Central Electricity Authority
System Planning & Project Appraisal Division
Sewa Bhawan, R.K. Puram, New Delhi – 110066

No. 51/4/SP&PA-2013/ 1448-1459 **Date: 22- August-2013**

To

1.The Member Secretary, Southern Regional Power Committee, 29, Race Course Cross Road, **Bangalore 560 009**. **FAX : 080-22259343**	2.The Director (Projects), Power Grid Corp. of India Ltd. "Saudamini", Plot No.2, Sector-29, **Gurgaon 122 001, Haryana**. **FAX : 95124-2571932**
3.The Director (Transmission), Transmission Corp. of Andhra Pradesh Ltd., Vidyut Soudha, **Hyderabad – 500 082.** **FAX : 040-66665137**	4.The Director (Transmission), Karnataka State Power Transmission Corp.Ltd., Cauvery Bhawan, **Bangalore 560 009**. **FAX : 080 -22228367**
5.The Member (Transmission), Kerala State Electricity Board, Vidyuthi Bhawanam, Pattom, P.B. No. 1028, **Thiruvananthapuram - 695 004.** **FAX : 0471-2444738**	6. Member (Distribution), Tamil Nadu electricity Board (TNEB), 6th Floor, Eastern Wing, 800 Anna Salai, **Chennai - 600002.** **FAX : 044-28516362**
7.The Director (Power), Corporate Office, Block – I, Neyveli Lignite Corp. Ltd., **Neyveli , Tamil Nadu – 607 801.** **FAX : 04142-252650**	8.The Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, **Puducherry – 605 001**. **FAX : 0413-2334277/2331556**
9. Director (Projects), National Thermal Power Corp. Ltd. (NTPC), NTPC Bhawan, Core-7, Scope Complex, Lodhi Road, **New Delhi-110003.** **FAX-011-24360912**	10. Director (Operations), NPCIL, 12th Floor,Vikram Sarabhai Bhawan, Anushakti Nagar, **Mumbai – 400 094.** **FAX : 022- 25991258**

Sub: 36th meeting of the Standing Committee on Power System Planning of Southern Region
- **Additional Agenda-III.**

Sir,

The **36th meeting** of the Standing Committee on Power System Planning of Southern Region is proposed to be held on 30-08-2013 at NRPC, Katwaria Sarai, New Delhi. Complete agenda is available at CEA's website.

(www.cea.nic.in).

Please make it convenient to attend the meeting.

Yours faithfully,

(Manjari Chaturvedi)
Deputy Director (SP&PA)
(Telephone: 011 26732310, Fax No. 011 26102045)

Copy to:

Shri S. K. Soonee, CEO, POSOCO,
B-9, Qutub Institutional Area,
Katwaria Sarai,
New Delhi-110016

GM, SRLDC,
29, Race Course Cross Road,
Bangalore 560 009
FAX – 080-22268725

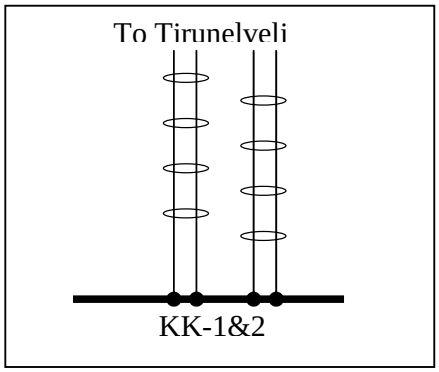
Additional Agenda-III Note for 36th Meeting of
Standing Committee on Power System Planning in Southern Region (SCPSPSR)

Date and Venue: 30-Aug-2013, NRPC, Katwaria Sarai, New Delhi.

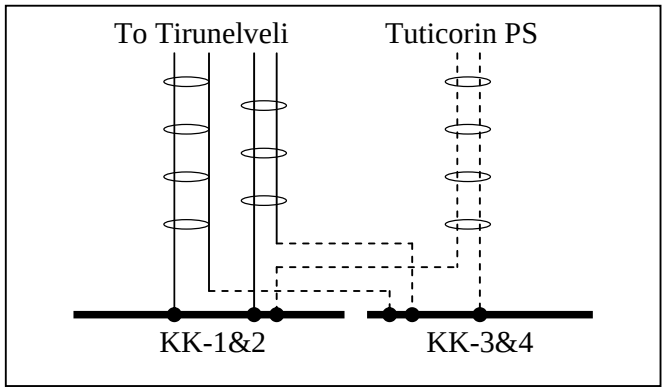
AA.0 Transmission System associated with Kudankulam APP :

AA.1 The Kudankulam APP transmission system inter-alia comprise of Kudankulam - Tirunelveli 400kV Quad 2xD/c lines , and the beyond Tirunelveli the power is dispersed through 400 kV D/c lines to Udumalpet, Trivandrum, Cochin and Madurai. In other words the entire evacuation is effected through Tirunelveli substation, and any untoward incidence at Tirunelveli substation shall have adverse effect on the safe operation of Kudankulam APP.

AA.2 During 15th meeting of LTOA and Connectivity meeting held on 04th Jan, 2013 , the connectivity arrangement for Kudankulam - 3 & 4 was finalized wherein one more 400 kV Quad Dlc line to Tuticorin Pooling station and suitable rearrangement at Kudankulam generation switchyard was agreed. The proposed rearrangement for reliable evacuation from Kudankulam 1&2 and 3&4 is as shown below:



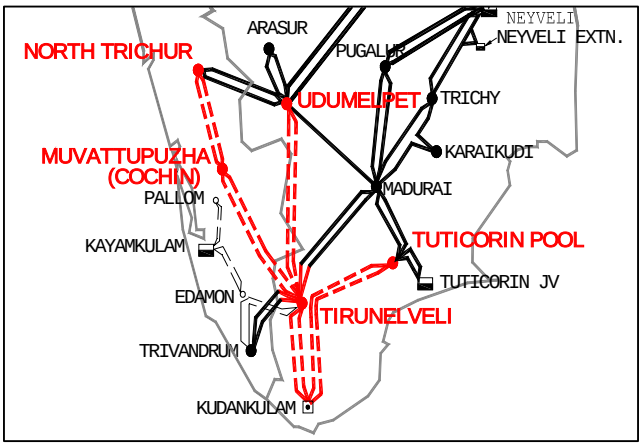
Existing Arrangement



Proposed Arrangement

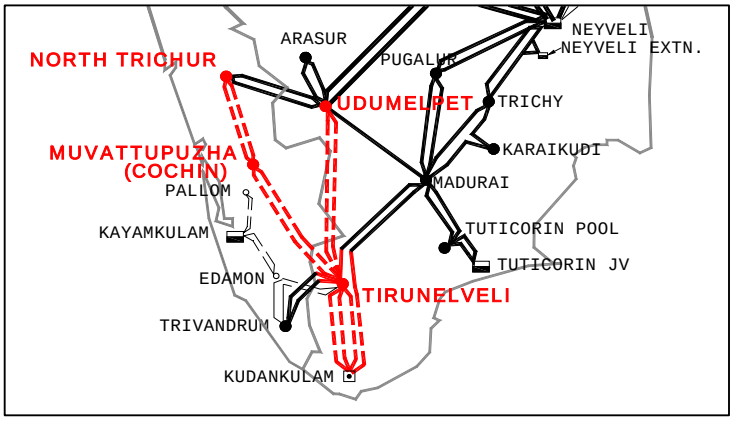
AA.3 Looking into the requirement of safe operation of Kudankulam APP on any untoward incidence at Tirunelveli substation, POWERGRID vide their letter no C/CTU/S/KAPP dated 7-8-2013 has proposed that Turicorin Pooling station – Tirunelveli section of the agreed Turicorin Pooling station – Kudankulam 400 kV Quad D/c line may be constructed ahead of Kudankulam – 3 &4 and one of the existing Kudankulam – Tirunelveli 400 kV Quad D/c may be connected to the same making Kudnakulam – Turicorin Pooling station 400kV Quad D/c line. This arrangement shall facilitate two termination points viz. Tirunelveli & Turicorin

Pooling station for evacuation of power from Kudankulam – 1&2 and shall avoid operational difficulties in case of any bus fault at either Tiruneliveli or Tuticorin pooling stations. The diagram of the proposed arrangement is given above and the relevant load flow studies are attached at Exhibits as per the details below.



1.	With Kudankulam – Tirunelveli / Tuticorin pooling station 400kV Quad D/c line	Exhibit-I
2.	Outage of both circuits of Kudankulam – Tirunelveli 400kV Quad D/c line	Exhibit-Ia
3.	Outage of one circuits of Kudankulam – Tirunelveli 400kV Quad D/c line	Exhibit-Ib
4.	Outage of one circuit of Tuticorin – Madurai 400kV Quad D/c line	Exhibit-Ic

AA.4 As the above scope includes construction of about 100 Km transmission line and the Kudankulam APP – 1&2 units are ready for commissioning and therefore POWERGRID also proposed an interim arrangement for safe operation in case of any untoward incidence at Tirunelveli substation. In this regard it may be mentioned that, one 400 kV circuit from Kudankulam and one 400kV circuit form Madurai are terminating in the same diameter at Tirunelveli substation and through opening of two main breakers & keeping tie breaker in closed position in normal condition shall provide the required bypass arrangement. By this arrangement, 3 nos. of 400kV circuits from Kudankulam shall be terminated at Tirunelveli, however one 400kV circuits shall be going to Madurai and provide two different termination points. This shall ensure that even with both the main busses out of service at Tirunelveli, the evacuation of Kudankulam APP is not affected. The diagram of the proposed arrangement is given above and the relevant load flow studies are attached at Exhibits as per the details below:



1.	Base Case – With approved Transmission System associated with Kudankulam APP	Exhibit-II
3.	Bypassing of Tirunelveli substation for Kudankulam – Madurai 400kV line	Exhibit-IIa
2.	Outage of both circuits of Kudankulam – Tirunelveli 400kV Quad D/c line	Exhibit-IIb

AA.5 POWERGRID may present the scheme. Members may discuss and agree.

BB.0 Mangalore (UPCL) –Kasargode- Kozhikode 400 kV link' – reg.

BB.1 The scheme 'Mangalore (UPCL) –Kasargode- Kozhikode 400 kV line' was approved in the 35th meeting of the Standing Committee on Power System Planning Southern Region held on 04.01.2013 for implementation through tariff based competitive bidding (TBCB) with the following scope:

Transmission Scheme
1. Mangalore(Udipi PCL) – Kasargode, 400kV quad D/C line
2. Kasargode - Kozhokode, 400kV quad D/C line
3. Establishment of 2x500 MVA, 400/220 kV GIS substation at Kasargode <u>400kV</u> – 400/220 kV ICTs : 2 no – Bus Reactor (63 MVAR): 2 no. – Line Bays : 6 – ICT bays : 2 – Space for bays : 4 <u>220 kV</u> – Line Bays : 6 – ICT bays : 2 – Space for bays : 6

It was also decided that 2 no. of 400 kV line bays would be provided by CTU and UPCL at Kozhikode S/S and Mangalore (UPCL) switchyard respectively for termination of the lines as per above scope.

BB.2 Subsequently, the scheme was put forth before the Empowered Committee on Transmission in its 31st meeting held on 18.02.2013 for recommending it to the Government for implementation through TBCB. During the discussions, POWEGRID pointed out that that there is a severe Right-of-Way (RoW) problem in the area and requested the co-operation of Kerala govt. in the implementation of the scheme. It was also informed that as per the current practice in other parts of the country, the compensation only for the tower footing should be paid, as otherwise the scheme would become unviable in case the compensation is sought for the land covered by the shadow of the conductors.Accordingly, the Empowered Committee has recommended the Scheme for implementation through TBCB subject to obtaining (i) commitment from Kerala govt. for compensation only for Right-of-Way for the tower footing area; and (ii) commitment from UPCL to provide two no. of 400 kV bays at Mangalore (UPCL) switchyard.

BB.3 In this regard, the matter has been taken up with Kerala State Electricity Board (KSEB) for RoW commitment, and with UPCL for confirmation of space availability at their Sub-station.

BB.4 With regard to the issue of RoW, the Kerala State Government has committed to vide their letter no. 2625/ C2/ 2013/ PD dated 22.06.2013 to pay for land compensation only for right-of-way only for the tower footing area, instead of the entire corridor, as proposed by KSEB.

BB.5 With regard to space availability at their Sub-station, UPCL informed vide their letter no: UPCL/B23/2013/7332 dated 26.07.2013 that they have no surplus land available to erect the 2 no. of 400 kV bays as desired. Further, as per the provisions of the Power Purchase Agreement entered into with the buyers, UPCL stated that any additional expenditure that it may incur on account of the maintenance of the above bays needs to be approved by them. Therefore, UPCL have requested to take up this with Karataka Power Transmission Corporation Ltd. (KPTCL), who is the nodal agency for power transmission.

BB.6 Members may discuss.

CC.0 Additional Studies for transmission system beyond Vemagiri for increasing import of power into Southern Region:

(refer to agenda item no 9.0 of the main agenda)

Alternative- 1:

(i) Vemagiri – Chilakaluripeta – Cuddapah – Salem 765kV D/c line

(ii) Chilakaluripeta – Podli 400kV (quad) D/c line

(iii) Cuddapah – Hindupur 400kV (quad) D/c line

(iv) Cuddapa – Hoody 400kV (quad) D/c line

(v) Establishment of 765/400kV substations at Chilakaluripeta and Cuddapah with 2x1500 MVA transformers each

(vi) Establishment of 400/220kV substations at Podli 2x315 MVA transformers each

Alternative- 2:

(i) Vemagiri – Khammam– Hyderabad 765kV D/c line

(ii) Hyderabad - Kurnool 765kV D/c line

(iii) LILO of Kurnool - Thiruvalam 765kV D/C line at Cuddapah

(iv) Cuddapah - Salem 765kV D/c line

(v) Cuddapah – Hindupur 400kV (quad) D/c line

(vi) Cuddapa – Hoody 400kV (quad) D/c line

(vii) Establishment of 765/400kV substations at Cuddapah with 2x1500 MVA transformers

Alternative- 3:

(i) Vemagiri – Chilakaluripeta – Cuddapah – Salem 765kV D/c line

(ii) Vemagiri – Khammam– Hyderabad 765kV D/c line

(iii) Chilakaluripeta – Podli 400kV (quad) D/c line

(iv) Cuddapah – Hindupur 400kV (quad) D/c line

(v) Cuddapa – Hoody 400kV (quad) D/c line

(vi) Establishment of 765/400kV substations at Chilakaluripeta and Cuddapah with 2x1500 MVA transformers each

(vii) Establishment of 400/220kV substations at Podli 2x315 MVA transformers each

Sl. No.	**Items**	**Optimistic generation additions (MW)**	**Pessimistic generation additions (MW)**	**Pessimistic generation additions with wind generations (MW)**
			Scenario-A	**Scenario-B**
1)	Existing Capacity	42952**	42952**	42952**
2)	Existing Availability	32428	32428	32428
3)	Capacity addition from new generation projects	22380	17230	36410
4)	Availability from new generation projects	19544	15760	27430[$]
5)	**Total Availability**	**51972**	**48188**	59858
6)	Projected Demand (2016-17)	57221	57221	57221
7)	**Import (-) / Export (+)**	**(-) 5249**	**(-) 9033**	**(+)2637**
8)	**Import from Talcher Generation**	**2000**	**2000**	**2000**
9)	**Net Import (-) / Export (+)**	**(-) 7249**	**(-) 11033**	**(+)637**

** *Note – Installed Capacity excluding 12,400 MW from Renewable energy*

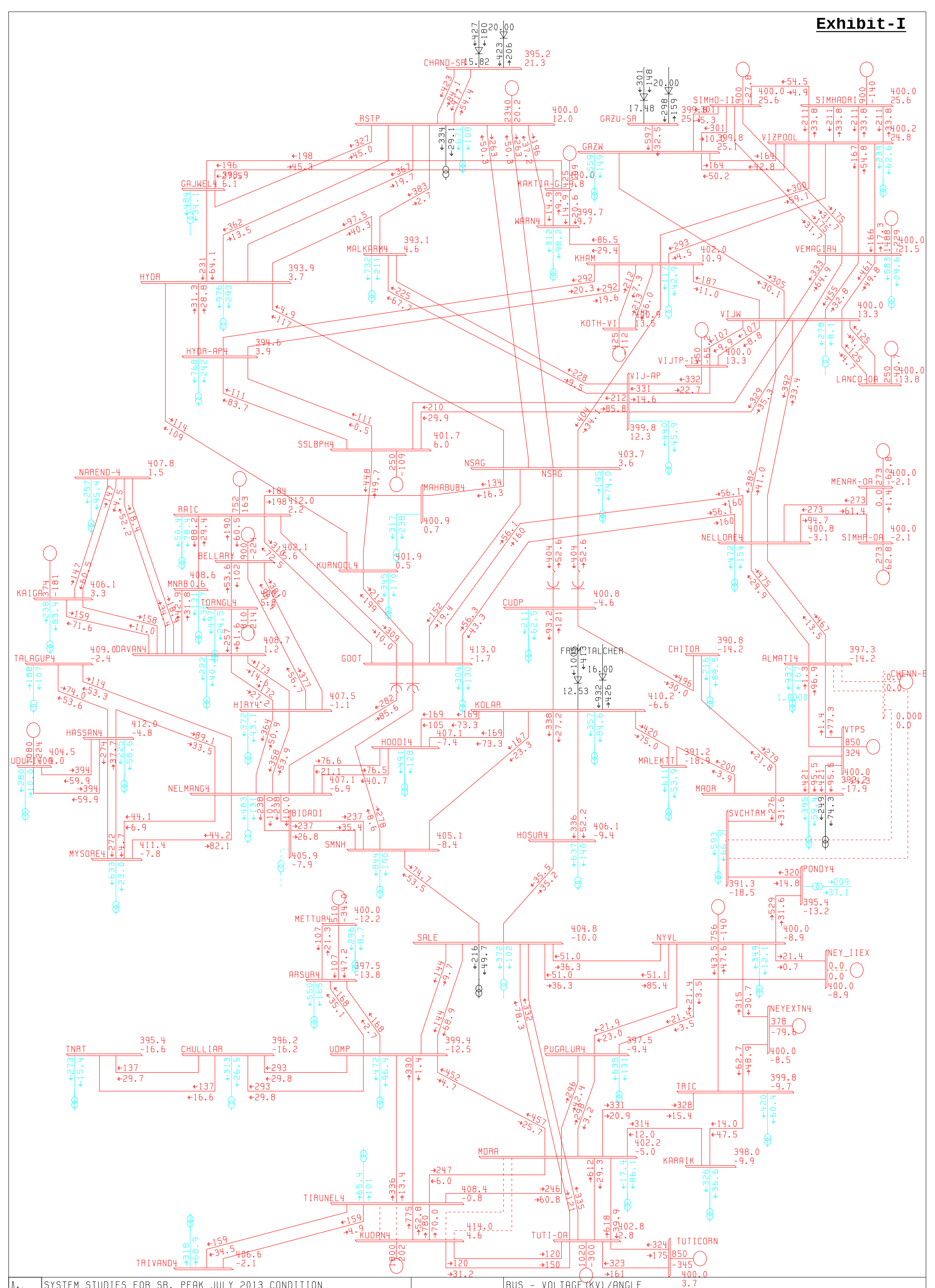
$- includes the projects listed below

	Additional generation projects and wind generations considered	Availability	Total addition
AP	wind	1950	2460
	Rayseema	510	
Karnataka	Yeramarus	1440	1440
Kerala		0	
TamilNadu	wind	5400	5400
Central sector	TPCIL	620	2370
	NCC	620	
	ILFS	510	
	East Coast	620	
		11670	**11670**

The relevant load flow studies are attached at Exhibits as per the details given below:

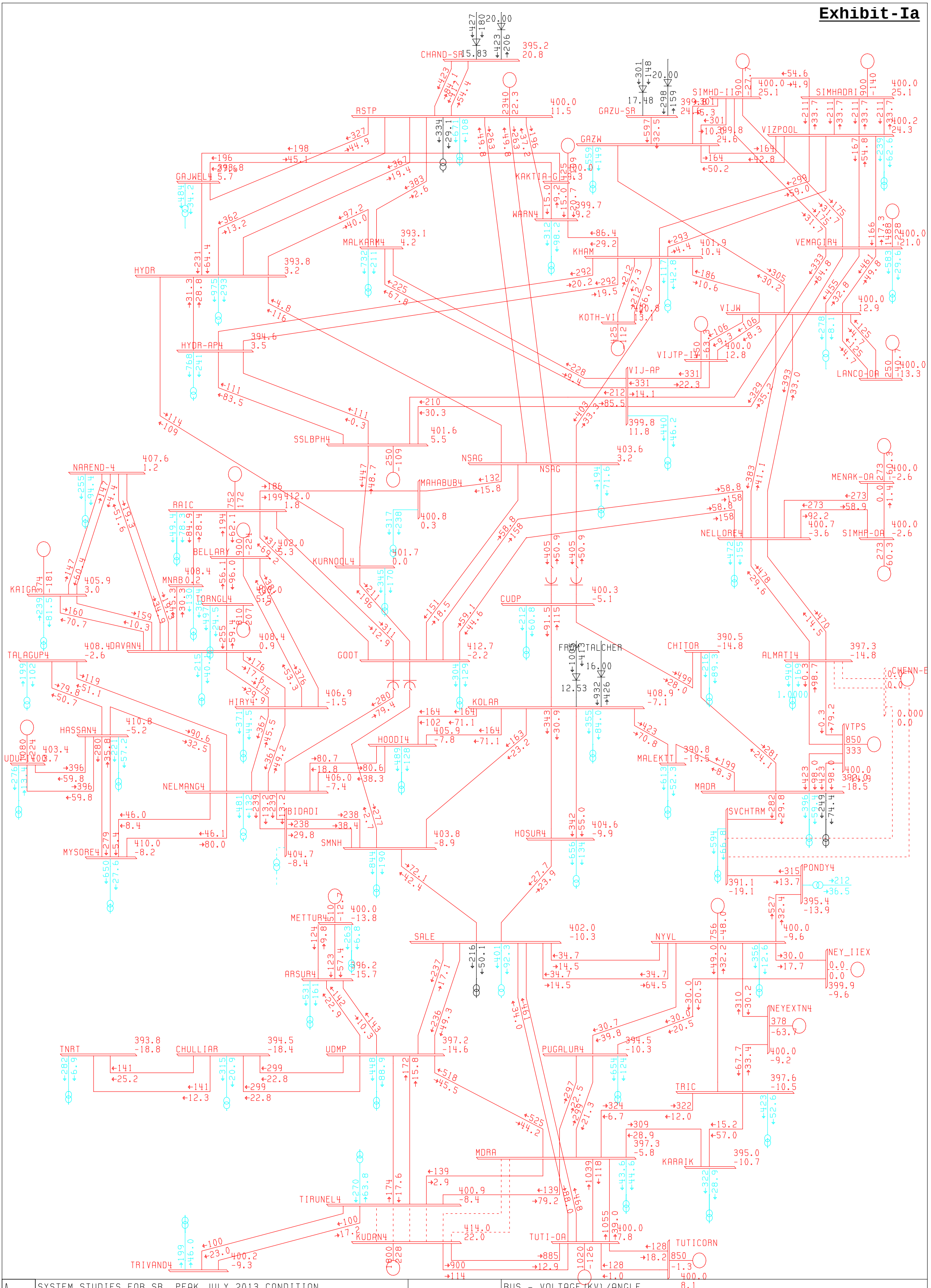
1.	Alternative-1 for Scenario -A	Exhibit-1A
2.	Alternative-2 for Scenario -A	Exhibit-2A
3.	Alternative-3 for Scenario -A	Exhibit-3A
4.	Alternative-1 for Scenario -B	Exhibit-1B
5.	Alternative-2 for Scenario -B	Exhibit-2B
6.	Alternative-1 for Scenario -B with reduced load	Exhibit-1C
7.	Alternative-2 for Scenario -B with reduced load	Exhibit-2C
	Outage Cases for Scenerio-A	
8.	Outage of Wardha -Dichpally 765kV D/C line for Alternative-1 and Alternative-2	Exhibit-1A-I Exhibit-2A-I
9.	Outage of Srikakulam -Vemagiri 765kV D/C line for Alternative-1 and Alternative-2	Exhibit-1A-II Exhibit-2A-II
10.	Outage of Vemagiri- Cpeta 765kV D/C line for Alternative-1	Exhibit-1A-III
11.	Outage of Vemagiri- Khammam 765kV D/C line for Alternative-2	Exhibit-2A-III
12.	Outage of Raigarh- Pugalur HVDC link for Alternative-1 and Alternative-2	Exhibit-1A-IV Exhibit-2A-IV

Exhibit-I



POWER TECHNOLOGIES, INC.	SYSTEM STUDIES FOR SR, PEAK JULY 2013 CONDITION	0.900 UV 1.050 OV	BUS - VOLTAGE (KV) /ANGLE
	FRI, AUG 16 2013 12:09	KV: ≤132 , ≤220 , ≤400	BRANCH - MW/MVAR
			EQUIPMENT - MW/MVAR

Exhibit-Ia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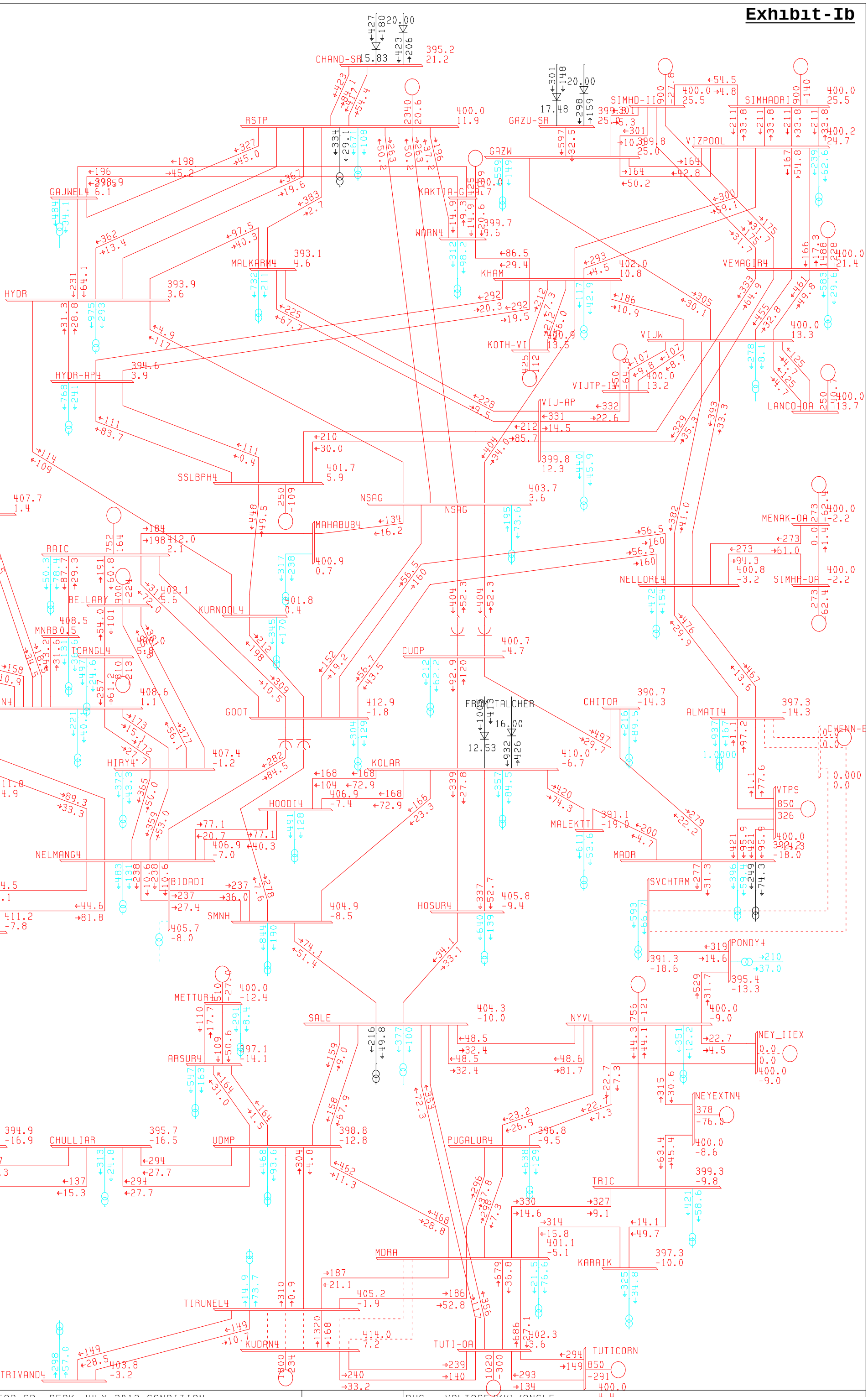
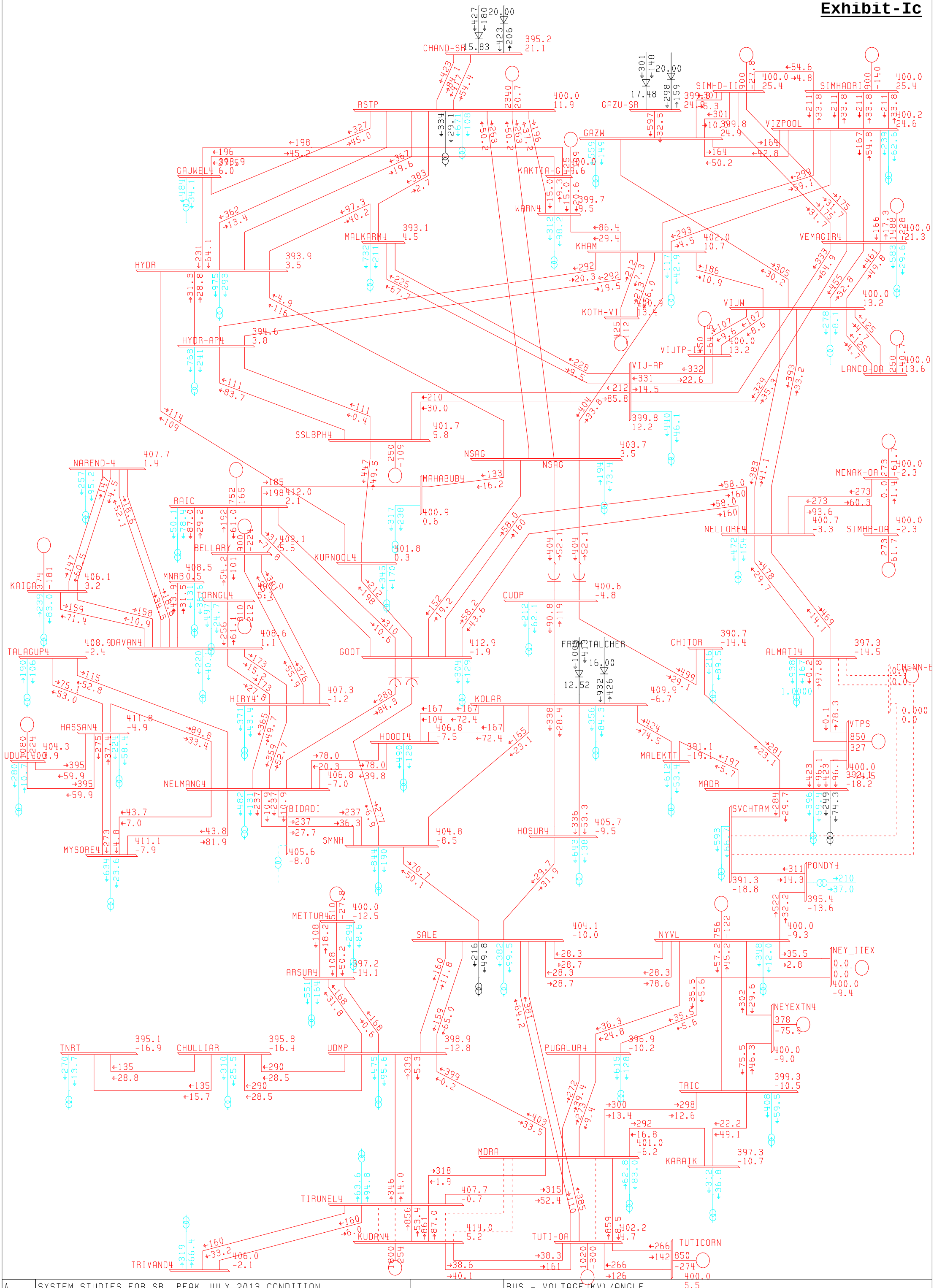
RSTP 400.0 11.5
GAZW
GAZU-SR
SIMHD-II
SIMHADRI 400.0 25.1
VIZPOOL 400.2 24.3
GAJWEL4 5.7
KAKTIA-G
WARN4 399.7 9.2
MALKARM4 393.1 4.2
HYDR 393.8 3.2
KHAM 401.9 10.4
VEMAGIR4 400.0 21.0
KOTH-VI
VIJW
VIJTP-II 400.0 12.8
HYDR-AP4 394.6 3.5
VIJ-AP
LANCO-OA 400.0 -13.3
SSLBPH4 401.6 5.5
NSAG 403.6 3.2
NAREND-4 407.6 1.2
MAHABUB4 400.8 0.3
RAIC
MENAK-OA 400.0 -2.6
NELLORE4
SIMHR-OA 400.0 -2.6
BELLARY 408.4 0.2
KURNOOL4 401.7 0.0
KAIGA 405.9 3.0
CUDP 400.3 -5.1
TORNGL4
TALAGUP4 408.4DAVAN4 -2.6
GOOT 412.7 -2.2
FRSTALCHER 16.00 12.53
CHITOR 390.5 -14.8
ALMATI4 397.3 -14.8
CHENN-E
HIRY4 406.9 -1.5
KOLAR 408.9 -7.1
HASSAN4 410.8 -5.2
VTPS 850 333 400.0 391.9 -18.5
HOODI4
MALEKTT 390.8 -19.5
MADR
NELMANG4
BIDADI
SVCHTRM
SMNH 403.8 -8.9
HOSUR4 404.6 -9.9
MYSORE4 410.0 -8.2
PONDY4 391.1 -19.1 395.4 -13.9
METTUR4 400.0 -13.8
SALE 402.0 -10.3
NYVL 400.0 -9.6
NEY_IIEX 399.9 -9.6
NEYEXTN4 378 -63.7 400.0 -9.2
ARSUR4
TNRT 393.8 -18.8
CHULLIAR 394.5 -18.4
UDMP 397.2 -14.6
PUGALUR4 394.5 -10.3
TRIC 397.6 -10.5
MDRA
KARAIK 395.0 -10.7
TIRUNEL4 400.9 -8.4
KUDAN4 414.0 22.0
TUTI-OA 400.0 7.8
TUTICORN 850 -1.3 400.0 8.1
TRIVAND4 400.2 -9.3
0.900 UV 1.050 OV
KV: ≤132 , ≤220 , ≤400
SYSTEM STUDIES FOR SR, PEAK JULY 2013 CONDITION
MON, AUG 19 2013 17:05
POWER TECHNOLOGIES, INC.
BUS - VOLTAGE(KV)/ANGLE
BRANCH - MW/MVAR
EQUIPMENT - MW/MVAR

Exhibit-Ib



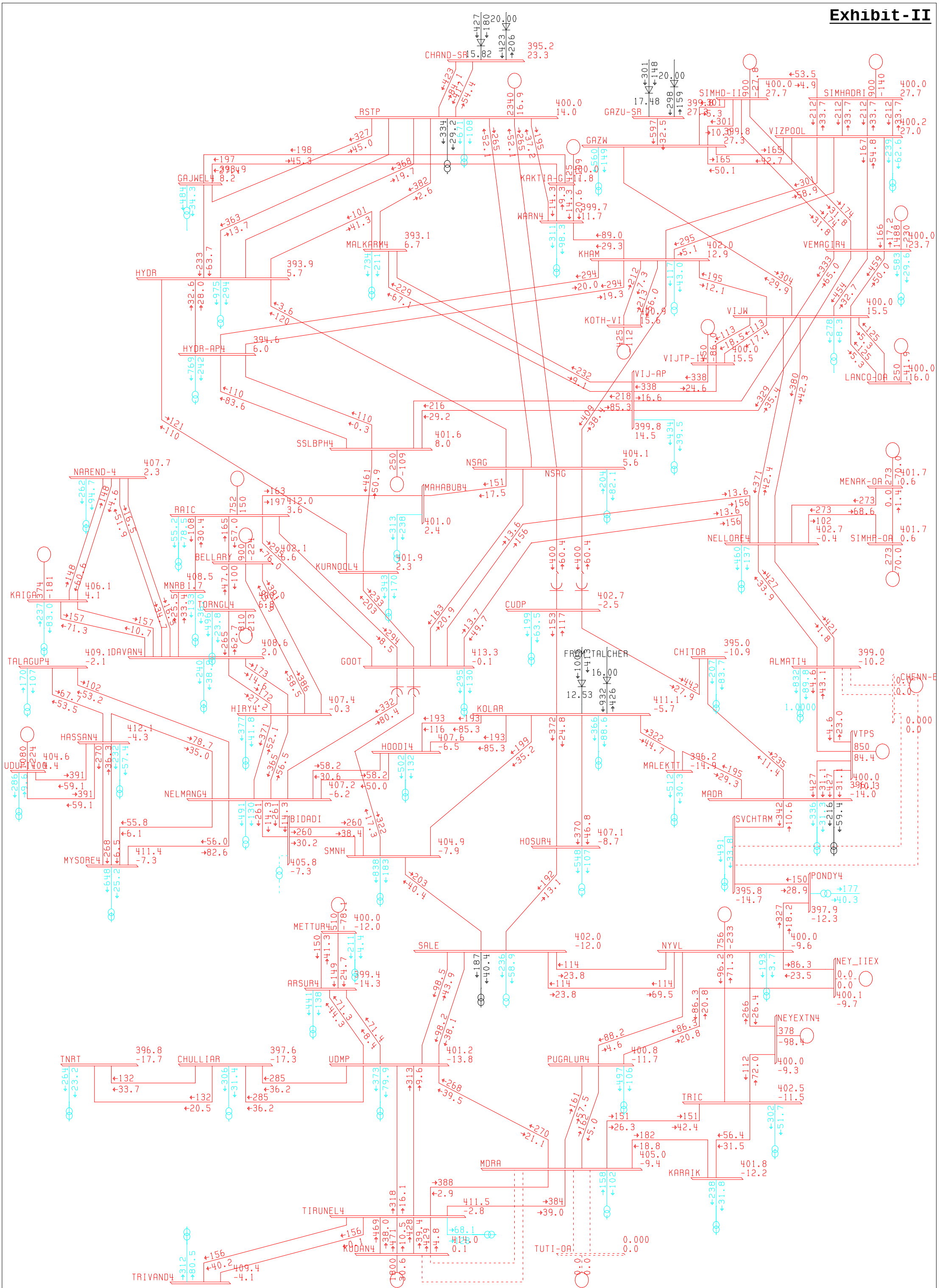
POWER TECHNOLOGIES, INC.	SYSTEM STUDIES FOR SR, PEAK JULY 2013 CONDITION	0.900 UV 1.050 OV	BUS - VOLTAGE (KV) /ANGLE
	FRI, AUG 16 2013 12:09	KV: ≤132 , ≤220 , ≤400	BRANCH - MW/MVAR
			EQUIPMENT - MW/MVAR

Exhibit-Ic



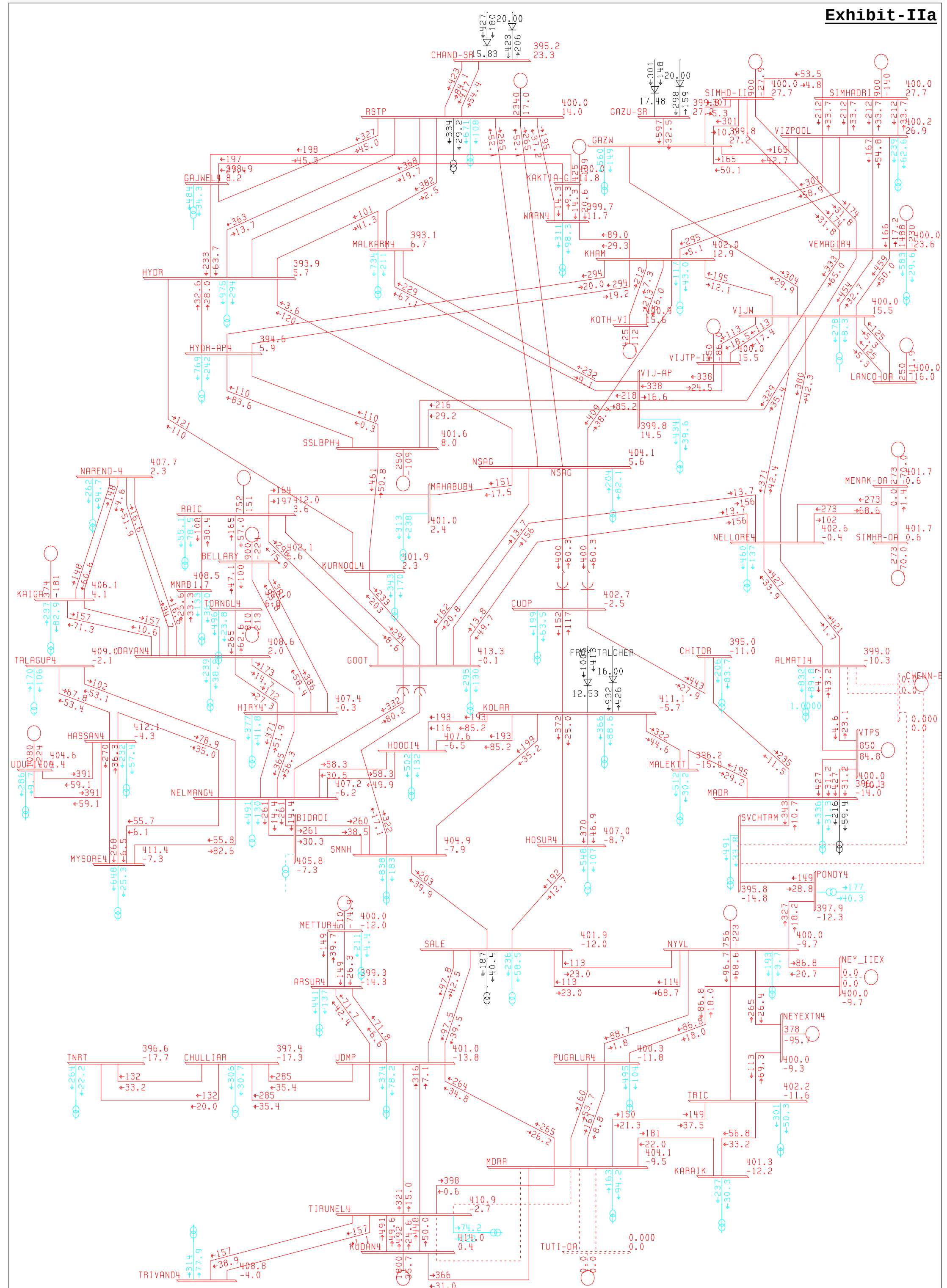
POWER TECHNOLOGIES, INC.	SYSTEM STUDIES FOR SR, PEAK JULY 2013 CONDITION FRI, AUG 16 2013 12:09	0.900 UV 1.050 OV KV: ≤132 , ≤220 , ≤400	BUS - VOLTAGE (KV) /ANGLE BRANCH - MW/MVAR EQUIPMENT - MW/MVAR

Exhibit-II



POWER TECHNOLOGIES, INC.	SYSTEM STUDIES FOR SR, PEAK JULY 2013 CONDITION	0.900 UV 1.050 OV	BUS - VOLTAGE (KV) /ANGLE
	FRI, AUG 16 2013 12:06	KV: ≤132 , ≤220 , ≤400	BRANCH - MW/MVAR
			EQUIPMENT - MW/MVAR

Exhibit-IIa



POWER TECHNOLOGIES, INC.	SYSTEM STUDIES FOR SR, PEAK JULY 2013 CONDITION FRI, AUG 16 2013 12:06	0.900 UV 1.050 OV KV: ≤132 , ≤220 , ≤400	BUS - VOLTAGE (KV) / ANGLE BRANCH - MW/MVAR EQUIPMENT - MW/MVAR

Exhibit-IIb

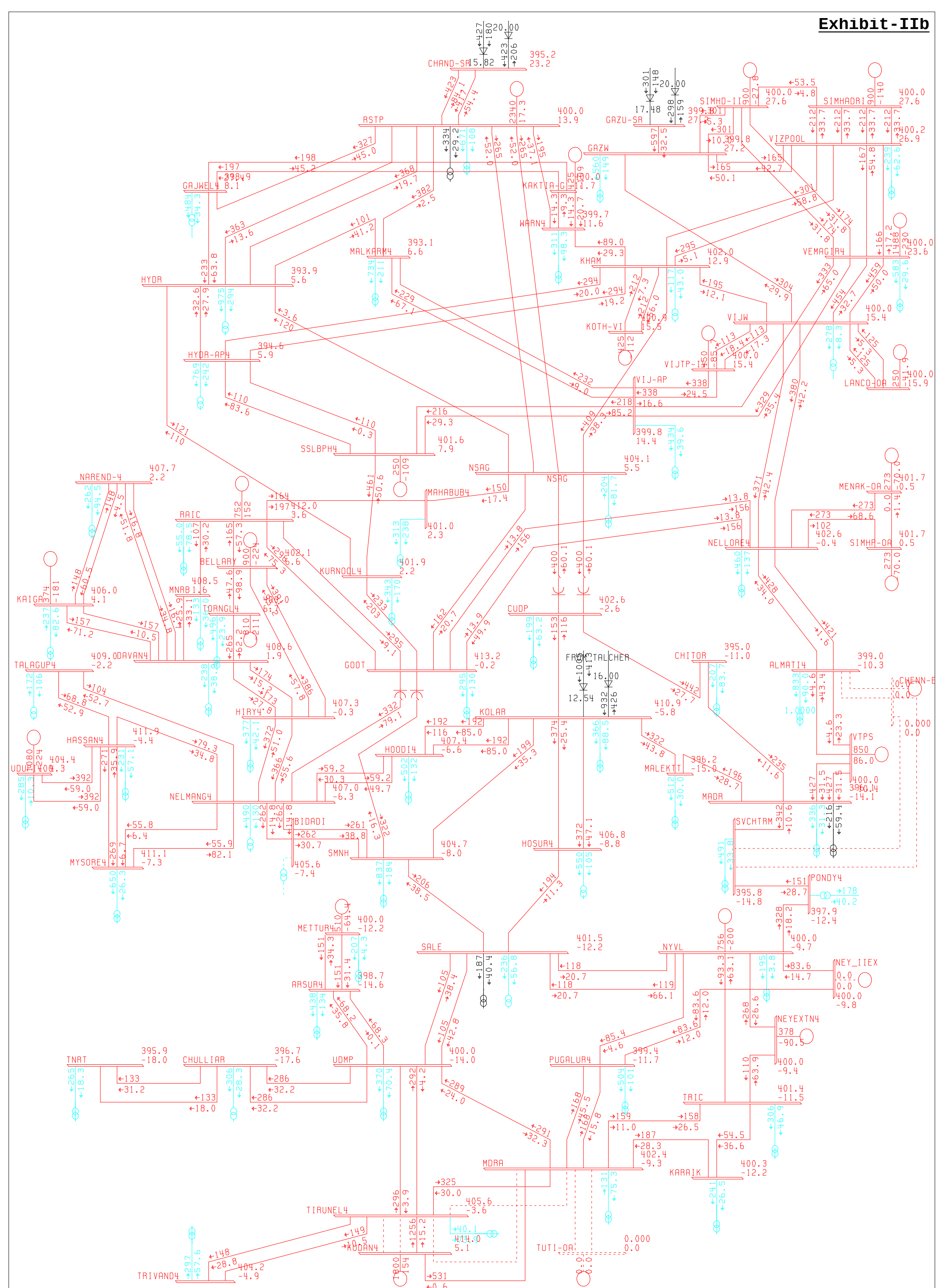
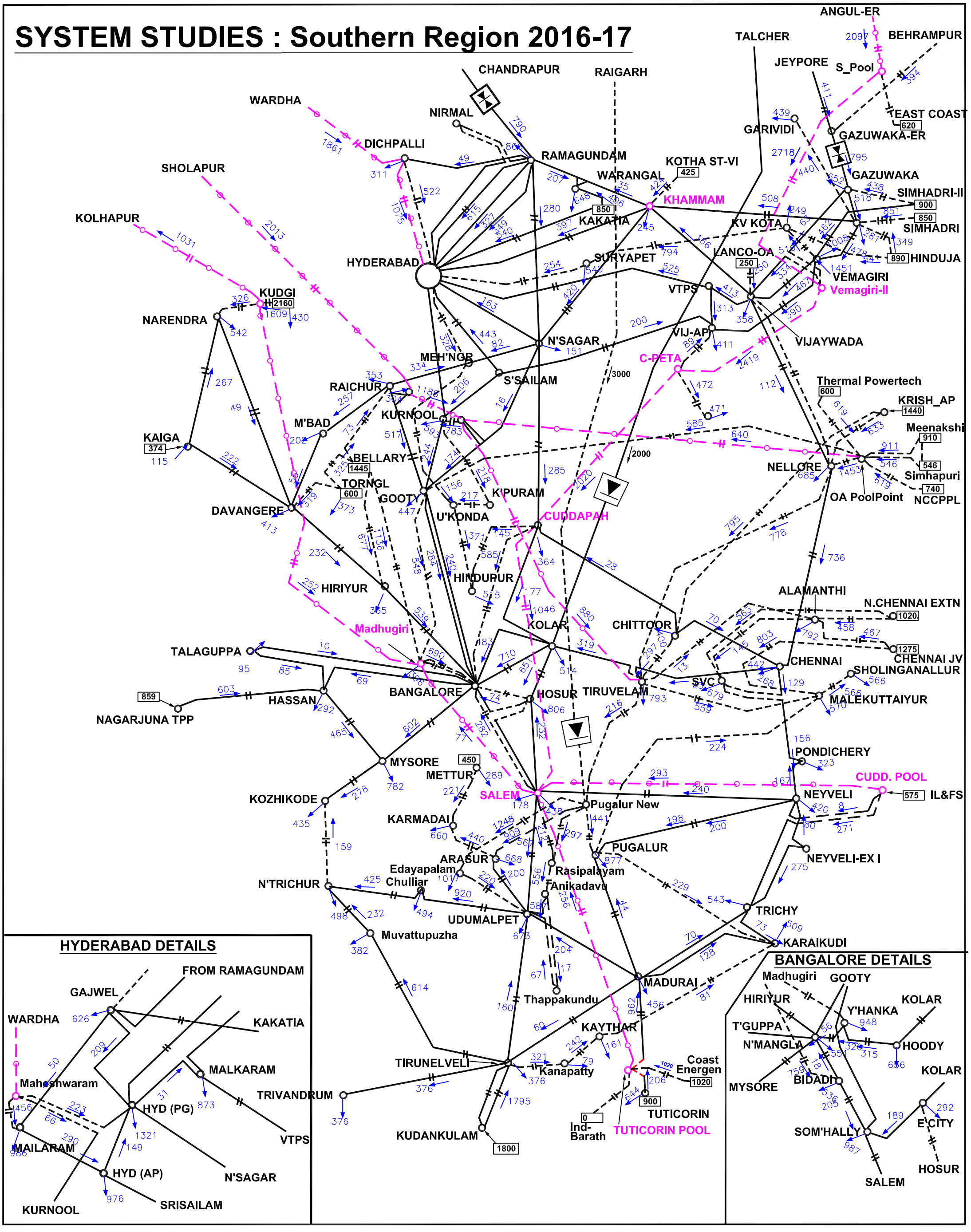

CHAND-SR 395.2 23.2
RSTP 400.0 13.9
GAZU-SR
SIMHD-II 399.3 27.1
SIMHADRI 400.0 27.6
VIZPOOL 400.2 26.9
GAZW
GAJWEL4 8.1
KAKTIA-G 399.7 11.6
WARN4
MALKARM4 393.1 6.6
HYDR 393.9 5.6
KHAM 402.0 12.9
VEMAGIR4 400.0 23.6
VIJW 400.0 15.4
KOTH-VI
VIJTP-I 400.0 15.4
LANCO-OA 400.0 15.9
HYDR-AP4 394.6 5.9
VIJ-AP
SSLBPH4 401.6 7.9
NSAG 404.1 5.5
NAREND-4 407.7 2.2
MAHABUB4 401.0 2.3
RAIC
BELLARY
KURNOOL4 401.9 2.2
MENAK-OA 401.7 0.5
NELLORE4
SIMHR-OA 401.7 0.5
KAIGA 406.0 4.1
MNRB 408.5 1.6
TORNGL4
CUDP 402.6 -2.6
DAVAN4 409.0 -2.2
GOOT 413.2 -0.2
FRSTALCHER 410.9 -5.8
CHITOR 395.0 -11.0
ALMATI4 399.0 -10.3
CHENN-E
TALAGUP4
HIRY4 407.3 -0.3
KOLAR
VTPS 400.0 14.1
HASSAN4 411.9 -4.4
HOODI4
MALEKTT 396.2 -15.0
UDUP4 404.4 4.3
NELMANG4
BIDADI
MADR
SVCHTRM
MYSORE4 411.1 -7.3
SMNH 404.7 -8.0
HOSUR4 406.8 -8.8
METTUR4 400.0 -12.2
PONDY4 397.9 -12.4
SALE 401.5 -12.2
NYVL 400.0 -9.7
NEY_IIEX 400.0 -9.8
NEYEXTN4 400.0 -9.4
ARSUR4 398.7 -14.6
TRIC 401.4 -11.5
UDMP 400.0 -14.0
PUGALUR4 399.4 -11.7
TNRT 395.9 -18.0
CHULLIAR 396.7 -17.6
KARAIK 400.3 -12.2
MDRA 402.4 -9.3
TIRUNEL4 405.6 -3.6
KUDAN4 411.0 5.1
TRIVAND4 404.2 -4.9
TUTI-OA 0.000 0.0
0.900 UV 1.050 OV
KV: ≤132 , ≤220 , ≤400
SYSTEM STUDIES FOR SR, PEAK JULY 2013 CONDITION
FRI, AUG 16 2013 12:06
POWER TECHNOLOGIES, INC.
BUS - VOLTAGE(KV)/ANGLE
BRANCH - MW/MVAR
EQUIPMENT - MW/MVAR

Exhibit - 1A

SYSTEM STUDIES : Southern Region 2016-17

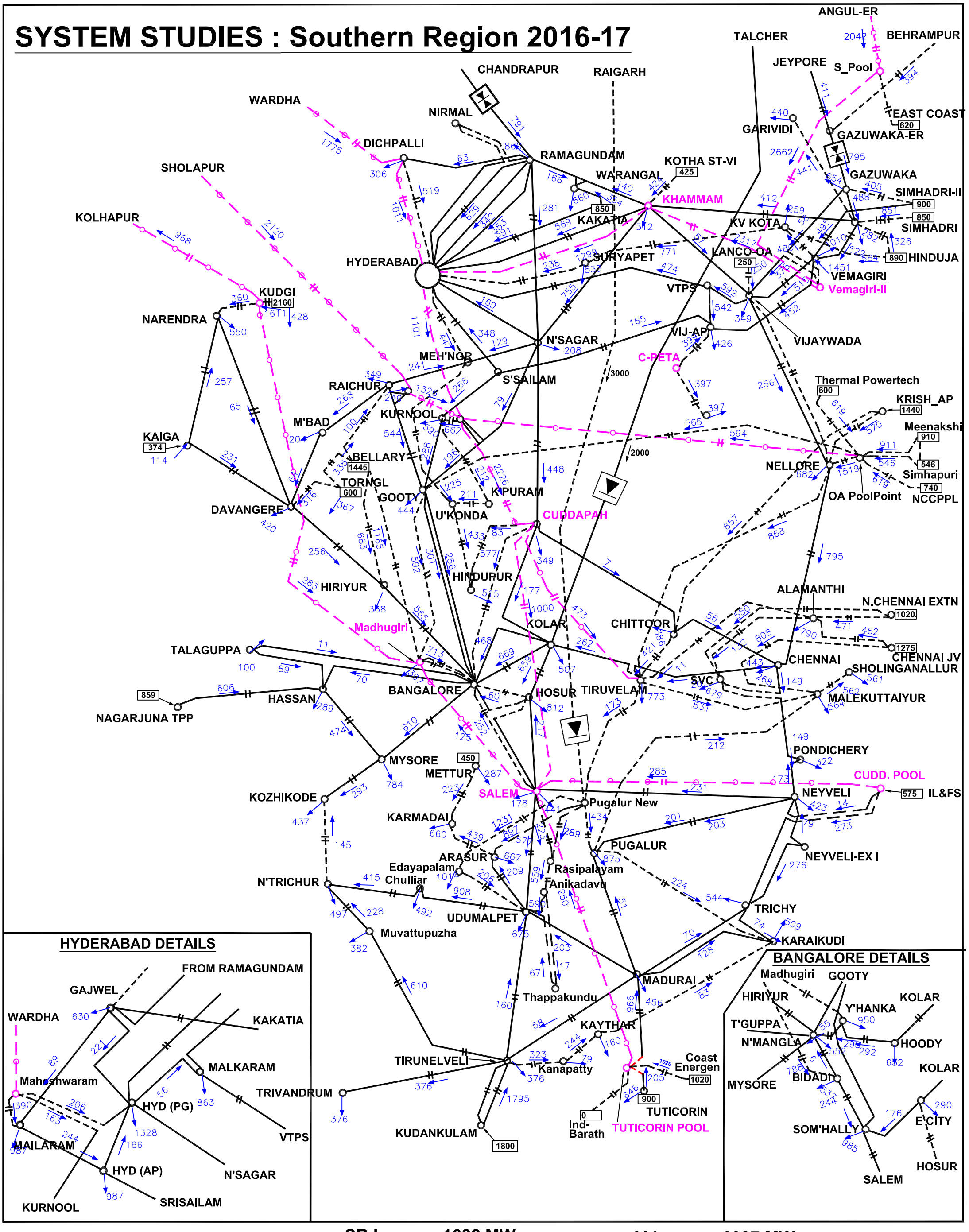


SR Losses: 1655MW

AI Losses: 6362 MW

Exhibit - 2A

SYSTEM STUDIES : Southern Region 2016-17

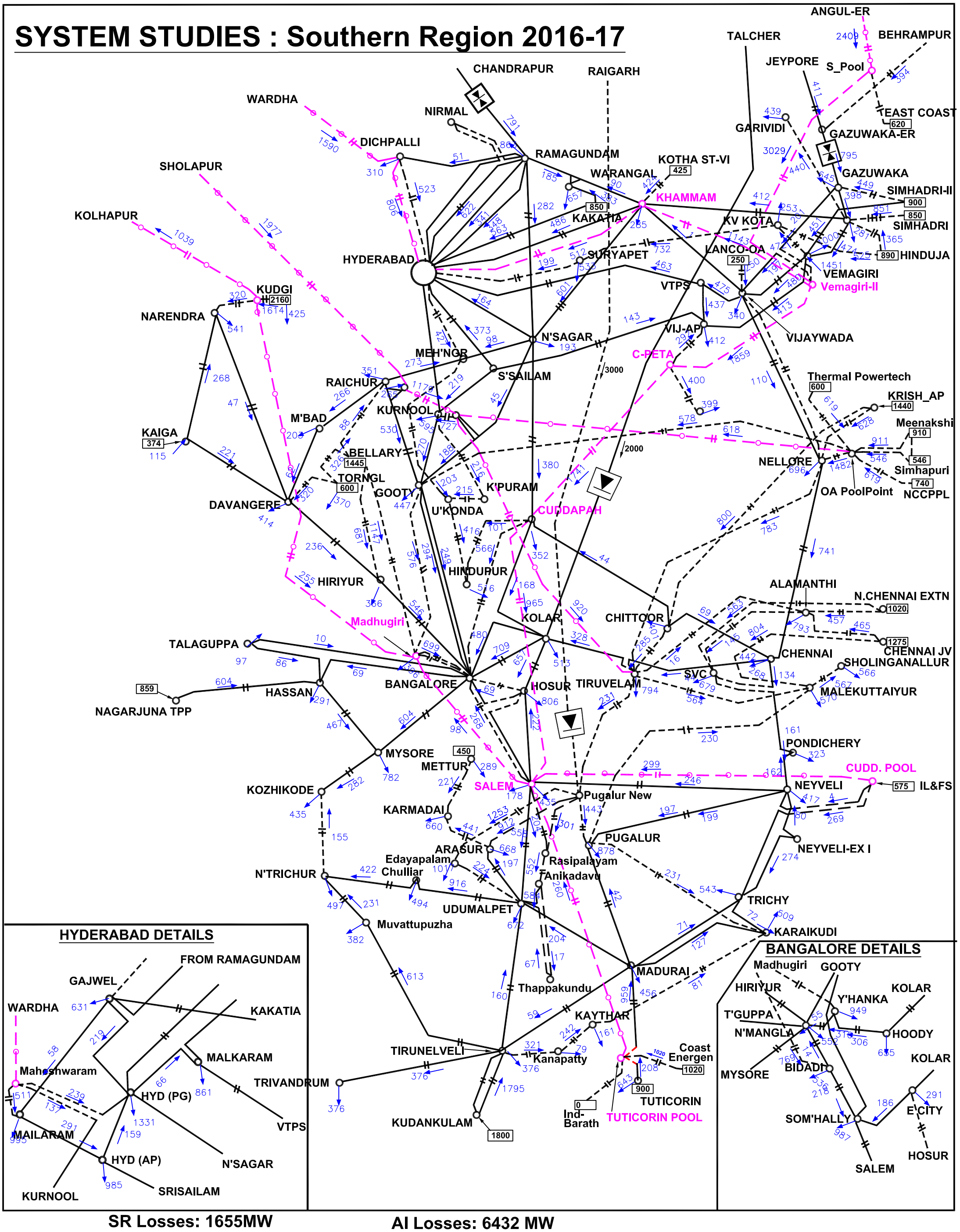


SR Losses: 1682 MW

AI Losses: 6397 MW

Exhibit - 3A

SYSTEM STUDIES : Southern Region 2016-17

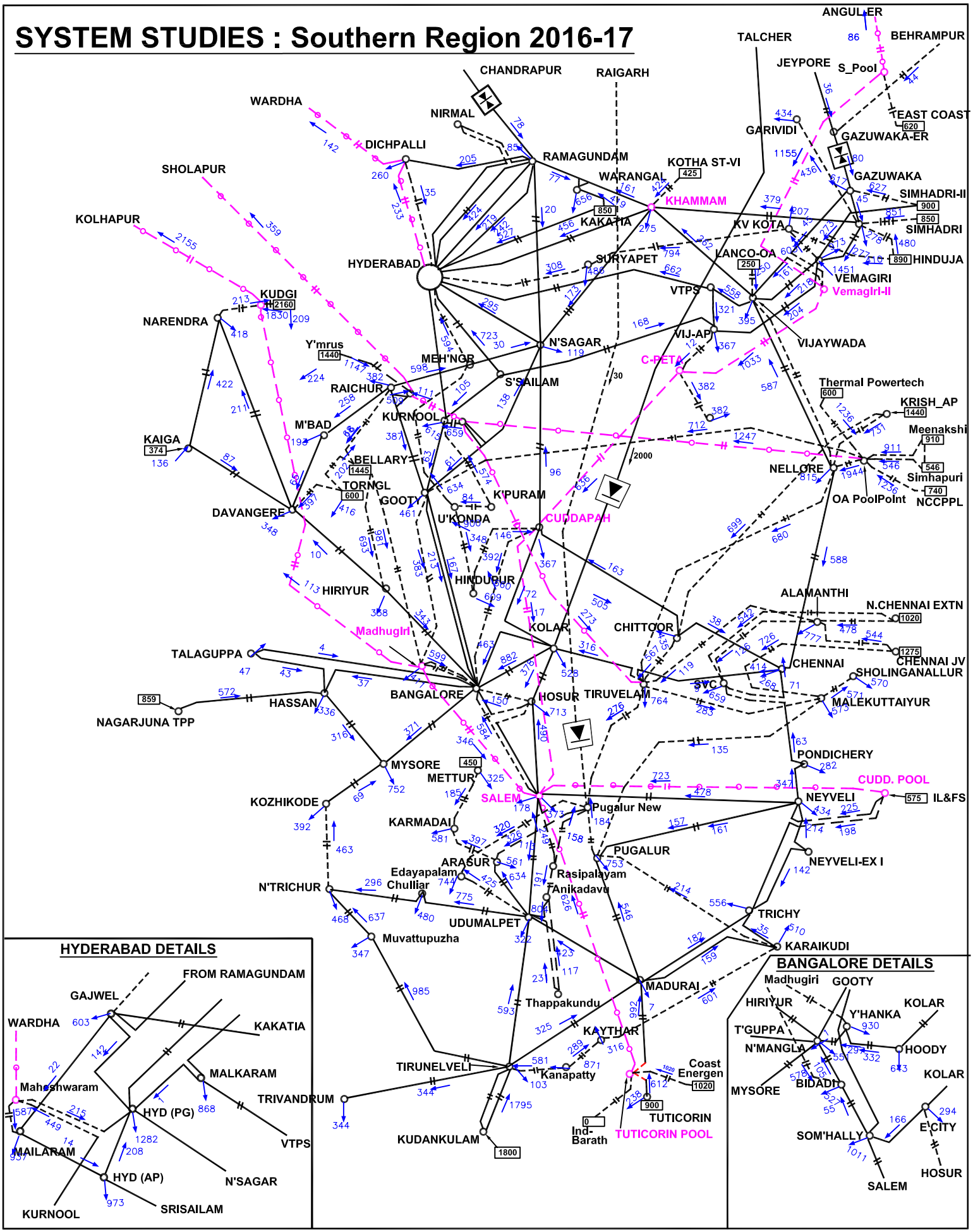


SR Losses: 1655MW

AI Losses: 6432 MW

Exhibit - 1B

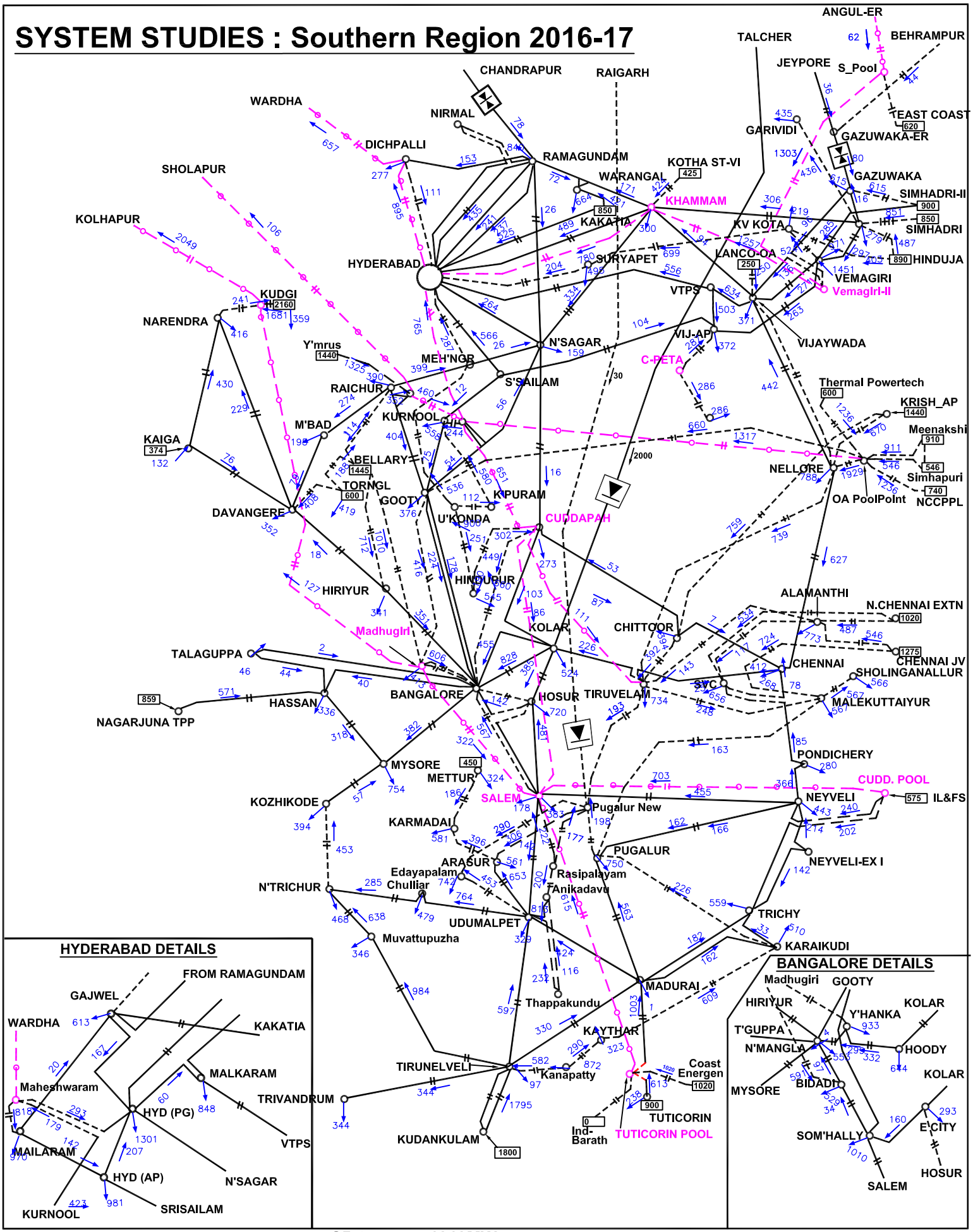
SYSTEM STUDIES : Southern Region 2016-17



SR Losses: 1321MW

AI Losses: 6492 MW

Exhibit - 2B

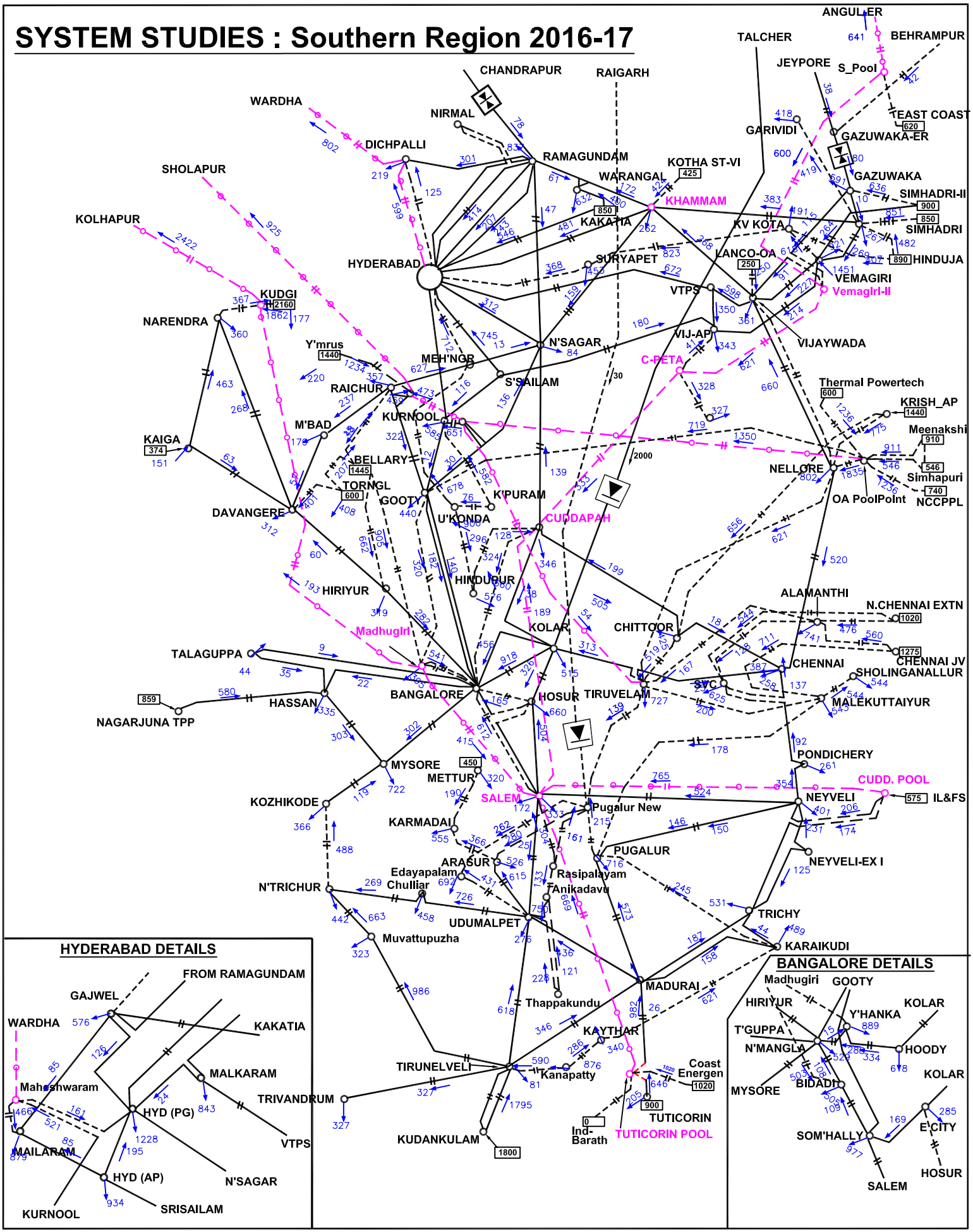


SR Losses: 1313MW

AI Losses: 6386 MW

Exhibit - 1C

SYSTEM STUDIES : Southern Region 2016-17

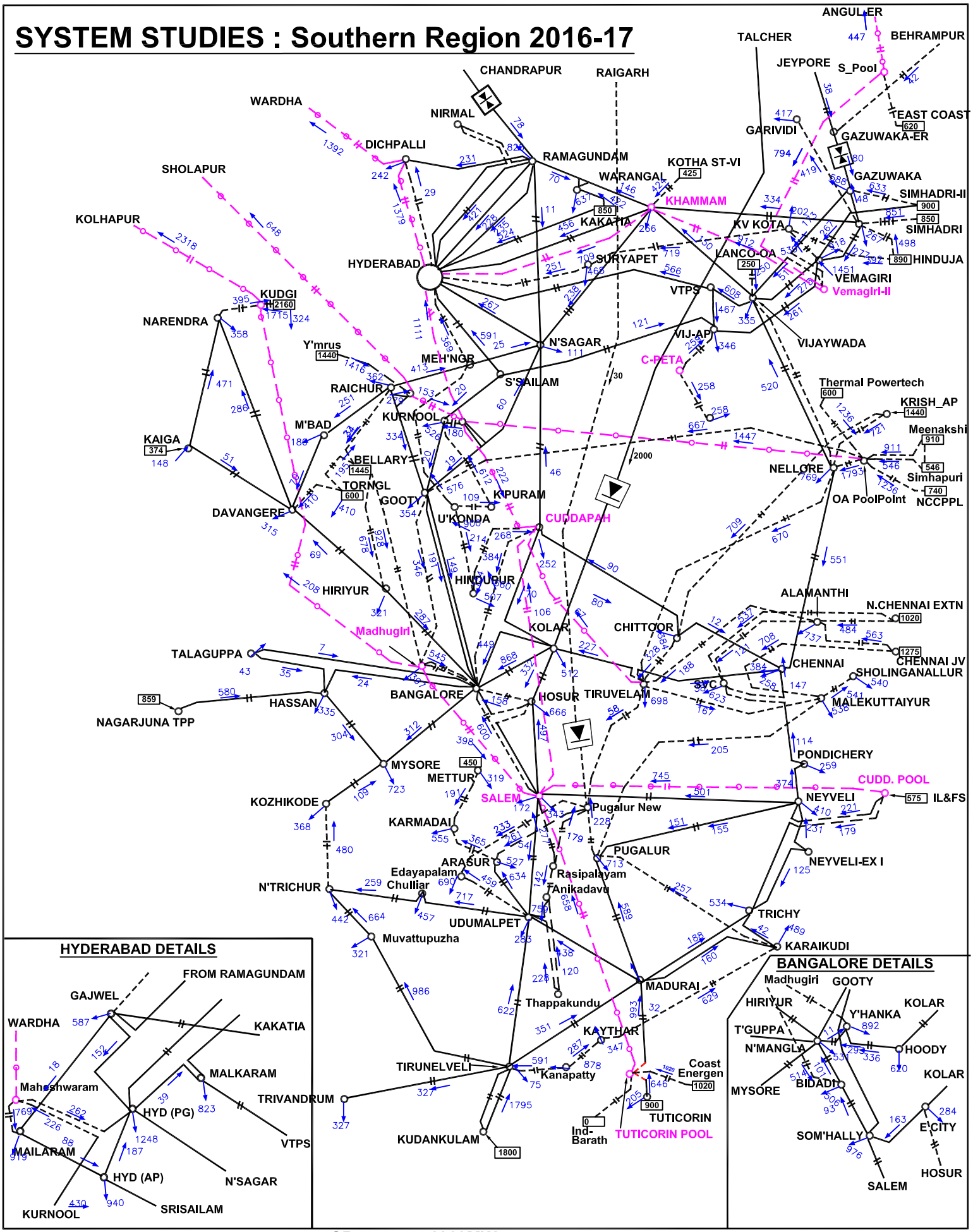


SR Losses: 1277MW

AI Losses: 6739 MW

Exhibit - 2C

SYSTEM STUDIES : Southern Region 2016-17

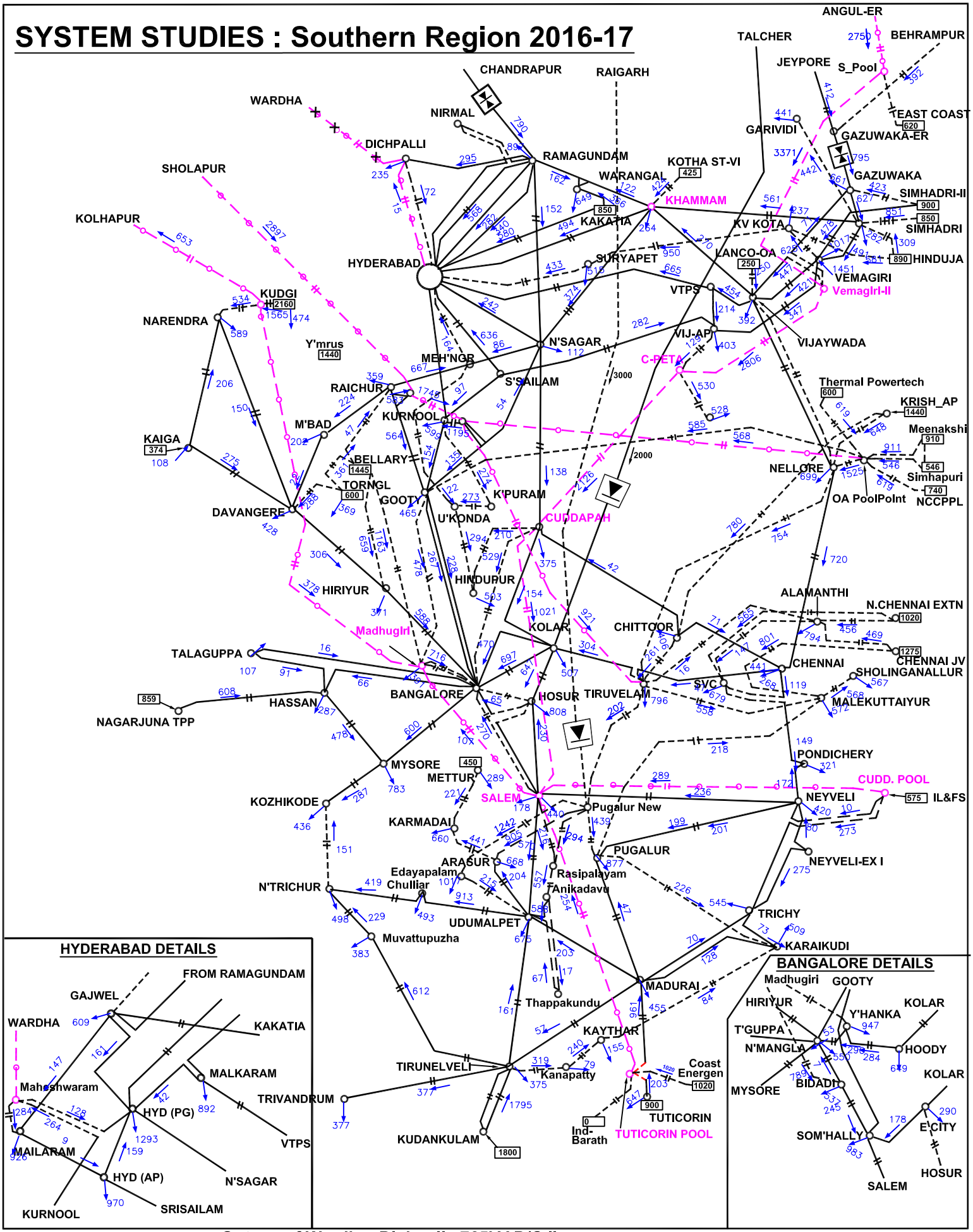


SR Losses: 1260MW

AI Losses: 6726MW

Exhibit - 1A-I

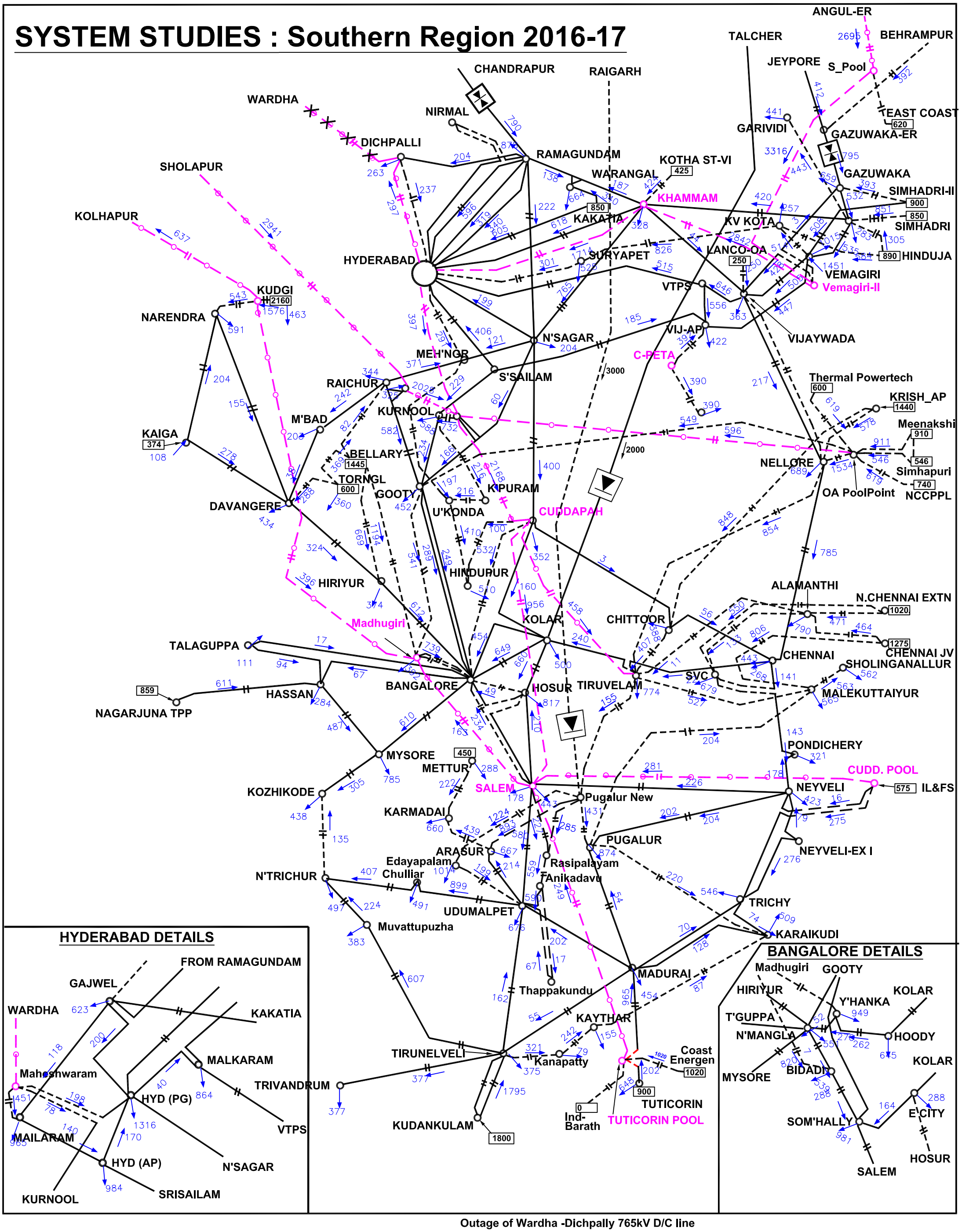
SYSTEM STUDIES : Southern Region 2016-17



Outage of Wardha -Dichpally 765kV D/C line

Exhibit - 2A-I

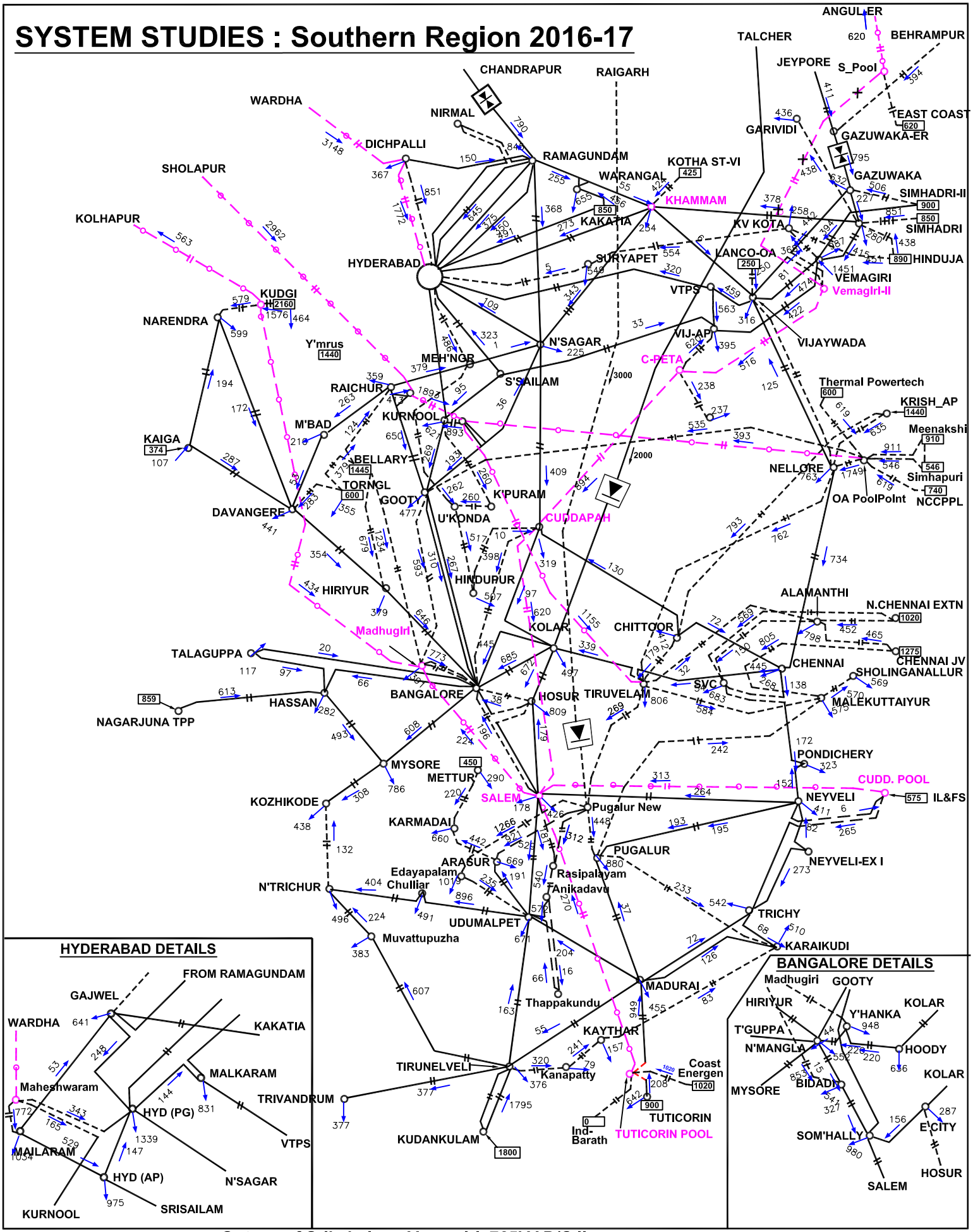
SYSTEM STUDIES : Southern Region 2016-17



Outage of Wardha -Dichpally 765kV D/C line

Exhibit - 1A-II

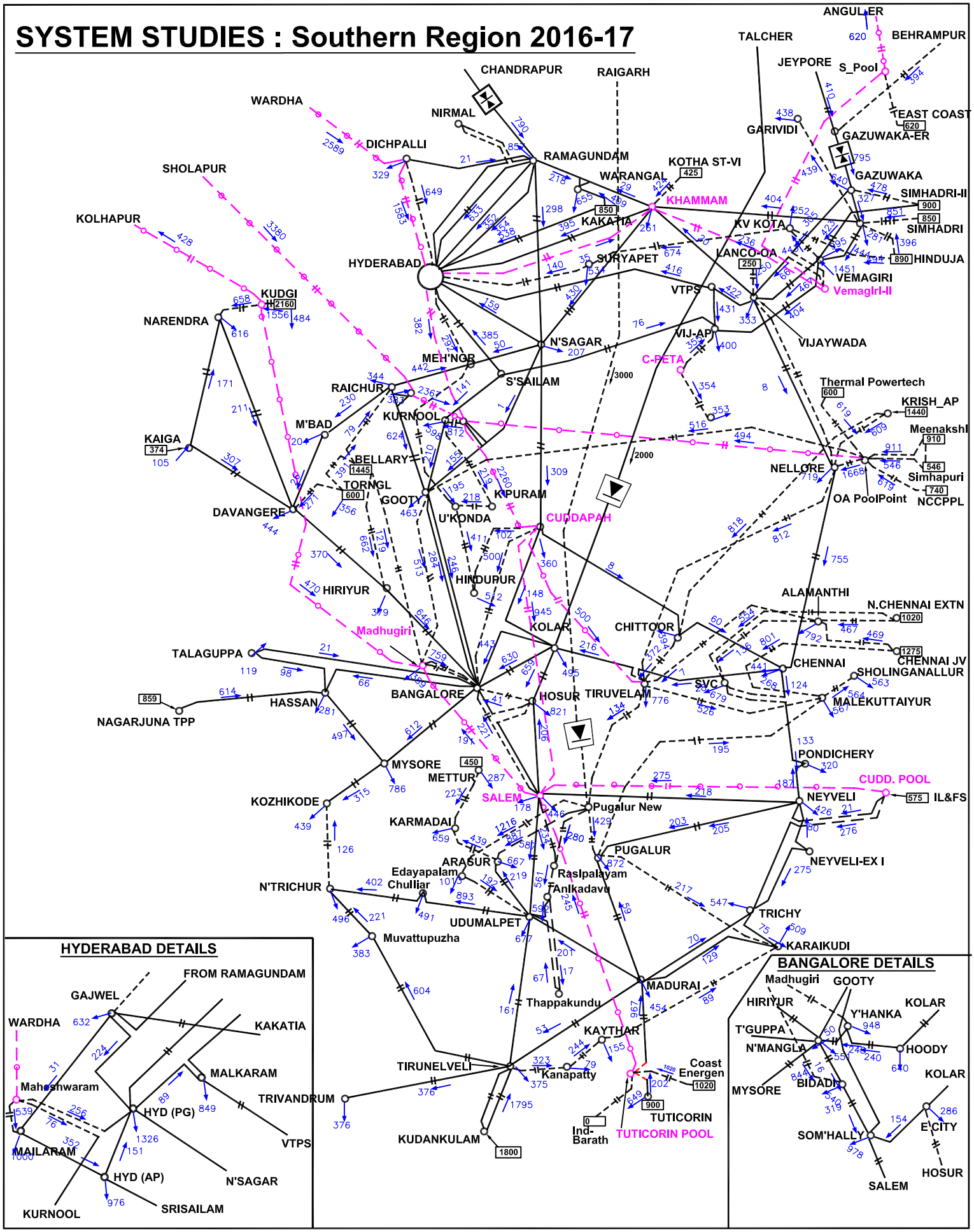
SYSTEM STUDIES : Southern Region 2016-17



Outage of Srikakulam -Vemagiri 765kV D/C line

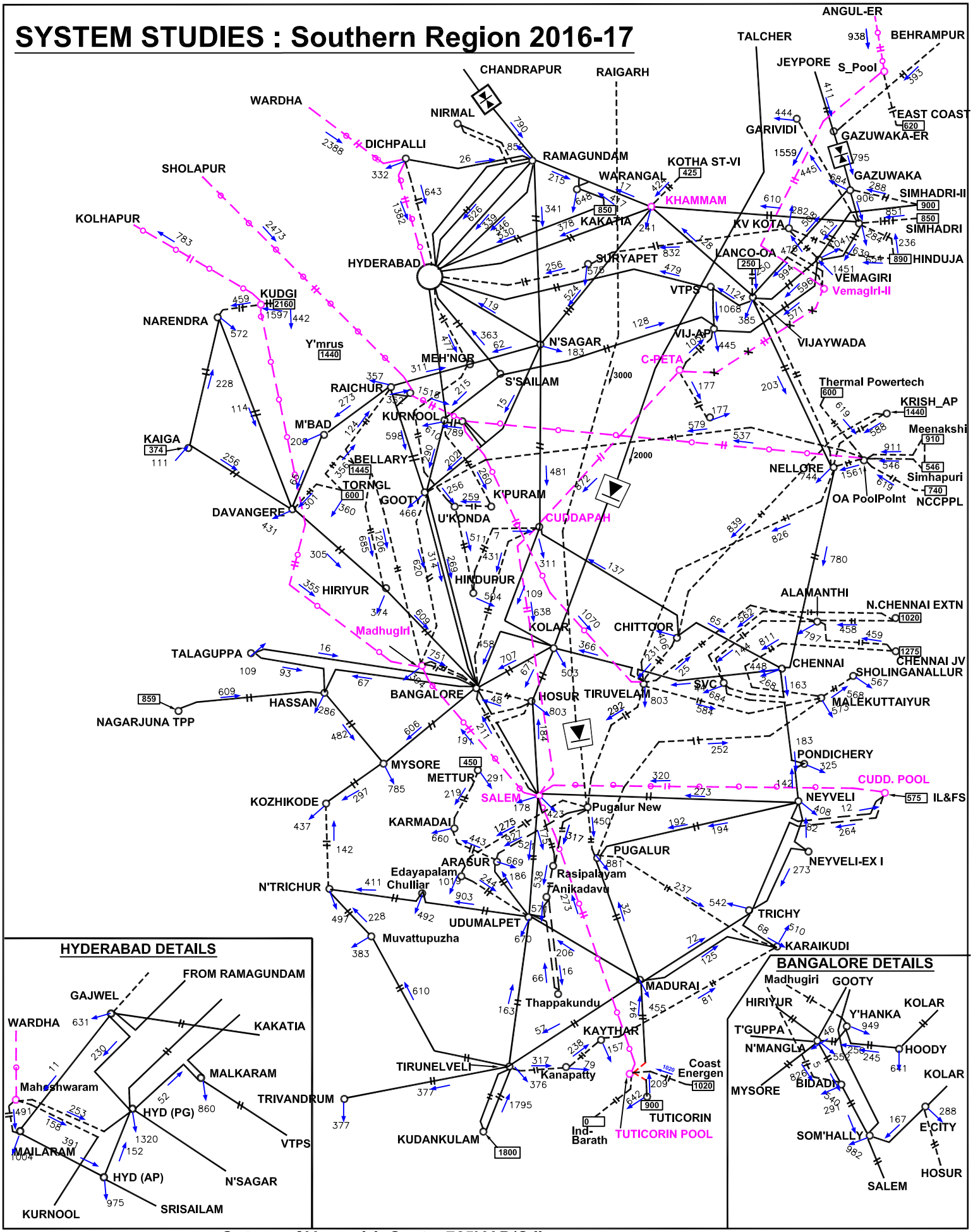
Exhibit - 2A-II

SYSTEM STUDIES : Southern Region 2016-17



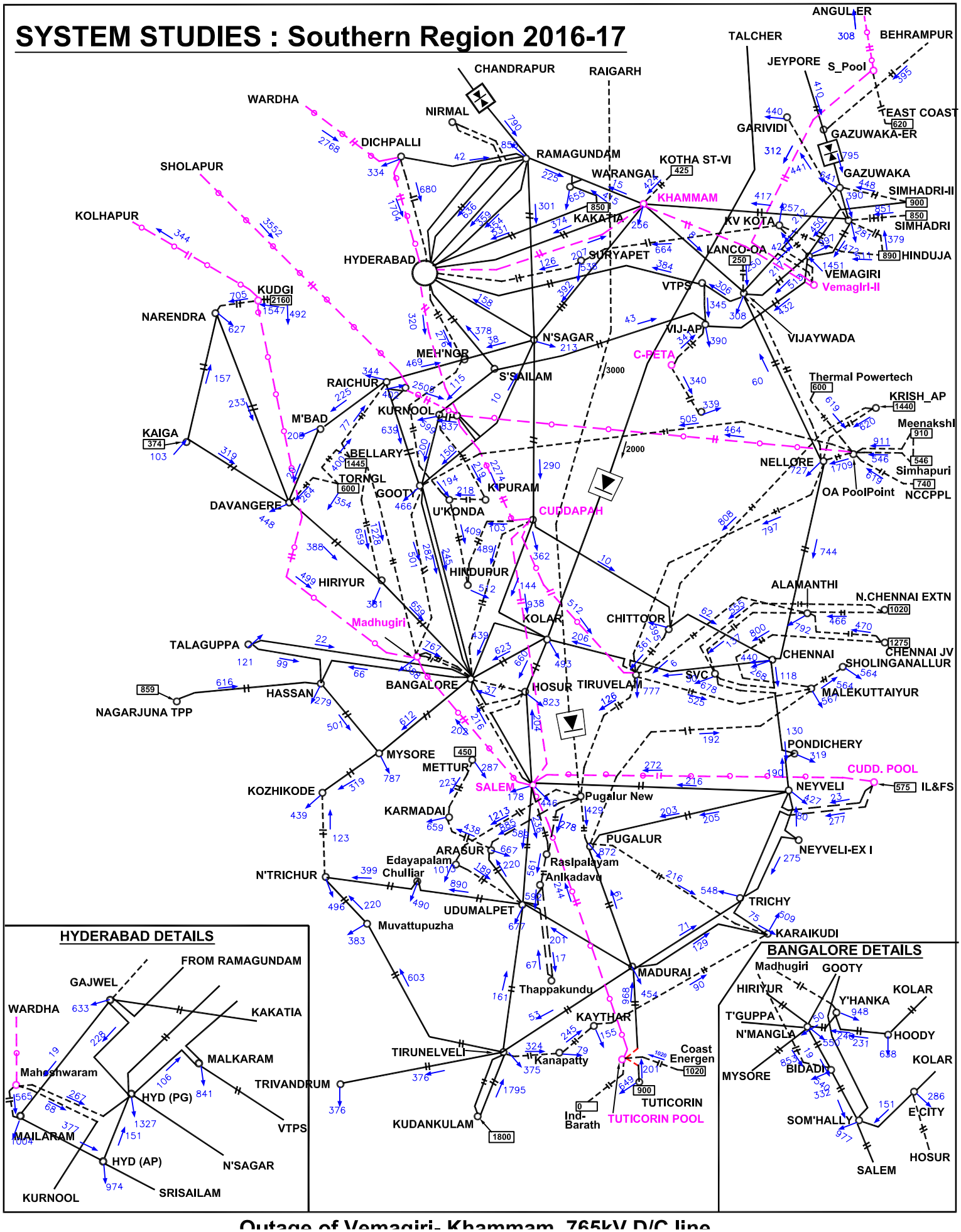
Outage of Srikakulam -Vemagiri 765kV D/C line

SYSTEM STUDIES : Southern Region 2016-17



Outage of Vemagiri- Cpeta 765kV D/C line

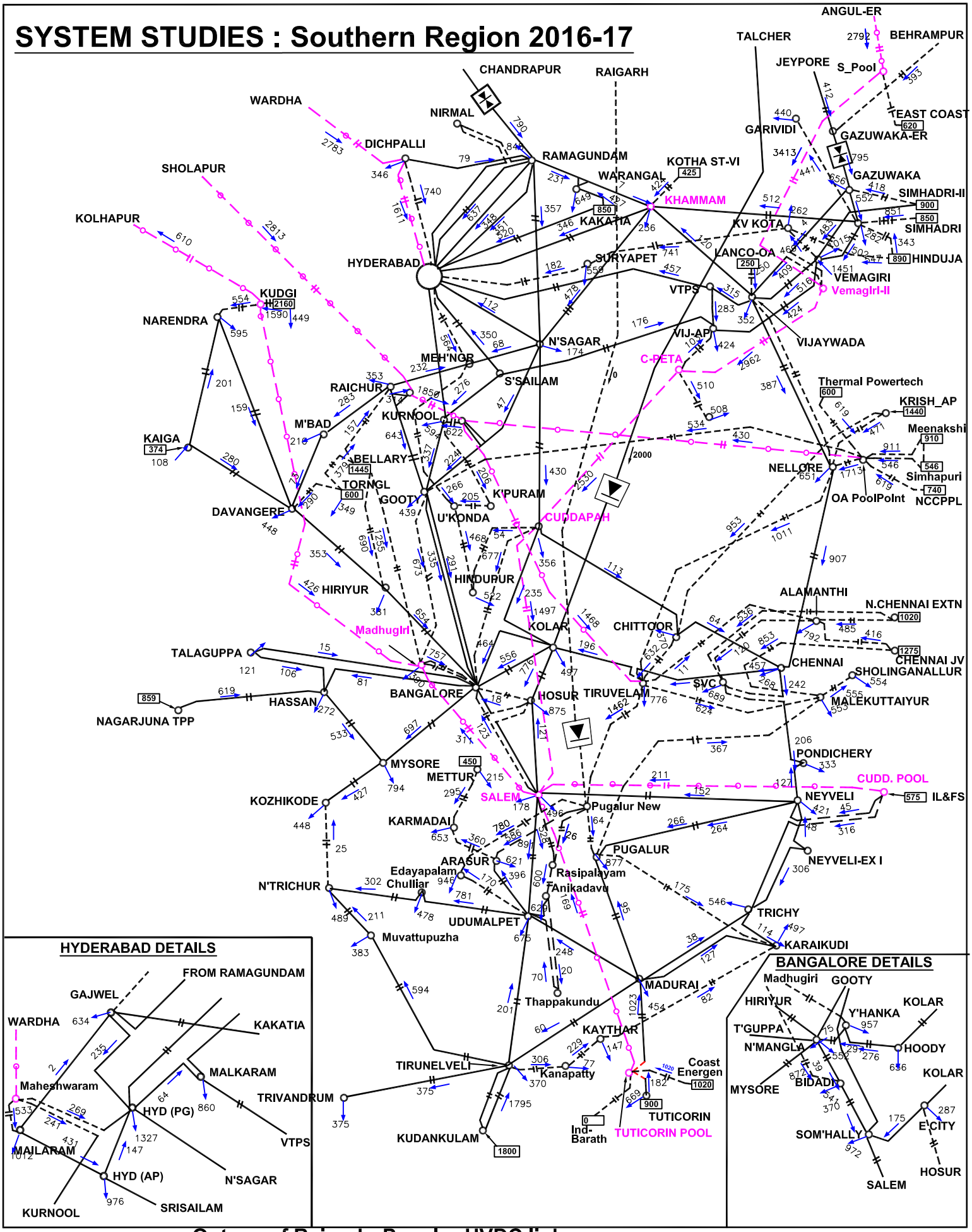
Exhibit - 2A-III



Outage of Vemagiri- Khammam 765kV D/C line

Exhibit - 1A-IV

SYSTEM STUDIES : Southern Region 2016-17



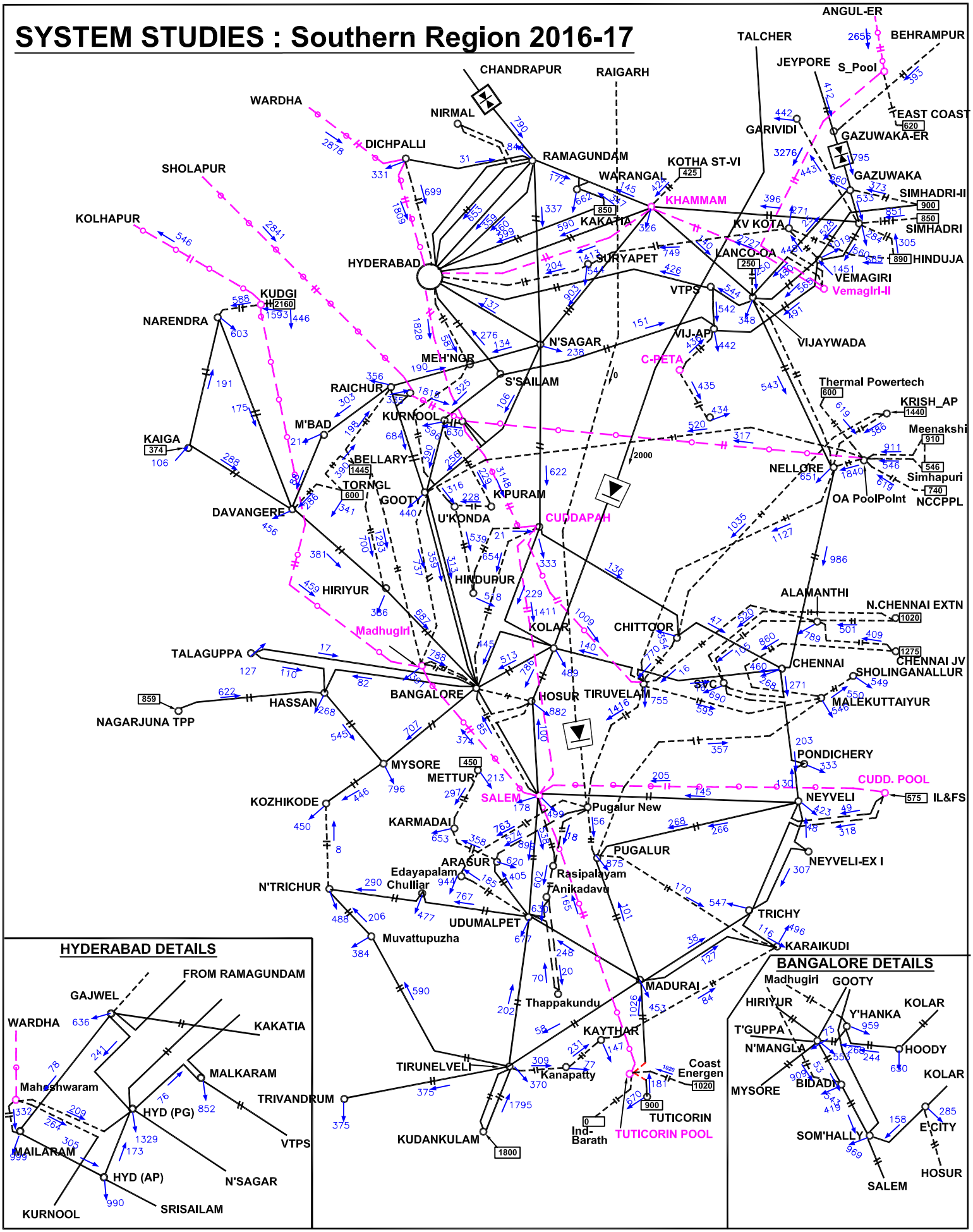
HYDERABAD DETAILS

BANGALORE DETAILS

Outage of Raigarh- Pugalur HVDC link

Exhibit - 2A-IV

SYSTEM STUDIES : Southern Region 2016-17



Outage of Raigarh- Pugalur HVDC link