



भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

दिनांक: 21.07.2024

सेवा में : संरक्षण उप-समिति के सदस्य (सूची के अनुसार) ।

To: Members of Protection Sub-Committee (As per mail list)

विषय: संरक्षण उप-समिति की 51 वीं बैठक की अतिरिक्त कार्यसूची ।

Subject: Additional agenda for 51st Protection Sub-Committee Meeting.

संरक्षण उप-समिति की 51 वीं बैठक, दिनांक 23.07.2024 को 10:30 बजे से गंगा कॉन्फ्रेंस हॉल, एनआरएलडीसी, कटवारियासराय, नई दिल्ली-110016 में आयोजित की जाएगी । उक्त बैठक की अतिरिक्त कार्यसूची संलग्न है । यह उत्तर क्षेत्रीय विद्युत् समिति की वेबसाइट (<http://164.100.60.165/>) पर भी उपलब्ध है । कृपया बैठक में उपस्थिति सुनिश्चित करें ।

The 51st meeting of Protection Sub-Committee is going to be held on 23.07.2024 at 10:30 Hrs at Ganga Conference Hall, NRLDC, Katwaria Sarai, New Delhi-110016. The additional agenda for the meeting is attached herewith. The same is also available on NRPC website (<http://164.100.60.165/>). Kindly make it convenient to attend the same.

Signed by Dharmendra
Kumar Meena
Date: 21-07-2024 11:42:20

डी. के. मीणा
अधीक्षण अभियंता (संरक्षण)

Additional agenda of 51st Protection Sub-Committee Meeting (23rd July, 2024)**Contents**

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Additional agenda of 51st Protection Sub-Committee Meeting (23rd July, 2024)

**Additional agenda for
51st Meeting of Protection Sub-Committee (PSC) of
Northern Regional Power Committee**

Date and time of meeting : 23.07.2024 10.30 Hrs.

Venue : Ganga Conference Hall, NRLDC,
Katwaria Sarai, New Delhi-110016

**AA.1. Discussion on Grid Sync Philosophy and Protection Scheme installed at IOCL
(agenda by HVPNL)**

AA.1.1 220kV Substation Indian Oil Corporation Limited (IOCL) owned by IOCL is being fed from 220kV Substation Mundh. On the request of IOCL, extension of Load of M/s Indian Oil Corporation Limited (IOCL) from 78 MVA to 320 MVA at 220kV level from 220kV Substation Mundh was approved by office of Chief Engineer/ Planning vide R. No. 1988 /Ch-81/ HAP-184/ Vol-I dated 02.04.2024 **(Annexure-A)**.

AA.1.2 In addition, another separate connectivity at 220kV level for additional load of 320 MVA from 220kV Substation Nain has been approved by office of Chief Engineer/Planning vide R. No. 1988/Ch-81/ HAP-184/ Vol-I dated 02.04.2024 **(Annexure-B)**.

AA.1.3 IOCL vide reference no. IOCL/ HVPNLAF/ 64 dated 22.03.2024 requested for approval for operating the grid with their captive generation in parallel **(Annexure-C)**.

AA.1.4 Technical details of their system are reproduced as under:

Additional agenda of 51st Protection Sub-Committee Meeting (23rd July, 2024)

S.No.	Technical Attributes	Remarks
1.	Sanctioned Maximum demand capacity	70 MW 78 MVA)
2.	Load Extension Proposal	288 MW 9320 MVA) (under WTD approval)
3.	Captive generation level.	33kV level.
4.	In house Generation capacity	462.5 MW
5.	Total Operating Load of System.	310 MW
6.	Base operating condition of Generating Machines	5GTs (30 MW) + 5 GTs (25 MW)
7.	Connectivity of 220kV with 33 kV generation level.	4 Nos of 220/ 33 kV 50/65 MVA Transformers.
8.	Continuous operating load.	50 MW-70 MW
9.	Ultimate load in case of multiple machine contingencies of IOCL end.	260 MVA (restricted by transformer capacities)
10.	Load shedding.	Available
11.	Momentary load during contingencies before actuation of load shedding.	310 MW
12.	Load post actuation of load shedding.	Limited by transformer capacities
13.	Power export Conditions (if any)	No

AA.1.5 The proposal of IOCL containing the request for parallel operation with the grid was taken up by Central Electricity Authority (CEA) for further deliberation and examining the stability study for captive generation being owned by IOCL.

AA.1.6 The meeting was held between members from CEA, CTUIL, Grid India, NRPC, HVPNL and IOCL on 03.06.2024 related to synchronization of grid with IOCL PRPC. As desired by CEA, the issue is required to be deliberated by the Protection committee of NRPC (**Annexure-D**). The proposal containing the details of existing protection at HVPNL end and IOCL end along with other technical parameters is annexed as **Annexure-E**.

Decision required from Forum:

Forum may please deliberate and accord approval of Grid Sync Philosophy and Protection Scheme installed at IOCL for synchronization of IOCL's captive plant at Panipat refinery with the Grid.

Additional agenda of 51st Protection Sub-Committee Meeting (23rd July, 2024)

AA.2. Approval of protection settings in compliance of IEGC 2023 (agenda by POWERGRID)

- AA.2.1 POWERGRID vide mail dtd. 10.07.2024 has intimated that 765kV Fatehgarh-II-Bhadla-II D/C line (Ckt-3 & 4) has been charged after FTC clearance by NRLDC (FTC case ID 1119119 & 1119120). Protection settings have been accepted by NRLDC during FTC.
- AA.2.2 As per protection setting procedure approved in 50th PSC meeting, utility has to get final approval of settings in PSC meeting, therefore, implemented settings are attached (as **Annexure-F**) for approval of forum.
- AA.2.3 Further, overvoltage stage-I settings of below lines have also been changes as per instruction of NRLDC. Same may also be approved by forum.

Line name	Existing setting		Proposed modified setting		Switchable Line Reactor		Sequence
	Voltage setting stage I (%)	Time delay (sec)	Voltage setting stage I (%)	Time delay (sec)	At Fatehgarh-II	At Bhadla-II Or Bhadla	
765kV Fatehgarh-II-Bhadla-II Ckt-1	109	9	106	5	240	0	1
765kV Fatehgarh-II-Bhadla-II Ckt-2	110	15	107	6	240	0	2
765kV Fatehgarh-II-Bhadla-II Ckt-3	NA	NA	109	9	240	240	4
765kV Fatehgarh-II-Bhadla-II Ckt-4	NA	NA	110	15	240	240	6
765kV Fatehgarh-II-Bhadla Ckt-1	108	6	108	8	240	0	3
765kV Fatehgarh-II-Bhadla Ckt-2	110	12	110	12	240	0	5

Decision required from Forum:

Forum may approve the settings after deliberation and may suggest changes, if any.

Members of Protection Sub-Committee (FY 24-25)

S. No.	NRPC Member Organization	Designation	Email-ID
1	Member (GO&D), CEA	Director, NPC Division	skdotancea@nic.in
2	Member (PS), CEA	Chief Engineer, PSPA-I Division	i.sharan@nic.in
3	CTUIL	Sr.GM	schakraborty@powergrid.in
4	PGCIL	GM	gunjan.agrawal@powergrid.in
5	NLDC*	Executive Director	scsaxena@grid-india.in
6	NRLDC*	Executive Director	nroy@grid-india.in
7	NTPC	GM(OS-NR)	dmandal@ntpc.co.in
8	BBMB	Director (P&C)	dirpc@bbmb.nic.in
9	THDC*	Chief General Manager (EM-Design)	rrsemwal@thdc.co.in
10	SJVN	General Manager	prakash_chand@sjvn.nic.in
11	NHPC	General Manager (O&M)	hod-om-co@nhpc.nic.in
12	NPCIL*	Director (Finance)	df@npcil.co.in
13	Delhi SLDC	General Manager	gmsldc@delhisldc.org
14	Haryana SLDC	Chief Engineer (SO&C)	cesocomml@hvpn.org.in
15	Rajasthan SLDC	Chief Engineer (LD)	ce.ld@rvpn.co.in
16	Uttar Pradesh SLDC	Superintending Engineer (R&A)	sera@upsldc.org
17	Uttarakhand SLDC	Chief Engineer	anupam_singh@ptcul.org
18	Punjab SLDC	Chief Engineer	ce-sldc@punjabsldc.org
19	Himachal Pradesh SLDC	Chief Engineer	cehpsldc@gmail.com
20	DTL	AGM-Protection	bharatgujardti@gmail.com
21	HVPNL	Chief Engineer (TS)	cetspkl@hvpn.org.in
22	RRVPNL	CE (M&P)	ce.mps@rvpn.co.in
23	UPPTCL*	Managing Director	md@upptcl.org
24	PTCUL	SE(T&C)	setandchld@gmail.com
25	PSTCL	Chief Engineer (P&M)	ce-pm@pstcl.org
26	HPPTCL*	Managing Director	md.tcl@hpmail.in
27	IPGCL	GM-T	satyendrap@ipgcl-ppcl.nic.in
28	HPGCL	SE(Tech)	setechhg@hpgcl.org.in
29	RRVUNL*	CMD	cmd@rrvun.com
30	UPRVUNL	Chief Engineer, (L-2)	ce.ppmm@uprvunl.org
31	UJVNL*	Managing Director	mdujvnl@ujvnl.com
32	HPPCL*	Managing Director	md@hppcl.in
33	PSPCL*	CMD	cmd-ppcl@pspcl.in
34	UHBVN	Managing Director	md@uhbvn.org.in
35	Jodhpur Vidyut Vitran Nigam Ltd.	Managing Director	MD.JDVVNL@RAJASTHAN.GOV.IN
36	Paschimanchal Vidyut Vitaran Nigam Ltd.	Managing Director	md@pvvnl.org
37	UPCL*	Managing Director	md@upcl.org
38	HPSEB*	Managing Director	md@hpseb.in
39	Prayagraj Power Generation Co. Ltd.*	Head (Commercial & Regulatory), DGM - Elect	sanjay.bhargava@tatapower.com , dhananjay.singh@ppgcl.co.in
40	Aravali Power Company Pvt. Ltd*	CEO	brahmaiq@ntpc.co.in
41	Apraava Energy Private Limited*	GM-Electrical	navin.chaturvedi@apraava.com
42	Talwandi Sabo Power Ltd. *	COO	Vibhav.Agarwal@vedanta.co.in
43	Nabha Power Limited*	CEO	sk.narang@larsentoubro.com
44	Lanco Anpara Power Ltd*	President	sudheer.kothapalli@meilanparapower.com
45	Rosa Power Supply Company Ltd	GM-ELECTRICAL	kesarinandan.pandey@relianceada.com
46	Lalitpur Power Generation Company Ltd	President	rnbedi.ltp@lpgcl.com
47	MEJA Urja Nigam Ltd.	AGM-EMD	SPSPUNDIR@NTPC.CO.IN
48	Adani Power Rajasthan Limited*	COO, Thermal, O&M	jayadeb.nanda@adani.com
49	JSW Energy Ltd. (KWHEP)*	Head Regulatory & Power Sales	jyotiprakash.panda@jsw.in
50	TATA POWER RENEWABLE*	Zonal Head, NR	dhmahabale@tatapower.com
51	UT of J&K*	Chief Engineer, JKPCL	ceikpcl2@gmail.com
52	UT of Ladakh*	Chief Engineer, LPDD	cepladakh@gmail.com
53	UT of Chandigarh	Executive Engineer	elop2-chd@nic.in
54	Noida Power Company Limited	Head – Power Purchase	ssrivastava@noidapower.com
55	Fatehgarh Bhadla Transmission Limited	AGM- Protection and Metering	ashish.baviskar@adani.com
56	NTPC Vidyut Vyapar Nigam Ltd.	CEO	ceonvvn@ntpc.co.in

* Organizations from where nominations are not received for PSC, members of NRPC have been mentioned. Nomination for PSC forum may be sent at the earliest.

Annexure - A & B.



HARYANA VIDYUT PRASARAN NIGAM LIMITED

REGD. OFFICE: - Shakti Bhawan, Sector-6, Panchkula

Corporate Identity Number: U40101HR1997SGC033683

O/o Chief Engineer/PD&C, HVPNL, Panchkula-134109

Website: www.hvprn.gov.in

E-mail - cepdc@hvprn.org.in

To

Superintending Engineer/Monitoring,
UHBVN, Panchkula.

Memo. No. R-1988 /Ch-81/HAP-184/Vol-I

Dated: 02.04.2024

- Subject:** (i) Approval for extension of load of 220KV S/Stn IOCL (now IOCL-I) from 78MVA to 320MVA to be fed from 220KV S/Stn Mund.
(ii) Approval for separate connectivity at 220 KV level for a load of 320MVA of 220KV Sub-station IOCL-II from 220KV Sub-station HVPNL, Nain.

This is in reference to your office memo no. Ch-63/SE/MON/case-file No.-1277/PNP/21-22 dated 27.06.2023 conveying the subject cited proposals duly approved by UHBVNL for separate connectivity at 220kV level for a load of 320MVA of 220KV sub-station IOCL-II from 220KV sub-station HVPNL, Nain and extension of load of 220KV S/Stn IOCL (now IOCL-I) from 78MVA to 320MVA to be fed from 220KV S/Stn Mund. The second source for both IOCL-I & IOCL-II shall be from new proposed HVPNL 400KV sub-station Munak (under consideration) at the cost of IOCL.

The proposal placed before WTDs HVPNL, through e-office file no. HVPNL-6001826/15//2021-Area Planning-1-HVPNL (Computer No. 518478), has been considered and approved as under:

Sr. No.	Description	Code
1.	To allow extension of load of 220KV S/Stn IOCL (now IOCL-I) from 78MVA to 320MVA to be fed from 220KV S/Stn Mund.	-----
2.	To allow separate connectivity at 220 KV level for an additional load of 320MVA of 220KV Sub-station IOCL-II to be fed from 220KV sub-station HVPNL, Nain.	-----
3.	To allow the creation of a new 220 KV S/Stn. IOCL-II with a capacity of 4X125 MVA, 220 KV / 66 KV transformers by M/s IOCL under self-execution mode.	-----
4.	Amendment in existing approval conveyed vide Chief Engineer / PD&C, HVPNL Panchkula vide Memo. No. R-1843/Ch-88/HAP-184 dated 03.01.2022 in view of sanctioned 320MVA load of 220kV S/Stn IOCL-II from new 220KV S/Stn Nain at 220KV level. (i) Cancellation of already approved creation of 220KV D/C Nain-IOCL (now IOCL-I) line with 0.5 Sq Inch ACSR conductor at the cost of M/s IOCL, Panipat. (mentioned at Sr. No. 2 of R-1843, Approval Code: 2L3821*) (ii) Cancellation of already approved creation of 2 no. 220kV line bays at 220KV sub-station Nain to accommodate 220KV D/C Nain-IOCL (now IOCL-I) line at the cost of M/s IOCL, Panipat. (mentioned at Sr. No. 3 of R-1843, Approval Code: 2B3822*)	2L3821A 2B3822A
5.	Creation of new 220KV D/C Nain-IOCL-II line with HTLS conductor equivalent to 0.5 Sq Inch ACSR conductor having capacity 1200 Ampere (approx. line length 22.5KMs) as per request of IOCL for better reliability of power supply on 220KV Double Circuit/Multi circuit /Monopole towers/cables (as the case may be) at the cost of M/s IOCL matching with commissioning of 220KV S/Stn Nain in FY 2026-27.	2D4256*
6.	Creation of 2 No. 220 KV line bays at 220KV S/Stn., Nain to accommodate 220KV D/C Nain-IOCL-II line at the cost of M/S IOCL in FY 2026-27.	2D4257*
7.	The second source for both IOCL-I & IOCL-II would be from the proposed 400kV sub-station Munak at the cost of IOCL and approval would be conveyed along with the approval of 400kV sub-station Munak (Karnal).	-----
Note: (i) All provisions of CE/PD&C, UHBVNL, Panchkula conveyed vide memo no. Ch-63/SE/MON/case-file No.-1277/PNP/21-22 dated 27.06.2023 shall be complied by M/s Indian Oil Corporation Limited (IOCL), Panipat.		

[Handwritten signature]

- (ii) All the guidelines/instructions issued by the Nigam from time to time for Deposit Work must be adhered to.
- (iii) TS/HVPNL Panipat shall ensure compliance with the provisions contained in Deputy Secretary/Operation, HVPNL office memo no. Ch-24/DSO-214/L-154/Vol-II dated 12.05.2017 & amendments thereafter.
- (iv) The charges involved for releasing the connection will be payable by M/s Indian Oil Corporation Limited (IOCL), Panipat as per Haryana Electricity Regulatory Commission (duty to supply electricity, Power to recover expenditure incurred in providing supply and power to require security) regulations, 2016 dated July 11, 2016 amended from time to time.
- (v) M/s Indian Oil Corporation Limited (IOCL), Panipat shall comply all the guidelines for self-execution of the deposit works issued vide memo no. Ch-17/DSO-214/L-11 dated 25.04.2012 and subsequently revised vide memo no. Ch-237/DSO-513 dated 11.11.2021.
- (vi) M/s Indian Oil Corporation Limited (IOCL), Panipat shall submit an undertaking with UHBVN and HVPNL to the fact that any cost chargeable from them (if worked out later on), shall be paid by them within 15 days from the date of issue on such demand by UHBVN and HVPNL.
- (vii) M/s Indian Oil Corporation Limited (IOCL), Panipat shall provide metering arrangements at the sending end and receiving end as per HERC Regulation of metering and in line with specifications & design requirements of UHBVNL & HVPNL.
- (viii) Chief Engineer (SO & Commercial), HVPNL, Panchkula being nodal to ensure the compliance of all Nigam's regulations/formalities including required metering equipment.
- (ix) M/s Indian Oil Corporation Limited (IOCL), Panipat shall seek all mandatory approvals necessitated prior to & post execution of work from respective authorities of HVPNL, UHBVNL, HSIIDC, HERC, Civic bodies NHAI, Forest dept., railways, other agencies, and office of Chief Electrical Inspector, Haryana. M/s IOCL shall assist TS Wing/ HVPNL for clearing of ROW.
- (x) The instructions issued by FA/HQs, HVPNL, Panchkula on "GST incidence on the transaction of the sum received from external agencies for execution of Deposit Work" vide Memo No. GST20-21/05 dated 22.05.2020 may also be adhered to.

The unique identification number CS/WTDs/Xen/Area Planning-I/RBC- 29.03.2024/April-1231 has been appended by Company Secretary, HVPNL, Panchkula.

Chief Engineer/PD&C,
HVPNL, Panchkula.

Copy to:

1. Chief Engineer/TS, HVPNL, Hisar & Panchkula.
2. Chief Engineer /P&M, HVPNL, Panchkula.
3. Chief Engineer/SO & Commercial, HVPNL, Panchkula.
4. Chief Engineer /PD&C, UHBVNL, Panchkula.
5. Chief Engineer /Operation, UHBVNL, Rohtak.
6. Superintending Engineer /Contracts, HVPNL, Panchkula.
7. Superintending Engineer, NCR Planning, HVPNL, Gurugram.
8. Superintending Engineer, Planning, HVPNL, Panchkula.
9. Superintending Engineer/Design, HVPNL, Panchkula.
10. Superintending Engineer /Civil Design, HVPNL, Panchkula.
11. Superintending Engineer /TS, HVPNL, Rohtak & Karnal.
12. Superintending Engineer /P&M, HVPNL, Panchkula.
13. Superintending Engineer /Operation, UHBVNL, Panipat & Karnal.
14. Superintending Engineer /P&D, UHBVNL, Panchkula.
15. Company Secretary, HVPNL, Panchkula.
16. S.P.S. to MD, HVPNL, Panchkula for kind information of Managing Director, HVPNL.
17. S.P.S. to MD, UHBVNL, Panchkula for kind information of MD, UHBVNL.
18. S.P.S. to Director (Technical), HVPNL, Panchkula for kind information of Director (Tech.).
19. S.P.S. to Director (Projects), HVPNL, Panchkula for kind information of Director (Projects).
20. S.P.S. to Director (Finance), HVPNL, Panchkula for kind information of Director (Finance).
21. S.P.S. to Director (Projects), UHBVNL, Panchkula for kind information of Director (Projects).
22. S.P.S. to Director (Operations), UHBVNL, Panchkula for kind information of Director (Operations).
23. Deputy Secretary /Projects, HVPNL, Panchkula.
24. Deputy Secretary /Operations, HVPNL, Panchkula.
25. Executive Engineer/TS, HVPNL, Panipat & Karnal.
26. Executive Engineer /System Study, HVPNL, Panchkula.
27. Executive Engineer /Planning, HVPNL, Panchkula.



इंडियन ऑयल कॉर्पोरेशन लिमिटेड
पानीपत रिफाइनरी एवं पेट्रोकेमिकल कॉम्प्लेक्स
पानीपत, हरियाणा - 132140

Indian Oil Corporation Limited
Panipat Refinery & Petrochemical Complex
Panipat, Haryana - 132140

वेबसाइट : www.iocl.com; ई-मेल : panipatrefinery@indianoil.in
दूरभाष : 0180-2524001; फैक्स : 0180-2578833

इंडियन ऑ

रिफाइनरीज प्रभाग
Refineries Division

Ref. No.: IOCL/HVPNL/AF/64

Date: 22.03.2024

To
The Superintending Engineer (PDC)
Haryana Vidyut Prasaran Nigam Limited
Panchkula

Subject: Permission for operating the existing captive generation system of IOCL Panipat Refinery & Petrochemical Complex (PRPC) with 220 KV Grid sourced from HVPNL Mundl in parallel in line with Net Zero Initiatives of the Govt. of India.

Ref. No.: 1. R-1650 / Ch-32/HAP-184 dt.10.7.19: WTD approval
2. Letter Ref. No.: IOCL/HVPNL/AF/63

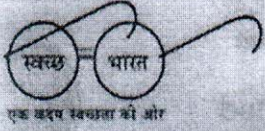
Respected Sir,

With reference to meeting held at the good office of Director(projects) and Director(Technical) on date: 21.03.2024, we are hereby providing the required details for carrying out the required analysis for accordance of the synchronization permission of our CPP with newly commissioned 220 KVB Grid.

The detailed technical attributes of our system is provided below:

S.N.	Technical Attributes	Remarks
1	Sanctioned Maximum demand capacity	70 MW (78 MVA)
2	Load Extension Proposal	288 MW (320 MVA) (under WTD approval)
2	Captive generation Level	33 KV level
3	In house Generation Capacity	462.5 MW
4	Total Operating Load of system	310 MW
5	Base operating condition of Generating Machines	5 GTs (30 MW) + 5 GTs (25 MW)
6	Connectivity of 220 KV with 33 KV generation level	4 Nos. of 220/33 KV; 50/65 MVA Trafos.
7	Continuous operating load	50 MW-70 MW
8	Ultimate load in case of multiple machine contingencies at IOCL end	260 MVA (restricted by transformer capacities.)
9	Load Shedding	Available.
10	Momentary load during contingencies before actuation of load shedding.	310 MW
10	Load post actuation of load shedding	Limited by transformer capacities.
11	Power export Conditions (if any)	No

पंजीकृत कार्यालय : जी-9, अली यावर जंग मार्ग, बान्द्रा (पूर्व), मुम्बई-400051, महाराष्ट्र (भारत)
Regd. Office : G-9, Ali Yavar Jung Marg, Bandra (East), Mumbai-400051, Maharashtra (India)
CIN - L 23201 MH 1959 GOI 011388



इंडियन ऑयल कॉर्पोरेशन लिमिटेड
पानीपत रिफाइनरी एवं पेट्रोकेमिकल कॉम्प्लेक्स
पानीपत, हरियाणा - 132140

Indian Oil Corporation Limited
Panipat Refinery & Petrochemical Complex
Panipat, Haryana - 132140

वेबसाइट : www.iocl.com; ई-मेल : panipatrefinery@indianoil.in
दूरभाष : 0180-2524001; फैक्स : 0180-2578833

इंडियन ऑ

रिफाइनरीज़ प्रभाग
Refineries Division

Additionally we are hereby enclosing the transient stability study carried out at our end for different severe faults as well as load throw off conditions.

With reference to above we would like to propose to your good office to kindly grant us the requisite approval for operating the grid with our captive generation in parallel at the earliest. We urgently need to synchronize our CPP with Grid order to stop additional STC in view of Net Zero directives by the Govt. of India within Mar'24.

Thanking you

Yours sincerely

Ravi Ranjan
Ravi Ranjan 22/03

Senior Maintenance Manager (Electrical)

- CC: a. Director(Projects)
b. Director(Technical)
c. Chief Engineer (SO & Commercial)
d. Chief Engineer (PDC)
e. Executive Engineer (System Study)

रवि रंजन
Ravi Ranjan
वरिष्ठ प्रबंधक अनुरक्षण (विद्युत)
Senior Manager Maintenance Elect
पानीपत रिफाइनरी (आई.ओ.सी.एल.)132
Panipat Refinery(I.O.C.L.)132

पंजीकृत कार्यालय: जी-9, अली यावर जंग मार्ग, बान्द्रा (पूर्व), मुम्बई-400051, महाराष्ट्र (भारत)
Regd. Office : G-9, Ali Yavar Jung Marg, Bandra (East), Mumbai-400051, Maharashtra (India)
CIN - L 23201 MH 1959 GOI 011388

Ammerome - D -



भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन-I प्रभाग
Power System Planning & Appraisal-I Division

सेवा में / To,

1. Member Secretary, NRPC, 18-A, Qutab Institutional Area, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110 016
2. COO (CTUIL), Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001
3. Director (System Operation), Grid- India, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi- 110010
4. Managing Director, Haryana Vidyut Prasaran Nigam Limited, Shakti Bhawan, Sector-6, Panchkula- 134109
5. Managing Director, Uttar Haryana Vitaran Nigam Limited, Panchkula- 134109
6. Chief General Manager, Indian Oil Corporation Limited, Panipat Refinery & Petrochemical Complex, Panipat, Haryana - 132140

विषय /Subject: Minutes of the meeting held on 03.06.2024 through video conferencing to discuss HVPNL's proposal regarding synchronization of IOCL's captive generation at Panipat refinery with the grid.

महोदय/ Sir,

Please find enclosed the minutes of the meeting held on 03.06.2024 through video conferencing to discuss HVPNL's proposal regarding synchronization of IOCL's captive generation at Panipat refinery with the grid.

भवदीय / Yours faithfully,

Kushwaha
13.06.2024

(कन्हैया सिंह कुशवाहा/ Kanhaiya Singh Kushwaha)

सहायक निदेशक/ Assistant Director

Minutes of the meeting held on 03.06.2024 through video conferencing to discuss HVPNL's proposal regarding synchronisation of IOCL's captive generation at Panipat refinery with the grid

List of participants is enclosed as Annexure-I.

Background:

- (i) HVPNL had granted connectivity for 78 MVA drawl to IOCL for their Panipat refinery load (viz Township, Project construction power, Ethanol-2G, Ethanol-3G loads) through Mundh (HVPNL) – IOCL-I 220 kV D/c line (already commissioned).
- (ii) In view of the expansions planned at Panipat refinery, IOCL submitted the proposal to HVPNL for revised connectivity of 320 MVA (288 MW) and intimated that out of 320 MVA load, 180 MVA load is expected by 2026-27 (50 MVA load already connected, 130 MVA additional load expected by 2026-27) and remaining 140 MVA load is expected to be connected beyond 2026-27. HVPNL forwarded IOCL's proposal to CEA for concurrence.
- (iii) CEA vide letter dated 08.02.2024 had concurred the proposal for revised IOCL load of 180 MVA with Mundh-IOCL-I 220 kV D/c line and for remaining load, additional connectivity of IOCL with 400/220 kV Munak substation of HVPNL was agreed through Munak- IOCL-I 220 kV D/c line in the first meeting of Standing Committee on Short Term & Perspective Power System Planning- Northern Region (SCSTPPSP-NR) held on 14.03.2024
- (iv) Subsequently, IOCL has submitted new proposal to HVPNL vide which they intimated that they have captive generation at Panipat refinery which is used to feed some load of Panipat refinery in islanded mode and they want to synchronize the captive generation with the grid. IOCL has also submitted the Transient Stability Study Report dated December, 2020.

Deliberations in the meeting:

- (i) IOCL gave a presentation regarding their proposal, summary of which is given below:
 - (a) At present, total generation capacity of IOCL's captive power plant (CPP) at Panipat refinery is 462.5 MW (5x30 MW GTs + 5x25 MW GTs + 3x25 MW STG +3x37.5 MW STG)
 - (b) Total load of Panipat refinery is 320 MW out of which 50 MW is being met from the grid (for which IOCL has taken connectivity of 70 MW/ 78 MVA) and remaining 270 MW load is being fed from CPP in islanded mode, for which IOCL needs to run 1 STG unit (25 MW) along with 10 GT units (275 MW). However, as STGs are inefficient and uneconomical, IOCL intends to stop the generation from STG unit and meet the commensurate load from the grid for which synchronization of CPP with the grid is proposed.
 - (c) IOCL has also envisaged additional load of 210 MW which is expected by September 2025. This load would be met from the grid supply. With this, the total demand of Panipat refinery would become 530 MW out of which 288 MW would be met from the grid and remaining through captive generation.
- (ii) HVPNL stated that IOCL has taken connectivity for drawl of 288 MW only, whereas, with the synchronization of captive generation unit and associated load with the grid, total connected load of IOCL would become 530 MW (320 MW+ 210 MW) by September 2025 and in case of tripping of IOCL's captive generation units, entire 530

- MW load would be drawn from grid only, which may overload the HVPNL's transmission network.
- (iii) Regarding the above apprehension of HVPNL, IOCL gave the following clarifications:
- (a) Simultaneous failure of all the 10 Nos. generation units is very unlikely. However, in case of tripping of generation units, commensurate load of IOCL would be shed off and ultimate drawl from the grid would be limited to 288 MW only for which load shedding scheme has been implemented at IOCL end.
 - (b) The load shedding scheme has the facility of keeping the system ready in pre-armed mode for tripping low priority excessive loads during any contingencies. This load shedding scheme is followed by under-frequency load shedding scheme as back-up.
 - (c) Protection scheme and islanding scheme have also been implemented at IOCL switchgears up to the 220 kV GIS level.
 - (d) For sustained operation of captive plant with the grid, a comprehensive system study have been carried out through M/s Tata Consultancy Engineering.
- (iv) Grid-India suggested for implementation of SPS for protection of grid against overloading during outage of multiple captive generating units of IOCL.
- (v) CTUIL and Grid-India stated that connectivity was granted to IOCL for 288 MW (320 MVA) with Mundh- IOCL-I 220 kV D/c line and Munak- IOCL-I 220 kV D/c line. However, as intimated by IOCL, additional load of IOCL is expected by September 2025 whereas Munak substation and associated lines may take at least 3-4 years for implementation. In the absence of Munak-IOCL-I 220 kV D/c line, Mundh-IOCL-I 220 kV D/c line and Jind (PG) - Mundh 220 kV D/c line may get overloaded and there would be requirement for reconductoring of the same with high capacity conductor.
- (vi) Chief Engineer (PSPA-I), CEA, opined that protection settings at IOCL end also needs to be reviewed and requested HVPNL to put forth the agenda for the same to protection committee of NRPC.
- (vii) After deliberations, IOCL's proposal regarding synchronization of IOCL's captive plant at Panipat refinery with the national grid was technically agreed subject to following:
- (a) IOCL's load to be met from grid would be 70 MW/ 78 MVA till September, 2025 and 288 MW/ 320 MVA beyond September, 2025.
 - (b) HVPNL to check the requirement of reconductoring of Mundh-IOCL-I 220 kV D/c line and Jind (PG) - Mundh 220 kV D/c lines and implement the same in the time frame of IOCL's additional load i.e. by September 2025.
 - (c) HVPNL to put up the agenda to protection committee of NRPC for deliberation on the protection settings and implementation of SPS.
 - (d) Implementation of Munak 400 kV S/s to be expedited by HVPNL.

Annexure I**List of participants:**

S.No.	Name (Ms/Shri)	Designation
CEA		
1	A. K. Rajput	Member (Power Systems)
2	Ishan Sharan	Chief Engineer
3	Kanhaiya Singh Kushwaha	Asst. Director
NRPC		
4	Dharmendra Kumar Meena	SE (Operation)
CTUIL		
5	Sandeep Kumawat	DGM
Grid - India		
6	Akash Tomar	Deputy Manager
HVPNL		
7	Sushil Kumar	SE, SLDC
8	Sanjay Verma	SE (Planning)
9	Rohtas Kaushik	SE (STU)
10	Anita Chaudhary	XEN AP-I
11	Akash Deep Sharma	XEN M&P
12	Munish Satija	XEN LPDC
13	Ashok Kumar Muthria	XEN Open Access
14	Deepak Sarit	XEN SS
15	Palak Sinha	AE SS
IOCL		
16	Mukul Aggrawal	CGM
17	Rajesh Shukla	DGM
18	Ravi Ranjan	Senior Maintenance Manager Electrical



HARYANA VIDYUT PARSARAN NIGAM LIMITED

Regd. Office: Shakti Bhawan, Sector-6, Panchkula
Corporate Identity Number: U40101HR1997SGC033683
Website: www.hvsn.org.in E-mail: sempccdk@hvsn.org.in
Tel No: 0171-2540014
Superintending Engineer/M&P-CC Circle
HVPNL, Dhulkote, (Ambala City-134007)



To

The Superintending Engineer/Planning
HVPNL, Panchkula

Memo No.: Ch- 135 /MPA/M-107A

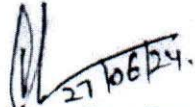
Dated:- 27.06.2024

Subject: Permission of operating the existing captive generation system of IOCL Panipat Refinery & Petrochemical Complex (PRPC) with 220kV Grid sourced from HVPNL Mundh in parallel in line with Net Zero Initiative of Govt. of India.

Please refer to your office Memo No. Ch-59/HSS-404 dated 07.06.2024 on the subject cited matter vide which it was requested to supply the agenda for placing in the Committee of NRPC meeting for deliberation on Protection settings and SPS System.

Enclosed please find herewith the agenda regarding Grid Sync Philosophy and Protection Scheme installed at IOCL PRPC end for your information and taking further necessary action please.

DA/As above


27/06/24.
Superintending Engineer
M&P-CC Circle, HVPNL,
Dhulkote

CC:

1. CE/PD&C, HVPNL, Panchkula for kind information please.
2. CE/TS, HVPNL, Panchkula for kind information please.
3. SE/TS, HVPNL, Karnal.
4. XEN /TS, HVPNL, Karnal.
5. XEN / M&P-CC Divn., HVPNL, Karnal
6. SPS to Director/ Technical, HVPNL, Panchkula for the kind information of Director / Technical, HVPNL, Panchkula please.
7. SPS to Director/ Projects, HVPNL, Panchkula for the kind information of Director / Projects, HVPNL, Panchkula please.
8. M/s. IOCL, Panipat.

Agenda for Grid Sync Philosophy and Protection Scheme installed at IOCL PRPC end.

The meeting was held between members from CEA, CTUIL, Grid India, NRPC, HVPNL and IOCL on 03.06.2024 related to synchronization of Grid with IOCL PRPC. As directed by CEA, the agenda was required to be submitted by HVPNL.

Accordingly, the meeting was called at the office of HVPNL TS division Karnal and detailed discussion was held related to the protection philosophy being followed. The agenda discussed is as follows:

Introduction:

The 220 KV Grid infrastructure from IOCL PRPC to HVPNL Mundh has been developed to cater the refinery expansion loads which has envisaged to be operated in parallel with the captive power plant. With commissioning of Grid, IOCL have shifted around 50 MW of less critical loads on Grid (viz Township, Project construction power, Ethanol-2G, Ethanol-3G loads) in islanded mode.

IOCL emphasized that it is required to synchronize the Grid with CPP of IOCL PRPC for operating additional load of process unit with Grid to maximize Grid power import upto the maximum demand capacity limit (78 MVA) and stopping uneconomical STG operation.

IOCL requested to consider the scenario of Grid synchronization in two phases:

- a. Phase-1:(upto commissioning of P-25 units)- Grid import of upto 70 MW only. Under this condition, IOCL requested to provide provisional approval for Grid synchronization.
- b. Phase-2: (Post P-25 commissioning)- Grid import shall be upto 288 MW, contract demand 320MVA as per the scheme discussed. The protection scheme at Grid end can be planned accordingly.

Protection and Operating Philosophy:

- a. IOCL team informed that for sustained operation of 220 KV Grid with IOCL PRPC CPP, the comprehensive system study have been carried out through M/s TCE (M/s Tata Consultancy Engineering).
- b. IOCL deliberated that the protection scheme and islanding scheme have been implemented at IOCL switchgears up to the 220 KV GIS level.
 - The protection schemes is already approved by HVPNL design wing. The following major minimum protection schemes have been considered:
 - i. Main-1 Numerical Distance Protection
 - ii. Main-2 Numerical Distance Protection
 - iii. Directional Back up O/C and E/F protection scheme
 - iv. Overload Alarm Scheme
 - v. Voltage protection scheme
 - vi. LBB protection scheme
 - The copy of the approval documents is attached as Annexure-1
 - The robust grid islanding protection scheme based on the system study carried out by our system consultant M/s TCE has been approved and attached as **Annxure-2**. Following major Grid islanding protection scheme is

being followed for effective islanding of grid from our end in case of any disturbances.

- i. **Directional Overcurrent plus Undervoltage:**
This protection is primarily defined for islanding of IOCL CPP from Grid in case direction of current is observed to be towards Grid with under voltage conditions indicating fault on Grid side.
 - ii. **Vector Jump Protection:**
This protection is primarily provided to detect out of phase closing of remote end breaker of the 220kV line.
 - iii. **Reverse Power plus Under-Frequency:**
For small systems like IOCL CPP, this setting is proposed to safely island in case of power flow in reverse direction towards Grid combined with under-frequency indicating overloading of Grid side.
 - iv. **Under-Frequency plus Df/Dt**
For small systems like IOCL CPP, this setting is proposed to safely island in case of under-frequency conditions combined with drastic rate of fall of frequency indicating loss of major prime movers on Grid side.
 - v. **Plain Under-Frequency:**
It is a plain under-frequency-based islanding protection.
 - vi. **Plain Over-Frequency:**
It is a plain over-frequency-based islanding protection.
 - vii. **Plain Under-Voltage**
It is a plain under-voltage-based islanding protection.
- **Protection Scheme for 220 KV GIS at IOCL PRPC:**
 - i. The switchboard is provided with instantaneous low impedance based redundant bus differential protection scheme for both buses in standard main and check zone configuration.
 - ii. The back-up over current and earth fault protection to bus differential and downstream feeders is also provided in all incomers and outgoing feeders.
 - iii. The 220 KV power transformers are also provided instantaneous unit based protections (transformer differential and REF for both primary and secondary winding.)
- c. **Grid Synchronization Philosophy:** The standard Grid synchronization with the incoming line source with the existing bus is being followed as is done in all synchronization philosophies. The standard synchronizing scheme with matching of voltage, frequency and phasor is being done using bright lamp and check synchronizing relay. The provision of guard relay for avoidance of beyond the sync window is also provided for guarding against prolonged close command or async close command. The standard sync trolley drawing is attached as Annexure-3
- d. **Load Shedding Scheme:** IOCL also emphasized that both contingencies based as well as under-frequency-based load shedding scheme has been implemented at IOCL end. Both are fully equipped to take care of Grid trip contingency as well as GT trip contingency.

The load shedding scheme has the facility of keeping the system ready in pre-armed mode for tripping low priority excessive loads during any contingencies. This load shedding scheme is followed by under-frequency load shedding scheme as back-up.

- e. Grid Power Evacuation Single Line Drawings: The grid synchronization as power evacuation SLD is being attached for deliberation and further discussion on the agenda point.

At 220KV Substation Mund :-


The 220KV Mund-IOCL D/C line was commissioned on 13.10.2023. The length of line 33.8KM and type of conductor is ACSR Moose(0.5Sq"). The current carrying capacity of conductor is 620Amp. 220KV Substation Mund is connected with 220KV Safidon D/C and 400KV Jind (PGCIL) D/C.

The protection schemes adopted by HVPNL is as under:-


- i. Main-1 Numerical Distance Protection (Make-ZIV)
- ii. Main-2 Numerical Distance Protection (Make-Micom442)
- iii. Directional Back up O/C and E/F protection scheme
- iv. LBB protection scheme

Submitted for kind consideration please.


Ravi Ranjan
SMNMEL
M/s IOCL


XEN TS Division
HVPNL, Karnal


XEN M&P cum CC Division
HVPNL, Karnal


SE/TS Circle, HVPNL, Karnal


SE/M&P cum CC Circle, HVPNL, Dhulkote

Protection SLD A1

RAVI, RANJAN (रवि, रंजन)

From: Naveen Chauhan [sdoconstpnp@gmail.com]
Sent: Wednesday, February 10, 2021 10:59 AM
To: RAVI, RANJAN (रवि, रंजन)
Subject: Fwd: Fwd: 220kV Switchyard IOCL Panipat Refinery.- Protection Single Line Diagram(SLD) drawings.
Attachments: Scan0380.pdf

EXTERNAL: External email. Do not click links or open attachments unless you recognize the sender and know the content is safe.

----- Forwarded message -----

From: Asstt Executive Engineer Const Panipat <aceconstpnp@hvpn.org.in>
Date: Wed, Feb 10, 2021, 10:52
Subject: Fwd: Fwd: 220kV Switchyard IOCL Panipat Refinery.- Protection Single Line Diagram(SLD) drawings
From: sdoconstpnp [sdoconstpnp@gmail.com]

----- Forwarded Message -----

From: Executive Engineer TS Panipat <xentspnp@hvpn.org.in>
To: Asstt Executive Engineer Const Panipat <aceconstpnp@hvpn.org.in>
Sent: Wed, 10 Feb 2021 09:32:52 +0530 (IST)
Subject: Fwd: 220kV Switchyard IOCL Panipat Refinery.- Protection Single Line Diagram(SLD) drawings.

From: "Executive Engineer Protection DESIGN" <xenpdesign@hvpn.org.in>
To: "Superintending Engineer TS Rohtak" <setsrtk@hvpn.org.in>
Cc: "Superintending Engineer Purchase" <sepurchase@hvpn.org.in>, "Executive Engineer TS Panipat" <xentspnp@hvpn.org.in>
Sent: Tuesday, February 9, 2021 12:07:46 PM
Subject: 220kV Switchyard IOCL Panipat Refinery.- Protection Single Line Diagram(SLD) drawings.

PEA



HARYANA VIDYUT PRASARAN NIGAM LIMITED
 REGD. OFFICE:- Shakti Bhawan, Sector-6, Panchkula
 Corporate Identity Number : U40101HR1997SGC033683
 Website : www.hvpng.org.in, E-mail: sedesign@hvpng.org.in
 Tel No.: 0172- 2583724 / 2583745, Fax No. 0172-2583724



SAVE ENERGY FOR THE BENEFIT OF SELF AND NATION

To
 The Superintending Engineer/TS Circle,
 HVPNL, Rohtak.

Memo No.: Ch-II / IR-680 / Prot.

Dated: 04.02.2021

Subject:- 220kV Switchyard IOCL Panipat Refinery.- Protection Single Line Diagram(SLD) drawings .

Please refer to your email dated 27.01.2021 vide which SLD drawings (TB-3-411-510-002 rev 4 sheet 1 to 8) were submitted for approval.

The SLD drawings (TB-3-411-510-002 rev 4 sheet 2) are approved subject to the following -

- i) Drawings/Relay should strictly meet with the requirement of HVPNL technical Specification.
- ii) Incorporation of comments & corrections made in red ink on drawing itself & attending of below mentioned observations :-
 1. The Distance Protection Scheme and Line Differential Protection Scheme as proposed (With Pilot Wire Protection preferably OPGW) shall be compatible to each other w.r.t. receiving end and sending end. Further, the sending end differential protection relay and communication between receiving end and sending end relays(both end) shall also to be provided by IOCL.
 2. As per technical specification of CR Panel with SAS cl 1.4.1, distance protection schemes on each 220 kV feeder C&R panel shall be of different make in view of fact that both the distance protection scheme (Main-I & Main-II) should have different measuring techniques.
 3. As per technical specification of CR Panel with SAS cl 5.14, the provision of single and three phase auto reclosing and check synchronizing, and dead line charging is also to be made. The auto reclosing scheme built with numerical distance protection relay is acceptable provided it is available in both main-I and main-II distance protection scheme. And meet HVPNL specification.
 4. The relay's shall meet all protection requirement and minimum protection to be provided as under-


Sr.No.	Description	Qty
1	Main-1 Numerical Distance protection Scheme	1 Set
2	Main-2 Numerical Distance protection Scheme	1 Set
3	Directional back up O/C and E/F protection scheme	1 Set
4	Overload alarm scheme	1 Set
5	3 phase Trip Relays	2 Nos
6	1 phase Trip Relays	6 Nos
7	Voltage selection scheme	1 set
8	Flag relays, carrier receive relays, aux Relays, timers etc as per scheme Requirements	Lot
9	Under Voltage relay for isolator/earth switch	2 Nos
10	LBB Protection Scheme	1 set
11	DC supply Supervision scheme	1 set
12	Trip Circuit supervision relays	6 Nos
13	Auto reclose scheme with check synchronising and dead line charging scheme	1 set
14	Bay control unit, Ethernet switch etc. as per technical specification enclosed as annex.1	1 Set

5. The core arrangement shall be done as under:
 - Core-1: Main-1 Distance
 - Core-2: Main II Distance.
 - Core-3: Bus Differential Main
 - Core-4: Bus Differential Check
 - Core-5: Measurement/Metering for BCU

- 6 Feeder overload alarm scheme is also to be provided. The feeder overload alarm relay in built with numerical distance protection relay or over current and earth fault protection relay is acceptable provided it meets HVPNL requirement.
7. The main protection relays provided should be as per relevant IS:3231/ IEC-61850 compliant with optical ports or other upto date relevant standards applicable in HVPNL.
8. Interlocking may be provided for isolators/ CB/ Earth Switches operation as per protection philosophy adopted in HVPNL.
- 9 The coordination and setting of relays shall be done in consultation with concerned M&P (Both for receiving end and sending end).
10. Burden of CTs, PTs & CVTs shall be strictly as per technical specification of equipments in HVPNL
- 11 The provision of window on fascia annunciators provided on C&R Panels shall be strictly as per technical specification of C&R Panels in HVPNL
- 12 SLD has been approved for Protection Point of view only for Line bay at IOCL end only.
- 13 Setting of all relays should be done in coordination of setting of relays at the HVPNL end
14. For metering purpose latest guidelines of HVPNL and UHBVNL for Interutility Metering be followed for & metering arrangement shall be strictly adhered as per approval of UHBVNL further the HVPNL specification of energy meter shall be strictly adhered.
15. The provision of indication of lamp i.e. ON, OFF, TRIP, Spring charge, Auto Trip & over load alarm shall be provided on C&R Panels.
- 16 Drawings of all the metering equipments will be approved separately.
17. Technical Parameters of equipments shall be strictly as per HVPNL Technical Specifications
18. All the CEA/ Haryana Grid Code Regulations amended upto date shall be strictly adhered by the firm and any equipment required to adhere those instructions at any point of time shall be provided by the firm.
- 19 Exchange of data/ information with HVPNL, necessary to maintain reliability and security of the grid will be ensured by IOCL and all relevant & mandatory equipments for communication of data/ information shall be provided & ensured by the IOCL.
- 20 Main and stand by data communication shall be provided with SLDC Panipat
- 21 All the electrical clearances shall be ensured by the firm as per Indian Electricity Rules/ Codes
- 22 All the terms & conditions as mentioned in the CE/Planning HVPNL, Panchkula memo no. R-1674/Ch-25/HAP-123 Dated 17.10.2019 and execution guidelines issued by Deputy Secretary/Operation, HVPNL, Panchkula vide memo no. Ch-17/DSO-214/L-154/L-2 dated 25.04.2012 shall be strictly adhered and complied with.
23. VT Fuse failure protection scheme shall be provided.
24. Wave trap shall be provided for communication and PLCC protection coupler (PLCC carrier trip) shall also be provided.
25. The final as built set of above approved SLD Drawings alongwith soft copy (CD) as per technical specification of HVPNL for reference and record to this office.

Further drawings of SLD for Transformer bay and bus coupler bay etc (drawing NoTB-3-411-510-002 rev 4 sheet 3 to 8) is not considered.

DA/Approved SLD for 220kV Line Bay


Superintending Engineer/ Design
for CE/ PD&C, HVPNL, Panchkula

Cc to:-

1. The Superintending Engineer/Purchase, HVPNL, Panchkula. (D/A as above)
2. The Executive Engineer/TS Divn. HVPNL, Panipat. (D/A as above)
3. Master file

A-2

3. df/dt and underfrequency setting

After the loss of grid when CPP generator continue to feed IOCL loads, the fall in frequency is observed to be at the rate of 0.8Hz/s through ETAP simulation. Therefore, the df/dt setting is done at 0.7Hz/s at 49.2Hz with a delay of 1sec.

4. Reverse power relay setting

Reverse power setting is set is set as below:

Stage 1: Reverse power threshold at 40MW (towards grid), UF threshold at 49.5 with a delay of 0.5sec

Stage 2: Reverse power threshold at 40MW (towards grid), UF threshold at 49.8Hz with delay of 5 sec.

As informed by IOCL officials, it is anticipated that 200MW of load is assumed to fall on IOCL generator in addition to IOCL in plant loads in case of sudden loss of grid at the substation falls on IOCL generators.

13 PROPOSED SETTINGS FOR ISLANDING RELAY

a) U/V + DOC scheme

U/V setting	:	40%
Time delay	:	0.0 sec (Instantaneous)
DOC	:	1000 A (Towards Grid)
Time delay	:	0.5 sec

b) Plain grid U/F Isolation scheme

U/F setting	:	49 Hz
Time delay	:	0.1 sec

c) df/dt + Under Frequency scheme

Under frequency	:	49.2 Hz
Rate of change of frequency	:	-0.7 Hz/sec
Time delay	:	1 sec

d) RP + UF scheme

Stage-1

Reverse power	:	40.0 MW
Time delay	:	0.5 sec
Under frequency	:	49.5 Hz



Indian Oil Corporation Limited



Stage-2

Reverse power	40.0 MW
Time delay	5.0 sec
Under frequency	49.8 Hz

e) Plain grid O/F isolation scheme

O/F setting	:	51.5 Hz
Time delay	:	1.0 sec

f) Plain grid U/V Isolation scheme

U/V setting	:	80%
Time delay	:	1.5 sec

g) Plain grid O/V Isolation scheme

O/V setting	:	115%
Time delay	:	0.5 sec

14 BASIS OF LOAD SHEDDING SCHEME

In addition to above load shedding scheme to isolate the grid disturbance, a robust load shedding scheme shall be implemented to maintain the load generation unbalance and ensuring the stability of CPP generators post islanding.

IOCL has shared the load priority table for PR and PNCP in line with the criticality of the process. As per the load priority table there are 16 load groups at PR and 17 load groups at PNCP, where first group is of least priority and last group has the highest priority.

It is observed that during normal operating condition 70MW was imported from the grid. Therefore, in case of grid underfrequency situation, if no loads are shed prior to the islanding (at 49Hz), the captive generators will experience a sudden jerk at the point of islanding due to additional 70MW of loads over and above the CPP generation capacity falling on the generators thus resulting in further fall in frequency.

Therefore, in case of loss of grid, to avoid jerk and further fall in frequency post islanding, it is recommended to shed the least priority load before the islanding occurs at different frequency stages before the system frequency reaches 49Hz. Suitable load shedding scheme to be initiated prior to grid islanding (in case of fall in frequency) in order to maintain the load near to generation capacity during the moment of islanding to avoid sudden jerk in CPP generator.

SIEMENS

MAIN-1_DIST_PROT_21_1_prn_14_40_33

SIMATIC

BHDLA-II_SS / 765kV / LINE WITH
REACTOR / LINE / BAY_713 / MAI...

19.07.24 14:40:33

BHDLA-II_SS / 765kV / LINE WITH REACTOR / LINE / BAY_713 / MAIN-1_DIST_PROT_21.1

MLFB: 7SA52216CB904QB4
 Parameter-set version: V04.73.03
 Device path: D:\Bhadla-II Relay Configuration\TATA PROJECTS & STATCOM-II\SIPROTEC_4
 \BHADLA-II\P7D\GV\SD\00000071
 Author:
 Creation date: 21.11.23 14:13:32
 Last modified: 19.07.24 14:40:12
 Operating mode: Offline
 Comment:
 Setting values in: Secondary value description

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1 Settings groups

1.1 Group Power System Data 2; Group Power System

Group Power System Data 2; Group Power System

No.	Settings	Value	Group
1103	Measurement: Full Scale Voltage (100%)	765.0 kV	A
1104	Measurement: Full Scale Current (100%)	3000 A	A
1105	Line Angle	87 °	A
1211	Angle of inclination, distance charact.	87 °	A
1107	P,Q operational measured values sign	not reversed	A
1110	x' - Line Reactance per length unit	0.1101 Ohm / km	A
1111	Line Length	202.2 km	A
1116	Zero seq. comp. factor RG/RL for Z1	2.00	A
1117	Zero seq. comp. factor XG/XL for Z1	0.87	A
1118	Zero seq. comp.factor RG/RL(> Z1)	2.00	A
1119	Zero seq. comp.factor XG/XL(> Z1)	0.87	A
1126	Mutual Parallel Line comp. ratio RM/RL	6.29	A
1127	Mutual Parallel Line comp. ratio XM/XL	0.88	A
1128	Neutral current RATIO Parallel Line Comp	85 %	A

1.2 Group Power System Data 2; Group Line Status

Group Power System Data 2; Group Line Status

No.	Settings	Value	Group
1130A	Pole Open Current Threshold	0.05 A	A
1131A	Pole Open Voltage Threshold	44 V	A
1132A	Seal-in Time after ALL closures	0.20 sec	A
1133A	minimal time for line open before SOTF	0.50 sec	A
1134	Recognition of Line Closures with	Current OR Voltage or Manual close BI	A
1135	RESET of Trip Command	Pickup Reset	A
1136	open pole detector	with measurement (V/I,trip, pickup, 52a	A
1140A	CT Saturation Threshold	6.0 A	A
1150A	Seal-in Time after MANUAL closures	0.20 sec	A
1151	Manual CLOSE COMMAND generation	NO	A
1152	MANUAL Closure Impulse after CONTROL	<none>	All

1.3 Group Power System Data 2; Group Trip 1-/3-pole

Group Power System Data 2; Group Trip 1-/3-pole

No.	Settings	Value	Group
1155	3 pole coupling	with Trip	A
1156A	Trip type with 2phase faults	3pole	A

1.4 Group 21 Distance protection, general settings; Group General

Group 21 Distance protection, general settings; Group General

No.	Settings	Value	Group
1201	21 Distance protection is	ON	A
1202	Phase Current threshold for dist. meas.	0.10 A	A
1211	Angle of inclination, distance charact.	87 °	A
1208	Series compensated line	NO	A
1215	Mutual coupling parall.line compensation	NO	A
1232	Instantaneous trip after SwitchOnToFault	with Zone Z1B	A
1241	R load, minimum Load Impedance (ph-g)	10.100 Ohm	A
1242	PHI load, maximum Load Angle (ph-g)	30 °	A
1243	R load, minimum Load Impedance (ph-ph)	30.300 Ohm	A
1244	PHI load, maximum Load Angle (ph-ph)	30 °	A
1317A	Single pole trip for faults in Z2	NO	A
1357	Z1B enabled before 1st AR (int. or ext.)	NO	A

1.5 Group 21 Distance protection, general settings; Group Ground faults

Group 21 Distance protection, general settings; Group Ground faults

No.	Settings	Value	Group
1203	3I0 threshold for neutral current pickup	0.10 A	A
1204	3V0 threshold zero seq. voltage pickup	5 V	A
1207A	3I0>-pickup-stabilisation (3I0>/ Iphmax)	0.15	A
1209A	Criterion of ground fault recognition	3I0> OR 3V0>	A
1221A	Loop selection with 2Ph-G faults	all loops	A

1.6 Group 21 Distance protection, general settings; Group Time Delays

Group 21 Distance protection, general settings; Group Time Delays

No.	Settings	Value	Group
1210	21 Condition for zone timer start	with zone pickup	A
1305	T1-1phase, delay for single phase faults	0.00 sec	A
1306	T1multi-ph, delay for multi phase faults	0.00 sec	A
1315	T2-1phase, delay for single phase faults	0.35 sec	A
1316	T2multi-ph, delay for multi phase faults	0.35 sec	A
1325	T3 delay	1.50 sec	A
1335	T4 delay	0.50 sec	A
1345	T5 delay	oo sec	A
1365	T6 delay	oo sec	A
1355	T1B-1phase, delay for single ph. faults	0.00 sec	A
1356	T1B-multi-ph, delay for multi ph. faults	0.00 sec	A

1.7 Group 21 Distance zones (quadrilateral); Group Zone Z1

Group 21 Distance zones (quadrilateral); Group Zone Z1

No.	Settings	Value	Group
1301	Operating mode Z1	Forward	A
1302	R(Z1), Resistance for ph-ph-faults	11.010 Ohm	A
1303	X(Z1), Reactance	17.810 Ohm	A
1304	RG(Z1), Resistance for ph-gnd faults	11.010 Ohm	A
1305	T1-1phase, delay for single phase faults	0.00 sec	A
1306	T1multi-ph, delay for multi phase faults	0.00 sec	A
1307	Zone Reduction Angle (load compensation)	5 °	A

1.8 Group 21 Distance zones (quadrilateral); Group Zone Z1B-exten.

Group 21 Distance zones (quadrilateral); Group Zone Z1B-exten.

No.	Settings	Value	Group
1351	Operating mode Z1B (overreach zone)	Forward	A
1352	R(Z1B), Resistance for ph-ph-faults	12.940 Ohm	A
1353	X(Z1B), Reactance	33.390 Ohm	A
1354	RG(Z1B), Resistance for ph-gnd faults	11.010 Ohm	A
1355	T1B-1phase, delay for single ph. faults	0.00 sec	A
1356	T1B-multi-ph, delay for multi ph. faults	0.00 sec	A
1357	Z1B enabled before 1st AR (int. or ext.)	NO	A

1.9 Group 21 Distance zones (quadrilateral); Group Zone Z2

Group 21 Distance zones (quadrilateral); Group Zone Z2

No.	Settings	Value	Group
1311	Operating mode Z2	Forward	A
1312	R(Z2), Resistance for ph-ph-faults	12.940 Ohm	A
1313	X(Z2), Reactance	33.390 Ohm	A
1314	RG(Z2), Resistance for ph-gnd faults	11.010 Ohm	A
1315	T2-1phase, delay for single phase faults	0.35 sec	A
1316	T2multi-ph, delay for multi phase faults	0.35 sec	A
1317A	Single pole trip for faults in Z2	NO	A

1.10 Group 21 Distance zones (quadrilateral); Group Zone Z3

Group 21 Distance zones (quadrilateral); Group Zone Z3

No.	Settings	Value	Group
1321	Operating mode Z3	Forward	A
1322	R(Z3), Resistance for ph-ph-faults	16.180 Ohm	A
1323	X(Z3), Reactance	53.430 Ohm	A
1324	RG(Z3), Resistance for ph-gnd faults	17.970 Ohm	A
1325	T3 delay	1.50 sec	A

1.11 Group 21 Distance zones (quadrilateral); Group Zone Z4

Group 21 Distance zones (quadrilateral); Group Zone Z4

No.	Settings	Value	Group
1331	Operating mode Z4	Reverse	A
1332	R(Z4), Resistance for ph-ph-faults	12.940 Ohm	A
1333	X(Z4), Reactance	2.230 Ohm	A
1334	RG(Z4), Resistance for ph-gnd faults	11.010 Ohm	A
1335	T4 delay	0.50 sec	A

1.12 Group 21 Distance zones (quadrilateral); Group Zone Z5

Group 21 Distance zones (quadrilateral); Group Zone Z5

No.	Settings	Value	Group
1341	Operating mode Z5	Non-Directional	A
1342	R(Z5), Resistance for ph-ph-faults	19.410 Ohm	A
1343	X(Z5)+, Reactance for Forward direction	64.120 Ohm	A
1344	RG(Z5), Resistance for ph-gnd faults	21.570 Ohm	A
1345	T5 delay	oo sec	A
1346	X(Z5)-, Reactance for Reverse direction	64.120 Ohm	A

1.13 Group 21 Distance zones (quadrilateral); Group Zone Z6

Group 21 Distance zones (quadrilateral); Group Zone Z6

No.	Settings	Value	Group
1361	Operating mode Z6	Inactive	A
1362	R(Z6), Resistance for ph-ph-faults	15.000 Ohm	A
1363	X(Z6)+, Reactance for Forward direction	15.000 Ohm	A
1364	RE(Z6), Resistance for ph-g faults	15.000 Ohm	A
1365	T6 delay	oo sec	A
1366	X(Z6)-, Reactance for Reverse direction	4.000 Ohm	A

1.14 Group 68 Power Swing detection

Group 68 Power Swing detection

No.	Settings	Value	Group
2002	Power Swing Operating mode	all zones blocked	A
2006	68T Power swing trip	NO	A

1.15 Group 85-21 Pilot Prot. for Distance prot.

Group 85-21 Pilot Prot. for Distance prot.

No.	Settings	Value	Group
2101	85-21 Pilot Prot. for Distance prot.	ON	A
2102	Type of Line	Three Terminals	A
2103A	Time for send signal prolongation	0.07 sec	A
2112A	DIS transient block by EF	YES	A
2113	Memorize receive signal	NO	A

1.16 Group DTT Direct Transfer Trip

Group DTT Direct Transfer Trip

No.	Settings	Value	Group
2201	Direct Transfer Trip (DTT)	OFF	A
2202	Trip Time Delay	0.01 sec	A

1.17 Group 50HS Instantaneous SOTF

Group 50HS Instantaneous SOTF

No.	Settings	Value	Group
2401	50HS Instantaneous SOTF-O/C is	ON	A
2404	50HS SOTF-O/C PICKUP	1.50 A	A

1.18 Group 50(N)/51(N) Backup OverCurrent; Group General

Group 50(N)/51(N) Backup OverCurrent; Group General

No.	Settings	Value	Group
2601	Operating mode	ON:only active with Loss of VT sec. cir.	A
2680	Trip time delay after SOTF	0.20 sec	A

1.19 Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-B1

Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-B1

No.	Settings	Value	Group
2610	50-B1 Pickup	oo A	A
2611	50-B1 Delay	oo sec	A
2612	50N-B1 Pickup	oo A	A
2613	50N-B1 Delay	oo sec	A
2614	Instantaneous trip via BI	NO	A
2615	Instantaneous trip after SwitchOnToFault	NO	A

1.20 Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-B2

Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-B2

No.	Settings	Value	Group
2620	50-B2 Pickup	oo A	A
2621	50-B2 Delay	oo sec	A
2622	50N-B2 Pickup	oo A	A
2623	50N-B2 Delay	oo sec	A
2624	Instantaneous trip via Pilot Prot./BI	NO	A
2625	Instantaneous trip after SwitchOnToFault	NO	A

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Group 50(N)/51(N) Backup OverCurrent; Group 51(N)-B

SIMATIC BHDLA-II_SS / 765kV / LINE WITH
REACTOR / LINE / BAY_713 / MAI...

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1.21 Group 50(N)/51(N) Backup OverCurrent; Group 51(N)-B

Group 50(N)/51(N) Backup OverCurrent; Group 51(N)-B

No.	Settings	Value	Group
2640	51-B Pickup	oo A	A
2642	51-B Time Dial	oo sec	A
2646	51-B Additional Time Delay	0.00 sec	A
2650	51N-B Pickup	oo A	A
2652	51N-B Time Dial	oo sec	A
2656	51N-B Additional Time Delay	0.00 sec	A
2660	IEC Curve	Normal Inverse	A
2670	Instantaneous trip via Pilot Prot./BI	NO	A
2671	Instantaneous trip after SwitchOnToFault	NO	A

1.22 Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-STUB

Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-STUB

No.	Settings	Value	Group
2630	50-STUB Pickup	1.50 A	A
2631	50-STUB Delay	0.05 sec	A
2632	50N-STUB Pickup	1.00 A	A
2633	50N-STUB Delay	0.05 sec	A
2634	Instantaneous trip via Pilot Prot./BI	NO	A
2635	Instantaneous trip after SwitchOnToFault	NO	A

1.23 Group Measurement Supervision; Group Balance / Summ.

Group Measurement Supervision; Group Balance / Summ.

No.	Settings	Value	Group
2901	Measurement Supervision	OFF	A
2902A	Voltage Threshold for Balance Monitoring	50 V	A
2903A	Balance Factor for Voltage Monitor	0.75	A
2904A	Current Threshold for Balance Monitoring	0.50 A	A
2905A	Balance Factor for Current Monitor	0.50	A
2906A	Summated Current Monitoring Threshold	0.10 A	A



Group Measurement Supervision; Group Balance / Summ.(2)

No.	Settings	Value	Group
2907A	Summated Current Monitoring Factor	0.10	A
2908A	T Balance Factor for Voltage Monitor	5 sec	A
2909A	T Current Balance Monitor	5 sec	A

1.24 Group Measurement Supervision; Group Meas.Volt.Fail

Group Measurement Supervision; Group Meas.Volt.Fail

No.	Settings	Value	Group
2910	Fuse Failure Monitor	ON	A
2911A	Minimum Voltage Threshold V>	40 V	A
2912A	Maximum Current Threshold I<	0.10 A	A
2913A	Maximum Voltage Threshold V< (3phase)	25 V	A
2914A	Differential Current Threshold (3phase)	0.10 A	A
2915	Voltage Failure Supervision	with current supervision	A
2916A	Delay Voltage Failure Supervision	3.00 sec	A

1.25 Group Measurement Supervision; Group VT mcb

Group Measurement Supervision; Group VT mcb

No.	Settings	Value	Group
2921	VT mcb operating time	0 ms	A

1.26 Group Measurement Supervision; Group Load Angle

Group Measurement Supervision; Group Load Angle

No.	Settings	Value	Group
2941	Limit setting PhiA	200 °	A
2942	Limit setting PhiB	340 °	A
2943	Minimum value I1>	0.05 A	A



Group Measurement Supervision; Group Load Angle(2)

No.	Settings	Value	Group
2944	Minimum value U1>	20 V	A

1.27 Group 50N/51N Ground OverCurrent; Group General

Group 50N/51N Ground OverCurrent; Group General

No.	Settings	Value	Group
3101	50N/51N Ground Overcurrent	ON	A
3102	Block 50N/51N for Distance protection	with every Pickup	A
3174	Block 50N/51N for Pickup 21	in zone Z1/Z1B	A
3103	Block 50N/51N for 1pole Dead time	YES	A
3104A	Stabilisation Slope with Iphase	10 %	A
3109	Single pole trip with ground ft.prot.	NO	A
3170	2nd harmonic ratio for inrush restraint	15 %	A
3171	Max.Current, overriding inrush restraint	7.50 A	A
3172	Instantaneous mode after SwitchOnToFault	with Pickup and direction	A
3173	Trip time delay after SOTF	0.00 sec	A

1.28 Group 50N/51N Ground OverCurrent; Group 50N-1

Group 50N/51N Ground OverCurrent; Group 50N-1

No.	Settings	Value	Group
3110	Operating mode	Inactive	A
3111	Pickup	0.50 A	A
3112	Time Delay	0.10 sec	A
3113	Instantaneous trip via Pilot Prot./BI	NO	A
3114	Instantaneous trip after SwitchOnToFault	NO	A
3115	Inrush Blocking	NO	A

1.29 Group 50N/51N Ground OverCurrent; Group 50N-2

Group 50N/51N Ground OverCurrent; Group 50N-2

No.	Settings	Value	Group
3120	Operating mode	Inactive	A
3121	Pickup	2.00 A	A
3122	Time Delay	0.60 sec	A
3123	Instantaneous trip via Pilot Prot./BI	NO	A
3124	Instantaneous trip after SwitchOnToFault	NO	A
3125	Inrush Blocking	NO	A

1.30 Group 50N/51N Ground OverCurrent; Group 50N-3

Group 50N/51N Ground OverCurrent; Group 50N-3

No.	Settings	Value	Group
3130	Operating mode	Inactive	A
3131	Pickup	1.00 A	A
3132	Time Delay	0.90 sec	A
3133	Instantaneous trip via Pilot Prot./BI	NO	A
3134	Instantaneous trip after SwitchOnToFault	NO	A
3135	Inrush Blocking	NO	A

1.31 Group 50N/51N Ground OverCurrent; Group 51N InverseTime

Group 50N/51N Ground OverCurrent; Group 51N InverseTime

No.	Settings	Value	Group
3140	Operating mode	Forward	A
3141	Pickup	0.10 A	A
3143	Time Dial	0.45 sec	A
3147	Additional Time Delay	0.00 sec	A
3148	Instantaneous trip via Pilot Prot./BI	NO	A
3149	Instantaneous trip after SwitchOnToFault	NO	A
3150	Inrush Blocking	NO	A
3151	IEC Curve	Normal Inverse	A

1.32 Group 50N/51N Ground OverCurrent; Group Direction

Group 50N/51N Ground OverCurrent; Group Direction

No.	Settings	Value	Group
3160	Polarization	with V2 and I2 (negative sequence)	A
3162A	ALPHA, lower angle for forward direction	338 °	A
3163A	BETA, upper angle for forward direction	122 °	A
3164	Min. zero seq.voltage 3Vo for polarizing	2.0 V	A
3166	Min. neg. seq. polarizing voltage 3V2	5.0 V	A
3167	Min. neg. seq. polarizing current 3I2	0.10 A	A
3168	Compensation angle PHI comp. for Sr	255 °	A
3169	Forward direction power threshold	0.3 VA	A
3186A	3V0 min for forward direction	0.0 V	A
3187A	Reactance X of series capacitor	0.000 Ohm	A

1.33 Group 27/59 Under/Over Voltage; Group 59 Vph-gnd

Group 27/59 Under/Over Voltage; Group 59 Vph-gnd

No.	Settings	Value	Group
3701	Operating mode Vph-g overvoltage prot.	ON	A
3702	59-1 Pickup Overvoltage (phase-ground)	69.2 V	A
3703	59-1 Time Delay	9.00 sec	A
3704	59-2 Pickup Overvoltage (phase-ground)	89.0 V	A
3705	59-2 Time Delay	0.10 sec	A
3709A	Reset ratio	0.99	A

1.34 Group 27/59 Under/Over Voltage; Group 59 Vph-ph

Group 27/59 Under/Over Voltage; Group 59 Vph-ph

No.	Settings	Value	Group
3711	Operating mode Vph-ph overvoltage prot.	OFF	A
3712	59-1 Pickup Overvoltage (phase-phase)	121.0 V	A
3713	59-1 Time Delay	2.00 sec	A

Group 27/59 Under/Over Voltage; Group 59 Vph-ph(2)

No.	Settings	Value	Group
3714	59-2 Pickup Overvoltage (phase-phase)	135.0 V	A
3715	59-2 Time Delay	1.00 sec	A
3719A	Reset ratio	0.98	A

1.35 Group 27/59 Under/Over Voltage; Group 59:3Vo or 59 Vx

Group 27/59 Under/Over Voltage; Group 59:3Vo or 59 Vx

No.	Settings	Value	Group
3721	Operating mode 3V0 (or Vx) overvoltage	OFF	A
3722	59G-1 Pickup 3V0 (or Vx) (zero seq.)	30.0 V	A
3723	59G-1 Time Delay	2.00 sec	A
3724	59G-2 Pickup 3V0 (or Vx) (zero seq.)	50.0 V	A
3725	59G-2 Time Delay	1.00 sec	A
3728A	59G: Stabilization 3Vo-Measurement	ON	A
3729A	Reset ratio	0.95	A

1.36 Group 27/59 Under/Over Voltage; Group 59 V1 (pos.seq)

Group 27/59 Under/Over Voltage; Group 59 V1 (pos.seq)

No.	Settings	Value	Group
3731	Operating mode V1 overvoltage prot.	OFF	A
3732	59-1 Pickup Overvoltage (pos. seq.)	150.0 V	A
3733	59-1 Time Delay	2.00 sec	A
3734	59-2 Pickup Overvoltage (pos. seq.)	175.0 V	A
3735	59-2 Time Delay	1.00 sec	A
3739A	Reset ratio	0.98	A

1.37 Group 27/59 Under/Over Voltage; Group 59 V2 (neg.seq)

Group 27/59 Under/Over Voltage; Group 59 V2 (neg.seq)

No.	Settings	Value	Group
3741	Operating mode V2 overvoltage prot.	OFF	A
3742	59-1 Pickup Overvoltage (neg. seq.)	30.0 V	A
3743	59-1 Time Delay	2.00 sec	A
3744	59-2 Pickup Overvoltage (neg. seq.)	50.0 V	A
3745	59-2 Time Delay	1.00 sec	A
3749A	Reset ratio	0.98	A

1.38 Group 27/59 Under/Over Voltage; Group 27 Vph-gnd

Group 27/59 Under/Over Voltage; Group 27 Vph-gnd

No.	Settings	Value	Group
3751	Operating mode Vph-g undervoltage prot.	OFF	A
3752	27-1 Pickup Undervoltage (phase-neutral)	30.0 V	A
3753	27-1 Time Delay	2.00 sec	A
3754	27-2 Pickup Undervoltage (phase-neutral)	10.0 V	A
3755	27-2 Time Delay	1.00 sec	A
3758	Current supervision (Vph-g)	ON	A
3759A	Reset ratio	1.05	A

1.39 Group 27/59 Under/Over Voltage; Group 27 Vph-ph

Group 27/59 Under/Over Voltage; Group 27 Vph-ph

No.	Settings	Value	Group
3761	Operating mode Vph-ph undervoltage prot.	OFF	A
3762	27-1 Pickup Undervoltage (phase-phase)	50.0 V	A
3763	27-1 Time Delay	2.00 sec	A
3764	27-2 Pickup Undervoltage (phase-phase)	17.0 V	A
3765	27-2 Time Delay	1.00 sec	A
3768	Current supervision (Vph-ph)	ON	A
3769A	Reset ratio	1.05	A

1.40 Group 27/59 Under/Over Voltage; Group 27 V1 (pos.seq)

Group 27/59 Under/Over Voltage; Group 27 V1 (pos.seq)

No.	Settings	Value	Group
3771	Operating mode V1 Undervoltage prot.	OFF	A
3772	27-1 Pickup Undervoltage (pos. seq.)	30.0 V	A
3773	27-1 Time Delay	2.00 sec	A
3774	27-2 Pickup Undervoltage (pos. seq.)	10.0 V	A
3775	27-2 Time Delay	1.00 sec	A
3778	Current supervision (V1)	ON	A
3779A	Reset ratio	1.05	A

1.41 Group Fault Locator; Group Fault Locator

Group Fault Locator; Group Fault Locator

No.	Settings	Value	Group
3802	Start fault locator with	TRIP	A
3805	Mutual coupling parall.line compensation	NO	A
3806	Load Compensation	YES	A