16
54	DHAKRANI	1	11.25	4.32	0.01	95.67	0.00
		2	11.25	13.86	3.01	83.13	0.00
		3	11.25	3.91	19.98	76.11	0.01
	TOTAL :		33.75	7.36	7.66	84.98	0.00
55	DHALIPUR	1	17.00	0.00	15.36	84.64	0.00
		2	17.00	1.24	0.02	98.75	0.00
		3	17.00	22.43	0.02	77.55	0.00
	TOTAL :		51.00	7.89	5.13	86.98	0.00
56	KHATIMA	1	13.80	0.00	99.73	0.27	0.00
		2	13.80	12.38	29.94	57.68	0.14
		3	13.80	1.95	13.78	84.28	0.18
	TOTAL :		41.40	4.78	47.82	47.40	0.11

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
57	KHODRI	1	30.00	8.24	0.00	91.76	0.00
		2	30.00	7.97	0.01	92.03	0.00
		3	30.00	12.67	0.00	87.33	0.00
		4	30.00	6.03	1.39	92.58	0.00
	TOTAL :		120.00	8.73	0.35	90.92	0.00
58	KULHAL	1	10.00	10.23	1.48	88.30	0.01
		2	10.00	8.30	1.94	89.76	1.28
		3	10.00	11.26	7.39	81.34	0.02
	TOTAL :		30.00	9.93	3.60	86.47	0.44
59	MANERI BHALI - I	1	30.00	0.00	1.16	98.84	0.00
		2	30.00	5.88	0.98	93.14	0.00
		3	30.00	24.54	9.13	66.33	0.00
	TOTAL :		90.00	10.14	3.76	86.10	0.00
60	MANERI BHALI - II	1	76.00	0.00	3.87	96.13	0.04
		2	76.00	27.31	2.16	70.54	0.03
		3	76.00	21.54	0.80	77.65	0.00
		4	76.00	0.27	1.31	98.42	0.00
	TOTAL :		304.00	12.28	2.04	85.68	0.02
61	RAMGANGA	1	66.00	6.85	0.17	92.98	3.77
		2	66.00	5.27	0.12	94.61	0.00
		3	66.00	9.39	0.09	90.52	2.44
	TOTAL :		198.00	7.17	0.13	92.70	2.07
	UPJVNL						
62	KHARA	1	24.00	0.02	0.46	99.52	0.72
		2	24.00	11.52	1.14	87.33	0.39
		3	24.00	3.53	0.82	95.65	0.46
	TOTAL :		72.00	5.02	0.81	94.17	0.52
63	MATATILA	1	10.20	22.87	1.49	75.65	0.00
		2	10.20	10.06	0.72	89.22	0.00
		3	10.20	31.91	0.47	67.63	0.00
	TOTAL :		30.60	21.61	0.89	77.50	0.00
64	OBRA	1	33.00	16.67	2.00	81.33	21.57
		2	33.00	11.98	3.27	84.75	0.00
		3	33.00	21.78	0.00	78.22	10.55
	TOTAL :		99.00	16.81	1.76	81.43	10.71
65	RIHAND	1	50.00	10.77	0.00	89.23	0.00
		2	50.00	99.73	0.00	0.27	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
		3	50.00	99.73	0.00	0.27	0.00
		4	50.00	99.73	0.00	0.27	0.00
		5	50.00	13.05	3.44	83.52	0.00
		6	50.00	7.78	5.64	86.58	0.00
	TOTAL :		300.00	55.13	1.51	43.36	0.00
	<u>WESTERN REGION</u>						
	<u>CSPGCL</u>						
1	HASDEOBANGO	1	40.00	0.00	0.00	100.00	0.00
		2	40.00	14.88	0.00	85.12	0.00
		3	40.00	0.00	0.00	100.00	0.00
	TOTAL :		120.00	4.96	0.00	95.04	0.00
	<u>DLHP</u>						
2	BHANDARDHARA ST-II	2	34.00	0.00	0.47	99.53	0.06
	TOTAL :		34.00	0.00	0.47	99.53	0.06
	<u>GSECL</u>						
3	KADANA	1	60.00	9.08	0.00	90.92	0.00
		2	60.00	0.14	0.00	99.86	0.00
		3	60.00	58.03	0.09	41.88	0.00
		4	60.00	0.00	0.00	100.00	0.00
	TOTAL :		240.00	16.81	0.02	83.17	0.00
4	UKAI	1	75.00	0.00	0.07	99.93	0.04
		2	75.00	0.00	6.41	93.59	0.01
		3	75.00	0.00	0.16	99.84	0.00
		4	75.00	0.00	49.71	50.29	0.00
	TOTAL :		300.00	0.00	14.09	85.91	0.01
	<u>MAHAGENCO</u>						
5	BHIRA TAIL RACE	1	40.00	1.70	10.55	87.75	0.00
		2	40.00	0.92	1.57	97.51	0.00
	TOTAL :		80.00	1.31	6.06	92.63	0.00
6	GHATGHAR PSS	1	125.00	0.00	9.94	90.06	0.00
		2	125.00	0.34	5.55	94.10	0.00
	TOTAL :		250.00	0.17	7.75	92.08	0.00
7	KOYNA DPH	1	18.00	0.00	0.72	99.28	0.00
		2	18.00	0.00	0.72	99.28	0.00
	TOTAL :		36.00	0.00	0.72	99.28	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
8	KOYNA-I & II	1	70.00	5.41	6.91	87.68	0.00
		2	70.00	5.39	0.00	94.61	0.00
		3	70.00	0.00	0.00	100.00	0.00
		4	70.00	1.21	0.00	98.79	0.00
		5	80.00	0.00	1.21	98.79	0.00
		6	80.00	0.00	2.90	97.10	0.00
		7	80.00	0.00	0.00	100.00	0.00
		8	80.00	0.00	0.00	100.00	0.00
	TOTAL :		600.00	1.40	1.35	97.25	0.00
9	KOYNA-III	1	80.00	7.03	0.00	92.97	0.00
		2	80.00	4.05	0.00	95.95	0.00
		3	80.00	0.00	28.56	71.44	0.00
		4	80.00	16.07	0.00	83.93	0.00
	TOTAL :		320.00	6.79	7.14	86.07	0.00
10	KOYNA-IV	1	250.00	0.00	5.78	94.22	0.00
		2	250.00	0.00	6.39	93.61	0.00
		3	250.00	22.19	5.19	72.62	0.00
		4	250.00	0.00	0.00	100.00	0.00
	TOTAL :		1000.00	5.55	4.34	90.11	0.00
11	TILLARI	1	60.00	0.05	0.17	99.78	0.00
			60.00	0.05	0.17	99.78	0.00
12	VAITARNA	1	60.00	41.31	1.04	57.65	0.00
			60.00	41.31	1.04	57.65	0.00
	<u>MPPGCL</u>						
13	BANSAGAR TONS-1	1	105.00	2.64	5.79	91.57	0.00
		2	105.00	7.89	2.46	89.65	0.00
		3	105.00	1.01	6.49	92.50	0.00
	TOTAL :		315.00	3.85	4.91	91.24	0.00
14	BANSAGAR TONS-II	1	15.00	4.65	6.19	89.16	0.00
		2	15.00	10.22	1.69	88.09	0.00
	TOTAL :		30.00	7.43	3.94	88.63	0.00
15	BANSAGAR TONS-III	1	20.00	4.68	0.07	95.24	0.00
		2	20.00	4.97	0.08	94.96	0.00
		3	20.00	4.44	0.06	95.50	0.00
	TOTAL :		60.00	4.70	0.07	95.23	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
16	BARGI	1	45.00	0.05	0.05	99.89	0.00
		2	45.00	11.07	0.19	88.74	0.00
	TOTAL :		90.00	5.56	0.12	94.32	0.00
17	GANDHI SAGAR	1	23.00	0.00	0.11	99.89	0.00
		2	23.00	0.00	0.07	99.93	0.00
		3	23.00	5.84	1.63	92.53	0.00
		4	23.00	6.11	0.00	93.89	0.00
		5	23.00	6.40	0.30	93.31	0.00
	TOTAL :		115.00	3.67	0.42	95.91	0.00
18	MADHIKHERA	1	20.00	8.75	2.36	88.89	0.01
		2	20.00	5.48	0.29	94.23	0.00
		3	20.00	16.71	2.43	80.86	0.00
	TOTAL :		60.00	10.31	1.70	87.99	0.00
19	PENCH	1	80.00	7.36	1.69	90.95	0.00
		2	80.00	21.47	0.82	77.72	0.00
	TOTAL :		160.00	14.41	1.26	84.33	0.00
20	RAJGHAT	1	15.00	9.28	1.50	89.22	0.00
		2	15.00	9.22	0.12	90.66	0.01
		3	15.00	43.10	0.06	56.84	0.10
	TOTAL :		45.00	20.54	0.56	78.90	0.04
	NHDC						
21	INDIRA SAGAR	1	125.00	0.00	0.33	99.67	0.00
		2	125.00	7.28	0.00	92.72	0.00
		3	125.00	4.91	0.10	94.99	0.00
		4	125.00	2.82	0.03	97.16	0.00
		5	125.00	2.57	0.00	97.43	0.00
		6	125.00	2.59	0.00	97.41	0.00
		7	125.00	2.82	0.00	97.18	0.00
		8	125.00	3.22	0.00	96.78	0.00
	TOTAL :		1000.00	3.28	0.06	96.66	0.00
22	OMKARESHWAR	1	65.00	0.01	0.00	99.99	0.00
		2	65.00	0.01	0.00	99.99	0.00
		3	65.00	0.01	0.00	99.99	0.00
		4	65.00	0.01	0.00	99.99	0.00
		5	65.00	0.00	0.00	100.00	0.00
		6	65.00	0.00	0.00	100.00	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
		7	65.00	0.00	0.00	99.99	0.00
		8	65.00	2.67	0.00	97.33	0.00
	TOTAL :		520.00	0.34	0.00	99.66	0.00
	<u>SSNNL</u>						
23	S SAROVAR CHPH	1	50.00	0.56	0.04	99.40	0.00
		2	50.00	0.62	2.79	96.58	0.00
		3	50.00	3.46	18.31	78.23	0.00
		4	50.00	10.04	0.00	89.96	0.00
		5	50.00	5.28	0.91	93.81	0.01
	TOTAL :		250.00	3.99	4.41	91.60	0.00
24	S SAROVAR RBPH	1	200.00	4.98	0.00	95.02	0.00
		2	200.00	27.96	0.03	72.00	0.00
		3	200.00	34.94	0.14	64.92	0.00
		4	200.00	0.11	0.54	99.36	0.00
		5	200.00	5.72	0.06	94.22	0.00
		6	200.00	0.00	0.00	100.00	0.00
	TOTAL :		1200.00	12.29	0.13	87.58	0.00
	<u>TATA MAH.</u>						
25	BHIRA	1	25.00	0.00	0.92	99.08	0.00
		2	25.00	0.00	0.91	99.09	0.00
		3	25.00	0.00	0.91	99.09	0.00
		4	25.00	1.73	0.91	97.36	0.00
		5	25.00	0.00	2.00	98.00	0.00
		6	25.00	0.00	0.92	99.08	0.00
	TOTAL :		150.00	0.29	1.10	98.61	0.00
26	BHIRA PSS	1	150.00	0.00	1.78	98.22	0.00
	TOTAL :		150.00	0.00	1.78	98.22	0.00
27	BHIVPURI	1	24.00	0.00	0.08	99.92	0.00
		2	24.00	0.00	0.08	99.92	0.00
		3	24.00	0.00	0.08	99.92	0.00
		4	1.50	0.00	0.08	99.92	0.00
		5	1.50	0.00	0.08	99.92	0.00
	TOTAL :		75.00	0.00	0.08	99.92	0.00
28	KHOPOLI	1	24.00	0.62	0.03	99.35	0.00
		2	24.00	0.62	0.00	99.38	0.00
		3	24.00	5.74	0.02	94.24	0.00
	TOTAL :		72.00	2.33	0.02	97.65	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
<u>SOUTHERN REGION</u>							
<u>APGENCO</u>							
1	HAMPI	1	9.00	9.80	0.78	89.42	0.00
		2	9.00	1.20	0.89	97.92	0.00
		3	9.00	6.08	0.26	93.65	0.00
		4	9.00	2.90	0.90	96.21	0.00
	TOTAL :		36.00	4.99	0.71	94.30	0.00
2	LOWER SILERU	1	115.00	0.16	18.73	81.11	0.00
		2	115.00	0.14	3.45	96.41	0.00
		3	115.00	0.61	4.38	95.02	0.00
		4	115.00	4.49	3.77	91.74	0.00
	TOTAL :		460.00	1.35	7.58	91.07	0.00
3	MACHKUND	1	17.00	0.00	18.53	81.47	0.01
		2	17.00	0.00	2.54	97.46	0.00
		3	17.00	0.00	67.21	32.79	0.00
		4	21.25	0.09	18.30	81.61	0.00
		5	21.25	0.00	73.16	26.84	0.00
		6	21.25	0.00	75.52	24.48	0.00
	TOTAL :		114.75	0.02	44.00	55.98	0.00
4	NAGARJUN SGR	1	110.00	0.00	0.37	99.63	0.00
		2	100.80	0.00	0.00	100.00	0.00
		3	100.80	8.57	0.35	91.08	0.00
		4	100.80	0.00	26.36	73.64	0.00
		5	100.80	0.00	3.69	96.31	0.00
		6	100.80	0.00	20.92	79.08	0.00
		7	100.80	0.00	26.45	73.55	0.00
		8	100.80	0.00	15.68	84.32	0.00
	TOTAL :		815.60	1.06	11.60	87.34	0.00
5	NAGARJUN SGR LBC	1	30.00	0.00	3.51	96.49	0.00
		2	30.00	0.00	0.73	99.27	0.00
	TOTAL :		60.00	0.00	2.12	97.88	0.00
6	NAGARJUN SGR RBC	1	30.00	0.00	0.33	99.67	0.00
		2	30.00	0.00	0.32	99.68	0.00
	TOTAL :		60.00	0.00	0.33	99.67	0.00
7	NAGARJUN SGR RBC EXTN.	1	30.00	0.00	1.99	98.01	0.00
	TOTAL :		30.00	0.00	1.99	98.01	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
8	POCHAMPAD	1	9.00	0.00	0.00	100.00	0.00
		2	9.00	0.00	0.00	100.00	0.00
		3	9.00	0.00	0.00	100.00	0.00
		TOTAL :	27.00	0.00	0.00	100.00	0.00
9	PRIYADARSHNI JURALA	1	39.00	0.00	0.89	99.11	73.67
		2	39.00	0.00	59.19	40.81	31.88
		3	39.00	0.00	58.98	41.02	31.19
		4	39.00	0.00	0.26	99.74	76.18
		5	39.00	0.00	58.89	41.11	33.57
		6	39.00	0.00	4.27	95.73	78.52
		TOTAL :	234.00	0.00	30.41	69.59	54.17
10	SRISAILAM	1	110.00	0.00	0.75	99.25	0.00
		2	110.00	0.00	1.34	98.66	0.00
		3	110.00	0.00	1.30	98.70	0.00
		4	110.00	27.57	1.48	70.95	0.00
		5	110.00	2.49	2.28	95.23	0.00
		6	110.00	0.00	1.45	98.55	0.00
		7	110.00	0.29	1.75	97.96	0.00
		TOTAL :	770.00	4.33	1.48	94.19	0.00
11	SRISAILAM LB	1	150.00	30.75	1.30	67.95	0.00
		2	150.00	30.11	1.30	68.59	0.00
		3	150.00	30.75	1.30	67.95	0.00
		4	150.00	30.48	1.30	68.22	0.00
		5	150.00	30.48	1.30	68.22	0.00
		6	150.00	30.48	1.30	68.22	0.00
		TOTAL :	900.00	30.51	1.30	68.19	0.00
12	T B DAM	1	9.00	2.88	2.29	94.84	0.00
		2	9.00	1.22	0.73	98.04	0.00
		3	9.00	5.79	57.37	36.84	0.00
		4	9.00	12.07	14.07	73.86	0.00
		TOTAL :	36.00	5.49	18.61	75.90	0.00
13	UPPER SILERU-I	1	60.00	0.00	0.00	100.00	0.00
		2	60.00	0.00	0.66	99.34	0.00
		TOTAL :	120.00	0.00	0.33	99.67	0.00
14	UPPER SILERU-II	1	60.00	0.00	0.00	100.00	0.00
		2	60.00	0.00	0.00	100.00	0.00
		TOTAL :	120.00	0.00	0.00	100.00	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
KPCL							
15	ALMATTI DPH	1	15.00	0.92	0.27	98.81	0.00
		2	55.00	12.68	0.50	86.83	0.00
		3	55.00	6.70	9.17	84.13	0.00
		4	55.00	10.21	0.02	89.77	0.00
		5	55.00	18.13	0.43	81.43	0.00
		6	55.00	18.90	1.97	79.14	0.00
TOTAL :		290.00	12.68	2.31	85.01	0.00	
16	BHADRA	1	2.00	0.23	0.40	99.36	0.00
		2	12.00	0.02	0.13	99.85	0.01
		3	12.00	99.73	0.00	0.27	0.00
		4	7.20	99.73	0.00	0.27	0.00
		5	6.00	3.09	2.52	94.39	0.03
TOTAL :		39.20	49.34	0.45	50.21	0.01	
17	GERUSUPPA	1	60.00	5.11	0.13	94.76	0.00
		2	60.00	4.38	0.05	95.57	0.00
		3	60.00	1.33	0.17	98.50	0.00
		4	60.00	0.91	0.04	99.05	0.00
TOTAL :		240.00	2.93	0.10	96.97	0.00	
18	GHAT PRABHA	1	16.00	8.86	9.11	82.03	28.69
		2	16.00	7.48	10.28	82.24	26.43
TOTAL :		32.00	8.17	9.70	82.13	27.56	
19	JOG	1	13.20	5.42	18.08	76.50	0.00
		2	13.20	6.28	80.29	13.44	0.00
		3	13.20	4.78	3.42	91.80	0.02
		4	13.20	6.49	0.54	92.97	0.03
		5	21.60	6.13	0.53	93.34	0.04
		6	21.60	7.04	73.05	19.91	0.00
		7	21.60	2.03	73.04	24.93	0.00
		8	21.60	14.09	0.17	85.74	0.01
TOTAL :		139.20	6.72	32.48	60.80	0.01	
20	KADRA	1	50.00	0.32	0.00	99.68	91.97
		2	50.00	1.42	0.00	98.58	87.49
		3	50.00	0.52	0.00	99.48	86.99
TOTAL :		150.00	0.76	0.00	99.24	88.82	

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
21	KALINADI	1	135.00	3.90	12.16	83.95	0.00
		2	135.00	7.18	22.48	70.33	0.00
		3	135.00	4.94	0.73	94.33	0.00
		4	150.00	9.59	4.40	86.01	0.00
		5	150.00	1.77	1.32	96.91	0.00
		6	150.00	0.00	0.02	99.98	0.00
	TOTAL :		855.00	4.52	6.59	88.89	0.00
22	KALINADI SUPA	1	50.00	6.37	0.06	93.57	2.44
		2	50.00	3.04	2.68	94.28	2.97
	TOTAL :		100.00	4.70	1.37	93.93	2.70
23	KODASALI	1	40.00	1.02	0.05	98.93	86.06
		2	40.00	0.75	0.61	98.64	85.54
		3	40.00	4.03	0.09	95.88	77.65
	TOTAL :		120.00	1.93	0.25	97.82	83.08
24	LIGANAMAKKI	1	27.50	5.48	8.73	85.79	0.00
		2	27.50	5.68	2.47	91.85	0.00
	TOTAL :		55.00	5.58	5.60	88.82	0.00
25	MUNIRABAD	1	9.00	25.01	0.00	74.99	0.07
		2	9.00	24.93	0.00	75.07	0.08
		3	10.00	25.79	0.48	73.73	0.18
	TOTAL :		28.00	25.26	0.17	74.57	0.11
26	SHARAVATHI	1	103.50	1.47	0.54	97.99	0.00
		2	103.50	0.80	0.57	98.63	0.00
		3	103.50	3.16	0.34	96.50	0.00
		4	103.50	0.59	0.59	98.83	0.00
		5	103.50	4.10	17.39	78.50	0.00
		6	103.50	3.97	1.23	94.80	0.01
		7	103.50	1.34	0.65	98.01	0.01
		8	103.50	0.51	0.44	99.05	0.01
		9	103.50	0.91	2.42	96.67	0.00
		10	103.50	6.70	41.69	51.60	0.00
	TOTAL :		1035.00	2.36	6.59	91.05	0.00
27	SIVASAMUNDRUM	1	3.00	0.05	0.75	99.19	0.23
		2	3.00	0.05	0.52	99.43	0.20
		3	3.00	0.04	0.30	99.65	0.51
		4	3.00	0.59	0.09	99.33	0.45

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
		5	3.00	0.04	0.07	99.89	0.66
		6	3.00	23.43	0.28	76.29	0.10
		7	6.00	0.04	0.89	99.07	0.06
		8	6.00	0.04	0.10	99.86	0.26
		9	6.00	0.05	0.36	99.59	0.07
		10	6.00	0.99	1.68	97.34	0.08
	TOTAL :		42.00	1.89	0.58	97.53	0.22
28	VARAHI	1	115.00	4.13	0.17	95.70	0.10
		2	115.00	0.38	3.36	96.26	0.17
		3	115.00	2.70	0.35	96.95	0.15
		4	115.00	0.43	0.05	99.52	0.08
	TOTAL :		460.00	1.91	0.98	97.11	0.13
	<u>KSEB</u>						
29	IDAMALAYAR	1	37.50	11.45	0.21	88.34	0.34
		2	37.50	10.84	0.22	88.95	0.30
	TOTAL :		75.00	11.15	0.21	88.64	0.32
30	IDUKKI	1	130.00	13.11	0.56	86.33	0.00
		2	130.00	10.53	1.18	88.29	0.00
		3	130.00	3.92	1.16	94.92	0.00
		4	130.00	7.77	0.59	91.64	0.00
		5	130.00	4.82	3.03	92.15	0.00
		6	130.00	2.10	0.22	97.68	0.02
	TOTAL :		780.00	7.04	1.12	91.84	0.00
31	KAKKAD	1	25.00	8.31	1.07	90.63	14.49
		2	25.00	6.69	0.32	92.98	12.12
	TOTAL :		50.00	7.50	0.69	91.81	13.30
32	KUTTIYADI	1	25.00	10.31	0.10	89.58	0.02
		2	25.00	9.00	0.45	90.55	0.02
		3	25.00	9.02	0.51	90.47	0.00
		4	50.00	17.52	0.44	82.03	0.02
	TOTAL :		125.00	12.68	0.39	86.93	0.02
33	KUTTIYADI ADDL. EXTN.	5	50.00	4.28	0.79	94.93	0.02
		6	50.00	10.65	1.17	88.18	0.02
	TOTAL :		100.00	7.47	0.98	91.55	0.02

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
34	LOWER PERIYAR	1	60.00	7.85	0.12	92.03	2.29
		2	60.00	7.81	0.10	92.09	1.72
		3	60.00	6.28	1.47	92.25	1.51
		TOTAL :	180.00	7.31	0.57	92.12	1.84
35	NARIAMANGLAM	1	15.00	7.68	0.26	92.06	4.64
		2	15.00	15.97	0.72	83.31	4.43
		3	15.00	0.17	0.07	99.77	2.05
		4	25.00	0.39	0.27	99.34	3.97
		TOTAL :	70.00	5.24	0.32	94.44	3.80
36	PALLIVASAL	1	5.00	6.54	0.07	93.39	0.00
		2	5.00	1.72	0.14	98.14	0.00
		3	5.00	7.37	0.09	92.54	0.00
		4	7.50	7.74	0.11	92.16	0.00
		5	7.50	7.84	0.11	92.05	0.00
		6	7.50	7.75	0.19	92.06	0.01
		TOTAL :	37.50	6.75	0.12	93.13	0.00
37	PANNIAR	1	15.00	8.11	0.20	91.69	23.15
		2	15.00	1.03	0.36	98.61	26.73
		TOTAL :	30.00	4.57	0.28	95.15	24.94
38	PORINGALKUTTU	1	8.00	0.00	0.00	100.00	0.00
		2	8.00	37.10	2.32	60.57	0.20
		3	8.00	5.04	2.14	92.82	0.10
		4	8.00	5.01	5.27	89.72	0.18
		TOTAL :	32.00	11.79	2.43	85.78	0.12
39	SABARIGIRI	1	50.00	1.17	4.82	94.00	11.97
		2	50.00	3.56	1.27	95.17	33.45
		3	50.00	5.22	0.73	94.05	18.25
		4	50.00	0.00	99.73	0.27	0.00
		5	50.00	7.65	0.56	91.79	27.01
		6	50.00	0.43	3.82	95.75	36.35
		TOTAL :	300.00	3.01	18.49	78.50	21.17
40	SENGULAM	1	12.00	7.73	0.06	92.21	6.66
		2	12.00	12.33	3.56	84.11	2.99
		3	12.00	11.11	0.00	88.89	8.79
		4	12.00	14.18	0.01	85.81	2.89
		TOTAL :	48.00	11.34	0.90	87.76	5.33

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
41	SHOLAYAR	1	18.00	8.61	4.40	86.98	38.85
		2	18.00	11.07	1.84	87.09	51.40
		3	18.00	41.26	1.81	56.93	18.33
	TOTAL :		54.00	20.31	2.69	77.00	36.19
	TNGDCL						
42	ALIYAR	1	60.00	7.84	0.14	92.02	0.00
	TOTAL :		60.00	7.84	0.14	92.02	0.00
43	BHAWANI BARRAGE III	1	15.00	0.00	0.00	100.00	99.73
		2	15.00	0.03	0.01	99.96	0.00
	TOTAL :		30.00	0.01	0.00	99.99	49.86
44	BHAWANI BARRAGE-II	1	15.00	14.46	0.74	84.80	0.00
		2	15.00	7.22	0.55	92.23	0.00
	TOTAL :		30.00	10.84	0.64	88.52	0.00
45	BHAWANI KATTALI (BARAGE-I)	1	15.00	10.85	0.01	89.14	0.00
		2	15.00	11.52	0.00	88.47	0.00
	TOTAL :		30.00	11.19	0.01	88.80	0.00
46	KADAMPARI	1	100.00	0.27	8.20	91.53	0.00
		2	100.00	0.10	0.27	99.64	0.00
		3	100.00	0.10	4.26	95.64	0.00
		4	100.00	0.10	11.13	88.78	0.00
	TOTAL :		400.00	0.14	5.96	93.90	0.00
47	KODAYAR-I	1	60.00	10.34	1.10	88.57	0.00
	TOTAL :		60.00	10.34	1.10	88.56	0.00
48	KODAYAR-II	1	40.00	15.37	27.13	57.50	0.00
	TOTAL :		40.00	15.37	27.13	57.50	0.00
49	KUNDAH-I	1	20.00	2.95	0.00	97.05	0.00
		2	20.00	3.06	0.28	96.66	0.00
		3	20.00	0.63	0.39	98.98	0.00
	TOTAL :		60.00	2.21	0.22	97.57	0.00
50	KUNDAH-II	1	35.00	3.07	0.01	96.92	0.00
		2	35.00	7.56	1.05	91.39	0.00
		3	35.00	3.40	2.39	94.21	0.00
		4	35.00	0.82	3.67	95.51	0.00
		5	35.00	3.81	0.16	96.04	0.00
	TOTAL :		175.00	3.73	1.46	94.81	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
51	KUNDAH-III	1	60.00	4.56	0.55	94.89	0.00
		2	60.00	5.52	0.10	94.39	0.00
		3	60.00	8.18	0.89	90.93	0.00
		TOTAL :	180.00	6.09	0.51	93.40	0.00
52	KUNDAH-IV	1	50.00	2.76	3.90	93.34	0.00
		2	50.00	12.10	0.37	87.54	0.00
		TOTAL :	100.00	7.43	2.14	90.43	0.00
53	KUNDAH-V	1	20.00	9.38	21.48	69.13	0.02
		2	20.00	5.12	0.50	94.39	0.02
		TOTAL :	40.00	7.25	10.99	81.76	0.02
54	LOWER METTUR-I	1	15.00	5.35	0.00	94.65	0.00
		2	15.00	30.00	0.00	70.00	0.00
		TOTAL :	30.00	17.68	0.00	82.32	0.00
55	LOWER METTUR-II	3	15.00	10.37	4.31	85.33	0.00
		4	15.00	40.83	2.64	56.53	0.00
		TOTAL :	30.00	25.60	3.48	70.92	0.00
56	LOWER METTUR-III	5	15.00	1.10	6.73	92.17	0.00
		6	15.00	7.24	0.93	91.82	0.00
		TOTAL :	30.00	4.17	3.83	92.00	0.00
57	LOWER METTUR-IV	7	15.00	10.31	0.00	89.69	0.00
		8	15.00	10.78	0.00	89.22	0.00
		TOTAL :	30.00	10.55	0.00	89.45	0.00
58	METTUR DAM	1	12.50	9.15	0.00	90.85	0.00
		2	12.50	0.00	5.80	94.20	0.00
		3	12.50	5.80	0.00	94.20	0.00
		4	12.50	0.00	0.19	99.81	0.00
		TOTAL :	50.00	3.74	1.50	94.76	0.00
59	METTUR TUNNEL	1	50.00	40.41	46.85	12.74	0.00
		2	50.00	32.68	0.42	66.91	0.00
		3	50.00	31.97	0.24	67.79	0.00
		4	50.00	18.78	0.09	81.13	0.00
		TOTAL :	200.00	30.96	11.90	57.14	0.00
60	MOYAR	1	12.00	4.95	7.44	87.61	0.15
		2	12.00	9.49	0.26	90.25	0.06
		3	12.00	4.56	2.19	93.25	0.00
		TOTAL :	36.00	6.34	3.29	90.37	0.07

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
61	PAPANASAM	1	8.00	3.83	1.99	94.18	0.00
		2	8.00	1.66	0.09	98.25	0.00
		3	8.00	2.05	1.26	96.69	0.00
		4	8.00	10.00	18.26	71.74	0.00
	TOTAL :		32.00	4.39	5.40	90.21	0.00
62	PARSON'S VALLEY	1	30.00	0.53	29.00	70.47	0.00
	TOTAL :		30.00	0.53	29.00	70.47	0.00
63	PERIYAR	1	35.00	5.63	0.13	94.23	0.00
		2	35.00	5.22	0.44	94.35	0.00
		3	35.00	9.55	0.00	90.45	0.00
		4	35.00	1.02	36.21	62.77	0.00
	TOTAL :		140.00	5.36	9.20	85.44	0.00
64	PYKARA	1	7.00	0.54	5.32	94.14	0.65
		2	7.00	0.36	2.30	97.34	0.00
		3	7.00	0.47	9.91	89.61	0.00
		4	13.60	0.00	0.00	100.00	0.00
		5	13.60	0.47	1.50	98.03	1.48
		6	11.00	0.41	0.02	99.57	0.01
	TOTAL :		59.20	0.35	2.42	97.23	0.42
65	PYKARA ULTMATE	1	50.00	5.55	6.49	87.95	0.16
		2	50.00	4.21	3.62	92.17	0.10
		3	50.00	4.78	11.09	84.13	0.00
	TOTAL :		150.00	4.85	7.07	88.08	0.08
66	SARKARPATHY	1	30.00	14.81	0.00	85.19	0.00
	TOTAL :		30.00	14.81	0.00	85.19	0.00
67	SHOLAYAR	1	35.00	10.79	19.22	69.99	0.19
		2	35.00	0.00	99.72	0.28	0.00
		3	25.00	14.93	0.43	84.64	0.16
	TOTAL :		95.00	7.90	43.93	48.17	0.11
68	SURULIYAR	1	35.00	6.40	0.00	93.60	0.00
	TOTAL :		35.00	6.40	0.00	93.60	0.00
<u>EASTERN REGION</u>							
<u>DVC</u>							
1	MAITHON	1	23.20	17.44	2.36	80.20	0.00
		2	20.00	10.08	8.23	81.69	0.00
		3	20.00	0.00	4.82	95.18	0.00
	TOTAL :		63.20	9.59	5.00	85.41	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
2	PANCHET	1	40.00	0.00	61.09	38.91	0.00
		2	40.00	0.00	23.30	76.70	0.00
	TOTAL :		80.00	0.00	42.20	57.80	0.00
	<u>GIL</u>						
3	CHUZACHEN	1	49.50	9.84	0.29	89.87	0.53
		2	49.50	9.84	0.46	89.70	0.20
	TOTAL :		99.00	9.84	0.38	89.78	0.37
	<u>JSEB</u>						
4	SUBERNREKHA-I	1	65.00	33.51	1.81	64.67	0.00
	TOTAL :		65.00	33.51	1.81	64.68	0.00
5	SUBERNREKHA-II	2	65.00	33.42	0.23	66.35	0.00
	TOTAL :		65.00	33.42	0.23	66.35	0.00
	<u>NHPC</u>						
6	RANGIT	1	20.00	6.54	0.56	92.90	0.89
		2	20.00	8.42	0.09	91.48	0.90
		3	20.00	7.90	2.91	89.19	0.90
	TOTAL :		60.00	7.62	1.19	91.19	0.90
7	TEESTA LOW DAM-III	1	33.00	0.07	41.76	58.17	8.77
		2	33.00	0.00	90.21	9.79	0.06
		3	33.00	0.00	32.26	67.74	9.70
		4	33.00	0.00	35.30	64.70	8.29
	TOTAL :		132.00	0.02	49.88	50.10	6.70
8	TEESTA V	1	170.00	0.00	0.61	99.39	6.80
		2	170.00	0.00	0.73	99.27	8.00
		3	170.00	0.00	2.51	97.49	11.71
	TOTAL :		510.00	0.00	1.28	98.72	8.84
	<u>OHPC</u>						
9	BALIMELA	1	60.00	0.00	0.00	100.00	0.00
		2	60.00	1.24	30.71	68.05	0.00
		3	60.00	0.68	33.45	65.86	0.00
		4	60.00	1.95	10.92	87.14	0.00
		5	60.00	8.62	2.65	88.73	0.00
		6	60.00	1.86	0.65	97.50	0.00
		7	75.00	19.77	13.03	67.20	0.00
		8	75.00	2.77	7.79	89.44	0.00
	TOTAL :		510.00	5.00	12.28	82.72	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
10	HIRAKUD-I	1	49.50	14.26	2.02	83.72	0.00
		2	49.50	18.84	4.37	76.79	0.00
		3	32.00	2.52	4.27	93.22	0.00
		4	32.00	2.02	0.00	97.98	0.00
		5	37.50	1.95	9.42	88.63	0.00
		6	37.50	0.15	62.91	36.94	0.00
		7	37.50	0.56	2.60	96.83	0.00
	TOTAL :		275.50	6.85	11.86	81.29	0.00
11	HIRAKUD-II	1	24.00	9.18	10.58	80.24	0.00
		2	24.00	0.65	0.48	98.87	0.00
		3	24.00	0.26	26.44	73.31	0.00
	TOTAL :		72.00	3.36	12.50	84.14	0.00
12	RENGALI	1	50.00	5.00	0.24	94.77	0.00
		2	50.00	8.58	0.82	90.60	0.00
		3	50.00	0.44	3.63	95.93	0.00
		4	50.00	5.66	0.57	93.77	0.00
		5	50.00	8.40	0.06	91.54	0.00
	TOTAL :		250.00	5.61	1.06	93.33	0.00
13	UPPER INDRAVATI	1	150.00	6.16	2.02	91.81	0.00
		2	150.00	5.53	0.00	94.47	0.00
		3	150.00	0.74	0.00	99.26	0.00
		4	150.00	1.02	0.28	98.70	0.00
	TOTAL :		600.00	3.36	0.58	96.06	0.00
14	UPPER KOLAB	1	80.00	9.20	5.78	85.02	0.00
		2	80.00	10.26	1.61	88.13	0.00
		3	80.00	28.84	8.12	63.04	0.00
		4	80.00	1.36	0.32	98.32	0.00
	TOTAL :		320.00	12.41	3.96	83.63	0.00
	<u>WBSedCL</u>						
15	JALDHAKA HPS ST-I	1	9.00	14.49	62.25	23.26	0.40
		2	9.00	1.58	16.89	81.53	30.66
		3	9.00	1.00	13.33	85.67	3.17
	TOTAL :		27.00	5.69	30.82	63.49	11.41
16	PURULIA PSS	1	225.00	1.41	0.01	98.58	0.00
		2	225.00	0.78	0.25	98.96	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
		3	225.00	34.34	0.01	65.65	0.00
		4	225.00	0.00	0.27	99.73	0.00
	TOTAL :		900.00	9.13	0.14	90.73	0.00
17	RAMMAM	1	12.50	0.00	0.21	99.79	28.20
		2	12.50	0.00	0.29	99.71	21.35
		3	12.50	0.00	0.23	99.77	28.77
		4	12.50	0.00	0.20	99.80	19.50
	TOTAL :		50.00	0.00	0.23	99.77	24.45
	<u>NORTH EASTERN REGION</u>						
	<u>APGPCCL</u>						
1	KARBI LANGPI HPS.	1	50.00	0.00	0.83	99.17	26.38
		2	50.00	19.47	7.84	72.69	27.41
	TOTAL :		100.00	9.74	4.33	85.93	26.90
	<u>MePGCL</u>						
2	KYRDEMKULAI HPS.	1	30.00	0.00	84.36	15.64	0.00
		2	30.00	22.54	1.16	76.30	0.00
	TOTAL :		60.00	11.27	42.76	45.97	0.00
3	MYNTDU(LESHKA) St-1 HPS	1	42.00	0.27	5.74	94.00	0.00
		2	42.00	0.89	1.88	97.23	0.00
		3	42.00	0.27	3.11	96.62	0.00
	TOTAL :		126.00	0.48	3.58	95.94	0.00
4	UMIAM HPS ST-I	1	9.00	0.60	0.17	99.24	0.00
		2	9.00	0.60	0.06	99.35	0.00
		3	9.00	1.78	0.06	98.16	0.00
		4	9.00	1.78	16.94	81.28	0.00
	TOTAL :		36.00	1.19	4.31	94.50	0.00
5	UMIAM HPS ST-IV	7	30.00	0.86	8.66	90.47	0.00
		8	30.00	11.26	14.85	73.89	0.00
	TOTAL :		60.00	6.06	11.76	82.18	0.00
	<u>NEEPCO.</u>						
6	DOYANG HPS.	1	25.00	5.33	0.00	94.67	0.00
		2	25.00	0.00	0.06	99.94	0.00
		3	25.00	0.00	0.51	99.49	0.00
	TOTAL :		75.00	1.78	0.19	98.03	0.00
7	KHONDONG HPS.	1	25.00	4.02	39.51	56.46	0.09
		2	25.00	17.23	7.46	75.31	0.00
	TOTAL :		50.00	10.63	23.49	65.88	0.04

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2013-2014

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)	MISC. NON AVAILABILITY (%)
8	KOPILI HPS.	1	50.00	28.70	16.24	55.06	0.00
		2	50.00	24.11	32.34	43.55	0.00
		3	50.00	0.00	39.42	60.58	0.02
		4	50.00	6.79	39.82	53.39	0.46
		5	25.00	0.00	45.54	54.46	0.00
	TOTAL :		225.00	13.24	33.46	53.30	0.11
9	RANGANADI HPS.	1	135.00	4.73	3.33	91.94	0.00
		2	135.00	3.38	0.00	96.62	0.00
		3	135.00	5.05	0.75	94.21	0.00
	TOTAL :		405.00	4.39	1.36	94.25	0.00
	<u>NHPC</u>						
10	LOKTAK HPS.	1	35.00	18.80	0.84	80.36	0.10
		2	35.00	0.00	0.77	99.23	0.11
		3	35.00	5.41	2.60	92.00	0.18
	TOTAL :		105.00	8.07	1.40	90.53	0.13

CHAPTER 7

GENERATION
PROGRAMME FOR THE
YEAY 2014-15

CHAPTER 7

GENERATION PROGRAMME FOR THE YEAR 2014-15

7.1 As on 31.3.2014, 188 HE Stations (of more than 25 MW capacity) having total installed capacity of 40531.41 MW are being monitored in the country. With the addition of new hydro units during 2014-15, the anticipated installed capacity of HE Stations in the country would be 41431.40 MW (HE station capacity above 25 MW) by 31st March, 2015. Generation Programme for HE stations in the country for the year 2014-15 has been fixed at 129097 MU (including 4800 MU import from Bhutan) which was 11348.42 MU less than actual generation of 140445.42 MU (including 5597.90 MU import from Bhutan during 2013-14).

7.2 Region wise details of likely installed capacity on 31.03.2015, Generation Programme for 2014-15 and actual generation during 2013-14 are given in **Table 7.1** below:

TABLE 7.1

REGIONWISE LIKELY INSTALLED CAPACITY OF HE STATIONS AND GENERATION PROGRAMME DURING 2014-15

Sl. No.	Region	Likely Installed Capacity on 31.03.2015 (MW)	Generation Programme for 2014-15 (MU)	Generation during 2013-14 (MU)	
				Programme	Actual
1.	Northern	16740.25	61804	61597	63472.70
2.	Western	7392.00	15918	15843	22828.76
3.	Southern	11642.45	31603	29454	32831.06
4.	Eastern	4374.70	10884	11191	11650.96
5.	North-Eastern	1282.00	4088	4178	4064.05
Sub total		41431.40	124297	122263	134847.52
6.	Import – from Bhutan		4800	4800	5597.90
Total(Including Import from Bhutan)			129097	127063	140445.42

7.3 While finalizing the Generation Programme for 2014-15, it was anticipated that 15 H.E. units having installed capacity of 882 MW will be added during the year. Unit wise details of these units are given in **Annex-7.1**.

7.4 Actual generation during the year 2013-14 from HE Stations was 140445.42 MU against the Generation Programme of 127063 MU including import from Bhutan. Sector wise, Utility wise details of likely installed Capacity as on 31.03.2015, targets and actual generation during 2013-14, generation target for 2014-15 are given in **Annex-7.2**.

**HYDRO ELECTRIC GENERATING UNITS LIKELY TO BE ADDED
DURING 2014-15**

Sl. No	Name of the Project	State/ Organization	Unit No.	Capacity (MW)	Programmed Date of Commissioning
	Central Sector				
1	Parbati-III	HP / NHPC	U-4	130	August 2014
2	Rampur	HP / SJVNL	U-3 U-4 U-6	68.67 68.67 68.67	June 2014 May 2014 April 2014
	State Sector				
3	Lower Jurala	AP /APGENCO	U-1 U-2 U-3 U-4	40 40 40 40	April 2014 June 2014 October 2014 February 2015
4	Nagarjuna Sagar	AP /APGENCO	U-1 U-2	25 25	July 2014 August 2014
5	New Umetru	Meghalaya/ MeECL	U-1 U-2	20 20	March 2015 March 2015
	Private Sector				
6	Jorethang Loop	Sikkim/ Dans Pvt. Ltd.	U-1 U-2	48 48	September 2014 October 2014
7	Teesta III	Sikkim/ Teesta Urja	U-1	200	February 2015
		Total: 2014-15	15	882	

**SECTORWISE PERFORMANCE OF HYDRO ELECTRIC STATIONS
DURING 2013-14 & TARGETS FOR 2014-15**

SECTOR/ STATE	Installed Capacity on 31.03.2015	Generation during 2013-14(MU)		Generation Programmed for 2014-15 (MU)
		Targets	Actual	
A. CENTRAL SECTOR				
BBMB	2866.30	9665	12125.01	9275
SJVNL	1912.00	6548	7190.55	7800
THDC	1400.00	3952	5582.28	3952
NHPC	4979.20	21107	18360.49	20770
NHDC	1520.00	3384	5711.90	3455
DVC	143.20	283	225.63	218
NEEPCO	755.00	2392	2199.87	2358
Sub Total	13575.70	47331	51395.73	47828
B. STATE ELECTRICITY BOARDS/CORPORATIONS				
HPSEBL	366.00	1603	1594.09	1599
JKPDC	660.00	3437	3531.19	3058
RRVUNL	411.00	562	1059.98	535
PSPCL	1051.00	3920	3913.52	3938
UPJVNL	501.60	1006	1241.73	1112
UJVNL	1252.15	4574	4338.34	4452
GSECL	540.00	690	1223.98	700
SSNNL	1450.00	3141	5882.31	3601
MPPGCL	875.00	2575	3504.03	2575
MAHAGENCO	2406.00	3873	4567.31	3852
CSPGC	120.00	250	251.51	250
APGENCO	3993.35	6603	7277.10	7074
KPCL	3585.40	11606	12851.04	12619
KSEB	1881.50	6589	7708.18	6849
TANGENCO	2182.20	4656	4994.74	5061
JSEB	130.00	160	109.53	128
OHPC	2027.50	5650	6974.86	5571
WBSEDCL	977.00	1078	1208.61	958
APGCL	100.00	390	422.14	390
MePGCL	322.00	896	802.20	820
Sub Total	24831.70	63259	73456.38	65142

SECTOR/ STATE	Installed Capacity on 31.03.2015	Generation during 2013-14(MU)		Generation Programmed for 2014-15 (MU)
		Targets	Actual	
C.PRIVATE SECTOR				
MPCL(HP)	86.00	344	318.34	340
ADHL(HP)	192.00	720	700.24	700
LGPPL(HP)	70.00	291	221.17	291
EPPL (HP)	100.00	386	339.87	360
JPVL (HP & UK)	1700.00	7402	6436.65	7403
SMHPCL(MP)	-	415	-	-
TATA HYDRO	447.00	1450	1596.92	1420
DLHP(MAH.)	34.00	65	90.80	65
GIPL(SIKKIM)	99.00	537	291.42	537
GVK INDIA(UK)	-	42	-	-
HSPL(HP)	-	21	-	-
DANS PVT LTD (SIKKIM)	96	-	-	75
TEESTA URJA(SIKKIM)	200	-	-	136
Sub Total	3024.00	11673	9995.41	11327
Total All India	41431.40	122263	134847.52	124297
Import from Bhutan		4800	5597.90	4800
Total Hydro generation including import from Bhutan		127063	140445.42	129097

Note:- Hydro schemes only above 25 MW has been considered.

CHAPTER 8

RENOVATION & MODERNISATION OF HYDRO-ELECTRIC POWER STATIONS

CHAPTER – 8

RENOVATION & MODERNISATION OF HYDRO ELECTRIC POWER PROJECTS

8.0 Introduction

Renovation & Modernisation (R&M) and uprating wherever feasible of old hydro power plants in the present scenario of resource constraint is considered to be the best option for bridging the gap between the demand and supply of power as R&M schemes are cost effective and quicker than the setting up of green field power plants.

8.1 R&M Phase-I Programme:

Recognising the benefits of the R&M programme, Govt. of India set up a National Committee in 1987 to formulate strategy on R&M of hydro power projects. Based on the recommendations of the National Committee and subsequent reviews, a programme for Renovation, Modernization and Uprating of Hydro Power Stations was formulated by Central Electricity Authority in which 55 schemes were identified with an aggregate capacity of 9653 MW. The total cost of these schemes was estimated as Rs.1493 Crores with expected benefit of 2531 MW.

8.2 R&M Phase-II Programme:

As per the hydro policy of Govt. of India declared in 1998, renovation & modernization of Hydro Power Plants was accorded priority. Accordingly, 67 hydro R&M schemes having an aggregate capacity of 10318 MW were identified to be undertaken under Phase-II programme till the end of X Plan to accrue a benefit of 3685 MW at an estimated cost of Rs. 2161 Crores.

8.3 National Perspective Plan:

CEA formulated the National Perspective Plan for hydro power stations in the year 2000 and incorporated R&M proposals under Phase-II programme alongwith the left out schemes as recommended in Phase-I programme of National Committee. The left out schemes were those which were either under implementation or were yet to be implemented. This Perspective Plan was for IX, X and XI Plan with 117 schemes having an aggregate installed capacity of 19370 MW with benefit of 7755MW at an estimated cost of Rs.4654 crores.

8.4 VIII, IX, X and XI Plan Achievements:

Under the hydro R&M programme, 83 (19 in Central Sector and 64 in State Sector) hydro electric schemes (13 upto the VIII Plan, 20 in the IX Plan, 32 in the X Plan and 18 in the XI Plan) with an installed capacity of 15332 MW at a cost of Rs.2,021 Crores have been completed by the end of the XI Plan (i.e. by 31.03.2012) & have accrued a benefit of 3086 MW through Life Extension, Uprating and Restoration. The state-wise list of hydro R&M schemes completed during the VIII, IX, X Plan & XI Plan is given at Annex. I, II, III & IV respectively.

8.5 XII & XIII Plan Programme:

During XII Plan, a total of 30 hydro R&M schemes (4 in Central Sector and 26 in State Sector) having an installed capacity of about 6066 MW and which will accrue benefit of about 1783 MW through uprating, life extension and restoration are expected to be completed at an estimated cost of about Rs.2403 Crores. A total of 20 schemes are programmed to be taken up in XII Plan and will accrue benefit of 1961 MW during XIII Plan. The state-wise list of hydro R&M schemes programmed for completion during XII Plan (30schemes) and XIII Plan (20schemes) is given at Annex.-V and Annex.-VI respectively. Out of the 30 schemes programmed for completion during XII Plan, 1 scheme in Central Sector and 7 schemes in State Sector with an installed capacity of about 1602 MW have been completed till June, 2014 and have accrued a benefit of 196 MW through Life Extension.

8.6 Summary of R&M of Hydro Projects (As on 30.06.2014)

I Hydro R&M schemes completed up to XI Plan

Sl. No.	Plan Period	No. of Projects			Installed Capacity (MW)	Estimated Cost (Rs. in Crs.)	Actual Expenditure (Rs. in Crs)	Benefit (MW)
		Central Sector	State Sector	Total				
1.	VIII Plan Schemes completed	2	11	13	1282.00	125.57	127.37	429.00 [39.00(U) + 336.00(Res.) +54.00(LE)]
2.	IX Plan Schemes completed	8	12	20	4892.10	597.84	570.16	1093.03 [339.00(U) + 331.03(Res.) + 423.00(LE)]
3.	X Plan Schemes completed	5	27	32	4336.60	1016.31	1028.97	829.08 [123.40(U) + 701.25 (LE) + 4.43(Res.)]
4.	XI Plan Schemes completed	4	14	18	4821.20	412.83	294.84	735 [12 (U) + 15 (LE) + 708 (Res.)]

II Candidate Hydro R&M schemes programmed for completion during XII Plan

Sl. No.	Description of Status of Scheme	No. of Projects			Installed Capacity (MW)	Estimated Cost (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total				
a)	Programmed (Original)	5	40	45	6065.90	2402.82	1249.89	1782.70 [148(U) + 1619.70(LE) + 15(Res.)]
	Revised	4	26	30				
b)	Completed	1	7	8	1601.60	326.38	313.33	196 [11 (U)+ 185 (LE)]

c)	Under Implementation	2	16	18	3257.30	1757.95	873.01	1414.70 [137(U) +15.0(Res.)+ 1262.70(LE)]
d)	Under Tendering	1	2	3	1207	318.49	63.55	172 (LE)
e)	Under DPR Preparation	0	1	1	1035	20	2.59	0

Abbreviations: MW – Mega Watt; Res. – Restoration; U – Uprating; LE – Life Extension

III Candidate Hydro R&M schemes to be taken up during the XII Plan and programmed for completion in the XIII Plan & beyond

Sl. No.	Description of Status of Scheme	No. of Projects			Installed Capacity (MW)	Estimated Cost (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total				
a)	Programmed	1	19	*20	2281.50	3951.60	6.59	1960.55 [69.05(U) + 1891.50(LE)]
b)	Under Tendering	-	11	11	1495.75	3072.61	0.84	1159.55 [53.80 (U) + 1105.75 (LE)]
c)	Under DPR Preparation	1	6	7	689.75	878.99	5.75	705 [15.25(U) + 689.75 (LE)]
d)	Under RLA Studies	-	2	2	96	-	-	96 [96(LE)]

Abbreviations: MW – Mega Watt; Res. – Restoration; U – Uprating; LE – Life Extension

* Out of these 20 schemes, 16 schemes have been rescheduled for completion from XII Plan to XIII Plan & beyond.

8.7 Programme for the year 2013-14

For the year 2013-14, it is programmed to complete following 13 schemes having an installed capacity of 1819 MW. On completion of these schemes, there will be a benefit of about 216 MW through Life Extension, Restoration and Uprating at an estimated cost of about Rs.717 Crores.

S.No. Name of Scheme (I.C. in MW), Agency

1. Rengali Unit-2 (1x50), OHPC

2. Bassi (4x16.5), HPSEB
3. Chenani (5x4.66), J&KPDC
4. Sumbal Sindh (2x11.3), J&KPDC
5. Ganderbal (2x3+2x4.5), J&KPDC
6. Pathri (3x6.8), UJVNL
7. Lower Jhelum (3x35), APGENCO
8. Srisaillam RB (7x110), APGENCO
9. Lower Sileru (4x115), APGENCO
10. Supa (2x50), KPCL
11. Sabirigiri(6x50), KSEB
12. Jaldhaka St.I (3x9), WBSEB
13. Kopili (2x50), NEEPCO

8.8 Achievement during the year 2013-14

R&M schemes namely Rengali Unit-2 of OHPC, Lower Sileru of APGENCO and Bassi of HPSEB having an aggregate installed capacity of about 576 MW have been completed during the year 2013-14 at an actual cost of Rs. 62.17 Crores and accrued benefit of 50 MW through Life Extension, Up-rating and Restoration.

8.9 Programme for the year 2014-15

For the year 2014-15, it is programmed to complete following 13 schemes having an installed capacity of 1453 MW. On completion of these schemes, there will be a benefit of about 318 MW through Life Extension, Restoration and Up-rating at an estimated cost of about Rs.781 Crores.

S.No. Name of Scheme (I.C. in MW), Agency

1. Sabirigiri(1x60), KSEB
2. Khandong (1x25), NEEPCO
3. Chenani (5x4.66), J&KPDC
4. Ganderbal (2x3+2x4.5), J&KPDC
5. Lower Jhelum (3x35), APGENCO
6. Sumbal Sindh (2x11.3), J&KPDC
7. Pathri (3x6.8), UJVNL
8. Srisaillam RB (7x110), APGENCO
9. Bhadra River (2x12), KPCL
10. Supa (2x50), KPCL
11. Periyar (1x35+3x42), TANGEDCO
12. Jaldhaka St.I (3x9), WBSEB
13. Kopili (2x50), NEEPCO

State wise List of Hydro RM&U schemes completed upto the VIII Plan

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Himachal Pradesh								
1.	Bairasiul, NHPC	CS	3x60	25.98	25.98	18.00 (U)	RM&U	1991-92
2.	Giri, HPSEB	SS	2x30	9.85	7.90	6.00 (U)	RM&U	1995-96
Punjab								
3.	UBDC-I, PSEB	SS	3x15	11.00	8.00	11.00 (Res)	R&M+Res.	1990-92
Uttar Pradesh								
4.	Rihand, UPJVNL	SS	6x50	1.43	1.43	100.00 (Res)	R&M+Res.	1995-96
Karnataka								
5.	Nagjhari, U-2, KPCL	SS	1x135	11.97	11.32	15.00 (U)	RM&U	1995-96
6.	Shivasamudra m, VVNL	SS	6x3 + 4x6	8.00	8.00	18.00 (LE)	RM&LE (3 MW Units)	N.A.
Kerala								
7.	Sholayar, KSEB	SS	3x18	7.58	7.58	-	R&M	1996-97
Tamil Nadu								
8.	Kadamparai (Units 3&4), TANGEDCO	SS	2x100	23.17	33.69	200.00 (Res)	R&M+Res.	1993-95
9.	Kundah III (Units 1&2), TANGEDCO	SS	2x60	5.45	3.20	-	R&M	1991-92
10.	Moyar, TANGEDCO	SS	3x12	1.62	1.30	36.00 (LE)	RM&LE	1990-91
11.	Sholayar-I, TANGEDCO	SS	2x35	1.40	0.85	-	R&M	1994-95
Meghalaya								
12.	Khandong, U-1, NEEPCO	CS	1x25	0.62	0.62	25.00 (Res)	R&M+Res.	1991-92
Tripura								
13.	Gumti, TSECL	SS	3x5	17.50	17.50	-	R&M	1994-95
	Total		1282.00	125.57	127.37	429.00 [39.0 (U) + 336.0 (Res) + 54.0(LE)]		

Abbreviations: R&M – Renovation & Modernisation; U – Uprating; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector; SS- State Sector

State wise List of Hydro RM&U schemes completed in the IX Plan

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Himachal Pradesh								
1.	Bhakra RB, BBMB	CS	5x132	88.45	90.68	125.00 (U)	RM&U	2000-01
2.	Dehar U-2, BBMB	CS	1x165	10.74	10.74	25.00 (Res.)	R&M+Res.	1998-99
3.	Bairasiul, NHPC	CS	3x66	18.45	18.45	-	R&M	2000-01
4.	Bassi, HPSEB	SS	4x15	5.35	4.3446	-	R&M	2000-01
Jammu & Kashmir								
5.	Salal St.I, NHPC	CS	3x115	51.50	51.50	-	R&M	2000-01
6.	Chenani, J&KPDC	SS	5x4.66	11.00	11.00	0.93 (Res)	R&M+Res.	2000-01
Punjab								
7.	Ganguwal, U-2, BBMB	CS	1x24.2	18.90	15.00	22.00 (LE)+ 2.20 (Res)	RM&LE+ Res.	1997-98
8.	Kotla, U-3, BBMB	CS	1x24.2	18.90	16.90	22.00 (LE)+ 2.20 (Res)	RM&LE+ Res.	1998-99
9.	Ganguwal U-3, BBMB	CS	1x24.2	25.00	43.40	22.00 (LE)+ 2.20 (Res)	RM&LE+ Res.	2000-01
10	Kotla U-2, BBMB	CS	1x24.2	25.00		22.00 (LE)+ 2.20 (Res)	RM&LE+ Res.	2001-02
Uttarakhand								
11	Chilla U-1, 3& 4, UJVNL	SS	3x36	4.25	4.1136	-	R&M	1998-99
12	Tiloth, UJVNL	SS	3x30	8.02	5.513	6.00 (U)	RM&U	1998-99
Andhra Pradesh								
13	Lower Sileru, APGENCO	SS	4x115	13.35	9.30	24.00 (Res)	R&M+Res.	2001-02
14	Srisailam, APGENCO	SS	7x110	16.32	11.40	-	R&M	2001-02
Karnataka								
15	Sharavathy, U-1 to 8, KPCL	SS	8x89.1	65.00	63.49	178.20 (Res) + 115.20 (U)	RM&U +Res.	1997-98
16	Sharavathy, U-9&10, KPCL	SS	2x89.1	17.96	14.68	19.10 (Res) + 28.80(U)	RM&U +Res.	1997-98

Annex-8.2
(Sheet 2/ 2)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Orissa								
17	Hirakud-I, U1&2, OHPC	SS	2x37.5	95.10		95.10	24.00(U) + 75.00(LE)	RMU&LE
Gujarat								
18	Ukai, U-1&3, GSECL	SS	2x75	24.99	24.99	75.00 (Res)	R&M+Res.	1997-98
Maharashtra								
19	Koyna I&II, MSPGCL	SS	4x65+ 4x75	74.91	74.91	40.00 (U) + 260.00 (LE)	RM&U of St-I & II & LE of St-I	1999-2000
20	Koyna III, U-10, 11 &12, MSPGCL	SS	3x80	4.65	4.65	-	R&M	1997-98
	Total		4892.10	597.84	570.16	1093.03 [339.0(U) + 331.03(Res) +423.0(LE)]		

Abbreviations: R&M – Renovation & Modernisation;. U – Uprating; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector: SS- State Sector

State wise List of Hydro RM&U schemes completed in the X Plan

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of completion
				(Rs. in Crs.)				
Himachal Pradesh								
1.	Pong, BBMB	CS	6x60	17.70	17.79	36.00 (U)	RM&U	2003-04
Punjab								
2.	Ganguwal,U-1, BBMB	CS	1x29.25	51.28 (incl. IDC 6.28)	81.9935	25.89 (LE) +2.10 (Res)	RM& LE+Res.	2006-07
3.	Kotla, U-1, BBMB	CS	1x29.25	51.28 (incl. IDC 6.28)		26.61 (LE) +2.33 (Res)	RM&LE + Res.	2006-07
4.	Shanan Ph.A, PSEB	SS	4x15+ 1x50 \$	11.35	10.93	-	R&M	2003-04
5.	Shanan, Ph.B, PSEB	SS	4x15+ 1x50 \$	35.95	13.34	60.00 (LE)	RM&LE (LE for 15 MW units + R&M for 50 MW unit)	2006-07
6.	Anandpur Sahib, PSEB	SS	4x33.5	3.68	1.04	-	R&M	2006-07
7.	UBDC I&II, PSEB	SS	3x15 + 3x15.45	7.89	2.44	45.00 (LE)	RM&LE (LE for 3x15 MW & R&M for 3 x 15.45 MW	2006-07
8.	Mukerian St.I, PSEB	SS	3x15	6.04	4.38	-	R&M	2006-07
Uttarakhand								
9.	Chibro, UJVNL	SS	4x60	10.45	10.52	-	R&M	2006-07
Karnataka								
10.	Nagjhari, U-1&3, KPCL	SS	2x135	26.12	21.62	30.00 (U)	RM&U	2002-03
11.	Supa PH, KPCL	SS	2x50	2.64	2.47	-	R&M	2002-03

Annex- 8.3
(Sheet 2/3)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
12	Mahatma Gandhi, VVNL	SS	4x12+ 4x18	44.66	43.13	19.20 (U)+120.00 (LE)	RMU&LE	2002-03
13	Munirabad, VVNL	SS	2x9+ 1x10.3	3.64	3.53	28.30 (LE)	RM&LE	2002-03
14	Mani Dam, KPCL	SS	2x4.5	1.00	1.00	-	R&M	2002-03
15	Shivasamudra m, VVNL	SS	6x3+ 4x6	68.38	73.17	42.00 (LE)	RM&LE	2004-05
16	Bhadra, Ph.II, KPCL	SS	1x2	3.30	2.51	2.00 (LE)	RM&LE	2005-06
17	Varahi, KPCL	SS	2x115	2.57	2.66	-	R&M	2006-07
18	Sharavathy, Ph.A, KPCL	SS	10x103.5	5.22	3.52	-	R&M	2006-07
Kerala								
19	Neriamangalam KSEB	SS	3x15	58.00	53.05	45.00 (LE) + 9.00 (U)	RMU&LE	2006-07
20	Pallivasal, KSEB	SS	3x5+3x 7.5	94.00	371.71	37.50 (LE)	RM&LE	2002-03
21	Sengulam, KSEB	SS	4x12	114.00		48.00 (LE)	RM&LE	2002-03
22	Panniar, KSEB	SS	2x15	62.00		30.00 (LE)	RM&LE	2002-03
Tamilnadu								
23	Pykara, TANGEDCO	SS	3x6.65+ 1x11+2x 14	26.06	20.147	58.95(LE)	RM&LE	2004-05
24	Papanasam, TANGEDCO	SS	4x7	27.05	22.61	4.00 (U) + 28.00 (LE)	RMU&LE	2005-06
Orissa								
25	Hirakud-I (Sw.yard), OHPC	SS		9.85	15.88	-	R&M	2006-07
26	Hirakud-I, U-3&4, OHPC	SS	2x24	126.14	108.86	16.00(U)+ 48.00(LE)	RMU&LE	2005-06
West Bengal								
27	Maithon, U-2, DVC	CS	1x20	42.08	36.94	20.00(LE) +3.20(U)	RMU&LE	2004-05

Annex- 8.3
(Sheet 3/3)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of completion
				(Rs. in Crs.)				
Maharashtra								
28	Bhira Tail Race, MSPGCL	SS	2x40	1.60	0.70	-	R&M	2003-04
29	Tillari, MSPGCL	SS	1x60	4.50	4.24	6.0 (U)	RM&U	2004-05
30	Koyna Gen. Complex, MSPGCL	SS	4x70+4x80+4x80	12.00	11.50	-	R&M	2004-05
Meghalaya								
31	Umium St.I MeSEB	SS	4x9	81.88	84.21	36.00 (LE)	RM&LE	2002-03
32	Khandong, NEEPCO	CS	2x25	4.00	3.3499	-	R&M	2003-04
	Total		4336.60	1016.31	1028.9704	829.08 [123.40(U) +701.25 (LE) + 4.43(Res.)]		

\$ - Installed Capacity of Shanan, Ph.B, at Sl. No. 5 not included in the total, as the same has already been accounted for at Sl. No. 4.

Abbreviations: R&M – Renovation & Modernisation; U – Uprating; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector; SS- State Sector

State-wise List of Hydro RM&U schemes completed in the XI Plan

S. No	Project, Agency	CS/SS	Inst. Cap. (MW)	Estimated Cost	Actual Expenditure	Benefits (MW)	Category	Completion Schedule
				(Rs. in Crs.)				
Completed Schemes								
Himachal Pradesh								
1.	Dehar Ph. A BBMB	CS	6x165	11.00	6.936		R&M	2010-11 Completed
2.	Dehar Ph. B BBMB	CS	6x165	49.00	24.454	330 (LE)	RM&LE	2009-10 Completed
Uttarakhand								
3	Tanakpur, NHPC	CS	3x31.4	10.77	11.95	-	R&M	2007-08 Completed
4	Khodri Ph.A UJVNL	SS	4x30	5.25	6.39	-	R&M	2008-09 Completed
5	Chilla Ph.A, UJVNL	SS	4x36	23.55	21.24	-	R&M	2008-09 Completed
Andhra Pradesh								
6	Upper Sileru, APGENCO	SS	4x60	4.20	3.34	-	R&M	2009-10 Completed
Karnataka								
7	Nagjhari, U1 to 6, KPCL	SS	5x150 + 1x135	14.75	15.31	-	R&M	2009-10 Completed
8	Sharavathy Ph.B, KPCL	SS	10x103.5	20.50	11.14	-	R&M	2009-10 Completed
9	Supa, KPCL	SS	2x50	3.45	4.90	-	R&M	2009-10 Completed
10	Bhadra, KPCL	SS	2x12	1.44	0.85	-	R&M	2009-10 Completed
11	Lingnamakki, KPCL	SS	2x27.5	3.81	2.62	-	R&M	2010-11 Completed
Tamil Nadu								
12	Mettur Dam, TANGEDCO	SS	4x10	30.17	24.16	10 (U) + 40 (LE)	RMU&LE	2007-08 Completed
Maharashtra								
13	Koyna St.I & II, MSPGCL	SS	4x70 + 4x80	87.50	81.82	-	R&M	2008-09 Completed
14	Vaitarna, MSPGCL	SS	1x60	16.00	0.14	-	R&M	2009-10 Completed
15	Koyna Dam PH, MSPGCL	SS	2x18	5.78	0.25	-	R&M	2009-10 Completed

Annex- 8.4
(Sheets 2 of 2)

S. No	Project, Agency	CS/SS	Inst. Cap. (MW)	Estimated Cost	Actual Expenditure	Benefits (MW)	Category	Completion Schedule
				(Rs. in Crs.)				
16	Koyna St.III, MSPGCL	SS	4x80	16.65		5.79	320 (LE)	RM&LE
Manipur								
17.	Loktak, NHPC	CS	3x30 derated	18.55		17.88	15.00 (Res.)	R&M + Res.
Meghalaya								
18	Umiam St.II , MeSEB	SS	2x9	90.46	55.67 (as on 31.03.12)	2(U)+ 18.00 (LE)	RM&LE	2011-12
	Total		4821.20	412.83	294.84	735 [12.00(U) + 708.00 (LE) + 15.0(Res)]		

Abbreviations: R&M – Renovation & Modernisation;. U – Upgrading; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector; SS- State Sector

State-wise List of Hydro RM&U schemes programmed for completion in the XII Plan

As on 30.06.2014

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Completed Schemes								
Odisha								
1	Rengali Unit-1 OHPC	SS	1x50	47.50	36.76 (as on 30.06.12)	50(LE)	RM&LE	2012-13
2	Rengali Unit-2 OHPC	SS	1x50	25.2 (approx)	20.73	50(LE)	RM&LE	2013-14
Himachal Pradesh								
3	Bassi, HPSEB	SS	4x16.5	119.83	155.42 (as on 28.02.14)	6.0(U)+ 60 (LE)	RMU&LE	2013-14
Andhra Pradesh								
4	Nagarjuna Sagar, APGENCO	SS	1x110+ 7x100.8	33.35	13.90 (as on 31.03.2012)	-	R&M	2012-13
5	Lower Sileru, APGENCO	SS	4x115	8.75	6.77 (as on 30.09.13)	-	R&M	2013-14
Kerala								
6	Idamalayar, KSEB	SS	2x37.5	14.50	13.22 (as on 31.03.13)	-	R&M	2012-13
7	Sabirigiri, KSEB Unit-4	SS	1x60	52.2	50.19 (as on 30.06.14)	5(UR)	RMU&LE	2014-15
Assam								
8	Khandong, NEEPCO	CS	1x25	25.05	16.34 (as on 31.03.13)	50.00 (LE)	RM&LE	2014-15
	Sub Total(A)		1601.60	326.38	313.33	221 [11(U)+ 210(LE)]		
Ongoing Schemes – Under Implementation								
Himachal Pradesh								
9	Bhakra LB, BBMB	CS	2x126+ 3x108	489.77	255.78 (as on 31.03.14)	540.00 (LE) + 90.00 (U)	RMU&LE	2015-16
Jammu & Kashmir								
10	Ganderbal, J&KSPDC	SS	2x3+ 2x4.5	34.65	9.51 (as on 30.09.13)	9.00 (LE)	RM&LE	2014-15
11	Chenani, J&KSPDC	SS	5x4.66	34.94	7.09 (as on 30.09.13)	23.30 (LE)	RM&LE	2014-15

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
12	Sumbal Sindh, J&KSPDC	SS	2x11.3	45.92		25.14 (as on 30.09.13)	-	R&M
13	Lower Jhelum, J&KSPDC	SS	3x35	126.41		83.65 (as on 30.09.13)	15.00 (Res.)	R&M+ Res.
Uttar Pradesh								
14	Matatila, UPJVNL	SS	3x10.2	10.29	1.55 (as on 30.06.14)	30.6 (LE)	RM&LE	2015-16
15	Obra, UPJVNL	SS	3x33	43.14	14.97 (as on 30.06.14)	99.00 (LE)	RM&LE	2015-16
16	Rihand, UPJVNL	SS	6x50	132.20 (Rev.)	80.75 (as on 30.06.14)	300.00 (LE)	RM&LE	2015-16
Uttarakhand								
17	Pathri, UJVNL	SS	3x6.8	113.25	49.05 (as on 30.11.13)	20.40 (LE)	RM&LE	2014-15
18	Khatima, UJVNL	SS	3x13.8	256.77	25.69 (as on 31.12.13)	41.40 (LE)	RM&LE	2016-17
Andhra Pradesh								
19	Srisailem RB, APGENCO	SS	7x110	16.70	16.66 (as on 31.03.14)	-	R&M	2014-15
Karnataka								
20	Bhadra River bed units, KPCL	SS	2x12	28.015	7.03 (as on 30.06.14)	-	R&M	2014-15
21	Supa, KPCL	SS	2x50	3.45	3.88	-	R&M	2014-15
22	Nagjhari, U-1 to 6, KPCL	SS	6x135	33.79	21.42 (upto 30.06.14)	-	R&M	2016-17
Kerala								
23	Poringalkuthu, KSEB	SS	4x8	88.63	33.86 (as on 30.06.14)	32.00 (LE)+ 4 (U)	RM&LE	2015-16
Tamil Nadu								
24	Periyar, TANGEDCO	SS	3x42+ 1x35	161.18	127.82 (as on 31.03.14)	140.00 (LE) + 28.00(U)	RMU&LE	2014-15
West Bengal								
25	Jaldhaka St.I, WBSEB	SS	3x9	88.62	79.97 (as on 30.06.14)	27.00(LE)	RM&LE	2014-15

Annex- 8.5
(Sheet 3 of 3)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Assam								
26	Kopili, NEEPCO	CS	2x50	50.22	29.19 (as on 31.03.13)	-	R&M & Refurbishment of Units 1 & 2	2014-15
	Sub Total(B)		3257.30	1757.95	873.01	1414.70 [137(U)+ 15(Res.)+ 1262.70 (LE)]		
Ongoing Schemes – Under Tendering								
Himachal Pradesh								
27	Giri, HPSEB	SS	2x30	47.80	-	60.00 (LE)	RM&LE	2016-17
Jharkhand								
28	Panchet, U-1, DVC	CS	1x40	58.22	1.99	40.00 (LE)	RM&LE	2016-17
Odisha								
29	Hirakud-II, OHPC	SS	3x24	192.47	58.97 (as on 30.06.14)	72.00 (LE)	RM&LE	2016-17
	Sub Total(C)		172	298.49	60.96	172(LE)		
Ongoing Schemes – Under DPR Preparation								
Karnataka								
30	Sharavathy (Ph B), KPCL	SS	10x103.5	20	2.59 (upto 30.06.14)	-	R&M	2016-17
	Sub Total (D)		1035	20	2.59			
	Total (A+B+C+D)		6065.90	2402.82	1249.89	1807.70 [148(U) + 1644.70 (LE) + 15(Res.)]		

Abbreviations: R&M – Renovation & Modernisation; U – Uprating; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector; SS- State Sector

State-wise List of Hydro RM&U schemes programmed for completion in the XIII Plan & beyond

(As on 30.06.2014)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Ongoing Schemes – Under Tendering								
Uttarakhand								
1	*Chilla Ph B UJVNL	SS	4x36	490.56	-	28.8(U) + 144(LE)	RMU&LE	2019-20
2	*Kulhal, UJVNL	SS	3x10	118.72	-	30(LE)	RM&LE	2017-18
3	**Ramganaga	SS	3x66	455.20	-	198(LE)	RM&LE	2017-18
4	*Tiloth, UJVNL	SS	3x30	384.66	-	90 (LE)	RM&LE	2019-20
5	*Dhakrani, UJVNL	SS	3x11.25	116.41	-	33.75 (LE)	RM&LE	2020-21
6	*Dhalipur, UJVNL	SS	3x17	116.81	-	51.00 (LE)	RM&LE	2020-21
Odisha								
7	*Balimela, OHPC	SS	6x60	664.7	0.84 (as on 30.06.14)	360(LE)	RM&LE	2019-20
8	*Hirakud-I U5&6, OHPC	SS	2x37.5	326	Nil	75.00 (LE) + 11 (UR)	RM&LE	2017-18
Kerala								
9	*Idukki 1 st stage, KSEB	SS	3x130	80	Nil	-	R&M	2017-18
10	*Sholayar, KSEB	SS	3x18	199.55	-	54.00 (LE)	RM&LE	2017-18
Tamil Nadu								
11	**Sholayar-I, TANGEDCO	SS	2x35	120	-	14.00(U) + 70.00 (LE)	RMU&LE	2017-18
	Sub Total(A)		1495.75	3072.61	0.84	1159.55 [53.80(U)+ 1105.75(LE)]		
Ongoing Schemes – Under DPR Preparation/Finalisation/Approval								
Uttarakhand								
12	*Chibro, UJVNL	SS	4x60	184.88	-	240(LE)	RM&LE	2023-24
13	*Khodri UJVNL	SS	4x30	169.63	-	120(LE)	RM&LE	2023-24
Meghalaya								
14	Umium St.III, Kyrdekulai, MePGCL	SS	2x30	344	-	60(LE)+6 (UR)	RMU&LE	XIII Plan
Tamil Nadu								
15	*Kodayar Ph-II, TANGEDCO	SS	1x40	-	-	40.0(LE) +4(UR)	RMU&LE	XIII Plan
Andhra Pradesh								
16	*Machkund, APGENCO	SS	3x17 (St.I) & 3x21.25 (St.II)	124.45	-	5.25 (U) + 114.75 (LE)	RMU&LE	XIII Plan
Kerala								
17	*Kuttiadi, KSEB	SS	3x25	Not estimated	-	75.00 (LE)	RM&LE	XIII Plan
West Bengal								

Annex 8.6(2 of 2)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
18	*Maithon, U-1&3, DVC	CS	2x20	56.03	5.75	40.00 (LE)	RMU&LE	XIII Plan
	Sub Total(B)		689.75	878.99	5.75	705 [15.25 (U)+689.75 (LE)]		
Ongoing Schemes – Under RLA Studies								
Tamil Nadu								
19	*Kodayar Ph.I, TANGEDCO	SS	1x60	-	-	60.00 (LE)	RM&LE	XIII Plan
20	**Moyar PH, TANGEDCO	SS	3x12	-	-	36(LE)	RM&LE	XIII Plan
	Sub Total(C)		96	-	-	96 (LE)		
	Total (A+B+C)		2281.50	3951.60	6.59	1960.55 [69.05 (U) +1891.50 (LE)]		

* These 16 schemes have been rescheduled for completion from XII Plan to XIII Plan & beyond.

** These 3 new schemes were taken up during XII Plan.

CHAPTER 9

DEFINITIONS AND ABBREVIATIONS

CHAPTER-9

DEFINITIONS AND ABBREVIATIONS

9.1 DEFINITIONS

The definitions of different performance indices and other terms referred to in this review are as under:

1. **Capacity:** Capacity in MW is the installed or Uprated/Derated capacity of the unit.

2. **Forced Outage Non-availability (FO) (%)**

$$= \frac{(Cf1 \times hf1 + Cf2 \times hf2 + \dots + Cfn \times hfn) \times 100}{CxH}$$

Where Cf1, Cf2 Cfn are the capacities in MW of the generating units on forced outage and hf1, hf2 hfn are the duration of each outage in hours during the year. C is the total installed capacity in MW and H is the total period in hours during the year.

3. **Planned Maintenance Non-availability (PM) (%)**

$$= \frac{(Cp1 \times hp1 + Cp2 \times hp2 + \dots + Cpn \times hpn) \times 100}{CxH}$$

Where Cp1, Cp2 Cfn are the capacities in MW of the generating units on planned shutdown and hp1, hp2 are the duration of each shutdown in hours during the year. C is the total installed capacity in MW and H is the total period in hours during the year.

4. **Operating availability (OFA) (%) = (100-FO-PM)**

5. **Miscellaneous Non-availability:** Non-availability of generating units due to one or more of the following factors:

- Low reservoir level/poor inflow
- Transmission line faults/constraints
- Excess weeding/silting
- No/reduced system demand

Low head/too high tail water level
 No irrigation demand
 Grid disturbance/failure
 Reserve shutdown/spinning reserve

6. **Design Energy:** Means the quantum of energy which could be generated in a 90% dependable year with 95% installed capacity of the generating station.
7. **Targeted Energy:** Estimated energy generation during the year based on the rainfall data, past records of energy generation etc.
8. **Full Reservoir Level(FRL):** The level up to which the water could normally be stored in the reservoir for conservation and regulation.
9. **Minimum Draw Down Level (MDDL):** The minimum level up to which the reservoir could be depleted under normal operating conditions.
10. **Types of H.E. Scheme:** The H.E. Schemes have been classified into following four categories:

Run-of-river without pondage
 Run-of river with pondage
 Storage Schemes
 Pumped Storage Schemes

11. **Average PLF (%):**

$$\frac{\text{Energy Generated (GWH)}}{\text{Installed Capacity (MW)} \times 8760 (\text{Total hours of year})} \times 100$$

9.2 Abbreviations

MW	Mega Watt	(10 ⁶ Watts)
Kwh	Kilo Watt hour (I unit)	(10 ³ Watts-hrs)
MU	Million Units	(10 ⁶ Units)
MCM	Million Cubic Meters	(10 ⁶ Cu.M.)
FRL	Full Reservoir Level	
MDDL	Minimum Draw Down Level	
HRT	Head Race Tunnel	

Abbreviations of Agencies

Northern Region

1 Himachal Pradesh	HPSEB Ltd. NHPC Ltd. SJVN Ltd. MPCL JPVL EPC ADPL LGPPL	Himachal Pradesh State Electricity Board Ltd. NHPC Ltd. SJVN Ltd Malana Power Company Ltd. Jaiprakash Power Venture Ltd. Everest Power Company Ltd. Allain Duhangan Power Ltd. Lanco Green Power Pvt. Ltd.
2 Jammu & Kashmir	JKSPDC	J&K State Power Development Corporation.
3 Punjab	PSPCL BBMB	Punjab State Power Corporation Ltd. Bhakra Beas Management Board
4 Rajasthan	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Ltd.
5 Uttar Pradesh	UPVUNL THDC	Uttar Pradesh Jal Vidyut Nigam Ltd. Tehri Hydro Development Corporation
6 Uttarakhand	UJVNL JPVL	Uttarakhand Jal Vidyut Nigam Ltd. Jaiprakash Power Venture Ltd.

Western Region

1 Gujarat	GSECL SSNNL	Gujarat State Electricity Corporation Ltd. Sardar Sarovar Narmada Nigam Ltd.
2 Madhya Pradesh	MPPGCL NHDC	Madhya Pradesh Power Generation Co. Ltd. Narmada Hydroelectric Development Co. Ltd.
3 Chhatisgarh	CSPGCL	Chhatisgarh State Power Generation Co Ltd.
4 Maharashtra	MAHAGENCO DLHP TATA	Maharashtra State Power Generation Co. Ltd. Dodson-Lindblom Hydro Power Pvt Ltd. Tata Power Company

Southern Region

1 Andhra Pradesh	APGENCO	Andhra Pradesh Generation Corporation.
2 Karnataka	KPCL	Karnataka Power Corporation Ltd.
3 Kerala	KSEB	Kerala State Electricity Board
4 Tamil Nadu	TANGEDCO	Tamil Nadu Generation & Distribution Co. Ltd

Eastern Region

1 Jharkhand	JSEB DVC	Jharkhand State Electricity Board Damodar Valley Corporation
2 Odisha	OHPC	Odisha Hydro Power Corporation
3 West Bengal	WBSEDCL	West Bengal State Electricity Distribution Co. Ltd.
4 Sikkim	GIPL	Gati Infrastructure Pvt. Limited

North Eastern Region

1 Assam	APGCL	Assam Power Generation Co. Ltd.
2 Meghalaya	MePGCL NEEPCO	Meghalaya Power Generation Corporation Limited North-Eastern Electric Power Corporation Ltd.