

**BORE LOG DATA SHEET** **BORE HOLE NO.80** Co-ordinates E=78 N=-113

Field Test	Nos	Samples	Nos	Commencement Date : 11/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 12/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 1.757 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE			SAMPLES	
		EACH DIVN. = 15cm			Ref. No	Depth (m)
0.00m. Medium dense, light whitish grey, clayey sandy silt. Observed conch pcs.					DS-1	0.50
		3	6	6	SPT-1	1.00-1.45
1.60m. Loose, light whitish grey, clayey sandy silt / clayey silty sand. Observed conch pcs.		1	2	3	*UDS-1	2.00-2.45
				5	SPT-2	2.50-2.95
		1	2	2	DS-2	3.50
				4	SPT-3	4.00-4.45
				>100		
5.50m. Very dense, light whitish grey, silty sand with decomposed rock.		00	10.0	cm Pentn.	*UDS-2	5.00-5.35
6.00m.		100	2.0	cm Pentn. Refusal	SPT-4	5.50-5.60
				Refusal	*SPT-5	5.80-5.82
					*SPT-6	6.00-6.02 6.00
6.75m. Highly weathered, light grey, coarse grained, fractured rock.				2.0 cm Pentn.	R1	CR=27%/RQD=0
7.50m. Highly weathered, light grey to whitish grey, coarse to medium grained, fractured rock.				NX rotary drilling from 6.00m to 20.00m	R2	CR=25% RQD=Nil
					R3	CR=27% RQD=Nil
					R4	CR=26% RQD=Nil
					R5	CR=27% RQD=Nil
					R6	CR=28% RQD=Nil
					R7	CR=26% RQD=Nil
					R8	CR=28% RQD=Nil
					R9	CR=29% RQD=Nil
					R10	CR=32% RQD=Nil
					R11	CR=38% RQD=Nil
					R12	CR=35% RQD=Nil
					R13	CR=34% RQD=Nil
					R14	CR=37% RQD=Nil
					R15	CR=38% RQD=Nil
					R16	CR=24% RQD=Nil
					R17	CR=23% RQD=Nil
					R18	CR=24% RQD=Nil
					R19	CR=25% RQD=Nil
17.25m. Highly weathered, light brownish grey / light yellowish grey, medium grained, fractured rock.						17.25
						18.00
						18.75
						19.50
20.00m. N.B. - '*' means sample could not be recovered / sample slip.						20.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 10/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO.81**

Co-ordinates E=189  
N=-125

Field Test	Nos	Samples	Nos	Commencement Date : 25/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 27/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 1.724 M.
		Water Sample (WS)	1	Water Struck At :
				Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.							
Medium dense, light grey, clayey sandy silt conch pcs.				16		DS-1	0.50
		6	7	9		SPT-1	1.00-1.45
1.60m.				3		UDS-1	2.00-2.45
Loose, light grey, clayey sandy silt with conch pcs		2	1	2		SPT-2	2.50-2.95
				4		WS-1	2.85
		2	2	2		DS-2	3.50
						SPT-3	4.00-4.45
5.00m.		100	7.0 cm	Pentn.	Refusal	SPT-4	5.00-5.07
Very dense, light grey, clayey sandy silt / silty sand with decomposed rock.		100	3.0 cm	Pentn.	Refusal	*SPT-5	5.30-5.33
5.50m.						*SPT-6	5.50-5.52
Highly weathered, light grey, coarse grained, fractured rock.		100				R1	5.50-5.52 5.50
			2.0 cm	Pentn.			CR=26%/RQD=0
						R2	CR=28% RQD=Nil
7.00m.							6.25
Highly weathered, light grey, coarse grained, fractured rock.						R3	CR=25% RQD=Nil
							7.00
7.75m.						R4	CR=27% RQD=Nil
							7.75
						R5	CR=30% RQD=Nil
							8.50
						R6	CR=31% RQD=Nil
							9.25
						R7	CR=27% RQD=Nil
							10.00
						R8	CR=29% RQD=Nil
							10.75
10.75m.						R9	CR=28% RQD=Nil
Highly weathered, light whitish grey to light yellowish brown, medium grained, fractured rock.							11.50
						R10	CR=22% RQD=Nil
							12.25
						R11	CR=21% RQD=Nil
							13.00
						R12	CR=21% RQD=Nil
							13.75
						R13	CR=22% RQD=Nil
							14.50
						R14	CR=23% RQD=Nil
							15.25
						R15	CR=22% RQD=Nil
							16.00
						R16	CR=24% RQD=Nil
							16.75
						R17	CR=26% RQD=Nil
							17.50
						R18	CR=25% RQD=Nil
							18.25
						R19	CR=24% RQD=Nil
							19.00
18.25m.							19.75
Highly weathered, light whitish grey to light bluish grey, medium grained, fractured rock.							20.10m.

BH-81/Sheet-1

**BORE LOG DATA SHEET** **BORE HOLE NO.82** Co-ordinates E=137 N=-135

Field Test	Nos	Samples	Nos	Commencement Date : 14/04/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	2	Completion Date : 14/04/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.831 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m. Loose, light whitish grey, clayey sandy silt. Observed conch pcs.					8	DS-1	0.50
1.70m. Loose, light whitish grey, clayey silty sand / clayey sandy silt. Observed conch.		3	4	4	5	SPT-1	1.00-1.45
4.00m. Very dense, light grey, silty sand with decomposed rock.		12	33	65	>100	*UDS-1	2.00-2.45
4.80m. Highly weathered, light grey, coarse grained, fractured rock.		100	5.0 cm Penetr.	3.0 cm Penetr. Refusal	Refusal	SPT-2	2.50-2.95
7.75m. Highly weathered, light grey, coarse grained, fractured rock.		100	2.0 cm Penetr.	NX rotary drilling from 4.80m to 20.00m		*UDS-2	3.50-3.95
9.25m. Highly weathered, light brownish grey, coarse grained, fractured rock.						SPT-3	4.00-4.35
10.00m. Highly weathered, light brownish grey to grey, coarse to medium grained, fractured rock.						*SPT-4	4.60-4.63
11.50m. Highly weathered, light brownish grey to grey, coarse to medium grained, fractured rock.						*SPT-5	4.80-4.82
12.25m. Highly weathered, light brownish grey to grey, coarse to medium grained, fractured rock.						R1	4.80-4.82 4.80 CR=23%/RQD=0
13.75m. Highly weathered, light brownish grey to grey, coarse to medium grained, fractured rock.						R2	5.50 CR=28% RQD=Nil
14.50m. Highly weathered, light brownish grey to grey, coarse to medium grained, fractured rock.						R3	6.25 CR=22% RQD=Nil
20.00m. N.B. - '*' means sample could not be recovered / sample slip.						R4	7.00 CR=24% RQD=Nil
						R5	7.75 CR=34% RQD=Nil
						R6	8.50 CR=28% RQD=Nil
						R7	9.25 CR=24% RQD=Nil
						R8	10.00 CR=29% RQD=Nil
						R9	10.75 CR=28% RQD=Nil
						R10	11.50 CR=22% RQD=Nil
						R11	12.25 CR=33% RQD=Nil
						R12	13.00 CR=28% RQD=Nil
						R13	13.75 CR=23% RQD=Nil
						R14	14.50 CR=36% RQD=16%
						R15	15.25 CR=27% RQD=Nil
						R16	16.00 CR=33% RQD=Nil
						R17	16.75 CR=26% RQD=Nil
						R18	17.50 CR=29% RQD=Nil
						R19	18.25 CR=33% RQD=Nil
						R20	19.00 CR=28% RQD=Nil

**BORE LOG DATA SHEET**

**BORE HOLE NO.83**

Co-ordinates E=-119 N=-164

Field Test	Nos	Samples	Nos	Commencement Date : 09/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 10/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 1.686 M.
		Water Sample (WS)	1	Water Struck At :
				Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES		
		EACH DIVN. = 15cm				Ref. No	Depth (m)	
0.00m.								
Medium dense, light whitish grey, clayey silt with sand mixture. Observed conch.				12		DS-1	0.50	
		3	6	6		SPT-1	1.00-1.45	
1.45m.								
Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.				4		UDS-1	2.05-2.50	
2.50m.		1	2	2		SPT-2	2.50-2.95	
Loose, light whitish grey, clayey silt with sand mixture & conch.				4		WS-1	2.80	
		2	2	2		DS-2	3.50	
4.60m.		100	5.0 cm	Pentn.	Refusal	SPT-4	4.60-4.65	
Very dense, light whitish grey, silty sand with decomposed rock. Observed conch.		100	2.0 cm	Pentn.	Refusal	*SPT-5	4.80-4.82	
5.00m.		100			Refusal	*SPT-6	5.00-5.02	
		2.0 cm		Pentn.		R1	CR=24% RQD=Nil	
		NX rotary drilling from 5.00m to 15.00m					R2	CR=27% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.							5.75	
							6.50	
							7.25	
							7.75	
8.00m.							8.00	
Highly weathered, light grey, coarse to medium grained, fractured rock.							8.75	
							9.50	
9.50m.							10.25	
Highly weathered, light whitish grey, medium grained, fractured rock.							11.00	
							11.75	
							12.50	
10.25m.							13.25	
Highly weathered, light whitish grey to light brownish grey, medium grained, fractured rock.							14.00	
							15.00	

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.84** Co-ordinates E=-155 N=-210

Field Test	Nos	Samples	Nos	Commencement Date : 10/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 11/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 1.680 M.
		Water Sample (WS)	1	Water Struck At :
				Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
0.00m. Medium dense, light whitish grey, silty sand. Observed conch pcs.							DS-1	0.50
1.45m.		3	6	7	13		SPT-1	1.00-1.45
Very loose, light whitish grey, clayey silt with sand mixture.		1	2	2	4		*UDS-1	2.00-2.45
		2	2	2	4		SPT-2	2.50-2.95
		2	2	2	4		WS-1	2.85
4.80m. Very dense, light whitish grey, silty sand with decomposed rock.		100	8.0	cm	Pentn. >100		SPT-4	4.80-4.88
5.25m.		100	2.0	cm	Pentn. Refusal		*SPT-5	5.00-5.02
		100			Refusal		*SPT-6	5.25-5.27
Highly weathered, light grey, coarse to medium grained, fractured rock.							R1	5.25-5.27 CR=28% RQD=Nil
							R2	6.00 CR=29% RQD=Nil
							R3	6.75 CR=28% RQD=Nil
7.50m. Highly weathered, light grey, coarse to medium grained, fractured rock.							R4	7.50 CR=24% RQD=Nil
8.25m. Highly weathered, light grey, coarse to medium grained, fractured rock.							R5	8.25 CR=27% RQD=Nil
							R6	9.00 CR=28% RQD=Nil
9.75m. Highly weathered, light grey, coarse to medium grained, fractured rock.							R7	9.75 CR=25% RQD=Nil
10.50m. Highly weathered, light grey, coarse to medium grained, fractured rock.							R8	10.50 CR=29% RQD=Nil
							R9	11.25 CR=26% RQD=Nil
							R10	12.00 CR=28% RQD=Nil
							R11	12.75 CR=29% RQD=Nil
							R12	13.50 CR=28% RQD=Nil
							R13	14.25 CR=30% RQD=Nil
15.00m. N.B. - '*' means sample could not be recovered / sample slip.								15.00

**BORE LOG DATA SHEET** **BORE HOLE NO.85** Co-ordinates E=-135 N=-235

Field Test	Nos	Samples	Nos	Commencement Date : 27/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 28/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.637 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE						SAMPLES	
		EACH DIVN. = 15cm						Ref. No	Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar.								DS-1	0.50
1.50m.		4	6	8	14			SPT-1	1.00-1.45
Loose, brownish grey, silty sand. Observed kankar & conch pcs.		1	2	2	4			*UDS-1	2.00-2.45
3.95m.								SPT-2	2.50-2.95
Medium dense, brownish grey, silty sand. Observed kankar & conch pcs.		6	9	13	22			*UDS-2	3.50-3.95
4.90m.								SPT-3	4.00-4.45
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		40	60	10.0	cm Pentn. >100			SPT-4	4.90-5.15
5.30m.		100	3.0	cm Pentn.	Refusal			*SPT-5	5.20-5.23
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		00	3.0	cm Pentn.	NX rotary drilling from 5.30m to 15.00m			*SPT-6	5.30-5.33
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.								R1	5.30-5.33 CR=22% RQD=Nil
Highly weathered, light grey, medium to fine grained, highly fractured rock.								R2	6.00 CR=28% RQD=Nil
								R3	6.75 CR=26% RQD=Nil
								R4	7.50 CR=30% RQD=Nil
								R5	8.25 CR=31% RQD=Nil
								R6	9.00 CR=33% RQD=Nil
								R7	9.75 CR=26% RQD=Nil
								R8	10.50 CR=28% RQD=Nil
								R9	11.25 CR=26% RQD=Nil
								R10	12.00 CR=30% RQD=Nil
								R11	12.75 CR=33% RQD=Nil
								R12	13.50 CR=35% RQD=Nil
								R13	14.25 CR=38% RQD=Nil
15.00m.									15.00

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.86** Co-ordinates E=137 N=-203

Field Test	Nos	Samples	Nos	Commencement Date : 26/04/2018
Penetrometer (SPT)	7	Undisturbed (UDS)	2	Completion Date : 27/04/2018
Cone (Pc)		Penetrometer (SPT)	7	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.749 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 3.10 m.

DESCRIPTION	SYMBOL	N-VALUE			SAMPLES	
		EACH DIVN. = 15cm			Ref. No	Depth (m)
0.00m. Medium dense, brownish grey to light grey, sandy silt to silty sand. Observed kankar & conch pcs.				18	DS-1	0.50
1.50m.		9	11	7	SPT-1	1.00-1.45
Very loose, light grey, silty sand. Observed conch pcs., kankar & clay binder.				2	*UDS-1	2.00-2.45
3.90m.		1	1	1	SPT-2	2.50-2.95
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.				>100	UDS-2	3.50-3.95
5.00m.		14	26	60	SPT-3	4.05-4.45
Highly weathered, deep to light grey, coarse to medium grained, fractured rock.				10.0 cm Pentn.	*SPT-4	4.80-4.83
8.00m.		100	3.0	cm Pentn. Refusal	*SPT-5	5.00-5.02 5.00
Completely/highly weathered, deep to light grey, coarse to medium grained, fractured rock.				Refusal	R1	CR=28%/RQD=0
9.50m.		100	2.0	cm Pentn.	R2	CR=31% RQD=Nil
Highly weathered, light grey, medium to coarse grained, fractured rock.				NX rotary drilling from 5.00m to 20.00m	R3	CR=27% RQD=Nil
11.00m.					R4	CR=32% RQD=Nil
Highly weathered, light grey, medium to coarse grained, fractured rock.					R5	CR=25% RQD=Nil
12.50m.					R6	CR=19%/RQD=0
Highly weathered, light grey, medium to coarse grained, fractured rock.					*SPT-6	9.50-9.52 9.50
14.00m.		50	2.0	cm Pentn.	R7	CR=27%/RQD=0
Highly weathered, light grey, medium to coarse grained, fractured rock.					R8	CR=27% RQD=Nil
16.25m.					R9	CR=25% RQD=Nil
Highly weathered, light grey, medium to coarse grained, fractured rock.					R10	CR=19%/RQD=0
17.00m.		50	2.0	cm Pentn.	*SPT-7	12.50-12.52 12.50
Highly weathered, light grey, medium to coarse grained, fractured rock.					R11	CR=25%/RQD=0
18.50m.					R12	CR=27% RQD=Nil
Highly weathered, light grey, medium to coarse grained, fractured rock.					R13	CR=23% RQD=Nil
20.00m.					R14	CR=25% RQD=Nil
Highly weathered, light grey, medium to coarse grained, fractured rock.					R15	CR=21% RQD=Nil
					R16	CR=27% RQD=Nil
					R17	CR=23% RQD=Nil
					R18	CR=24% RQD=Nil
					R19	CR=27% RQD=Nil
					R20	CR=28% RQD=Nil

N.B. - \* means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.87** Co-ordinates E=137 N=-274

Field Test	Nos	Samples	Nos	Commencement Date : 29/04/2018
Penetrometer (SPT)	7	Undisturbed (UDS)	2	Completion Date : 29/04/2018
Cone (Pc)		Penetrometer (SPT)	7	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.386 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 3.00 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m. Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.						DS-1	0.50
2.00m. Loose to medium dense, light grey, silty sand. Observed conch pcs., kankar & clay binder.		6	9	11	20	SPT-1	1.00-1.45
4.60m. Very dense, light grey, silty sand with conch pcs. Observed kankar & decomposed rock.		2	2	3	5	*UDS-1	2.00-2.45
		5	4	8	12	SPT-2	2.55-3.00
		100	5.0 cm	Pentn.	Refusal	SPT-3	3.50-3.95
		100	2.0 cm	Pentn.	Refusal	SPT-4	4.00-4.45
		100				*SPT-5	4.70-4.75
						*SPT-6	4.90-4.92
						R1	5.00-5.02 5.00
							CR=23% RQD=Nil
						R2	5.75
							CR=21% RQD=Nil
						R3	6.50
							CR=23% RQD=Nil
						R4	7.25
							CR=21% RQD=Nil
						R5	8.00
							CR=29% RQD=Nil
						R6	8.75
							CR=25% RQD=Nil
						R7	9.50
							CR=32% RQD=Nil
						R8	10.25
							CR=21% RQD=Nil
						R9	11.00
							CR=35% RQD=Nil
						R10	11.75
							CR=23% RQD=Nil
						R11	12.50
							CR=27% RQD=Nil
						R12	13.25
							CR=16% RQD=Nil
						*SPT-7	14.00
						R13	14.00
							CR=22% RQD=Nil
							15.00

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.88** Co-ordinates E = 67 N = -275

Field Test	Nos	Samples	Nos	Commencement Date : 29/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 29/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 1.533 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m. Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.					14	DS-1	0.50
		5	7	7		SPT-1	1.00-1.45
2.00m. Loose, light grey, clayey sandy silt. Observed conch pcs.					3	*UDS-1	2.00-2.45
		2	1	2		SPT-2	2.50-2.95
					4	DS-2	3.50
4.60m. Very dense, light grey, silty sand with decomposed rock.						SPT-3	4.00-4.45
5.00m.		100	7.0 cm	Pentn.	Refusal	SPT-4	4.60-4.67
		100	3.0 cm	Pentn.	Refusal	*SPT-5	4.80-4.83
					Refusal	*SPT-6	5.00-5.02
5.75m. Highly weathered, light grey, coarse grained, fractured rock.						R1	CR=27%/RQD=0
						R2	CR=25% RQD=Nil
						R3	CR=22% RQD=Nil
						R4	CR=23% RQD=Nil
						R5	CR=22% RQD=Nil
						R6	CR=22% RQD=Nil
						R7	CR=28% RQD=Nil
						R8	CR=29% RQD=Nil
						R9	CR=30% RQD=Nil
						R10	CR=32% RQD=Nil
						R11	CR=33% RQD=Nil
						R12	CR=37% RQD=Nil
						R13	CR=37% RQD=Nil
						R14	CR=39% RQD=Nil
						R15	CR=27% RQD=Nil
						R16	CR=26% RQD=Nil
						R17	CR=29% RQD=Nil
						R18	CR=30% RQD=Nil
						R19	CR=26% RQD=Nil
						R20	CR=28% RQD=Nil
20.00m. Highly weathered, light yellowish grey to light grey, medium grained, fractured rock.							

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.89** Co-ordinates E=-533 N=-289

Field Test	Nos	Samples	Nos	Commencement Date : 12/03/2018
Penetrometer (SPT)	11	Undisturbed (UDS)	2	Completion Date : 13/03/2018
Cone (Pc)		Penetrometer (SPT)	11	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 0.466 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.35 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.							
Soft, light grey, clayey silt with sand mixture. Observed conch.	[Grid Symbol]	1	1	1	2	DS-1	0.55
						SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
2.50m.	[Vertical Line Symbol]	5	6	6	12	SPT-2	2.60-3.05
						*UDS-2	3.50-3.95
		4	6	7	13	SPT-3	4.10-4.55
4.80m.	[Vertical Line Symbol]	37	73	>100		SPT-4	4.90-5.13
		100	3.0 cm	Pentn. Refusal		*SPT-5	5.20-5.23
		100	3.0 cm	Refusal		*SPT-6	5.30-5.32
5.30m.	[Horizontal Line Symbol]	00	2.0 cm	Pentn.		R1	CR=22% RQD=Nil
						R2	CR=21% RQD=Nil
						R3	CR=23% RQD=18%
7.50m.	[Horizontal Line Symbol]					R4	CR=29% RQD=Nil
						R5	CR=28% RQD=Nil
						R6	CR=21% RQD=Nil
9.00m.	[Horizontal Line Symbol]					R7	CR=25% RQD=Nil
						R8	CR=14% RQD=Nil
		50			Refusal	*SPT-7	11.25-11.27 11.25
Completely to highly weathered, light grey, fine grained, highly fractured rock.	[Horizontal Line Symbol]	2.0 cm			Pentn.	R9	CR=12% RQD=Nil
		51			Refusal	*SPT-8	12.00-12.02 12.00
		2.0 cm			Pentn.	R10	CR=Nil RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.	[Horizontal Line Symbol]	53			Refusal	DS-2	RQD=Nil
		3.0 cm			Pentn.	*SPT-9	12.75-12.78 12.75
		50			Refusal	R11	CR=14% RQD=Nil
15.00m.	[Horizontal Line Symbol]	3.0 cm			Pentn.	*SPT-10	13.50-13.53 13.50
		51			Refusal	R12	CR=18% RQD=Nil
		2.0 cm			Pentn.	*SPT-11	14.25-14.27 14.25
					R13	CR=21% RQD=Nil	

**BORE LOG DATA SHEET** **BORE HOLE NO.90** Co-ordinates E=133 N=-357

Field Test	Nos	Samples	Nos	Commencement Date : 29/04/2018
Penetrometer (SPT)	7	Undisturbed (UDS)	2	Completion Date : 30/04/2018
Cone (Pc)		Penetrometer (SPT)	7	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.194 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
0.00m. Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.							DS-1	0.50
2.00m.		6	9	10	19		SPT-1	1.00-1.45
Loose to medium dense, brownish grey, clayey silty sand. Observed kankar & conch pcs.		2	2	3	5		*UDS-1	2.00-2.45
							SPT-2	2.55-3.00
4.80m.		7	10	10	20		*UDS-2	3.50-3.95
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		35	65	5.0 cm Pentn.	>100		SPT-3	4.00-4.45
5.20m.		100	4.0 cm Pentn.	Refusal			SPT-4	4.80-5.00
		100	3.0 cm Pentn.	Refusal			*SPT-5	5.10-5.14
							*SPT-6	5.20-5.23 5.20
Completely to highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		52			Refusal		R1	CR=18%/RQD=0
		2.0 cm Pentn.					*SPT-7	6.00-6.02 6.00
							R2	CR=22%/RQD=0
7.50m.							R3	CR=24% RQD=Nil
							R4	CR=26% RQD=Nil
							R5	CR=30% RQD=Nil
							R6	CR=32% RQD=16%
							R7	CR=30% RQD=Nil
							R8	CR=33% RQD=Nil
							R9	CR=29% RQD=Nil
							R10	CR=36% RQD=Nil
							R11	CR=30% RQD=Nil
							R12	CR=32% RQD=Nil
							R13	CR=26% RQD=Nil
15.00m.							R14	CR=29% RQD=Nil
Highly weathered, brownish grey, medium grained, highly fractured rock.							R15	CR=24% RQD=Nil
15.75m.							R16	CR=38% RQD=16%
Highly weathered, brownish grey to light grey, medium to fine grained, highly fractured rock.							R17	CR=40% RQD=25%
							R18	CR=28% RQD=Nil
							R19	CR=36% RQD=Nil
							R20	CR=34% RQD=Nil
Highly weathered, brownish grey to light grey, medium to fine grained, highly fractured rock.								18.00
								18.75
								19.50
N.B. - '*' means sample could not be recovered / sample slip.								20.00

**BORE LOG DATA SHEET** **BORE HOLE NO.91** Co-ordinates E=137 N=-414

Field Test	Nos	Samples	Nos	Commencement Date : 02/05/2018
Penetrometer (SPT)	7	Undisturbed (UDS)	1	Completion Date : 03/05/2018
Cone (Pc)		Penetrometer (SPT)	7	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.287 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.40 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.						DS-1	0.50
Soft to medium, light grey, clayey silt with sand mixture.		2	2	2	4	SPT-1	1.00-1.45
2.00m.						*UDS-1	2.00-2.45
Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		3	8	9	17	SPT-2	2.55-3.00
3.60m.		45	55	5.0	cm Pentn. >100	SPT-3	3.60-3.80
Very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.		100	4.0	cm Pentn. Refusal		*SPT-4	3.90-3.94
		100	3.0	cm Pentn. Refusal		*SPT-5	4.00-4.03 4.00
4.00m.		50	3.0	cm Pentn. Refusal		R1	CR=17%/RQD=0
						*SPT-6	4.75-4.78 4.75
Completely to highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.		52				R2	CR=12%/RQD=0
						*SPT-7	5.50-5.52 5.50
7.00m.						R3	CR=22%/RQD=0
						R4	CR=24% RQD=Nil
Completely to highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.						R5	CR=26% RQD=Nil
						R6	CR=29% RQD=Nil
9.25m.						R7	CR=26% RQD=Nil
						R8	CR=22% RQD=Nil
10.00m.						R9	CR=28% RQD=Nil
						R10	CR=31% RQD=Nil
13.00m.						R11	CR=27% RQD=Nil
						R12	CR=28% RQD=Nil
Highly weathered, light to deep grey, medium to fine grained, highly fractured rock.						R13	CR=33% RQD=Nil
						R14	CR=35% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.						R15	CR=30% RQD=Nil
						R16	CR=36% RQD=Nil
20.00m.						R17	CR=27% RQD=Nil
						R18	CR=26% RQD=Nil
						R19	CR=22% RQD=Nil
						R20	CR=38% RQD=Nil
						R21	CR=30% RQD=Nil

**BORE LOG DATA SHEET** **BORE HOLE NO.92** Co-ordinates E = 78 N = -448

Field Test	Nos	Samples	Nos	Commencement Date : 30/04/2018
Penetrometer (SPT)	4	Undisturbed (UDS)	1	Completion Date : 02/05/2018
Cone (Pc)		Penetrometer (SPT)	4	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.281 M.
		Water Sample (WS)	1	Water Struck At :
				Standing Water Level : 1.40 m.

DESCRIPTION	SYMBOL	N-VALUE			SAMPLES	
		EACH DIVN. = 15cm			Ref. No	Depth (m)
0.00m.						
Loose, light whitish grey, clayey sandy silt. Observed conch pcs.		2	2	1	3	DS-1 0.50
						SPT-1 1.00-1.45
						WS-1 1.40
2.50m.		40	65		>100	*UDS-1 2.00-2.45
						SPT-2 2.50-2.80
4.10m.		100	3.0 cm		Pentn. Refusal	*SPT-3 3.50-3.53
Highly weathered, light grey, coarse to medium grained, fractured rock.		100	2.0 cm		Pentn. Refusal	*SPT-4 4.10-4.12
						R1 CR=29%/RQD=0 4.10
						R2 CR=30%/RQD=0 4.50
						R3 CR=27%/RQD=0 5.00
						R4 CR=29%/RQD=0 5.50
						R5 CR=27% RQD=Nil 6.00
						R6 CR=26% RQD=Nil 6.75
						R7 CR=28% RQD=Nil 7.50
						R8 CR=27% RQD=Nil 8.25
						R9 CR=26% RQD=Nil 9.00
						R10 CR=28% RQD=Nil 9.75
						R11 CR=32% RQD=Nil 10.50
						R12 CR=35% RQD=Nil 11.25
						R13 CR=37% RQD=Nil 12.00
11.25m.						R14 CR=35% RQD=Nil 12.75
						R15 CR=32% RQD=Nil 13.50
						R16 CR=32% RQD=Nil 14.25
						R17 CR=34% RQD=Nil 15.00
						R18 CR=35% RQD=Nil 15.75
						R19 CR=37% RQD=Nil 16.50
						R20 CR=35% RQD=Nil 17.25
						R21 CR=32% RQD=Nil 18.00
						R22 CR=35% RQD=Nil 18.75
						R23 CR=37% RQD=Nil 19.50
20.10m.						



Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.92** Co-ordinates E = 78 N = -448

Field Test	Nos	Samples	Nos	Commencement Date : 30/04/2018
Penetrometer (SPT)	4	Undisturbed (UDS)	1	Completion Date : 02/05/2018
Cone (Pc)		Penetrometer (SPT)	4	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.281 M.
		Water Sample (WS)	1	Water Struck At :
				Standing Water Level : 1.4 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES							
		EACH DIVN. = 15cm				Ref. No	Depth (m)						
Highly weathered, light whitish grey, medium grained, fractured rock.						R24	20.25						
						R25	21.00						
						R26	21.75						
						R27	22.50						
						R28	23.25						
						R29	24.00						
						R30	24.75						
						R31	25.50						
						R32	26.25						
						R33	27.00						
						R34	27.75						
						R35	28.50						
						Highly to moderately weathered, light yellowish grey, medium to fine grained, light fractured rock.						R36	29.25
												R37	30.00
												R38	30.75
R39	31.50												
R40	32.25												
R41	33.00												
R42	33.75												
R43	34.50												
R44	35.25												
R45	36.00												
Slightly weathered, light yellowish grey, medium to fine grained, light fractured rock.						R46	36.75						
						R47	37.50						
						R48	38.25						
						R49	39.00						
							40.00						

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 10/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO.93**

Co-ordinates E=196  
N=-448

Field Test	Nos	Samples	Nos	Commencement Date :	03/05/2018
Penetrometer (SPT)	4	Undisturbed (UDS)	1	Completion Date :	03/05/2018
Cone (Pc)		Penetrometer (SPT)	4	Bore Hole Diameter :	150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground :	-0.153 M.
		Water Sample (WS)	0	Water Struck At :	
				Standing Water Level :	1.50 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m							
Soft, light grey, clayey silt with sand mixture.		1	2	1		DS-1	0.50
					3	SPT-1	1.00-1.45
					>100		
2.50m		60	42			*UDS-1	2.00-2.45
Very dense, light whitish grey, silty sand with decomposed rock.		50	100	2.0 cm Pentn.		SPT-2	2.50-2.70
				Refusal		*SPT-3	2.80-2.82
3.00m				Refusal		*SPT-4	3.00-3.02
		100				R1	CR=29%/RQD=0
		2.0 cm Pentn.				R2	CR=27%
						R3	RQD=Nil
						R4	CR=28%
						R5	RQD=Nil
						R6	CR=30%
						R7	RQD=Nil
						R8	CR=28%
						R9	RQD=Nil
						R10	CR=29%
						R11	RQD=Nil
						R12	CR=32%
						R13	RQD=Nil
						R14	CR=33%
						R15	RQD=Nil
						R16	CR=30%
						R17	RQD=Nil
						R18	CR=32%
						R19	RQD=Nil
						R20	CR=29%
						R21	RQD=Nil
						R22	CR=32%
						R23	RQD=Nil
							CR=37%
							RQD=Nil
							20.00

N.B. - '\*' means sample could not be recovered / sample slip.



**BORE LOG DATA SHEET** **BORE HOLE NO.94** Co-ordinates E=687 N=-396

Field Test	Nos	Samples	Nos	Commencement Date : 03/03/2018
Penetrometer (SPT)	10	Undisturbed (UDS)	2	Completion Date : 05/03/2018
Cone (Pc)		Penetrometer (SPT)	10	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.098 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.10 m.

DESCRIPTION	SYMBOL	N-VALUE			SAMPLES		
		EACH DIVN. = 15cm			Ref. No	Depth (m)	
0.00m.							
Medium, light grey, clayey silt with sand mixture. Observed conch pcs.		4	4	2	6	DS-1 0.50 SPT-1 1.00-1.45	
2.30m.		0	1	1	2	*UDS-1 2.00-2.45 SPT-2 2.50-2.95	
Very loose, light grey, clayey silty sand. Observed kankar, conch pcs.							
3.80m.		00			>100	*UDS-2 3.50-3.95	
Very dense, light grey, sandy silt / silty sand.		14.0 cm			Pentr.	SPT-3 4.00-4.14	
4.50m.		100			2.0 cm Pentn. Refusal	*SPT-4 4.30-4.32	
Highly weathered, light grey to whitish grey, coarse to fine grained, fractured rock.		00			Refusal	*SPT-5 4.50-4.52 4.50	
5.25m.		2.0 cm			Pentr.	R1 CR=26% RQD=16%	
		NX rotary drilling from 4.50m to 15.00m					5.25
						R2 CR=22% RQD=14%	6.00
						R3 CR=14% RQD=Nil	6.75
		50			Refusal	*SPT-6 6.75-6.77 6.75	
		2.0 cm			Pentr.	R4 CR=14% RQD=Nil	7.50
		50			Refusal	*SPT-7 7.50-7.52 7.50	
		2.0 cm			Pentr.	R5 CR=18% RQD=14%	8.25
		50			Refusal	*SPT-8 8.25-8.27 8.25	
		2.0 cm			Pentr.	R6 CR=22% RQD=Nil	9.00
Completely to highly weathered, light grey to whitish grey, coarse to fine grained, fractured rock.						R7 CR=20% RQD=Nil	9.75
						R8 CR=13% RQD=Nil	10.50
		50			Refusal	*SPT-9 10.50-10.52 10.50	
		2.0 cm			Pentr.	R9 CR=14% RQD=Nil	11.25
		50			Refusal	*SPT-10 11.25-11.27 11.25	
		2.0 cm			Pentr.	R10 CR=25% RQD=Nil	12.00
						R11 CR=21% RQD=Nil	12.75
						R12 CR=22% RQD=Nil	13.50
						R13 CR=23% RQD=Nil	14.25
14.25m.						R14 CR=32% RQD=19%	15.00
Highly weathered, light grey, fine grained, fractured rock.							
15.00m.							

N.B. - \* means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.95** Co-ordinates E=-473 N=-809

Field Test	Nos	Samples	Nos	Commencement Date : 14/03/2018
Penetrometer (SPT)	8	Undisturbed (UDS)	1	Completion Date : 15/03/2018
Cone (Pc)		Penetrometer (SPT)	8	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.670 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.10 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.							
Medium dense, light grey, silty sand. Observed kankar & conch.				12		DS-1 0.50	
		3	5	7		SPT-1 1.00-1.45	
2.55m.				39		*UDS-1 2.00-2.45	
Dense, light grey, silty sand. Observed kankar & conch.		14	18	21		SPT-2 2.55-3.00	
3.00m.		32	68	100	10.0 cm Pentn. >100	SPT-3 3.10-3.35	
Very dense, light grey, silty sand with rock pcs.		100	3.0 cm Pentn.	Refusal	Refusal	*SPT-4 3.45-3.48	
3.55m.		00	2.0 cm Pentn.	Refusal	Refusal	*SPT-5 3.55-3.57	3.55
Highly weathered, light grey, medium grained, highly fractured rock.						R1 CR=25% RQD=Nil	4.25
4.25m.					NX rotary drilling from 3.55m to 15.00m	R2 CR=36% RQD=Nil	5.00
						R3 CR=37% RQD=Nil	5.75
Highly weathered, light brownish grey to light grey, medium to fine grained, fractured rock.						R4 CR=39% RQD=24%	6.50
						R5 CR=36% RQD=Nil	7.25
8.00m.						R6 CR=40% RQD=Nil	8.00
Highly weathered, light brownish grey to light grey, medium to fine grained, fractured rock.						R7 CR=22% RQD=Nil	8.75
						R8 CR=26% RQD=Nil	9.50
9.50m.						R9 CR=21% RQD=Nil	10.25
						R10 CR=17% RQD=Nil	11.00
Completely to highly weathered, whitish grey, coarse grained, highly fractured rock.		51			Refusal	*SPT-6 11.00-11.02	11.75
		2.0 cm Pentn.				R11 CR=25% RQD=Nil	12.50
						R12 CR=16% RQD=Nil	13.25
		50			Refusal	*SPT-7 12.50-12.53	14.00
		3.0 cm Pentn.				R13 CR=22% RQD=Nil	14.75
						R14 CR=18% RQD=Nil	15.50
14.00m.		52			Refusal	*SPT-8 14.00-14.02	16.25
Highly weathered, light grey, fine grained, highly fractured rock.		2.0 cm Pentn.				R15 CR=27% RQD=Nil	17.00
N.B. - '*' means sample could not be recovered / sample slip.							15.00

**BORE LOG DATA SHEET** **BORE HOLE NO.96** Co-ordinates E=705 N=-881

Field Test	Nos	Samples	Nos	Commencement Date : 05/03/2018
Penetrometer (SPT)	9	Undisturbed (UDS)	1	Completion Date : 06/03/2018
Cone (Pc)		Penetrometer (SPT)	9	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.761 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.65 m.

DESCRIPTION	SYMBOL	N-VALUE			SAMPLES	
		EACH DIVN. = 15cm			Ref. No	Depth (m)
0.00m.						
Medium dense, light grey, silty sand. Observed conch pcs.		5	7	10	17	DS-1 0.50
2.70m.						
Very loose, light grey, silty sand. Observed kankar, conch pcs.		0	1	1	2	SPT-1 1.00-1.45
3.60m.						
Very dense, light grey, silty sand with decomposed rock. Observed conch pcs.		100			>100	*UDS-1 2.00-2.45
4.50m.						
Completely weathered, light to deep grey, coarse grained, fractured rock.		50			Refusal	SPT-3 4.00-4.14
6.00m.						
Highly weathered, light to deep grey, coarse grained, fractured rock.		50			Refusal	*SPT-4 4.35-4.37
7.50m.						
Completely to highly weathered, light grey, coarse to medium grained, fractured rock.		50			Refusal	*SPT-5 4.50-4.52 4.50
10.50m.						
Highly to moderately weathered, light grey, medium grained, fractured rock.		50			Refusal	R1 CR=14% RQD=Nil
12.75m.						
Completely/highly weathered, whitish grey, coarse to fine grained, fractured rock.		50			Refusal	*SPT-6 5.25-5.27 5.25
N.B. - '*' means sample could not be recovered / sample slip.		50			Refusal	R2 CR=13% RQD=Nil
15.00m.						
		50			Refusal	*SPT-7 6.00-6.03 6.00
		50			Refusal	R3 CR=38% RQD=25%
		50			Refusal	R4 CR=41% RQD=22%
		50			Refusal	R5 CR=22% RQD=Nil
		50			Refusal	R6 CR=26% RQD=Nil
		50			Refusal	R7 CR=18% RQD=Nil
		50			Refusal	*SPT-8 9.75-9.77 9.75
		50			Refusal	R8 CR=22% RQD=Nil
		50			Refusal	R9 CR=30% RQD=Nil
		50			Refusal	R10 CR=46% RQD=Nil
		50			Refusal	R11 CR=45% RQD=Nil
		50			Refusal	R12 CR=21% RQD=Nil
		50			Refusal	R13 CR=28% RQD=Nil
		50			Refusal	R14 CR=14% RQD=Nil
		50			Refusal	*SPT-9 5.00-15.02 15.00

**BORE LOG DATA SHEET** **BORE HOLE NO.97** Co-ordinates E=-260 N=-1148

Field Test	Nos	Samples	Nos	Commencement Date : 15/03/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 17/03/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.221 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.56 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m. Loose, light grey, silty sand. Observed kankar, conch pcs. & clay binder.						DS-1	0.50
		2	2	3	5	SPT-1	1.00-1.45
2.45m. Very loose, light grey, silty sand. (Observed kankar, conch pcs. & clay binder.)						UDS-1	2.00-2.45
		1	2	2	4	SPT-2	2.50-2.95
3.00m. Very dense, light grey, silty sand		100	9.0	cm	Pentn. >100	SPT-3	3.10-3.19
3.50m. with conch pcs. & decomposed rock		100	3.0	cm	Pentn. Refusal	*SPT-4	3.30-3.33
		00			Refusal	*SPT-5	3.50-3.523.50
4.25m. Completely weathered, light grey, coarse grained, fractured rock.					2.0 cm Pentn.	R1	CR=20% RQD=Nil
					NX rotary drilling from 3.50m to 15.00m	R2	CR=30% RQD=Nil
7.25m. Highly weathered, deep to light grey, fine to coarse grained, fractured rock.						R3	CR=32% RQD=Nil
						R4	CR=28% RQD=Nil
						R5	CR=29% RQD=Nil
						R6	CR=25% RQD=Nil
						R7	CR=24% RQD=Nil
						R8	CR=24% RQD=Nil
13.25m. Completely to highly weathered, light to whitish grey, medium to coarse grained, moderately to highly fractured rock.					Refusal	R9	CR=18% RQD=Nil
		50			2.0 cm Pentn.	*SPT-6	0.25-10.27 10.25
						R10	CR=22% RQD=Nil
						R11	CR=24% RQD=Nil
						R12	CR=33% RQD=16%
						R13	CR=25% RQD=Nil
						R14	CR=29% RQD=Nil
15.00m. Highly weathered, light grey, medium grained, fractured rock. N.B. - '*' means sample could not be recovered / sample slip.						R15	CR=36% RQD=Nil

**BORE LOG DATA SHEET** **BORE HOLE NO.98** Co-ordinates E=112 N=-1560

Field Test	Nos	Samples	Nos	Commencement Date : 14/03/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	2	Completion Date : 15/03/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.379 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.6 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES		
		EACH DIVN. = 15cm				Ref. No	Depth (m)	
0.00m.								
Very loose, light grey, sandy silt / silty sand. Observed kankar, conch pcs., gravel & clay binder.						DS-1	0.50	
		2	1	1	2	SPT-1	1.00-1.45	
						UDS-1	2.00-2.45	
		1	1	3	4	SPT-2	2.50-2.95	
3.40m.						*UDS-2	3.50-3.58	
Very dense, light grey, silty sand. Observed kankar, conch pcs. & decomposed rock.		00			>100	SPT-3	3.90-3.99	
		9.0 cm			Pentr.	*SPT-4	4.20-4.22	
		100	2.0 cm		Pentr. Refusal	*SPT-5	4.50-4.52 4.50	
					Refusal	R1	CR=24% RQD=Nil	
4.50m.							5.25	
Completely to highly weathered, light grey, coarse grained, fractured rock.							R2	CR=20% RQD=Nil
							R3	CR=21% RQD=Nil
							R4	CR=28% RQD=Nil
6.75m.		Highly weathered, light to deep grey, medium to coarse grained, fractured rock.					R5	CR=28% RQD=Nil
							R6	CR=29% RQD=Nil
							R7	CR=33% RQD=Nil
							R8	CR=26% RQD=Nil
							R9	CR=32% RQD=Nil
							R10	CR=22% RQD=Nil
							R11	CR=28% RQD=Nil
							R12	CR=25% RQD=Nil
9.00m.		Highly weathered, whitish grey to light grey, medium to coarse grained, fractured rock.					R13	CR=28% RQD=Nil
							R14	CR=25% RQD=Nil
11.25m.	Highly weathered, whitish grey to light grey, medium to coarse grained, fractured rock.						12.00	
							12.75	
							13.50	
	N.B. - '*' means sample could not be recovered / sample slip.						14.25	
15.00m.							15.00	

**BORE LOG DATA SHEET** **BORE HOLE NO.99** Co-ordinates E=914 N=-1357

Field Test	Nos	Samples	Nos	Commencement Date : 06/03/2018
Penetrometer (SPT)	8	Undisturbed (UDS)	2	Completion Date : 07/03/2018
Cone (Pc)		Penetrometer (SPT)	8	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.543 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.53 m.

DESCRIPTION	SYMBOL	N-VALUE			SAMPLES	
		EACH DIVN. = 15cm			Ref. No	Depth (m)
0.00m Loose, light grey, silty sand. Observed conch pcs., kankar & clay binder.				10	DS-1	0.50
		3	4	6	SPT-1	1.00-1.45
2.40m Very loose, light grey, silty sand. Observed kankar.				3	UDS-1	2.00-2.45
		0	1	2	SPT-2	2.50-2.95
				5	*UDS-2	3.50-3.95
		1	2	3	SPT-3	4.00-4.45
4.70m Very dense, brownish grey to light grey, silty sand with mica. Observed gravel & decomposed rock.				>100	SPT-4	5.00-5.12
		00		12.0 cm Pentn.	*SPT-5	5.30-5.32
		100		2.0 cm Pentn. Refusal	*SPT-6	5.50-5.53
5.50m		00		3.0 cm Pentn. Refusal	R1	5.50
				NX rotary drilling from 5.50m to 15.00m	R2	6.25
					R3	7.00
					R4	7.75
					R5	8.50
					R6	9.25
					R7	10.00
					R8	10.75
					R9	11.50
					R10	12.25
12.25m Completely to highly weathered, whitish grey to brownish grey, medium grained, lightly fractured rock.				Refusal	*SPT-7	13.00
		50		3.0 cm Pentn.	R11	13.00
				Refusal	*SPT-8	13.75
13.75m Moderately weathered, whitish grey to light grey, medium grained, moderately fractured rock.		50		2.0 cm Pentn.	R12	13.75
					R13	14.50
N.B. - '*' means sample could not be recovered / sample slip.						15.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 15/03/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO.100**

Co-ordinates E=748  
N=-1746

Field Test	Nos	Samples	Nos	Commencement Date : 07/03/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	2	Completion Date : 08/03/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.073 m.
		Water Sample (WS)	1	Water Struck At :
				Standing Water Level : 1.92 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m. Loose, light grey, silty sand. Observed mica, clay binder & brownish spots.					8	DS-1	0.50
		6	5	3		SPT-1	1.00-1.45
						WS-1	1.92
					2	UDS-1	2.00-2.45
2.50m. Very loose, light grey, silty sand. Observed clay binder with high % of conch pcs. & gravel.		0	0	2		SPT-2	2.50-2.95
					1	*UDS-2	3.50-3.95
		0	0	1		SPT-3	4.05-4.50
4.70m. Very dense, light grey, silty sand with conch pcs. & decomposed rock.		00			>100	SPT-4	4.70-4.84
5.00m.		00			14.0 cm Pentn. Refusal	*SPT-5	5.00-5.03 5.00
					3.0 cm Pentn.	R1	CR=24% RQD=14% 5.45
					NX rotary drilling from 5.00m to 15.00m	R2	RQD=13% 6.20
						R3	CR=24% RQD=Nil 6.95
						R4	CR=28% RQD=Nil 7.70
						R5	CR=20% RQD=Nil 8.45
8.45m.						R6	CR=29% RQD=17% 9.20
						R7	CR=28% RQD=16% 9.95
						R8	CR=33% RQD=Nil 10.70
						R9	CR=38% RQD=Nil 11.45
						R10	CR=39% RQD=Nil 12.20
						R11	CR=32% RQD=13% 12.95
						R12	CR=42% RQD=Nil 13.70
						R13	CR=25% RQD=Nil 14.45
						R14	CR=27% RQD=Nil 15.00

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.101** Co-ordinates E=-106 N=333

Field Test	Nos	Samples	Nos	Commencement Date : 17/04/2018
Penetrometer (SPT)	10	Undisturbed (UDS)	2	Completion Date : 20/04/2018
Cone (Pc)		Penetrometer (SPT)	10	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	5	Level Of Ground : 2.003 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES		
		EACH DIVN. = 15cm					Ref. No	Depth (m)	
0.00m. Medium dense, light grey, silty sand. Observed kankar.							10	DS-1 SPT-1	0.50 1.00-1.45
1.50m. Loose to medium dense, brownish grey, silty sand with kankar & conch pcs. Observed clay binder.		6	5	5			5	*UDS-1 SPT-2 *UDS-2	2.00-2.45 2.50-2.95 3.00-3.45
5.00m. Very dense, light grey, silty sand with kankar & conch pcs. Observed 5.60m. decomposed rock.		7	10	10			20	SPT-3	4.00-4.45
5.00m. Very dense, light grey, silty sand with kankar & conch pcs. Observed 5.60m. decomposed rock.		5	35	50	5.0 cm Pentn.	>100	100	SPT-4 *SPT-5 *SPT-6	5.00-5.34 5.50-5.53 5.60-5.63 5.60
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.					3.0 cm Pentn.			R1 R2 R3 R4	CR=22%/RQD=0 CR=26% RQD=Nil CR=22% RQD=Nil CR=24% RQD=Nil
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.								R5 R6 R7 R8 R9	CR=26% RQD=Nil CR=28% RQD=Nil CR=26% RQD=Nil CR=28% RQD=Nil CR=29% RQD=Nil
Highly weathered, brownish grey to deep grey, medium to fine grained, highly fractured rock.								R10 R11 R12	CR=26% RQD=Nil CR=28% RQD=Nil CR=24% RQD=Nil
Highly weathered, brownish grey to deep grey, medium to fine grained, highly fractured rock.								R13 R14 R15 R16	CR=22% RQD=Nil CR=25% RQD=Nil CR=27% RQD=Nil CR=24% RQD=Nil
Highly to moderately weathered, brownish grey to deep grey, medium to fine grained, highly fractured rock.								R17 R18 R19	CR=28% RQD=Nil CR=26% RQD=Nil CR=29% RQD=Nil

3.0 cm Pentn. Refusal  
NX rotary drilling from 5.60m to 40.00m

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 04/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.101** Co-ordinates E=-106 N=333

Field Test	Nos	Samples	Nos	Commencement Date : 17/04/2018
Penetrometer (SPT)	10	Undisturbed (UDS)	2	Completion Date : 20/04/2018
Cone (Pc)		Penetrometer (SPT)	10	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	5	Level Of Ground : 2.003 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE			SAMPLES	
		EACH DIVN. = 15cm			Ref. No	Depth (m)
Highly to moderately weathered, brownish grey to deep grey, medium to fine grained, highly fractured rock.					R20	CR=30% RQD=Nil 20.50
					R21	CR=28% RQD=Nil 21.25
					R22	CR=31% RQD=Nil 22.00
					R23	CR=36% RQD=Nil 22.75
					R24	CR=28% RQD=Nil 23.50
					R25	CR=31% RQD=17% 24.25
					R26	CR=38% RQD=16% 25.00
					R27	CR=38% RQD=17% 25.75
					R28	CR=40% RQD=Nil 26.50
					R29	CR=42% RQD=13% 27.25
Completely weathered, brownish grey, medium grained, fully decomposed & disintegrated rock particles collected as sludge sample.					R30/DS-2	CR=0/RQD=0 28.00
					SPT-7	28.00-28.25
					R31/DS-3	CR=0/RQD=0 28.75
					SPT-8	28.75-28.95
					R32/DS-4	CR=0/RQD=0 29.50
Highly to moderately weathered, light to brownish grey, medium to fine grained, highly fractured rock.					SPT-9	29.50-29.85
					R33/DS-5	CR=0/RQD=0 30.25
					*SPT-10	30.25-30.29
					R34	CR=38%/RQD=0 31.00
					R35	CR=37% RQD=Nil 31.75
					R36	CR=35% RQD=Nil 32.50
N.B. - '*' means sample could not be recovered / sample slip.					R37	CR=40% RQD=Nil 33.25
					R38	CR=34% RQD=Nil 34.00
					R39	CR=40% RQD=Nil 34.75
					R40	CR=33% RQD=Nil 35.50
					R41	CR=40% RQD=Nil 36.25
					R42	CR=33% RQD=Nil 37.00
					R43	CR=40% RQD=Nil 37.75
					R44	CR=38% RQD=13% 38.50
					R45	CR=36% RQD=Nil 39.25
					R46	CR=45% RQD=Nil 40.00

**BORE LOG DATA SHEET** **BORE HOLE NO.102** Co-ordinates E=-119 N=311

Field Test	Nos	Samples	Nos	Commencement Date : 13/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 16/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 2.017 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE			SAMPLES		
		EACH DIVN. = 15cm			Ref. No	Depth (m)	
0.00m. Medium dense, light grey, silty sand. Observed kankar.					11	DS-1 SPT-1	0.50 1.00-1.45
2.00m. Very soft, light grey, clayey silt with sand mixture.					6	*UDS-1 SPT-2	2.00-2.45 2.55-3.00
3.95m. Medium dense, brownish grey, silty sand with kankar & conch. Observed clay binder.					22	UDS-2 SPT-3	3.50-3.95 4.00-4.45
4.50m. Dense to very dense, light grey, silty sand with mica, kankar & conch. Observed decomposed rock.					32	SPT-4	5.00-5.45
5.70m. Highly weathered, brownish grey, medium grained, highly fractured rock.					Refusal	*SPT-5 *SPT-6	5.60-5.64 5.70-5.73 5.70
6.50m. Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.					Refusal	R1	CR=31%/RQD=0 6.50
8.00m. Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.					Refusal	R2	CR=25% RQD=Nil 7.25
8.75m. Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.					Refusal	R3	CR=24% RQD=Nil 8.00
9.50m. Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.					Refusal	R4	CR=26% RQD=Nil 8.75
11.75m. Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.					Refusal	R5	CR=34% RQD=Nil 9.50
14.00m. Highly weathered, light grey, medium to fine grained, highly fractured rock.					Refusal	R6	CR=25% RQD=Nil 10.25
					Refusal	R7	CR=29% RQD=Nil 11.00
					Refusal	R8	CR=24% RQD=Nil 11.75
					Refusal	R9	CR=26% RQD=Nil 12.50
					Refusal	R10	CR=33% RQD=Nil 13.25
					Refusal	R11	CR=29% RQD=Nil 14.00
					Refusal	R12	CR=38% RQD=Nil 14.75
					Refusal	R13	CR=31% RQD=Nil 15.50
					Refusal	R14	CR=40% RQD=Nil 16.25
					Refusal	R15	CR=37% RQD=Nil 17.00
					Refusal	R16	CR=33% RQD=Nil 17.75
					Refusal	R17	CR=31% RQD=Nil 18.50
					Refusal	R18	CR=29% RQD=Nil 19.25
20.10m.					Refusal	R19	CR=30% RQD=Nil 20.00

4.0 cm Penetr. Refusal  
3.0 cm Penetr.  
NX rotary drilling from 5.70m to 40.00m

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 04/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.102** Co-ordinates E=-119 N=311

Field Test	Nos	Samples	Nos	Commencement Date : 13/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 16/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 2.017 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
20.10m. Highly weathered, light grey, medium to fine grained, highly fractured rock.						R20	CR=35% RQD=Nil 20.75
						R21	CR=34% RQD=Nil 21.50
						R22	CR=40% RQD=Nil 22.25
22.25m. Highly weathered, light to brownish grey, fine to medium grained, moderately fractured rock.						R23	CR=38% RQD=Nil 23.00
						R24	CR=38% RQD=Nil 23.75
						R25	CR=34% RQD=Nil 24.50
						R26	CR=34% RQD=Nil 25.25
						R27	CR=36% RQD=Nil 26.00
						R28	CR=27% RQD=Nil 26.75
						R29	CR=30% RQD=Nil 27.50
						R30	CR=28% RQD=Nil 28.25
						R31	CR=33% RQD=Nil 29.00
						R32	CR=38% RQD=Nil 29.75
29.75m. Highly weathered, light to brownish grey, fine to medium grained, moderately fractured rock.						R33	CR=25% RQD=Nil 30.50
						R34	CR=22% RQD=Nil 31.25
						R35	CR=22% RQD=Nil 32.00
31.25m. Highly weathered, light to brownish grey, fine to medium grained, moderately fractured rock.						R36	CR=30% RQD=Nil 32.75
						R37	CR=26% RQD=Nil 33.50
						R38	CR=24% RQD=Nil 34.25
33.50m. Highly weathered, brownish grey, medium to fine grained, highly fractured rock.						R39	CR=21% RQD=Nil 35.00
						R40	CR=25% RQD=Nil 35.75
						R41	CR=26% RQD=Nil 36.50
						R42	CR=28% RQD=Nil 37.25
						R43	CR=26% RQD=Nil 38.00
						R44	CR=32% RQD=Nil 38.75
						R45	CR=36% RQD=Nil 39.50
35.75m. Highly weathered, brownish grey, medium to fine grained, highly fractured rock.						R46	CR=38% RQD=Nil 40.00
40.00m. N.B. - '*' means sample could not be recovered / sample slip.							

**BORE LOG DATA SHEET** **BORE HOLE NO.103** Co-ordinates E=99 N=-399

Field Test	Nos	Samples	Nos	Commencement Date : 30/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 30/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.231 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.40 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.							
Stiff to very stiff, light grey, clayey silt with sand mixture & traces of gravel.		9	11	6	17	DS-1	0.50
2.00m.						SPT-1	1.00-1.45
Very loose, light grey, sandy silt to silty sand. Observed kankar & clay binder.		1	1	1	2	*UDS-1	2.00-2.45
					>100	SPT-2	2.50-2.95
3.40m.		54	46			*UDS-2	3.20-3.28
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		100	3.0	cm Pentn. Refusa		SPT-3	3.50-3.78
4.00m.		100	2.0	cm Pentn. Refusa		*SPT-4	3.90-3.93
						*SPT-5	4.00-4.02 4.00
						R1	CR=24% RQD=Nil
Completely to highly weathered, deep to light grey, coarse grained, highly fractured rock.						R2	CR=14% RQD=Nil
						*SPT-6	5.50-5.52 5.50
		50				R3	CR=21% RQD=Nil
		2.0	cm Pentr.			R4	CR=21% RQD=Nil
6.25m.						R5	CR=27% RQD=Nil
Highly weathered, deep grey, medium grained, fractured rock.						R6	CR=32% RQD=Nil
7.00m.						R7	CR=29% RQD=Nil
Highly weathered, deep grey, medium grained, fractured rock.						R8	CR=24% RQD=Nil
8.50m.						R9	CR=24% RQD=Nil
Highly weathered, deep grey, medium grained, fractured rock.						R10	CR=24% RQD=Nil
9.25m.						R11	CR=21% RQD=Nil
						R12	CR=28% RQD=Nil
Highly weathered, light grey, medium grained, highly fractured rock with reddish spots.						R13	CR=34% RQD=Nil
12.25m.						R14	CR=32% RQD=Nil
Highly weathered, whitish grey, medium grained, fractured rock.						R15	CR=26% RQD=Nil
13.00m.							14.50
15.00m.							15.00

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.104** Co-ordinates E=177 N=-409

Field Test	Nos	Samples	Nos	Commencement Date : 02/05/2018
Penetrometer (SPT)	7	Undisturbed (UDS)	1	Completion Date : 02/05/2018
Cone (Pc)		Penetrometer (SPT)	7	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.117 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.40 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES		
		EACH DIVN. = 15cm				Ref. No	Depth (m)	
0.00m.								
Stiff to very stiff, light grey, clayey silt with sand mixture & traces of gravel.	[Grid Symbol]				11	DS-1	0.50	
		5	8	3		SPT-1	1.00-1.45	
3.20m. Very dense, light grey, silty sand with conch pcs. & decomposed rock. Observed kankar.	[Grid Symbol]				2	*UDS-1	2.00-2.45	
		2	1	1		SPT-2	2.55-3.00	
3.60m. Completely to highly weathered, deep to light grey, coarse grained, highly to moderately fractured rock.	[Grid Symbol]	00	5.0	cm	Pentn.	Refusa	SPT-3	3.30-3.35
		00	2.0	cm	Pentn.	Refusa	*SPT-4	3.50-3.52
		00	2.0	cm	Pentn.	Refusa	*SPT-5	3.60-3.62 3.60
		50	3.0	cm	Pentn.	Refusal	R1	CR=18%/RQD=0 ↓
		NX	rotary drilling from 3.60m to 15.00m				*SPT-6	4.25-4.28 4.25
6.50m. Highly weathered, deep to light grey, coarse grained, highly to moderately fractured rock.	[Grid Symbol]					R2	CR=22% RQD=Nil ↓	
						R3	CR=22% RQD=Nil ↓	
						R4	CR=19% RQD=Nil ↓	
9.50m. Highly weathered, light grey, medium grained, moderately fractured rock.	[Grid Symbol]	50	2.0	cm	Pentn.		*SPT-7	6.50-6.52 6.50
						R5	CR=31% RQD=Nil ↓	
						R6	CR=30% RQD=Nil ↓	
10.25m. Highly weathered, light to whitish grey, medium grained, moderately to highly fractured rock.	[Grid Symbol]					R7	CR=32% RQD=Nil ↓	
						R8	CR=38% RQD=Nil ↓	
11.00m. Highly weathered, light to whitish grey, medium grained, moderately to highly fractured rock.	[Grid Symbol]					R9	CR=28% RQD=Nil ↓	
						R10	CR=23% RQD=Nil ↓	
12.50m. Highly weathered, light to whitish grey, medium grained, moderately to highly fractured rock.	[Grid Symbol]					R11	CR=29% RQD=Nil ↓	
						R12	CR=36% RQD=Nil ↓	
14.00m. Highly weathered, whitish grey, medium grained, highly fractured rock.	[Grid Symbol]					R13	CR=23% RQD=Nil ↓	
						R14	CR=23% RQD=Nil ↓	
15.00m. N.B. - '*' means sample could not be recovered / sample slip.	[Grid Symbol]					R15	CR=35% RQD=Nil ↓	

**BORE LOG DATA SHEET** **BORE HOLE NO.105** Co-ordinates E=144 N=-98

Field Test	Nos	Samples	Nos	Commencement Date : 12/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 13/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 1.766 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N-VALUE						SAMPLES	
		EACH DIVN. = 15cm						Ref. No	Depth (m)
0.00m. Loose, light whitish grey, clayey sandy silt. Observed conch.								9	DS-1 0.50
1.60m. Loose to medium dense, light whitish grey, clayey sandy silt. Observed conch pcs.		2	3	6				4	SPT-1 1.00-1.45 *UDS-1 2.00-2.45 SPT-2 2.50-2.95
4.50m. Very dense, light whitish grey, silty sand with decomposed rock.		3	5	21				26	DS-2 3.50 SPT-3 4.00-4.45 *SPT-4 4.60-4.65 *SPT-5 4.80-4.82 *SPT-6 5.00-5.02
5.00m. Highly weathered, light grey, coarse grained, fractured rock.		00	00	00	00	00	00	Refusal	R1 CR=24%/RQD=0
8.00m. Highly weathered, light grey, coarse grained, fractured rock.		00	00	00	00	00	00	2.0 cm Pentn.	R2 CR=27% RQD=Nil
10.25m. Highly weathered, light grey, coarse grained, fractured rock.		00	00	00	00	00	00	NX rotary drilling from 5.00m to 20.00m	R3 CR=23% RQD=Nil
11.00m. Highly weathered, light grey, coarse grained, fractured rock.		00	00	00	00	00	00		R4 CR=25% RQD=Nil
12.50m. Highly weathered, light brownish grey to light grey, medium grained, fractured rock.		00	00	00	00	00	00		R5 CR=27% RQD=Nil
20.00m. N.B. - '*' means sample could not be recovered / sample slip.		00	00	00	00	00	00		R6 CR=29% RQD=15%
		00	00	00	00	00	00		R7 CR=27% RQD=Nil
		00	00	00	00	00	00		R8 CR=24% RQD=Nil
		00	00	00	00	00	00		R9 CR=27% RQD=Nil
		00	00	00	00	00	00		R10 CR=30% RQD=Nil
		00	00	00	00	00	00		R11 CR=32% RQD=Nil
		00	00	00	00	00	00		R12 CR=26% RQD=Nil
		00	00	00	00	00	00		R13 CR=38% RQD=38%
		00	00	00	00	00	00		R14 CR=33% RQD=Nil
		00	00	00	00	00	00		R15 CR=34% RQD=Nil
		00	00	00	00	00	00		R16 CR=34% RQD=Nil
		00	00	00	00	00	00		R17 CR=29% RQD=Nil
		00	00	00	00	00	00		R18 CR=27% RQD=Nil
		00	00	00	00	00	00		R19 CR=27% RQD=Nil
		00	00	00	00	00	00		R20 CR=34% RQD=Nil

**BORE LOG DATA SHEET** **BORE HOLE NO.106** Co-ordinates E = 91 N = -150

Field Test	Nos	Samples	Nos	Commencement Date : 15/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 16/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 1.670 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
0.00m.								
Medium dense, light whitish grey, clayey sandy silt. Observed conch.					11		DS-1	0.50
		3	5	6			SPT-1	1.00-1.45
1.60m.					4		UDS-1	2.05-2.50
Loose, light whitish grey, clayey sandy silt. Observed conch.		1	2	2			SPT-2	2.50-2.95
					5		DS-2	3.50
		2	2	3			SPT-3	4.00-4.45
4.90m.		100	10.0 cm	Pentn. >100			SPT-4	4.90-5.00
Very dense, light whitish grey, silty sand with decomposed rock.		100	2.0 cm	Pentn. Refusal			*SPT-5	5.20-5.22
5.50m.				Refusal			*SPT-6	5.50-5.52 5.50
Highly weathered, light grey, coarse grained, fractured rock.		100					R1	CR=27%/RQD=0
6.25m.		2.0 cm	Pentn.				R2	CR=25% RQD=Nil
		NX	rotary drilling from 5.50m to 20.00m				R3	CR=28% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.							R4	CR=23% RQD=Nil
8.50m.							R5	CR=26% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.							R6	CR=30% RQD=Nil
10.00m.							R7	CR=37% RQD=Nil
							R8	CR=38% RQD=Nil
							R9	CR=32% RQD=Nil
							R10	CR=50% RQD=17%
							R11	CR=44% RQD=Nil
							R12	CR=37% RQD=Nil
Highly/moderately weathered, light yellowish grey to light grey, medium grained, fractured rock.							R13	CR=50% RQD=17%
							R14	CR=42% RQD=Nil
							R15	CR=28% RQD=Nil
							R16	CR=27% RQD=Nil
							R17	CR=29% RQD=Nil
							R18	CR=27% RQD=Nil
							R19	CR=29% RQD=Nil
20.00m.								

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.107** Co-ordinates E=133 N=-468

Field Test	Nos	Samples	Nos	Commencement Date : 03/05/2018
Penetrometer (SPT)	7	Undisturbed (UDS)	1	Completion Date : 03/05/2018
Cone (Pc)		Penetrometer (SPT)	7	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.353 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.50 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m. Soft to medium, light grey, clayey silt with sand mixture.						DS-1	0.50
		4	4	4	8	SPT-1	1.00-1.45
2.00m. Loose, light grey, clayey silty sand. Observed kankar & conch pcs.						*UDS-1	2.00-2.45
		3	3	4	7	SPT-2	2.50-2.95
3.20m. Vrey dense, light to brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.						SPT-3	3.20-3.45
		37	65	10.0	cm Pentn. >100	*SPT-4	3.60-3.64
		100	4.0	cm Pentn. Refusa		*SPT-5	3.70-3.73
		100	3.0	cm Pentn. Refusa		R1	CR=14% RQD=Nil
		NX	rotary drilling from 3.70m to 15.00m				
		52	3.0	cm Pentn. Refusal		*SPT-6	4.50-4.53 4.50
						R2	CR=16% RQD=Nil
		54			Refusal	*SPT-7	5.25-5.27 5.25
			2.0	cm Pentn.		R3	CR=24% RQD=Nil
Completely to highly weathered, deep grey, medium to coarse grained, highly fractured rock.						R4	CR=22% RQD=Nil
						R5	CR=21% RQD=Nil
						R6	CR=24% RQD=Nil
						R7	CR=22% RQD=Nil
9.00m. Highly weathered, light brown, medium to fine grained, highly fractured rock.						R8	CR=29% RQD=Nil
						R9	CR=26% RQD=Nil
						R10	CR=34% RQD=Nil
11.25m. Highly weathered, light brown, medium to fine grained, highly fractured rock.						R11	CR=25% RQD=Nil
						R12	CR=32% RQD=Nil
12.00m. Highly weathered, light brown, medium to fine grained, highly fractured rock.						R13	CR=33% RQD=Nil
						R14	CR=28% RQD=Nil
						R15	CR=31% RQD=Nil
15.00m. N.B. - '*' means sample could not be recovered / sample slip.							15.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 10/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.108** Co-ordinates E=170 N=-174

Field Test	Nos	Samples	Nos	Commencement Date : 28/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 28/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 1.799 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m. Medium dense, light grey, clayey sandy silt. Observed conch pcs.						DS-1	0.50
		6	7	8	15	SPT-1	1.00-1.45
1.60m. Loose to medium dense, light grey, clayey sandy silt. Observed conch pcs.		2	1	2	3	*UDS-1	2.00-2.45
						SPT-2	2.50-2.95
					11	DS-2	3.50
		2	2	9		SPT-3	4.00-4.45
4.60m. Very dense, light grey, silty sand with decomposed rock.		100	6.0	cm	Pentn. Refusa	SPT-4	4.60-4.66
5.00m. Highly weathered, light grey, coarse grained, fractured rock.		100	3.0	cm	Pentn. Refusa	*SPT-5	4.80-4.83
					Refusal	*SPT-6	5.00-5.02 5.00
		2.0	cm	Pentn.		R1	CR=28% RQD=Nil
		NX rotary drilling from 5.00m to 15.00m				R2	CR=25% RQD=Nil
						R3	CR=27% RQD=Nil
						R4	CR=24% RQD=Nil
						R5	CR=25% RQD=Nil
						R6	CR=24% RQD=Nil
						R7	CR=27% RQD=Nil
						R8	CR=23% RQD=Nil
						R9	CR=25% RQD=Nil
						R10	CR=22% RQD=Nil
						R11	CR=21% RQD=Nil
						R12	CR=23% RQD=Nil
						R13	CR=27% RQD=Nil
15.00m.							

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.109** Co-ordinates E=102 N=-183

Field Test	Nos	Samples	Nos	Commencement Date : 27/04/2018
Penetrometer (SPT)	8	Undisturbed (UDS)	2	Completion Date : 28/04/2018
Cone (Pc)		Penetrometer (SPT)	8	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.633 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m. Medium dense, light grey, sandy silt. Observed conch pcs., kankar & clay binder.						DS-1	0.50
1.50m.		9	8	11	19	SPT-1	1.00-1.45
Very loose, light grey, silty sand to sandy silt. Observed conch pcs. & clay binder.						*UDS-1	2.00-2.45
4.00m.		1	1	2	3	SPT-2	2.50-2.95
Very dense, light grey, silty sand with conch pcs. & decomposed rock. Observed kankar.						Refusal	
4.40m.		100				*UDS-2	3.50-3.95
4.40m.		100	6.0 cm		Pentn.	SPT-3	4.05-4.11
4.40m.		100	2.0 cm		Pentn. Refusa	*SPT-4	4.30-4.32
4.40m.		100	2.0 cm		Pentn. Refusa	*SPT-5	4.40-4.42 4.40
Completely to highly weathered, deep grey, medium grained, highly to moderately fractured rock.						R1	CR=18%/RQD=0
5.75m.		50			Refusal	*SPT-6	5.00-5.02 5.00
		2.0 cm			Pentn.	R2	CR=27% RQD=Nil
						R3	CR=23% RQD=Nil
						R4	CR=25% RQD=Nil
						R5	CR=16% RQD=Nil
		50			Refusal	*SPT-7	8.00-8.02 8.00
		2.0 cm			Pentn.	R6	CR=18% RQD=Nil
					Refusal	*SPT-8	8.75-8.77 8.75
		50			Pentn.	R7	CR=28% RQD=Nil
		2.0 cm				R8	CR=27% RQD=Nil
						R9	CR=21% RQD=Nil
						R10	CR=29% RQD=Nil
						R11	CR=41% RQD=Nil
						R12	CR=33% RQD=Nil
						R13	CR=25% RQD=Nil
						R14	CR=21% RQD=Nil
Highly weathered, light grey, coarse grained, highly to moderately fractured rock.							
Highly weathered, light grey, coarse grained, moderately fractured rock.							
Highly/moderately weathered, light to whitish grey, medium to fine grained, fractured rock.							
Highly weathered, light to whitish grey, medium to fine grained, fractured rock. N.B. - '*' means sample could not be recovered / sample slip.							

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.110** Co-ordinates E=-301 N=511

Field Test	Nos	Samples	Nos	Commencement Date : 04/05/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 04/05/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.847 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar.							DS-1	0.50
		5	8	9	17		SPT-1	1.00-1.45
1.50m. Loose to medium dense, brownish grey, silty sand with kankar & conch pcs. Observed clay binder.		2	3	3	6		*UDS-1	2.00-2.45
							SPT-2	2.55-3.00
		4	8	20	28		*UDS-2	3.50-3.95
							SPT-3	4.00-4.45
5.00m. Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		40	60	5.0	cm Pentn. >100		SPT-4	5.00-5.20
5.60m. Highly weathered, brownish grey, coarse grained, highly fractured rock.		100	4.0	cm Pentn. Refusa	Refusal		*SPT-5	5.40-5.44
							*SPT-6	5.60-5.63
							R1	CR=26%/RQD=0 ↓ 6.25
							R2	CR=24% RQD=Nil ↓ 7.00
							R3	CR=27% RQD=16% ↓ 7.75
7.75m. Highly weathered, brownish grey, coarse grained, highly fractured rock.							R4	CR=22% RQD=Nil ↓ 8.50
							R5	CR=23% RQD=Nil ↓ 9.25
							R6	CR=24% RQD=Nil ↓ 10.00
							R7	CR=22% RQD=Nil ↓ 10.75
10.75m. Highly weathered, brownish grey, coarse grained, highly fractured rock.							R8	CR=26% RQD=Nil ↓ 11.50
							R9	CR=28% RQD=Nil ↓ 12.25
							R10	CR=34% RQD=Nil ↓ 13.00
							R11	CR=28% RQD=Nil ↓ 13.75
							R12	CR=32% RQD=Nil ↓ 14.50
11.50m. Highly weathered, light to brownish grey, fine to medium grained, moderately fractured rock.							R13	CR=34% RQD=Nil ↓ 15.00
15.00m. N.B. - '*' means sample could not be recovered / sample slip.								

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.111** Co-ordinates E=-118 N=511

Field Test	Nos	Samples	Nos	Commencement Date : 04/05/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 04/05/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.973 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.78 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m. Medium dense, light grey, clayey silty sand. Observed kankar.						DS-1	0.50
		4	7	6	13	SPT-1	1.00-1.45
1.50m. Loose to medium dense, brownish grey, silty sand with clay binder. Observed kankar & conch pcs.		2	1	3	4	*UDS-1	2.00-2.45
						SPT-2	2.55-3.00
		6	7	11	18	*UDS-2	3.50-3.95
						SPT-3	4.05-4.50
5.00m. Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		35	65	10.0	cm Penetr. >100	SPT-4	5.00-5.25
5.50m.		100	4.0	cm Penetr. Refusal		*SPT-5	5.40-5.44
						*SPT-6	5.50-5.53
		00				R1	5.50-5.53
		3.0	cm Penetr.				6.25
		NX	rotary drilling from 5.50m to 15.00m			R2	CR=25% RQD=Nil
						R3	CR=21% RQD=Nil
						R4	CR=22% RQD=Nil
						R5	CR=24% RQD=Nil
						R6	CR=26% RQD=Nil
						R7	CR=28% RQD=Nil
						R8	CR=22% RQD=Nil
						R9	CR=24% RQD=Nil
						R10	CR=26% RQD=Nil
						R11	CR=28% RQD=Nil
						R12	CR=30% RQD=Nil
						R13	CR=32% RQD=Nil
12.25m. Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.							10.00
10.75m. Highly weathered, brownish grey, medium to fine grained, highly fractured rock.							10.75
9.25m. Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.							11.50
5.00m. Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.							12.25
							13.00
							13.75
							14.50
							15.00

N.B. - '\*' means sample could not be recovered / sample slip.



Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.113** Co-ordinates E = 25 N = 1586

Field Test	Nos	Samples	Nos	Commencement Date : 05/05/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 05/05/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.890 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE			SAMPLES	
		EACH DIVN. = 15cm			Ref. No	Depth (m)
0.00m.						
Medium dense, light whitish grey, clayey silty sand. Observed conch pcs.		5	6	7	13	DS-1 0.50 SPT-1 1.00-1.45
1.60m.						
Loose, light whitish grey, clayey silty sand. Observed conch pcs.		2	1	2	3	*UDS-1 2.00-2.45 SPT-2 2.50-2.95
		2	2	2	4	*UDS-2 3.50-3.95 SPT-3 4.00-4.45
5.00m.						
Very dense, light grey, silty sand with decomposed rock.		100	10.0 cm	Pentn. >100		SPT-4 5.00-5.10
5.50m.		100	3.0 cm	Pentn. Refusal		*SPT-5 5.30-5.33
		100		Refusal		*SPT-6 5.50-5.52 5.50
Highly weathered, light grey, coarse grained, fractured rock.			2.0 cm	Pentn.		R1 CR=27% RQD=Nil ↓ 6.25
			NX	rotary drilling from 5.50m to 15.00m		R2 CR=30% RQD=Nil ↓ 7.00
7.75m.						R3 CR=28% RQD=Nil ↓ 7.75
						R4 CR=23% RQD=Nil ↓ 8.50
						R5 CR=22% RQD=Nil ↓ 9.25
Highly weathered, light grey, coarse grained, fractured rock.						R6 CR=22% RQD=Nil ↓ 10.00
						R7 CR=23% RQD=Nil ↓ 10.75
11.50m.						R8 CR=22% RQD=Nil ↓ 11.50
						R9 CR=42% RQD=Nil ↓ 12.25
						R10 CR=45% RQD=Nil ↓ 13.00
Moderately weathered, yellowish grey, medium grained, light fractured rock.						R11 CR=43% RQD=22% ↓ 14.00
						R12 CR=45% RQD=Nil ↓ 15.00

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.114** Co-ordinates E=32 N=1684

Field Test	Nos	Samples	Nos	Commencement Date : 04/05/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 04/05/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 1.740 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.90 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
0.00m. Medium dense, whitish grey, clayey silty sand. Observed conch.							DS-1	0.50
		3	5	6	11		SPT-1	1.00-1.45
1.60m. Loose, whitish grey, clayey silty sand. Observed conch pcs.		2	2	2	4		*UDS-1	2.00-2.45
		2	2	2	4		SPT-2	2.50-2.95
		2	2	2	4		DS-2	3.50
		2	2	2	4		SPT-3	4.00-4.45
5.00m. Very dense, light grey, silty sand with decomposed rock.		43	68	5.0	cm Penetr. >100		SPT-4	5.00-5.20
5.50m.		100	5.0	cm Penetr. Refusal	Refusal		*SPT-5	5.30-5.35
		00					*SPT-6	5.50-5.52 5.50
		00					R1	CR=28% RQD=Nil ↓ 6.25
		2.0			cm Penetr.		R2	CR=27% RQD=Nil ↓ 7.00
		NX			rotary drilling from 5.50m to 15.00m		R3	CR=30% RQD=Nil ↓ 7.75
							R4	CR=32% RQD=Nil ↓ 8.50
							R5	CR=30% RQD=Nil ↓ 9.25
							R6	CR=34% RQD=Nil ↓ 10.00
							R7	CR=30% RQD=Nil ↓ 10.75
							R8	CR=35% RQD=Nil ↓ 11.50
							R9	CR=37% RQD=Nil ↓ 12.25
							R10	CR=38% RQD=Nil ↓ 13.00
							R11	CR=42% RQD=Nil ↓ 14.00
							R12	CR=43% RQD=Nil ↓ 15.00

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.118** Co-ordinates E=-377 N=276

Field Test	Nos	Samples	Nos	Commencement Date : 11/05/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	1	Completion Date : 11/05/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.539 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.93 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.						DS-1	0.50
Stiff, light grey, clayey silt with sand mixture & conch pcs.		2	3	5	8	SPT-1	1.00-1.45
		1	2	8	10	*UDS-1	2.00-2.45
3.00m.		100	9.0	cm	Pentn. >100	SPT-3	3.20-3.29
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		100	2.0	cm	Pentn. Refusa	*SPT-4	3.40-3.42
		100	2.0	cm	Refusal	*SPT-5	3.50-3.52
3.50m.		100	2.0	cm	Pentn.	R1	CR=29% RQD=Nil
Highly weathered, deep grey, coarse grained, fractured rock.		NX rotary drilling from 3.50m to 15.00m				R2	CR=28% RQD=Nil
						R3	CR=27% RQD=Nil
						R4	CR=32% RQD=Nil
						R5	CR=28% RQD=Nil
						R6	CR=24% RQD=Nil
						R7	CR=25% RQD=Nil
						R8	CR=27% RQD=Nil
						R9	CR=29% RQD=Nil
						R10	CR=37% RQD=16%
						R11	CR=23% RQD=Nil
						R12	CR=24% RQD=Nil
						R13	CR=22% RQD=Nil
						R14	CR=24% RQD=16%
						R15	CR=21% RQD=Nil
		7.25m.					
8.75m.							5.00
10.25m.							5.75
11.00m.							6.50
							7.25
							8.00
							8.75
							9.50
							10.25
							11.00
							11.75
							12.50
							13.25
							14.00
							15.00

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 18/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO.119**

Co-ordinates E = -8  
N = 1743

Field Test	Nos	Samples	Nos	Commencement Date : 10/05/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	2	Completion Date : 11/05/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.889 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 3.10 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.							
Loose, light grey, silty sand with kankar & conch pcs. Observed clay binder.						DS-1	0.50
		2	2	4	6	SPT-1	1.00-1.45
		2	3	5	8	*UDS-1	2.00-2.45
		2	3	5	8	SPT-2	2.55-3.00
4.00m.		24	35	42	>100	*UDS-2	3.50-3.95
		100	4.0	cm Pentn.	10.0 cm Pentn.	SPT-3	4.00-4.40
		100	4.0	cm Pentn.	Refusal	*SPT-4	4.40-4.44
4.90m.		100	3.0	cm Pentn.	Refusal	*SPT-5	4.90-4.93
						R1	4.90 CR=21%/RQD=0
						R2	5.50 CR=22% RQD=Nil
						R3	6.25 CR=24% RQD=Nil
						R4	7.00 CR=22% RQD=Nil
						R5	7.75 CR=24% RQD=Nil
						R6	8.50 CR=26% RQD=Nil
						R7	9.25 CR=24% RQD=Nil
						R8	10.00 CR=22% RQD=Nil
						R9	10.75 CR=24% RQD=Nil
						R10	11.50 CR=35% RQD=Nil
						R11	12.25 CR=32% RQD=Nil
						R12	13.00 CR=30% RQD=Nil
						R13	13.75 CR=42% RQD=30%
10.00m.							
Highly weathered, yellowish brown, medium to fine grained, highly to moderately fractured rock.						R14	14.50 CR=40% RQD=Nil
							15.00
11.50m.							
Highly/moderately weathered, yellowish brown, medium to fine grained, highly to moderately fractured rock.							
15.00m.							

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.120** Co-ordinates E= 98 N=-235

Field Test	Nos	Samples	Nos	Commencement Date : 09/05/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 09/05/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.747 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 3.0 m.

DESCRIPTION	SYMBOL	N-VALUE			SAMPLES	
		EACH DIVN. = 15cm			Ref. No	Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar.	[Symbol: Vertical lines]	4	8	8	DS-1	0.50
1.50m.					SPT-1	1.00-1.45
Loose to medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		2	2	2	*UDS-1	2.00-2.45
4.50m.	[Symbol: Vertical lines]	8	13	17	SPT-2	2.55-3.00
Very dense, light grey, silty sand with conch pcs. & decomposed rock.					UDS-2	3.50-3.95
5.50m.					SPT-3	4.00-4.45
	[Symbol: Horizontal lines]	40	60	5.0	SPT-4	5.00-5.20
		100	3.0	cm Penetr. Refusal	*SPT-5	5.40-5.43
					*SPT-6	5.50-5.53
					R1	5.50
						CR=24% RQD=Nil
						6.25
					R2	CR=22% RQD=Nil
						7.00
					R3	CR=24% RQD=Nil
						7.75
					R4	CR=26% RQD=Nil
						8.50
					R5	CR=22% RQD=Nil
					9.25	
				R6	CR=28% RQD=Nil	
					10.00	
				R7	CR=24% RQD=Nil	
					10.75	
				R8	CR=25% RQD=Nil	
					11.50	
				R9	CR=28% RQD=Nil	
					12.25	
				R10	CR=24% RQD=Nil	
					13.00	
				R11	CR=29% RQD=Nil	
					13.75	
				R12	CR=30% RQD=Nil	
					14.50	
				R13	CR=25% RQD=Nil	
					15.00	

N.B. - \* means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.121** Co-ordinates E=173 N=-235

Field Test	Nos	Samples	Nos	Commencement Date : 07/05/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 09/05/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.794 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.78 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
0.00m. Medium dense, brownish grey, silty sand to sandy silt. Observed kankar & conch pcs.							DS-1	0.50
1.50m. Very loose, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		4	7	5	12		SPT-1	1.00-1.45
3.50m. Medium dense, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		3	2	2	4		*UDS-1 SPT-2	2.00-2.45 2.50-2.95
4.80m. Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		7	9	11	20		*UDS-2 SPT-3	3.50-3.95 4.00-4.45
5.40m. Highly weathered, deep to light grey, coarse to medium grained, highly to moderately fractured rock.		100	8.0 cm	Pentn. >100			SPT-4	4.90-4.98
		100	3.0 cm	Pentn. Refusal			*SPT-5	5.20-5.23
		100		Refusal			*SPT-6	5.40-5.42 5.40
		2.0 cm	Pentr.				R1	CR=21%/RQD=0
		NX	rotary drilling from 5.40m to 15.00m				R2	CR=24% RQD=Nil
							R3	CR=21% RQD=Nil
							R4	CR=25% RQD=Nil
							R5	CR=21% RQD=Nil
							R6	CR=25% RQD=Nil
							R7	CR=31% RQD=Nil
							R8	CR=29% RQD=Nil
							R9	CR=21% RQD=Nil
							R10	CR=21% RQD=Nil
							R11	CR=23% RQD=Nil
							R12	CR=21% RQD=Nil
							R13	CR=28% RQD=Nil

N.B. - \* means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.122** Co-ordinates E = 83 N = - 502

Field Test	Nos	Samples	Nos	Commencement Date : 08/05/2018
Penetrometer (SPT)	8	Undisturbed (UDS)	1	Completion Date : 08/05/2018
Cone (Pc)		Penetrometer (SPT)	8	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.325 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.52 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.						DS-1	0.50
Soft to medium, light grey, clayey silt with sand mixture.		2	3	3	6	SPT-1	1.00-1.45
2.00m.						*UDS-1	2.00-2.45
Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		3	5	6	11	SPT-2	2.55-3.00
3.40m.		40	60	5.0	cm Pentn. >100	SPT-3	3.40-3.60
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		100	4.0	cm Pentn. Refusa		*SPT-4	3.80-3.84
4.00m.		100	3.0	cm Pentn. Refusa		*SPT-5	4.00-4.03 4.00
		50	2.0	cm Pentn. Refusal		R1	CR=16% RQD=Nil
		50	2.0	cm Pentn. Refusal		*SPT-6	4.75-4.77 4.75
		50	2.0	cm Pentn. Refusal		R2	CR=15% RQD=Nil
		50	2.0	cm Pentn. Refusal		*SPT-7	5.50-5.52 5.50
		50	3.0	cm Pentn. Refusal		R3	CR=18% RQD=Nil
		50	3.0	cm Pentn. Refusal		*SPT-8	6.25-6.28 6.25
		50	3.0	cm Pentn. Refusal		R4	CR=22% RQD=Nil
Completely to highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		NX	rotary drilling from 4.00m to 15.00m			R5	CR=24% RQD=Nil
						R6	CR=22% RQD=Nil
						R7	CR=24% RQD=Nil
						R8	CR=25% RQD=Nil
						R9	CR=22% RQD=Nil
						R10	CR=24% RQD=Nil
						R11	CR=22% RQD=Nil
						R12	CR=24% RQD=Nil
						R13	CR=26% RQD=Nil
						R14	CR=25% RQD=Nil
						R15	CR=24% RQD=Nil
10.00m.							10.00
							10.75
							11.50
							12.25
							13.00
							13.75
							14.50
							15.00
15.00m.							15.00

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.123** Co-ordinates E=133 N=-534

Field Test	Nos	Samples	Nos	Commencement Date : 08/05/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	1	Completion Date : 08/05/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.525 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.55 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.						DS-1	0.50
Soft to medium, light grey, clayey silt with sand mixture.		2	3	4	7	SPT-1	1.00-1.45
2.00m.						*UDS-1	2.00-2.45
Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		3	5	5	10	SPT-2	2.50-2.95
3.50m.						SPT-3	3.70-3.95
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		35	65	10.0	cm Pentn. >100	*SPT-4	4.10-4.14
4.20m.		100	4.0	cm Pentn. Refusal		*SPT-5	4.20-4.23 4.20
						R1	CR=22%/RQD=0 ↓
						R2	CR=24% RQD=Nil ↓ 5.00
						R3	CR=24% RQD=Nil ↓ 5.75
						R4	CR=26% RQD=Nil ↓ 6.50
						R5	CR=25% RQD=Nil ↓ 7.25
						R6	CR=27% RQD=Nil ↓ 8.00
						R7	CR=24% RQD=Nil ↓ 8.75
						R8	CR=22% RQD=Nil ↓ 9.50
						R9	CR=24% RQD=Nil ↓ 10.25
						R10	CR=26% RQD=Nil ↓ 11.00
						R11	CR=22% RQD=Nil ↓ 11.75
						R12	CR=24% RQD=13% ↓ 12.50
						R13	CR=24% RQD=Nil ↓ 13.25
						R14	CR=25% RQD=Nil ↓ 14.00
							↓ 15.00

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.124** Co-ordinates E=177 N=-502

Field Test	Nos	Samples	Nos	Commencement Date : 08/05/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	1	Completion Date : 08/05/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.778 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.50 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.							
Soft to medium, light grey, clayey silt with sand mixture.					8	DS-1	0.50
		2	4	4		SPT-1	1.00-1.45
2.00m.					12	*UDS-1	2.00-2.45
Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		3	5	7		SPT-2	2.55-3.00
3.60m.		38	62	10.0	cm Pentn. >100	SPT-3	3.60-3.85
Very dense, light grey, silty sand with kankar & conch pcs. Observed 4.10m. decomposed rock.		100	4.0	cm Pentn. Refusal	Refusal	*SPT-4	4.00-4.04
		00				*SPT-5	4.10-4.13 4.10
					3.0 cm Pentn.	R1	CR=22%/RQD=0 ↓
					NX rotary drilling from 4.10m to 15.00m	R2	CR=21% RQD=Nil ↓
						R3	CR=24% RQD=Nil ↓
						R4	CR=22% RQD=Nil ↓
						R5	CR=22% RQD=Nil ↓
						R6	CR=25% RQD=Nil ↓
						R7	CR=24% RQD=Nil ↓
						R8	CR=22% RQD=Nil ↓
						R9	CR=26% RQD=Nil ↓
						R10	CR=22% RQD=Nil ↓
						R11	CR=23% RQD=Nil ↓
						R12	CR=22% RQD=Nil ↓
						R13	CR=25% RQD=Nil ↓
						R14	CR=27% RQD=Nil ↓
						R15	CR=22% RQD=Nil ↓
10.00m.							10.00
							10.75
							11.50
							12.25
							13.00
							13.75
							14.50
							15.00
15.00m.							

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 18/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.125** Co-ordinates E = 59 N = -340

Field Test	Nos	Samples	Nos	Commencement Date : 09/05/2018
Penetrometer (SPT)	8	Undisturbed (UDS)	2	Completion Date : 09/05/2018
Cone (Pc)		Penetrometer (SPT)	8	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.671 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m.							
Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.				16		DS-1	0.50
		5	7	9		SPT-1	1.00-1.45
2.00m.							
Loose, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.				5		*UDS-1	2.00-2.45
		2	2	3		SPT-2	2.55-3.00
		5	8	7		*UDS-2	3.50-3.95
						SPT-3	4.00-4.45
4.70m.							
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		35	65	100	cm Pentn. >100	SPT-4	4.80-5.05
		100	4.0	cm Pentn. Refusal		*SPT-5	5.30-5.34
5.50m.						*SPT-6	5.50-5.53 5.50
Highly weathered, deep grey, medium grained, fractured rock.		00				R1	CR=22% RQD=Nil
		3.0	cm Pentn.				6.25
		NX	rotary drilling from 5.50m to 15.00m			R2	CR=23% RQD=Nil
							7.00
						R3	CR=24% RQD=Nil
							7.75
						R4	CR=21% RQD=Nil
							8.50
						R5	CR=27% RQD=Nil
							9.25
						R6	CR=21% RQD=Nil
							10.00
						R7	CR=24% RQD=Nil
							10.75
						R8	CR=23% RQD=Nil
							11.50
						R9	CR=25% RQD=Nil
							12.25
12.25m.						R10	CR=19% RQD=Nil
		50			Refusal	*SPT-7	3.00-13.02 13.00
		2.0	cm Pentn.			R11	CR=15% RQD=Nil
		50			Refusal	*SPT-8	3.75-13.77 13.75
		2.0	cm Pentn.			R12	CR=21% RQD=Nil
							14.50
						R13	CR=22% RQD=Nil
							15.00

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.126** Co-ordinates E=-208 N=-230

Field Test	Nos	Samples	Nos	Commencement Date : 09/05/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 10/05/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.638 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 3.10 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
0.00m Medium dense, light grey, silty sand. Observed kankar.					17		DS-1	0.50
1.50m		5	8	9			SPT-1	1.00-1.45
Very loose, light grey, clayey silty sand. Observed kankar & conch pcs.		2	1	2	3		*UDS-1 SPT-2	2.00-2.45 2.50-2.95
3.95m Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		4	8	10	18		*UDS-2 SPT-3	3.50-3.95 4.00-4.45
4.70m Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		25	40	35	5.0 cm Pentn. >100		SPT-4 *SPT-5 *SPT-6	4.70-5.05 5.20-5.24 5.30-5.33
5.30m		100	100	4.0 cm Pentn. Refusal	Refusal		R1	CR=22% RQD=NII
Highly weathered, deep grey, medium to coarse grained, highly fractured rock.				3.0 cm Pentn.			R2	CR=24% RQD=NII
				NX rotary drilling from 5.30m to 15.00m			R3	CR=26% RQD=16%
8.25m							R4	CR=25% RQD=16%
Highly weathered, deep grey, medium to coarse grained, highly fractured rock.							R5	CR=28% RQD=16%
9.75m							R6	CR=28% RQD=NII
Highly weathered, deep grey, medium to coarse grained, highly fractured rock.							R7	CR=24% RQD=NII
12.00m							R8	CR=22% RQD=NII
Highly weathered, deep grey, medium to coarse grained, highly fractured rock.							R9	CR=24% RQD=NII
							R10	CR=26% RQD=NII
							R11	CR=28% RQD=NII
							R12	CR=30% RQD=NII
							R13	CR=32% RQD=NII
15.00m								

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET**

**BORE HOLE NO.127**

Co-ordinates E=-346  
N=1800

Field Test	Nos	Samples	Nos	Commencement Date : 08/05/2018
Penetrometer (SPT)	7	Undisturbed (UDS)	2	Completion Date : 09/05/2018
Cone (Pc)		Penetrometer (SPT)	7	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.012 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.90 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m						DS-1	0.50
Soft, brownish grey to light grey clayey silt with sand. Observed kankar & conch pcs.		3	2	2	4	SPT-1	1.00-1.45
		2	1	2	3	*UDS-1	2.00-2.45
						SPT-2	2.50-2.95
4.00m		8	7	11	18	*UDS-2	3.50-3.95
Medium dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.						SPT-3	4.05-4.50
5.00m		100	8.0 cm	Pentn. >100		SPT-4	5.00-5.08
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		100	3.0 cm	Pentn. Refusal		*SPT-5	5.30-5.33
						*SPT-6	5.50-5.52 5.50
Completely to highly weathered, deep to light grey, medium to coarse grained, fractured rock.		100	2.0 cm	Pentn.		R1	CR=23% RQD=Nil
						R2	CR=23% RQD=Nil
						R3	CR=19% RQD=Nil
						*SPT-7	7.75-7.77 7.75
						R4	CR=21% RQD=Nil
						R5	CR=23% RQD=Nil
						R6	CR=24% RQD=Nil
						R7	CR=21% RQD=Nil
						R8	CR=28% RQD=Nil
						R9	CR=29% RQD=Nil
						R10	CR=27% RQD=Nil
						R11	CR=21% RQD=Nil
						R12	CR=22% RQD=Nil
				R13	CR=22% RQD=Nil		

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 23/05/2018 Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO.128**

Co-ordinates E=-423  
N=1300

Field Test	Nos	Samples	Nos	Commencement Date : 16/05/2018
Penetrometer (SPT)	9	Undisturbed (UDS)	1	Completion Date : 17/05/2018
Cone (Pc)		Penetrometer (SPT)	9	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.370 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.40 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m						DS-1	0.50
Very loose, light to brownish grey, clayey silty sand. Observed conch pcs.	1	1	2		3	SPT-1	1.00-1.45
		2	2		4	*UDS-1	2.00-2.45
2.95m		2	2			SPT-2	2.50-2.95
Loose, light to brownish grey, clayey silty sand. Observed conch pcs.	2	2	4		6	SPT-3	4.00-4.45
		45	100		>100		
4.50m		100	10.0 cm Pentn.			SPT-4	5.00-5.25
Very dense, brownish grey to greyish brown, silty sand with mica & conch pcs. Observed decomposed rock.	100	100	4.0 cm Pentn. Refusal			*SPT-5	5.40-5.44
		100	2.0 cm Pentn. Refusal			*SPT-6	5.50-5.52 5.50
5.50m			Refusal			R1	CR=14% RQD=NII
	50	50	3.0 cm Pentn.			*SPT-7	6.25-6.28 6.25
			NX rotary drilling from 5.50m to 15.00m			R2	CR=21% RQD=NII
Completely to highly weathered, whitish grey to brownish grey, medium to coarse grained, highly fractured rock.	50		Refusal			R3	CR=20% RQD=NII
		50	2.0 cm Pentn.			R4	CR=16% RQD=NII
	50		Refusal			*SPT-8	8.50-8.52 8.50
			Refusal			R5	CR=24% RQD=NII
	50		Refusal			R6	CR=21% RQD=NII
			Refusal			R7	CR=22% RQD=NII
11.50m	50		Refusal			R8	CR=21% RQD=NII
			Refusal			R9	CR=19% RQD=NII
Completely/highly weathered, whitish grey to light grey, medium grained, fractured rock. Observed reddish spots.	50		Refusal			*SPT-9	12.25-12.28 12.25
			3.0 cm Pentn.			R10	CR=23% RQD=NII
	50		Refusal			R11	CR=32% RQD=22%
			Refusal			R12	CR=23% RQD=NII
15.00m	50		Refusal			R13	CR=20% RQD=NII
			Refusal				

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 23/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO.129**

Co-ordinates E=-567  
N=884

Field Test	Nos	Samples	Nos	Commencement Date : 16/05/2018
Penetrometer (SPT)	7	Undisturbed (UDS)	2	Completion Date : 17/05/2018
Cone (Pc)		Penetrometer (SPT)	7	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 2.529 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m Very loose, light grey, clayey silty sand. Observed kankar & conch pcs.					4	DS-1	0.50
		1	2	2		SPT-1	1.00-1.45
2.55m Loose, light grey, clayey silty sand. Observed kankar & conch pcs.					5	*UDS-1	2.00-2.45
		1	2	3		SPT-2	2.55-3.00
4.60m Very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.					7	*UDS-2	3.50-3.95
		2	3	4		SPT-3	4.00-4.45
		40	60	5.0 cm Pentn.	>100	SPT-4	4.60-4.80
		100	4.0 cm Pentn.	Refusal		*SPT-5	4.90-4.94
		100	3.0 cm Pentn.	Refusal		*SPT-6	5.00-5.03 5.00
				Refusal		R1	CR=16%/RQD=0 ↓
		52				*SPT-7	5.75-5.77 5.75
		2.0 cm Pentn.				R2	CR=21%/RQD=0 ↓
							6.50 ↓
						R3	CR=22% RQD=Nil ↓
							7.25 ↓
						R4	CR=22% RQD=Nil ↓
							8.00 ↓
						R5	CR=24% RQD=Nil ↓
							8.75 ↓
						R6	CR=22% RQD=Nil ↓
							9.50 ↓
						R7	CR=21% RQD=Nil ↓
							10.25 ↓
						R8	CR=22% RQD=Nil ↓
							11.00 ↓
						R9	CR=24% RQD=Nil ↓
							11.75 ↓
						R10	CR=25% RQD=Nil ↓
							12.50 ↓
						R11	CR=28% RQD=Nil ↓
							13.25 ↓
						R12	CR=24% RQD=Nil ↓
							14.00 ↓
						R13	CR=25% RQD=Nil ↓
							15.00

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 23/05/2018 Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO.130**

Co-ordinates E=-600  
N=373

Field Test	Nos	Samples	Nos	Commencement Date : 17/05/2018
Penetrometer (SPT)	7	Undisturbed (UDS)	1	Completion Date : 18/05/2018
Cone (Pc)		Penetrometer (SPT)	7	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.626 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.20 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m Very loose, brownish grey to steel grey, clayey silty sand. Observed conch pcs.					4	DS-1	0.50
		1	2	2		SPT-1	1.00-1.45
2.50m Loose, brownish grey to steel grey, clayey silty sand. Observed conch pcs.					5	UDS-1	2.00-2.45
		2	3	2		SPT-2	2.50-2.95
3.70m Very dense, light grey, medium grained, silty sand with conch pcs. Observed decomposed rock.		58	100		>100	SPT-3	3.80-4.02
		100	7.0 cm Pentn.			*SPT-4	4.20-4.23
4.40m		100	3.0 cm Pentn. Refusal			*SPT-5	4.40-4.42 4.40
			2.0 cm Pentn. Refusal			R1	CR=18%/RQD=0
		50	Refusal			*SPT-6	5.00-5.02 5.00
			2.0 cm Pentn.			R2	CR=21% RQD=NII
			NX rotary drilling from 4.40m to 15.00m			R3	CR=18% RQD=NII
			Refusal			*SPT-7	6.50-6.53 6.50
		52	3.0 cm Pentn.			R4	CR=23% RQD=NII
						R5	CR=25% RQD=NII
						R6	CR=23% RQD=NII
						R7	CR=22% RQD=NII
						R8	CR=25% RQD=NII
						R9	CR=27% RQD=NII
						R10	CR=24% RQD=NII
						R11	CR=22% RQD=NII
						R12	CR=25% RQD=NII
						R13	CR=28% RQD=NII
						R14	CR=25% RQD=NII
8.00m Highly weathered, light grey, medium grained, moderately fractured rock.							11.00
							11.75
							12.50
							13.25
							14.00
15.00m N.B. - '*' means sample could not be recovered / sample slip.							15.00

**BORE LOG DATA SHEET** **BORE HOLE NO.131** Co-ordinates E=-539 N=-37

Field Test	Nos	Samples	Nos	Commencement Date : 18/05/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 18/05/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.779 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.20 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES		
		EACH DIVN. = 15cm				Ref. No	Depth (m)	
0.00m								
Loose, light grey, clayey silty sand. Observed kankar & conch pcs.	[Symbol]	1	2	2	4	DS-1	0.50	
						SPT-1	1.00-1.45	
		2	3	4	7	*UDS-1	2.00-2.45	
						SPT-2	2.50-2.95	
Very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.	[Symbol]	35	65		>100	*UDS-2	3.50-3.95	
		100	100	10.0 cm Pentn.	Refusal	SPT-3	4.00-4.25	
		100	100	4.0 cm Pentn.	Refusal	*SPT-4	4.40-4.44	
		100	100	3.0 cm Pentn.	Refusal	*SPT-5	4.50-4.53 4.50	
						R1	CR=16% RQD=NII	↓
Completely to highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.	[Symbol]	53			Refusal	*SPT-6	5.25-5.27 5.25	
						R2	CR=21% RQD=NII	↓
								6.00
						R3	CR=24% RQD=NII	↓
								6.75
						R4	CR=23% RQD=NII	↓
								7.50
						R5	CR=24% RQD=NII	↓
								8.25
						R6	CR=28% RQD=NII	↓
8.25m						9.00		
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.	[Symbol]					R7	CR=30% RQD=NII	↓
								9.75
9.75m							10.50	
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.	[Symbol]					R8	CR=24% RQD=NII	↓
								11.25
11.25m							12.00	
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.	[Symbol]					R9	CR=24% RQD=NII	↓
								12.75
						R10	CR=28% RQD=NII	↓
								13.50
12.00m							14.25	
Highly weathered, light grey, coarse grained, highly fractured rock.	[Symbol]					R11	CR=26% RQD=NII	↓
								14.25
14.25m							15.00	
15.00m							15.00	

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.132** Co-ordinates E=-503 N=-482

Field Test	Nos	Samples	Nos	Commencement Date : 17/05/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 17/05/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.775 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 3.00 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m							
Loose, light grey, clayey silty sand. Observed kankar & conch pcs.						DS-1	0.50
		1	2	1	3	SPT-1	1.00-1.45
		1	2	2	4	*UDS-1	2.00-2.45
						SPT-2	2.50-2.95
Very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.						*UDS-2	3.50-3.95
		3	3	5	8	SPT-3	4.00-4.45
		100	100	100	>100	SPT-4	4.60-4.70
		100	100	4.0 cm Pentn.	Refusal	*SPT-5	4.80-4.84
						*SPT-6	4.90-4.93
						R1	4.90
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.							5.60
						R2	6.25
						R3	7.00
						R4	7.75
						R5	8.50
						R6	9.25
						R7	10.00
						R8	10.75
						R9	11.50
						R10	12.25
Highly weathered, light grey, medium to fine grained, highly fractured rock.						R11	13.00
						R12	13.75
						R13	14.50
						R14	15.00

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 23/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.133** Co-ordinates E=-399 N=-937

Field Test	Nos	Samples	Nos	Commencement Date : 18/05/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	1	Completion Date : 18/05/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.052 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.10 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m							
Very loose, light grey, clayey silty sand. Observed conch pcs.	1 2 2	4			DS-1	0.50	
		Z			SPT-1	1.00-1.45	
2.50m Loose, light grey, clayey silty sand. Observed conch pcs.	2 3 4	Z			*UDS-1	2.00-2.45	
		Z			SPT-2	2.50-2.95	
3.90m Very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.	25 35 40	≥100			SPT-3	3.90-4.25	
		5.0 cm Pentn.			*SPT-4	4.50-4.54	
4.70m	100	4.0 cm Pentn. Refusal			*SPT-5	4.70-4.73	
		Refusal			R1	4.70	
10.75m Highly weathered, brownish grey to light grey, medium to fine grained, highly fractured rock.	NX	3.0 cm Pentn.				CR=22% RQD=NII	5.50
		NX rotary drilling from 4.70m to 15.00m			R2	CR=24% RQD=NII	5.50
					R3	CR=26% RQD=NII	6.25
					R4	CR=24% RQD=NII	7.00
					R5	CR=21% RQD=NII	7.75
					R6	CR=21% RQD=NII	8.50
					R7	CR=24% RQD=NII	9.25
					R8	CR=26% RQD=NII	10.00
					R9	CR=22% RQD=NII	10.75
					R10	CR=25% RQD=NII	11.50
					R11	CR=20% RQD=NII	12.25
					R12	CR=21% RQD=NII	13.00
					R13	CR=28% RQD=NII	13.75
					R14	CR=32% RQD=NII	14.50
15.00m							

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.134** Co-ordinates E=-80 N=-1264

Field Test	Nos	Samples	Nos	Commencement Date : 18/05/2018
Penetrometer (SPT)	7	Undisturbed (UDS)	2	Completion Date : 19/05/2018
Cone (Pc)		Penetrometer (SPT)	7	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.372 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.25 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
0.00m							DS-1	0.50
Very loose, brownish grey, clayey silty sand. Observed conch pcs.		1	1	1		2	SPT-1	1.00-1.45
		1	2	1		3	*UDS-1	2.00-2.45
Loose, brownish grey, clayey silty sand. Observed conch pcs.		2	3	5		8	SPT-2	2.50-2.95
							UDS-2	3.50-3.95
Very dense, light grey, medium grained, silty sand with conch pcs. Observed decomposed rock.		100	120	cm Pentn.	>100		SPT-3	4.00-4.45
		100	3.0	cm Pentn.	Refusal		*SPT-4	4.90-5.02
Completely to highly weathered, light to whitish grey, medium grained, completely fractured rock.		100	2.0	cm Pentn.	Refusal		*SPT-5	5.20-5.23
							*SPT-6	5.30-5.32 5.30
							R1	CR=18% RQD=NII
							*SPT-7	6.00-6.02 6.00
							R2	CR=22% RQD=NII
								6.75
							R3	CR=24% RQD=NII
								7.50
							R4	CR=27% RQD=NII
								8.25
							R5	CR=23% RQD=NII
								9.00
							R6	CR=26% RQD=NII
						9.75		
					R7	CR=28% RQD=12%		
						10.50		
					R8	CR=24% RQD=NII		
						11.25		
					R9	CR=29% RQD=NII		
						12.00		
					R10	CR=31% RQD=NII		
						12.75		
					R11	CR=27% RQD=NII		
						13.50		
					R12	CR=32% RQD=NII		
						14.25		
					R13	CR=30% RQD=NII		
						15.00		

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. **CETEST**

Job No : 4115 Created by : SKD Created on : 23/05/2018 Sheet No:

**BORE LOG DATA SHEET** **BORE HOLE NO.135** Co-ordinates E=241 N=-1704

Field Test	Nos	Samples	Nos	Commencement Date : 19/05/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	1	Completion Date : 19/05/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 0.887 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 1.90 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m							
Loose, light grey, clayey silty sand. Observed kankar & onch pcs.	[Symbol]	1	2	3	5	DS-1	0.50
						SPT-1	1.00-1.45
		2	3	4	7	*UDS-1	2.00-2.45
	[Symbol]				≥100	SPT-2	2.55-3.00
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.	[Symbol]	32	68			SPT-3	3.80-4.05
		100	100			*SPT-4	4.20-4.24
						*SPT-5	4.30-4.33
						R1	CR=21% RQD=NII ↓ 5.00
						R2	CR=22% RQD=NII ↓ 5.75
						R3	CR=24% RQD=NII ↓ 6.50
						R4	CR=26% RQD=NII ↓ 7.25
						R5	CR=22% RQD=NII ↓ 8.00
						R6	CR=24% RQD=NII ↓ 8.75
						R7	CR=24% RQD=NII ↓ 9.50
						R8	CR=25% RQD=NII ↓ 10.25
						R9	CR=26% RQD=NII ↓ 11.00
						R10	CR=24% RQD=NII ↓ 11.75
						R11	CR=26% RQD=NII ↓ 12.50
						R12	CR=24% RQD=NII ↓ 13.25
						R13	CR=28% RQD=NII ↓ 14.00
						R14	CR=25% RQD=NII ↓ 15.00

N.B. - '\*' means sample could not be recovered / sample slip.

**BORE LOG DATA SHEET** **BORE HOLE NO.136** Co-ordinates E=377 N=276

Field Test	Nos	Samples	Nos	Commencement Date : 20/05/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 20/05/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.948 M.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 3.20 m.

DESCRIPTION	SYMBOL	N-VALUE						SAMPLES	
		EACH DIVN. = 15cm						Ref. No	Depth (m)
0.00m								DS-1	0.50
Loose, light grey, clayey silty sand. Observed kankar.	3	4	6			10		SPT-1	1.00-1.45
		1	2	3		5		*UDS-1	2.00-2.45
									SPT-2
3.00m								*UDS-2	3.50-3.95
Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		5	10	20		30		SPT-3	4.05-4.50
4.50m		30	70	100	cm Pentn.	>100		SPT-4	4.80-5.05
Dense to very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.		100	4.0	cm Pentn.	Refusal			*SPT-5	5.20-5.24
5.30m								*SPT-6	5.30-5.33
Highly weathered, brownish grey to light grey, medium to coarse grained, highly to moderately fractured rock.								R1	5.30 CR=22% RQD=NII
								R2	6.00 CR=24% RQD=NII
								R3	6.75 CR=24% RQD=NII
								R4	7.50 CR=26% RQD=NII
								R5	8.25 CR=22% RQD=NII
								R6	9.00 CR=26% RQD=NII
								R7	9.75 CR=28% RQD=NII
								R8	10.50 CR=32% RQD=NII
								R9	11.25 CR=24% RQD=NII
								R10	12.00 CR=27% RQD=NII
								R11	12.75 CR=30% RQD=NII
								R12	13.50 CR=22% RQD=NII
								R13	14.25 CR=34% RQD=NII
15.00m									15.00

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 19/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. PMT1**

Co-ordinates E=-171  
N=315

Field Test	Nos	Samples	Nos	Commencement Date :	20/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	0	Completion Date :	22/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter :	150mm / NX.
Vane (V)		Disturbed (DS)	3	Level Of Ground :	2.073 m.
		Water Sample (WS)	0	Water Struck At :	
				Standing Water Level :	Not found

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES		
		EACH DIVN. = 15cm				Ref. No	Depth (m)	
0.00m Medium dense, light grey, silty sand. Observed kankar.						DS-1	0.50	
1.50m		5	6	5	11	SPT-1	1.00-1.45	
Very loose, light grey, silty sand with kankar & conch pcs. Observed clay binder.		1	2	2	4	SPT-2	2.50-2.95	
4.00m		9	12	14	26	DS-3	3.50	
Medium dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		45	55		>100	SPT-3	4.00-4.45	
5.00m		100	4.0 cm Pentn.		Refusal	SPT-4	5.00-5.25	
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		100	10.0 cm Pentn.		Refusal	*SPT-5	5.40-5.44	
5.50m		100	4.0 cm Pentn.		Refusal	*SPT-6	5.50-5.53 5.50	
			3.0 cm Pentn.			R1	CR=29% RQD=NII	
			NX rotary drilling from 5.50m to 25.50m					6.50
						R2	CR=37% RQD=NII	
							7.50	
						R3	CR=37% RQD=NII	
							8.50	
						R4	CR=33% RQD=NII	
							9.50	
						R5	CR=26% RQD=NII	
							10.50	
						R6	CR=29% RQD=NII	
							11.50	
						R7	CR=30% RQD=NII	
							12.50	
12.50m							12.50	
12.90m							↓	

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 19/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. PMT1**

Co-ordinates E=-171  
N=315

Field Test	Nos	Samples	Nos	Commencement Date : 20/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	0	Completion Date : 22/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	3	Level Of Ground : 2.073 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : Not found

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES		
		EACH DIVN. = 15cm				Ref. No	Depth (m)	
Highly weathered, light to brownish grey, medium to fine grained, highly fractured rock.						R8	CR=30% RQD=NII	12.90m
						R9	CR=33% RQD=NII	13.50
						R10	CR=27% RQD=NII	14.50
						R11	CR=28% RQD=NII	15.50
						R12	CR=26% RQD=NII	16.50
						R13	CR=28% RQD=NII	17.50
						R14	CR=24% RQD=NII	18.50
						R15	CR=27% RQD=NII	19.50
						R16	CR=28% RQD=NII	20.50
						R17	CR=28% RQD=NII	21.50
Highly weathered, whitish grey, medium grained, highly to moderately fractured rock.						R18	CR=29% RQD=NII	22.50
						R19	CR=32% RQD=NII	23.50
						R20	CR=29% RQD=NII	24.50
N.B. - '*' means sample could not be recovered / sample slip.								25.50m

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 19/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. PMT2**

Co-ordinates E=-119  
N=123

Field Test	Nos	Samples	Nos	Commencement Date : 16/04/2018
Penetrometer (SPT)	4	Undisturbed (UDS)	0	Completion Date : 17/04/2018
Cone (Pc)		Penetrometer (SPT)	4	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	4	Level Of Ground : 1.663 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : Not found

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m							
Medium dense, brownish grey, silty sand to sandy silt. Observed kankar.		6	9	9	18	DS-1	0.50
						SPT-1	1.50-1.95
2.50m							
Very loose, light grey, silty sand. Observed mica, conch pcs. & clay binder.		0	0	1	1	DS-2	3.00
						SPT-2	3.50-3.95
4.50m							
Very dense, brownish grey, silty sand with conch pcs. Observed kankar & decomposed rock.						DS-3	4.50
						DS-4	5.00
5.80m							
		100				*SPT-3	5.50-5.54
		4.0				*SPT-4	5.80-5.83 5.80
						R1	CR=12% RQD=Nil
		100					↓
		3.0				R2	CR=15% RQD=Nil
							↓
						R3	CR=16% RQD=Nil
							↓
						R4	CR=15% RQD=Nil
							↓
						R5	CR=12% RQD=Nil
							↓
						R6	CR=14% RQD=Nil
							↓
						R7	CR=13% RQD=Nil
							↓
12.90m							12.80

NX rotary drilling from 5.80m to 25.30m

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 19/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. PMT2**

Co-ordinates E=-119  
N=123

Field Test	Nos	Samples	Nos	Commencement Date : 16/04/2018
Penetrometer (SPT)	4	Undisturbed (UDS)	0	Completion Date : 17/04/2018
Cone (Pc)		Penetrometer (SPT)	4	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	4	Level Of Ground : 1.663 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : Not found

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
12.90m Completely weathered, brownish grey to light grey, medium grained, completely fractured rock.						R8	CR=17% RQD=Nil 13.80
						R9	CR=17% RQD=Nil 14.80
14.80m Completely to highly weathered, whitish grey to light grey, medium grained, fractured rock.						R10	CR=18% RQD=Nil 15.80
						R11	CR=15% RQD=Nil 16.80
						R12	CR=20% RQD=12% 17.80
						R13	CR=32% RQD=Nil 18.80
						R14	CR=25% RQD=Nil 19.80
19.80m Highly weathered, whitish grey to light grey, medium grained, fractured rock.						R15	CR=29% RQD=Nil 20.80
						R16	CR=33% RQD=Nil 21.80
						R17	CR=26% RQD=Nil 22.80
22.80m Highly weathered, whitish grey to light grey, medium grained, fractured rock.						R18	CR=24% RQD=Nil 23.80
						R19	CR=28% RQD=Nil 25.30
23.80m Highly weathered, light grey, medium grained, fractured rock.							
25.30m N.B. - '*' means sample could not be recovered / sample slip.							

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 19/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. PMT3**

Co-ordinates E=-155  
N=32

Field Test	Nos	Samples	Nos	Commencement Date : 18/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	0	Completion Date : 19/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	3	Level Of Ground : 1.591 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : Not found

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m							
Loose, light whitish grey, clayey sandy silt. Observed conch pcs.						DS-1	0.50
						DS-2	1.00
1.70m		2	4	2		SPT-1	1.50-1.95
					6		
		1	2	2		SPT-2	2.45-2.90
					4		
Very loose, light whitish grey, clayey silty sand. Observed conch pcs.						DS-3	3.50
		1	1	2		SPT-3	4.00-4.45
4.60m		100	5.0 cm	Pentn.	Refusal	SPT-4	4.60-4.65
		100	2.0 cm	Pentn.	Refusal	*SPT-5	4.80-4.82
5.20m					Refusal	*SPT-6	5.20-5.22 5.20
Highly weathered, light grey, coarse to medium grained, fractured rock.						R1	CR=27% RQD=Nil
						R2	CR=29% RQD=Nil
						R3	CR=32% RQD=14%
						R4	CR=33% RQD=Nil
9.20m						R5	CR=34% RQD=20%
						R6	CR=35% RQD=Nil
Highly weathered, whitish grey, medium grained, moderately fractured rock.						R7	CR=35% RQD=Nil
12.90m					R8	CR=40% RQD=Nil	

NX rotary drilling from 5.20m to 25.20m

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 19/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. PMT3**

Co-ordinates E=-155  
N=32

Field Test	Nos	Samples	Nos	Commencement Date : 18/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	0	Completion Date : 19/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	3	Level Of Ground : 1.591 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : Not found

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
12.90m						R9	13.20
Highly weathered, whitish grey, medium grained, moderately fractured rock.						R10	14.20
15.20m						R11	15.20
Highly weathered, brownish grey to whitish grey, medium grained, fractured rock.						R12	16.20
						R13	17.20
						R14	18.20
						R15	19.20
20.20m						R16	20.20
Highly weathered, brownish grey to whitish grey, medium grained, fractured rock.						R17	21.20
21.20m						R18	22.20
Highly weathered, brownish grey to whitish grey, medium grained, fractured rock.						R19	23.20
23.20m						R20	24.20
Highly weathered, brownish grey to whitish grey, medium grained, fractured rock.							25.20
24.20m							
Highly weathered, whitish grey, medium grained, completely fractured rock.							
25.20m							

N.B. - '\*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 04/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. CST1**

Co-ordinates E=-220  
N=287

Field Test	Nos	Samples	Nos	Commencement Date : 13/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 15/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.768 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
0.00m Loose, brownish grey, silty sand. Observed kankar & conch.							DS-1	0.50
1.50m		9	5	4		9	SPT-1	1.00-1.45
Very loose, light grey, sandy silt. Observed conch pcs. & clay binder.		1	0	1		1	UDS-1	2.00-2.45
							SPT-2	2.50-2.95
							*UDS-2	3.50-3.95
4.60m		1	2	2		4	SPT-3	4.05-4.50
Very dense, light grey, silty sand with decomposed rock. Observed conch pcs.						>100		
5.60m		11	23	66		>100	SPT-4	5.00-5.40
Highly weathered, light grey, medium grained, highly to moderately fractured rock.		100	5.0	cm Pentn. Refusal		10.0 cm Pentn. Refusal	*SPT-5	5.50-5.53
6.25m		100				2.0 cm Pentn. Refusal	*SPT-6	5.60-5.62
							R1	5.60-5.62
							R2	6.25
Highly weathered, light grey, coarse grained, moderately fractured rock.							R3	7.00
							R4	7.75
8.50m							R5	8.50
							R6	9.25
Highly weathered, light grey, fine to medium grained, highly to moderately fractured rock.							R7	10.00
							R8	10.75
11.50m							R9	11.50
							R10	12.25
Highly weathered, light brownish grey, coarse to medium grained, highly to moderately fractured rock.							R11	13.00
13.60m								

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 04/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. CST1**

Co-ordinates E=-220  
N=287

Field Test	Nos	Samples	Nos	Commencement Date : 13/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 15/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 1.768 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
13.60m						R12	13.75 CR=32% RQD=Nil
						R13	14.50 CR=34% RQD=Nil
Highly weathered, light brownish grey, coarse to medium grained, highly to moderately fractured rock.						R14	15.25 CR=33% RQD=Nil
						R15	16.00 CR=28% RQD=Nil
						R16	16.75 CR=34% RQD=Nil
17.50m						R17	17.50 CR=32% RQD=Nil
Highly weathered, light grey, fine grained, moderately fractured rock.						R18	18.25 CR=31% RQD=Nil
						R19	19.00 CR=32% RQD=Nil
						R20	19.75 CR=34% RQD=Nil
						R21	20.50 CR=35% RQD=Nil
19.00m						R22	21.25 CR=37% RQD=Nil
Highly weathered, whitish grey, medium grained, moderately fractured rock.						R23	22.00 CR=39% RQD=Nil
						R24	22.75 CR=38% RQD=Nil
						R25	23.50 CR=39% RQD=Nil
23.50m						R26	24.25 CR=41% RQD=Nil
Highly to moderately weathered, whitish grey to greenish grey, medium grained, moderately to highly fractured rock.						R27	25.00 CR=45% RQD=Nil
						R28	25.75 CR=52% RQD=Nil
25.75m						R29	26.50 CR=54% RQD=Nil
Moderately weathered, whitish grey, fine to medium grained, moderately fractured rock.							27.00
N.B. - '*' means sample could not be recovered / sample slip.							

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 25/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. CST2**

Co-ordinates E=-27  
N=318

Field Test	Nos	Samples	Nos	Commencement Date : 05/04/2018
Penetrometer (SPT)	9	Undisturbed (UDS)	3	Completion Date : 07/04/2018
Cone (Pc)		Penetrometer (SPT)	9	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 2.39 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
0.00m Light grey, sandy silt. Observed conch.							DS-1	0.50
1.00m Medium dense, light brownish grey, sandy silt. Observed kankar & conch.		6	8	9	17		SPT-1	1.00-1.45
1.80m Very loose, light grey, clayey sandy silt. Observed conch.		1	0	1	1		*UDS-1	2.00-2.45
					3		SPT-2	2.55-3.00
		1	1	2	3		*UDS-2	3.50-3.95
4.60m Very dense, light grey, silty sand. Observed kankar, conch & rock pcs.		36	64	>100			SPT-3	4.05-4.50
5.75m Completely weathered, light grey, coarse to medium grained, highly fractured rock.		36	64	5.0 cm Pentn.	>100		UDS-3	5.00-5.25
		100	3.0 cm Pentn.	Refusal			SPT-4	5.35-5.55
							*SPT-5	5.65-5.68
							*SPT-6	5.75-5.78 5.75
							R1	CR=18% RQD=Nil
		50	2.0 cm Pentn.	Refusal			*SPT-7	6.50-6.52 6.50
							R2	CR=16% RQD=Nil
7.25m Completely/highly weathered, light grey, medium grained, moderately fractured rock.		50	3.0 cm Pentn.	Refusal			*SPT-8	7.25-7.28 7.25
							R3	CR=21% RQD=Nil
								8.00
							R4	CR=24% RQD=Nil
								8.75
							R5	CR=21% RQD=Nil
								9.50
							R6	CR=12% RQD=Nil
								10.25
10.25m Highly weathered, light grey, coarse to fine grained, highly to moderately fractured rock.		50	3.0 cm Pentn.	Refusal			*SPT-9	10.25-10.28 10.25
							R7	CR=21% RQD=Nil
								11.00
							R8	CR=24% RQD=Nil
								11.75
11.75m Highly weathered, light grey, fine grained, moderately fractured rock.							R9	CR=29% RQD=Nil
								12.50
12.50m Highly weathered, light grey, medium grained, moderately fractured rock.							R10	CR=33% RQD=Nil
								13.25
13.75m							R11	CR=37% RQD=Nil

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 25/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. CST2**

Co-ordinates E=-27  
N=318

Field Test	Nos	Samples	Nos	Commencement Date : 05/04/2018
Penetrometer (SPT)	9	Undisturbed (UDS)	3	Completion Date : 07/04/2018
Cone (Pc)		Penetrometer (SPT)	9	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 2.39 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
13.75m Highly weathered, light grey, medium grained, moderately fractured rock.						R12	14.00 CR=32% RQD=Nil
14.00m Highly weathered, light brownish grey, fine to medium grained, fractured rock.						R13	14.75 CR=29% RQD=Nil
15.50m Highly weathered, light grey, fine grained, moderately fractured rock.						R14	15.50 CR=24% RQD=Nil
17.00m Highly weathered, light grey, fine grained, moderately fractured rock.						R15	16.25 CR=25% RQD=Nil
17.00m Highly weathered, light grey, fine grained, moderately fractured rock.						R16	17.00 CR=27% RQD=Nil
19.25m Highly weathered, light grey, fine grained, moderately fractured rock.						R17	17.75 CR=34% RQD=13%
19.25m Highly weathered, coarse to medium grained, moderately fractured rock.						R18	18.50 CR=28% RQD=Nil
20.75m Highly weathered, coarse to medium grained, moderately fractured rock.						R19	19.25 CR=26% RQD=Nil
20.75m Highly weathered, coarse to medium grained, moderately fractured rock.						R20	20.00 CR=31% RQD=Nil
23.00m Highly weathered, whitish grey, medium to fine grained, highly to moderately fractured rock.						R21	20.75 CR=30% RQD=Nil
23.00m Highly weathered, whitish grey, medium to fine grained, highly to moderately fractured rock.						R22	21.50 CR=33% RQD=Nil
23.00m Highly weathered, whitish grey, medium to fine grained, highly to moderately fractured rock.						R23	22.25 CR=39% RQD=Nil
23.00m Highly weathered, whitish grey, medium to fine grained, highly to moderately fractured rock.						R24	23.00 CR=43% RQD=16%
23.00m Highly weathered, whitish grey, medium to fine grained, highly to moderately fractured rock.						R25	23.75 CR=48% RQD=Nil
23.00m Highly/moderately weathered, whitish grey, fine grained, moderately fractured rock.						R26	24.50 CR=34% RQD=Nil
23.00m Highly/moderately weathered, whitish grey, fine grained, moderately fractured rock.						R27	25.25 CR=32% RQD=Nil
23.00m Highly/moderately weathered, whitish grey, fine grained, moderately fractured rock.						R28	26.00 CR=28% RQD=Nil
27.00m N.B. - '*' means sample could not be recovered / sample slip.							27.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 25/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. CST3**

Co-ordinates E=-154  
N=96

Field Test	Nos	Samples	Nos	Commencement Date : 12/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date : 13/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 2.14 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m Medium dense, light grey, silty sand. Observed kankar.					12	DS-1	0.50
1.50m		5	6	6		SPT-1	1.00-1.45
Loose, light grey, silty sand with kankar & conch pcs. Observed clay binder.					4	*UDS-1	2.00-2.45
4.00m		2	2	2		SPT-2	2.50-2.95
4.70m Medium dense, light grey, silty sand with kankar, mica & conch pcs. Observed decomposed rock.					24	*UDS-2	3.50-3.95
5.25m		8	11	13		SPT-3	4.00-4.45
Very dense, light grey, silty sand with kankar, mica & conch pcs.						SPT-4	4.70-4.95
		25	75	100	cm Pentn. >100	*SPT-5	5.10-5.14
		100	4.0	cm Pentn. Refusal	Refusal	*SPT-6	5.25-5.28 5.25
		100			3.0 cm Pentn.	R1	CR=21% RQD=Nil ↓
							6.25
					NX rotary drilling from 5.25m to 26.25m	R2	CR=24% RQD=Nil ↓
							7.25
						R3	CR=28% RQD=Nil ↓
							8.25
						R4	CR=24% RQD=Nil ↓
							9.25
						R5	CR=38% RQD=Nil ↓
							10.25
						R6	CR=25% RQD=Nil ↓
							11.25
						R7	CR=34% RQD=Nil ↓
							12.25
						R8	CR=38% RQD=Nil ↓
							13.25
						R9	CR=26% RQD=Nil ↓
							13.75m

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 25/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. CST3**

Co-ordinates E=-154  
N=96

Field Test	Nos	Samples	Nos	Commencement Date :	12/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	2	Completion Date :	13/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter :	150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground :	2.14 m.
		Water Sample (WS)	0	Water Struck At :	
				Standing Water Level :	

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES	
		EACH DIVN. = 15cm					Ref. No	Depth (m)
13.75m Highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.								14.25
14.25m Highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.							R10	CR=22% RQD=Nil
15.25m Highly weathered, brownish grey, coarse grained, highly fractured rock.							R11	CR=29% RQD=Nil
16.25m Highly weathered, light grey, medium to fine grained, highly fractured rock.							R12	CR=32% RQD=Nil
17.25m Highly weathered, light grey, medium to fine grained, highly fractured rock.							R13	CR=34% RQD=Nil
18.25m Highly weathered, light grey, medium to fine grained, highly fractured rock.							R14	CR=30% RQD=Nil
19.25m Highly weathered, light grey, medium to fine grained, highly fractured rock.							R15	CR=29% RQD=Nil
20.25m Highly weathered, light grey, medium to fine grained, highly fractured rock.							R16	CR=24% RQD=Nil
21.25m Highly weathered, light grey, medium to fine grained, highly fractured rock.							R17	CR=26% RQD=Nil
22.25m Highly weathered, light grey, medium to fine grained, highly fractured rock.							R18	CR=29% RQD=Nil
23.25m Highly weathered, light grey, medium to fine grained, highly fractured rock.							R19	CR=24% RQD=Nil
24.25m Highly weathered, light grey, medium to fine grained, highly fractured rock.							R20	CR=26% RQD=Nil
25.25m Highly weathered, light grey, medium to fine grained, highly fractured rock.							R21	CR=30% RQD=Nil
26.25m N.B. - '*' means sample could not be recovered / sample slip.								



Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 25/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. CST4**

Co-ordinates E = -11  
N = 126

Field Test	Nos	Samples	Nos	Commencement Date : 08/04/2018
Penetrometer (SPT)	8	Undisturbed (UDS)	0	Completion Date : 09/04/2018
Cone (Pc)		Penetrometer (SPT)	8	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	3	Level Of Ground : 2.28 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
Highly weathered, brownish grey to light grey, medium to coarse grained, completely fractured rock.	13.75m	[Symbol]				R9	CR=31% RQD=Nil
		[Symbol]					14.60
		[Symbol]				R10	CR=26% RQD=Nil
		[Symbol]					15.60
	15.60m	[Symbol]				R11	CR=35% RQD=Nil
		[Symbol]					16.60
		[Symbol]				R12	CR=29% RQD=13%
		[Symbol]					17.60
		[Symbol]				R13	CR=32% RQD=Nil
		[Symbol]					18.60
		[Symbol]				R14	CR=26% RQD=Nil
		[Symbol]					19.60
		[Symbol]				R15	CR=33% RQD=Nil
		[Symbol]					20.60
Highly weathered, whitish grey to light grey, medium grained, fractured rock.		[Symbol]				R16	CR=33% RQD=Nil
		[Symbol]					21.60
		[Symbol]				R17	CR=34% RQD=Nil
		[Symbol]					22.60
		[Symbol]				R18	CR=40% RQD=Nil
		[Symbol]					23.60
		[Symbol]				R19	CR=37% RQD=Nil
		[Symbol]					24.60
		[Symbol]				R20	CR=38% RQD=Nil
		[Symbol]					25.60
	26.60m	[Symbol]				R21	CR=35% RQD=Nil
		[Symbol]					26.60

N.B. - '\*' means sample could not be recovered / sample slip.



Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 25/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. CST5**

Co-ordinates E=-226  
N=28

Field Test	Nos	Samples	Nos	Commencement Date : 15/04/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	2	Completion Date : 16/04/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 2.14 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.2 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
0.00m Medium dense, light grey, silty sand. Observed conch pcs.		8	6	4	10	DS-1	0.50
1.70m		1	0	1	1	*UDS-1 SPT-2	2.00-2.45 2.50-2.95
4.00m Very dense, light grey, silty sand with decomposed rock.		19	8	1	>100	UDS-2	3.50-3.95
4.50m		100	9.0 cm Pentn.	4.0 cm Pentn.	Refusal	SPT-3 *SPT-4 *SPT-5	4.00-4.24 4.40-4.44 4.50-4.53 4.50
9.50m		100	3.0 cm Pentn.	NX rotary drilling from 4.50m to 26.50m			
12.50m						R1	CR=24% RQD=Nii ↓ 5.50
13.75m						R2	CR=23% RQD=Nii ↓ 6.50
						R3	CR=25% RQD=Nii ↓ 7.50
						R4	CR=22% RQD=Nii ↓ 8.50
						R5	CR=26% RQD=Nii ↓ 9.50
						R6	CR=21% RQD=Nii ↓ 10.50
						R7	CR=23% RQD=Nii ↓ 11.50
						R8	CR=22% RQD=Nii ↓ 12.50
						R9	CR=23% RQD=Nii ↓ 13.50

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 25/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. CST5**

Co-ordinates E=-226  
N=28

Field Test	Nos	Samples	Nos	Commencement Date : 15/04/2018
Penetrometer (SPT)	5	Undisturbed (UDS)	2	Completion Date : 16/04/2018
Cone (Pc)		Penetrometer (SPT)	5	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	1	Level Of Ground : 2.14 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level : 2.2 m.

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
13.75m						R10	CR=22% RQD=NII ↓ 14.50
Highly weathered, light brownish grey, coarse to medium grained, moderately to highly fractured rock.						R11	CR=24% RQD=NII ↓ 15.50
						R12	CR=25% RQD=NII ↓ 16.50
						R13	CR=23% RQD=NII ↓ 17.50
16.50m						R14	CR=28% RQD=NII ↓ 18.50
Highly weathered, light grey, fine grained, highly fractured rock.						R15	CR=29% RQD=NII ↓ 19.50
						R16	CR=31% RQD=NII ↓ 20.50
17.50m						R17	CR=31% RQD=NII ↓ 21.50
Highly weathered, light grey, fine grained, highly fractured rock.						R18	CR=32% RQD=NII ↓ 22.50
						R19	CR=30% RQD=NII ↓ 23.50
						R20	CR=33% RQD=NII ↓ 24.50
21.50m						R21	CR=36% RQD=NII ↓ 25.50
Highly weathered, whitish grey, fine grained, moderately fractured rock.						R22	CR=34% RQD=NII ↓ 26.50
26.50m							

N.B. - '\*' means sample could not be recovered / sample slip.



Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 25/05/2018

Sheet No:

**BORE LOG DATA SHEET**

**BORE HOLE NO. CST6**

Co-ordinates E=-19  
N=28

Field Test	Nos	Samples	Nos	Commencement Date : 17/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 18/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 2.26 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE					SAMPLES		
		EACH DIVN. = 15cm					Ref. No	Depth (m)	
0.00m Medium dense, light grey, clayey silty sand / clayey sandy silt. Observed conch.							13	DS-1 SPT-1	0.50 1.00-1.45
1.60m Loose, light whitish grey, clayey sandy silt. Observed conch pcs.							4	*UDS-1 SPT-2	2.00-2.45 2.50-2.95
							5	DS-2 SPT-3	3.50 4.00-4.45
5.00m Very dense, light grey, silty sand with decomposed rock.		100	100	100	100	100	>100	SPT-4	5.00-5.10
5.50m Highly weathered, light grey, coarse grained, fractured rock.		100	100	100	100	100	3.0 cm Pentn. Refusal Refusal	*SPT-5 *SPT-6	5.30-5.33 5.50-5.52 5.50
6.50m Highly weathered, light grey, coarse grained, fractured rock.							2.0 cm Pentn. NX rotary drilling from 5.50m to 26.50m	R1	CR=27% RQD=NII ↓ 6.50
								R2	CR=25% RQD=NII ↓ 7.50
								R3	CR=28% RQD=NII ↓ 8.50
								R4	CR=25% RQD=NII ↓ 9.50
								R5	CR=26% RQD=NII ↓ 10.50
								R6	CR=24% RQD=NII ↓ 11.50
11.50m Highly weathered, light grey, coarse grained, fractured rock.								R7	CR=27% RQD=NII ↓ 12.50
12.50m Highly weathered, light whitish grey, medium grained, fractured rock.								R8	CR=28% RQD=NII ↓ 13.50
13.50m 13.75m									↓ 13.50

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.

**CETEST**

Job No : 4115

Created by : SKD

Created on : 25/05/2018

Sheet No:

**BORE LOG DATA SHEET**

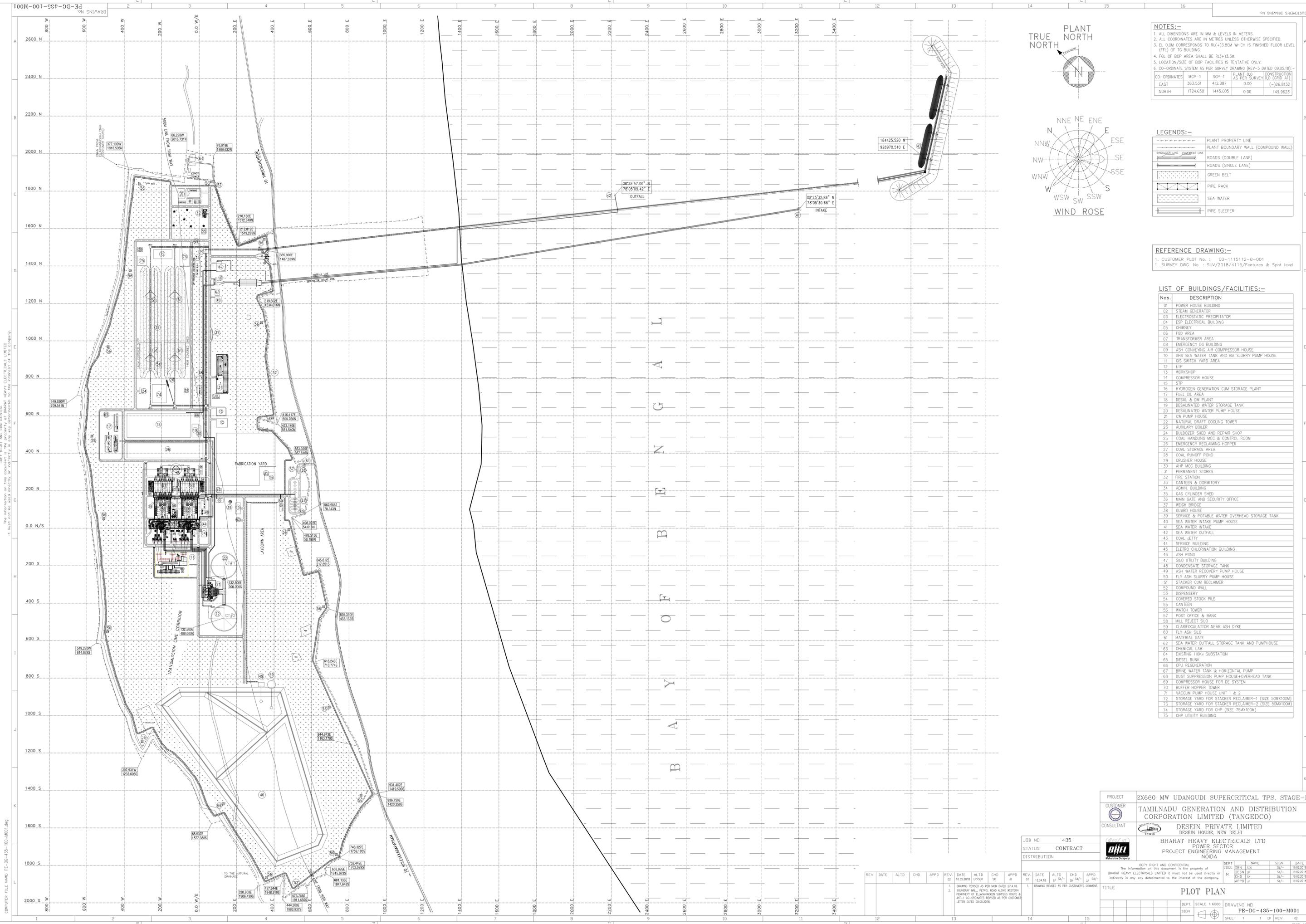
**BORE HOLE NO. CST6**

Co-ordinates E=-19  
N=28

Field Test	Nos	Samples	Nos	Commencement Date : 17/04/2018
Penetrometer (SPT)	6	Undisturbed (UDS)	1	Completion Date : 18/04/2018
Cone (Pc)		Penetrometer (SPT)	6	Bore Hole Diameter : 150mm / NX.
Vane (V)		Disturbed (DS)	2	Level Of Ground : 2.26 m.
		Water Sample (WS)	0	Water Struck At :
				Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE				SAMPLES	
		EACH DIVN. = 15cm				Ref. No	Depth (m)
13.75m Highly weathered, light whitish grey to grey, medium grained, fractured rock.						R9	CR=25% RQD=Nil ↓ 14.50
16.50m Slightly weathered, light whitish grey to grey, medium grained, fractured rock.						R10	CR=28% RQD=Nil ↓ 15.50
17.50m Highly weathered, light whitish grey to grey, medium grained, fractured rock.						R11	CR=24% RQD=Nil ↓ 16.50
21.50m Highly weathered, light whitish grey to grey, medium grained, fractured rock.						R12	CR=80% RQD=Nil ↓ 17.50
24.50m Highly weathered, light whitish grey to grey, medium grained, fractured rock.						R13	CR=29% RQD=Nil ↓ 18.50
26.50m Highly weathered, light whitish grey to grey, medium grained, fractured rock.						R14	CR=30% RQD=Nil ↓ 19.50
						R15	CR=32% RQD=Nil ↓ 20.50
						R16	CR=27% RQD=Nil ↓ 21.50
						R17	CR=24% RQD=Nil ↓ 22.50
						R18	CR=28% RQD=Nil ↓ 23.50
						R19	CR=25% RQD=Nil ↓ 24.50
						R20	CR=30% RQD=Nil ↓ 25.50
						R21	CR=27% RQD=Nil ↓ 26.50

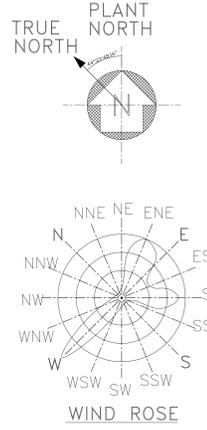
N.B. - '\*' means sample could not be recovered / sample slip.



**NOTES:-**

- ALL DIMENSIONS ARE IN MM & LEVELS IN METERS.
- ALL COORDINATES ARE IN METRES UNLESS OTHERWISE SPECIFIED.
- EL. O.M. CORRESPONDS TO RL(+3.80M WHICH IS FINISHED FLOOR LEVEL (FFL) OF 1<sup>ST</sup> BUILDING.
- FFL OF BOP AREA SHALL BE RL(+13.3M).
- LOCATION/SIZE OF BOP FACILITIES IS TENTATIVE ONLY.
- CO-ORDINATE SYSTEM AS PER SURVEY DRAWING (REV-5 DATED 09.05.18):

CO-ORDINATES	MCP-1	SOP-1	PLANT 0.0	CONSTRUCTION AS PER SURVY D.O (GRID A1)
EAST	363.531	412.087	0.00	(-326.8132
NORTH	1724.658	1445.005	0.00	149.9623



**LEGENDS:-**

--- (dashed line)	PLANT PROPERTY LINE
--- (solid line)	PLANT BOUNDARY WALL (COMPOUND WALL)
--- (thick solid line)	ROADS (DOUBLE LANE)
--- (thin solid line)	ROADS (SINGLE LANE)
--- (dotted pattern)	GREEN BELT
--- (cross-hatch pattern)	PIPE RACK
--- (wavy pattern)	SEA WATER
--- (horizontal lines)	PIPE SLEEPER

**REFERENCE DRAWING:-**

- CUSTOMER PLOT No. : 00-111512-G-001
- SURVEY DWG. No. : SUV/2018/4115/Features & Spot level

**LIST OF BUILDINGS/FACILITIES:-**

Nos.	DESCRIPTION
01	POWER HOUSE BUILDING
02	STEAM GENERATOR
03	ELECTROSTATIC PRECIPITATOR
04	ESP ELECTRICAL BUILDING
05	CHIMNEY
06	FOB AREA
07	TRANSFORMER AREA
08	EMERGENCY DG BUILDING
09	ASH CONVEYING AIR COMPRESSOR HOUSE
10	AHS SEA WATER TANK AND BA SLURRY PUMP HOUSE
11	DS SWITCH YARD AREA
12	ETP
13	WORKSHOP
14	COMPRESSOR HOUSE
15	STR
16	HYDROGEN GENERATION CUM STORAGE PLANT
17	FUEL OIL AREA
18	DESAL & DM PLANT
19	DESALINATED WATER STORAGE TANK
20	DESALINATED WATER PUMP HOUSE
21	CW PUMP HOUSE
22	NATURAL DRAFT COOLING TOWER
23	AUXILIARY BOILER
24	BUILDING SHED AND REPAIR SHOP
25	COAL HANDLING MCC & CONTROL ROOM
26	EMERGENCY RECLAIMING HOPPER
27	COAL STORAGE AREA
28	COAL BIN/FEED POND
29	CRUSHER HOUSE
30	AHP MCC BUILDING
31	PERMANENT STORES
32	FIRE STATION
33	CANTEEN & DORMITORY
34	ADMIN. BUILDING
35	GAS CYLINDER SHED
36	MAIN GATE AND SECURITY OFFICE
37	WEIGH BRIDGE
38	GUARD HOUSE
39	SERVICE & POTABLE WATER OVERHEAD STORAGE TANK
40	SEA WATER INTAKE PUMP HOUSE
41	SEA WATER INTAKE
42	SEA WATER OUTFALL
43	COAL JETTY
44	SERVICE BUILDING
45	ELECTRO CHLORINATION BUILDING
46	ASH POND
47	SILO UTILITY BUILDING
48	CONDENSATE STORAGE TANK
49	ASH WATER RECOVERY PUMP HOUSE
50	FLY ASH SLURRY PUMP HOUSE
51	STACKER CUM RECLAIMER
52	COMPOUND WALL
53	DISPENSERY
54	COVERED STOCK PILE
55	CANTEEN
56	WATCH TOWER
57	POST OFFICE & BANK
58	MILL REJECT SILO
59	CLARIFI-COAGULATOR NEAR ASH DYKE
60	FLY ASH SILO
61	MATERIAL GATE
62	SEA WATER OUTFALL STORAGE TANK AND PUMPHOUSE
63	CHEMICAL LAB
64	EXISTING 110KV SUBSTATION
65	DIESEL BUNK
66	CRU REGENERATION
67	BRINE WATER TANK & HORIZONTAL PUMP
68	DUST SUPPRESSION PUMP HOUSE-OVERHEAD TANK
69	COMPRESSOR HOUSE FOR DE SYSTEM
70	BUFFER HOPPER TOWER
71	VACUUM PUMP HOUSE UNIT 1 & 2
72	STORAGE YARD FOR STACKER RECLAIMER-1 (SIZE 50MX100M)
73	STORAGE YARD FOR STACKER RECLAIMER-2 (SIZE 50MX100M)
74	STORAGE YARD FOR CHP (SIZE 75MX100M)
75	CHP UTILITY BUILDING

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PROJECT	2X660 MW UDANGUDI SUPERCRITICAL TPS, STAGE-1
CUSTOMER	TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
CONSULTANT	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA
JOB NO.	435
STATUS	CONTRACT
DISTRIBUTION	

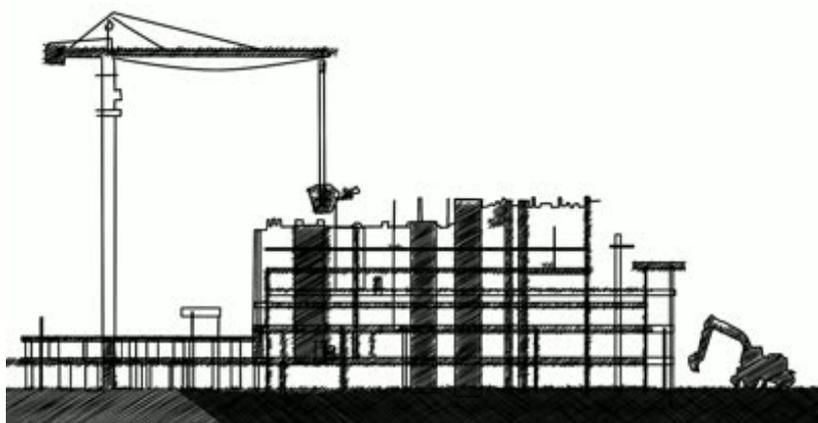
DEPT: ENR, NAME: ENR, SIGN: ENR, DATE: 19/02/2018  
 DEPT: CHD, NAME: CHD, SIGN: CHD, DATE: 19/02/2018  
 DEPT: APPD, NAME: APPD, SIGN: APPD, DATE: 19/02/2018

TITLE: PLOT PLAN  
 DEPT: SCALE: 1:6000, DRAWING NO: PE-DG-435-100-M001  
 SHEET: 1 OF 02, REV: 02

REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD
1					1				
2					2				

1. DRAWING REVISION AS PER MOM DATED 27.4.18.  
 2. BOUNDARY WALL, FENCE, ROAD ALONG WESTERN PROPERTY OF UDANGUDI SUPERCRITICAL TPS & JETTY-1 CO-ORDINATES REVISION AS PER CUSTOMER LETTER DATED 09.05.2018.

COMPUTER FILE NAME: PE-DG-435-100-M001.dwg



**HEALTH,  
SAFETY and  
ENVIRONMENT  
PLAN**

for

**SITE  
OPERATIONS**

by

**SUB-  
CONTRACTORS**

**POWER SECTOR**



HEALTH, SAFETY AND ENVIRONMENT  
PLAN FOR  
SITE OPERATION by SUBCONTRACTORS

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

POWER SECTOR

DOCUMENT ISSUE SHEET

	Prepared	Reviewed	Approved
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Designation	Dy. Manager PSHQ(FQA & Safety)	GM PSHQ(FQA & Safety)	ED PSHQ(FQA & Safety)
Signature			
Date	12/8/14	12/8/14	12/8/14

# HSE PLAN FOR SITE OPERATIONS BY BHEL'S SUBCONTRACTORS

## AT A GLANCE

BEFORE START	<b>SIGNING OF MOU</b> Agree to comply to HSE requirement- Statutory and BHEL's	
PLAN	<b>HSE ORGANISATION</b>	
	<p style="text-align: center;"><b>Manpower</b></p> <ul style="list-style-type: none"> <li>1 (one) safety officer for every 500 workers or part thereof</li> <li>1(one) safety-steward/ supervisor for every 100 workers</li> </ul> <p><b>Qualification</b> As per Cl. 7.1</p>	<p style="text-align: center;"><b>HSE Roles and responsibilities</b></p> <ul style="list-style-type: none"> <li>Site In-charge- As per clause 7.2.1</li> <li>Safety officer- As per clause 7.2.2</li> </ul>
	<b>HSE Planning</b> for Man , Machinery/Equipment/Tools & Tackles	
PROVIDE	<b>HSE INFRASTRUCTURE</b>	
	<ul style="list-style-type: none"> <li>PPEs</li> <li>Drinking Water</li> <li>Washing Facilities</li> <li>Latrines and Urinals</li> <li>Provision of shelter for rest</li> <li>Medical facilities</li> </ul>	<ul style="list-style-type: none"> <li>Canteen facilities</li> <li>Labour Colony</li> <li>Emergency Vehicle</li> <li>Pest Control</li> <li>Scrapyard</li> <li>Illumination</li> </ul>
TRAIN	<b>HSE TRAINING , AWARENESS &amp; PROMOTION</b>	
	<p style="text-align: center;"><b>Training</b></p> <ul style="list-style-type: none"> <li>Induction training</li> <li>Height work and other critical areas</li> <li>Tool Box talk &amp; Pep Talk</li> </ul>	<p style="text-align: center;"><b>Awareness &amp; Promotion</b></p> <ul style="list-style-type: none"> <li>Signage</li> <li>Poster</li> <li>Banner</li> <li>Competition</li> <li>Awards</li> </ul>
COMMUNICATE	<b>HSE COMMUNICATION</b>	
	<p style="text-align: center;"><b>Incident Reporting</b></p> <ul style="list-style-type: none"> <li>Accident- Fatal &amp; Major</li> <li>Property damage</li> <li>Near Miss</li> </ul>	<p style="text-align: center;"><b>Event Reporting</b></p> <ul style="list-style-type: none"> <li>Celebrations</li> <li>Training</li> <li>Medical camp</li> </ul>

**EXECUTE SAFELY**

**OPERATIONAL CONTROL PROCEDURES**

**PERMIT TO WORK**

Height work ( above 2 metres), Hot Work, Heavy Lifting, Confined Space, Radiography, excavation( More than 4 metres)

**SAFETY DURING WORK EXECUTION**

- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>• Welding</li><li>• Rigging</li><li>• Cylinder- storage &amp; Movement</li><li>• Demolition work</li><li>• T&amp;Ps</li><li>• Chemical Handling</li><li>• Electrical works</li></ul> | <ul style="list-style-type: none"><li>• Fire</li><li>• Scaffolding</li><li>• Height work</li><li>• Working Platform</li><li>• Excavation</li><li>• Ladder</li><li>• Lifting</li><li>• Hoisting appliance</li></ul> |
|--|--|

**HOUSE KEEPING**

**WASTE MANGEMENT**

**TRAFFIC MANAGEMENT**

**ENVIRONMENTAL CONTROL**

**EMERGENCY PREPAREDNESS AND RESPONSE PLAN**

**CHECKS**

**HSE AUDITS & INSPECTION**

- |  |   |
|--|---|
| <ul style="list-style-type: none"><li>• Daily Checks</li><li>• Inspection of PPEs</li><li>• Inspection of T&amp; Ps</li><li>• Inspection of Cranes &amp; Winches</li></ul> | <ul style="list-style-type: none"><li>• Inspection of Height work</li><li>• Inspection of Welding and Gas cutting</li><li>• Inspection of elevators etc</li></ul> |
|--|---|

**HSE PERFORMANCE EVALUATION PARAMETERS**

**NON CONFORMANCE**

**PENALTY for NON CONFORMANCE**

**Refer Clause 16**

**Incremental penalty**

For repeated violation by the same person, the penalty would be double of the previous penalty

For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.



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## 1.0 PURPOSE

- 1.1 The purpose of this HSE Plan is to provide for the systematic identification, evaluation, prevention and control of general workplace hazards, specific job hazards, potential hazards and environmental impacts that may arise from foreseeable conditions during installation and servicing of industrial projects and power plants.
- 1.2 This document shall be followed by BHEL's subcontractors at all installation and servicing sites. In case customer specific documents are to be implemented, this document will be followed in conjunction with customer specific documents.
- 1.3 Although every effort has been made to make the procedures and guidelines in line with statutory requirements, in case of any discrepancy relevant statutory guidelines must be followed.
- 1.4 In case the customer has any specific requirement, the same is to be fulfilled.

## 2.0 SCOPE

The document is applicable for BHEL's Subcontractors at all installation / servicing activities of BHEL Power Sector as per the relevant contractual obligations.

## 3.0 OBJECTIVES AND TARGETS

The HSE Plan reflects that BHEL places high priority upon the Occupational Health, Safety and Environment at workplaces.

- Ensure the Health and Safety of all persons at work site is not adversely affected by the work.
- Ensure protection of environment of the work site.
- Comply at all times with the relevant statutory and contractual HSE requirements.
- Provide trained, experienced and competent personnel. Ensure medically fit personnel only are engaged at work.
- Provide and maintain plant, places and systems of work that are safe and without risk to health and the environment.
- Provide all personnel with adequate information, instruction, training and supervision on the safety aspect of their work.
- Effectively control, co-ordinate and monitor the activities of all personnel on the Project sites including subcontractors in respects of HSE.
- Establish effective communication on HSE matters with all relevant parties involved in the Project works.
- Ensure that all work planning takes into account all persons that may be affected by the work.
- Ensure fitness testing of all T&Ps/Lifting appliances like cranes, chain pulley blocks etc. are to be certified by competent person.
- Ensure timely provision of resources to facilitate effective implementation of HSE requirements.
- Ensure continual improvements in HSE performance
- Ensure conservation of resources and reduction of wastage.
- Capture the data of all incidents including near misses, process deviation etc. Investigate and analyze the same to find out the root cause.
- Ensure timely implementation of correction, corrective action and preventive action.



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**HSE TARGETS**

EXPLOSION	ZERO
FATALITY	ZERO
LOST TIME INJURY	ZERO
FIRE	ZERO
VEHICLE INCIDENTS	ZERO
ENVIRONMENTAL INCIDENTS	ZERO

**4.0 BHEL POWER SECTOR HEALTH, SAFETY & ENVIRONMENT POLICY**

**Power Sector HSE Policy**

We, at BHEL Power Sector, reaffirm our belief that the Health and Safety of our stakeholders and conservation of Environment is of utmost importance and takes precedence in all our business decisions. In pursuit of this belief and commitment, we strive to:

- ✓ Ensure total compliance with applicable legislation, regulations and other requirements concerning Occupational Health, Safety and Environment.
- ✓ Ensure continual improvement in the Occupational Health, Safety and Environment Management System performance.
- ✓ Enhance Occupational Health, Safety and Environment awareness amongst employees, customers and suppliers by proactive communication and training.
- ✓ Review periodically and improve Occupational Health, Safety and Environment Management System to ensure its continuing suitability, adequacy and effectiveness in a continuously changing business environment.
- ✓ Develop a culture of safety through active leadership and provide appropriate training at all levels to enable employees to fulfill their Health, Safety and Environmental obligations.
- ✓ Incorporate appropriate Occupational Health, Safety and Environmental criteria into business decisions for selection of plant, technology and services as well as appointment of key personnel.
- ✓ Ensure availability at all times of appropriate resources to fully implement the Occupational Health, Safety and Environmental policy of the company.

This policy will be communicated to all employees and made available to interested parties.

Sd/-

Date: 01.05.2013

Director (Power)



**HEALTH, SAFETY AND ENVIRONMENT  
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**5.0 MEMORANDUM OF UNDERSTANDING:**

After award of work, subcontractors are required to enter into a memorandum of understanding as given below:

**Memorandum of Understanding**

BHEL, Power Sector \_\_\_\_\_ Region is committed to Health, Safety and Environment Policy (HSE Policy).

M/s \_\_\_\_\_ do hereby also commit to comply with the same HSE Policy while executing the Contract Number \_\_\_\_\_

M/s \_\_\_\_\_ shall ensure that safe work practices as per the HSE plan. Spirit and content therein shall be reached to all workers and supervisors for compliance.

In addition to this, M/S \_\_\_\_\_ shall comply to all applicable statutory and regulatory requirements which are in force in the place of project and any special requirement specified in the contract document of the principal customer.

M/s \_\_\_\_\_ shall co-operate in HSE audits/inspections conducted by BHEL /customer/ third party and ensure to close any non-conformity observed/reported within prescribed time limit.

Signed by authorized representative of M/s -----

Name :

Place & Date:



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## 6.0 TERMS AND DEFINITIONS

### 6.1 DEFINITIONS

#### 6.1.1 INCIDENT

Work- related or natural event(s) in which an injury , or ill health (regardless of severity), damage to property or fatality occurred, or could have occurred.

#### 6.1.2 NEAR MISS

An incident where no ill health, injury, damage or other loss occurs, but it had a potential to cause, is referred to as "Near-Miss".

#### 6.1.3 MAN-HOUR WORKED

The total number of man hours worked by all employees including subcontractors working in the premises. It includes managerial, supervisory, professional, technical, clerical and other workers including contract labours. Man-hours worked shall be calculated from the payroll or time clock recorded including overtime. When this is not feasible, the same shall be estimated by multiplying the total man-days worked for the period covered by the number of hours worked per day. The total number of workdays for a period is the sum of the number of men at work on each day of period. If the daily hours vary from department to department separate estimate shall be made for each department and the result added together.

#### 6.1.4 FIRST AID CASES

First aids are not essentially all reportable cases, where the injured person is given medical treatment and discharged immediately for reporting on duty, without counting any lost time.

#### 6.1.5 LOST TIME INJURY

Any work injury which renders the injured person unable to perform his regular job or an alternative restricted work assignment on the next scheduled work day after the day on which the injury occurred.

#### 6.1.6 MEDICAL CASES

Medical cases come under non-reportable cases, where owing to illness or other reason the employee was absent from work and seeks Medical treatment.

#### 6.1.7 TYPE OF INCIDENTS & THEIR REPORTING:

The three categories of Incident are as follows:

##### **Non-Reportable Cases:**

An incident, where the injured person is given medical help and discharged for work without counting any lost time.



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**Reportable Cases:**

In this case the injured person is disable for 48 hours or more and is not able to perform his duty.

**Injury Cases:**

These are covered under the heading of non-reportable cases. In these cases the incident caused injury to the person, but he still continues his duty.

**6.1.8 TOTAL REPORTABLE FREQUENCY RATE**

Frequency rate is the number of Reportable Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula read as:

$$\frac{\text{Number of Reportable LTI} \times 1,000,000}{\text{Total Man Hours Worked}}$$

**6.1.9 SEVERITY RATE**

Severity rate is the Number of days lost due to Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula reads as:

$$\frac{\text{Days lost due to LTI} \times 1,000,000}{\text{Total Man Hours Worked}}$$

**6.1.10 INCIDENCE RATE**

Incidence Rate is the Number of LTI per one thousand manpower deployed. Mathematically, the formula reads as:

$$\frac{\text{Number of LTI} \times 1000}{\text{Average number of manpower deployed}}$$

**7.0 HSE ORGANISATION**

**Number of safety officers:**

The subcontractor must deploy one safety officer for every 500 workers or part thereof in each package. In addition, there must be one safety-steward/safety-supervisor for every 100 workers.

**Deployment:** The subcontractor should deploy sufficient safety officers and safety-steward/Safety-supervisor, as per requirement given above, since initial stage and add more in proportion to the added strength in work force. Any delay in deployment will attract a penalty of Rs.30,000/- per man month for the delayed period.

**7.1 QUALIFICATION FOR HSE PERSONNEL**

Sl.no	Designation	Qualification	Experience
1	Safety officer (Construction Agency)	Degree or Diploma in Engineering with full time diploma in Industrial Safety with construction safety as one of the subjects	Minimum two years for degree holder and five years for diploma holder in the field of Construction of power plant/ major industries



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2	Safety-Steward/ Supervisor	Safety-	Degree or diploma in any discipline with full time diploma in Industrial Safety with construction safety as one of the subjects	Minimum two years
---	-------------------------------	---------	---	-------------------

## 7.2 RESPONSIBILITIES

### 7.2.1 SITE IN -CHARGE OF SUBCONTRACTOR

- Shall sign Memorandum of Understanding (MoU) for compliance to BHEL's HSE Plan for Site Operations as per clause 5.0
- Shall engage qualified safety officer(s) and steward (s) as per clause 7.0
- Shall adhere to the rules and regulations mentioned in this code, practice very strictly in his area of work in consultation with his concerned engineer and the safety coordinator.
- Shall screen all workmen for health and competence requirement before engaging for the job and periodically thereafter as required.
- Shall not engage any employee below 18 years.
- Shall arrange for all necessary PPEs like safety helmets, belts, full body harness, shoes, face shield, hand gloves etc. before starting the job. Shall ensure that no working men/women carry excessive weight more than stipulated in Factory Rule Regulation R57.
- Shall ensure that all T&Ps engaged are tested for fitness and have valid certificates from competent person.
- Shall ensure that provisions stipulated in contract Labour Regulation Act 1970, Chapter V C.9, canteen, rest rooms/washing facilities to contracted employees at site.
- Shall adhere to the instructions laid down in Operation Control Procedures (OCPs) available with the site management.
- Shall ensure that person working above 2.0 meter should use Safety Harness tied to a life line/stable structure.
- Shall ensure that materials are not thrown from height. Cautions to be exercised to prevent fall of material from height.
- Shall report all incidents(Fatal/Major/Minor/Near Miss)to the Site engineer /HSE officer of BHEL.
- Shall ensure that Horseplay is strictly forbidden.
- Shall ensure that adequate illumination is arranged during night work.
- Shall ensure that all personnel working under subcontractor are working safely and do not create any Hazard to self and to others.
- Shall ensure display of adequate signage/posters on HSE.
- Shall ensure that mobile phone is not used by workers while working.
- Shall ensure conductance of HSE audit, mockdrill, medical camps, induction training and training on HSE at site.
- Shall ensure full co-operation during HQ/External /Customer HSE audits.



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- Shall ensure submission of look-ahead plan for procurement of HSE equipment's and PPEs as per work schedule.
- Shall ensure good housekeeping.
- Shall ensure adequate valid fire extinguishers are provided at the work site.
- Shall ensure availability of sufficient number of toilets /restrooms and adequate drinking water at work site and labour colony.
- Shall ensure adequate emergency preparedness.
- Shall be member of site HSE committee and attend all meetings of the committee
- Power source for hand lamps shall be maximum of 24 v.
- Temporary fencing should be done for open edges if Hand – railings and Toe-guards are not available.

**7.2.2 HEALTH, SAFETY AND ENVIRONMENT OFFICER OF SUBCONTRACTOR**

- Carry out safety inspection of Work Area, Work Method, Men, Machine & Material, P&M and other tools and tackles.
- Facilitate inclusion of safety elements into Work Method Statement.
- Highlight the requirements of safety through Tool-box / other meetings.
- Help concerned HOS to prepare Job Specific instructions for critical jobs.
- Conduct investigation of all incident/dangerous occurrences & recommend appropriate safety measures.
- Advice & co-ordinate for implementation of HSE permit systems, OCPs & MPs.
- Convene HSE meeting & minute the proceeding for circulation & follow-up action.
- Plan procurement of PPE & Safety devices and inspect their healthiness.
- Report to PS Region/HQ on all matters pertaining to status of safety and promotional program at site level.
- Facilitate administration of First Aid
- Facilitate screening of workmen and safety induction.
- Conduct fire Drill and facilitate emergency preparedness
- Design campaigns, competitions & other special emphasis programs to promote safety in the workplace.
- Apprise PS– Region on safety related problems.
- Notify site personnel non-conformance to safety norms observed during site visits / site inspections.
- Recommend to Site In charge, immediate discontinuance of work until rectification, of such situations warranting immediate action in view of imminent danger to life or property or environment.
- To decline acceptance of such PPE / safety equipment that do not conform to specified requirements.
- Encourage raising Near Miss Report on safety along with, improvement initiatives on safety.
- Shall work as interface between various agencies such customer, package-in-charges, subcontractors on HSE matters



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**8.0 PLANNING BY SUBCONTRACTOR**

**8.1 MOBILISATION OF MACHINERY/EQUIPMENT/TOOLS BY SUBCONTRACTOR**

- As a measure to ensure that machinery, equipment and tools being mobilized to the construction site are fit for purpose and are maintained in safe operating condition and complies with legislative and owner requirement, inspection shall be arranged by in-house competent authority for acceptance as applicable.
- The machinery and equipment to be embraced for this purpose shall include but not limited to the following:
  - Mobile cranes.
  - Side Booms.
  - Forklifts.
  - Grinding machine.
  - Drilling machine.
  - Air compressors.
  - Welding machine.
  - Generator sets.
  - Dump Trucks.
  - Excavators.
  - Dozers
  - Grit Blasting Equipment.
  - Hand tools.
- Subcontractor shall notify the engineer, of his intention to bring on to site any equipment or any container, with liquid or gaseous fuel or other substance which may create a hazard. The Engineer shall have the right to prescribe the condition under which such equipment or container may be handled and used during the performance of the works and the subcontractor shall strictly adhere to such instructions. The Engineer shall have the right to inspect any construction tool and to forbid its use, if in his opinion it is unsafe. No claim due to such prohibition will be entertained.

**8.2 MOBILISATION OF MANPOWER BY SUBCONTRACTOR**

- The subcontractor shall arrange induction and regular health check of their employees as per schedule VII of BOCW rules by a registered medical practitioner.
- The subcontractor shall take special care of the employees affected with occupational diseases under rule 230 and schedule II of BOCW Rules. The employees not meeting the fitness requirement should not be engaged for such job.
- Ensure that the regulatory requirements of excessive weight limit (to carry/lift/ move weights beyond prescribed limits) for male and female workers are complied with.
- Appropriate accommodation to be arranged for all workmen in hygienic condition.



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**8.3 PROVISION OF PPEs**

- Personnel Protective Equipment (PPEs), in adequate numbers, will be made available at site & their regular use by all concerned will be ensured
- The following matrix recommends usage of minimum PPEs against the respective job.

Sl. No	Type of work	PPEs
1	Concrete and asphalt mixing	Nose mask, hand glove, apron and gum boot
2	Welders/Grinders/ Gas cutters	Welding/face screen, apron, hand gloves, nose mask and ear muffs if noise level exceeds 90dB. Helmet fitted with welding shield is preferred for welders
3	Stone/ concrete breakers	Ear muffs, safety goggles, hand gloves
4	Electrical Work	Rubber hand glove, Electrical Resistance shoes
5	Insulation Work	Respiratory mask, Hand gloves, safety goggles
6	Work at height	Double lanyard full body harness, Fall arrestor (specific cases)
7	Grit/Sand blasting	Blast suit, blast helmet, respirator, leather gloves
8	Painting	Plastic gloves, Respirators (particularly for spray painting)
9	Radiography	As per BARC guidelines

- The PPEs shall conform to the relevant standards as below and bear ISI mark.

**Relevant is-codes for personal protection**

IS: 2925 – 1984	Industrial Safety Helmets.
IS: 4770 – 1968	Rubber gloves for electrical purposes.
IS: 6994 – 1973 (Part-I)	Industrial Safety Gloves (Leather & Cotton Gloves).
IS: 1989 – 1986 (Part-I-II)	Leather safety boots and shoes.
IS: 5557 – 1969	Industrial and Safety rubber knee boots.
IS: 6519 – 1971	Code of practice for selections care and repair of Safety footwear.
IS: 11226 – 1985	Leather Safety footwear having direct molding sole.
IS: 5983 – 1978	Eye protectors.
IS: 9167 – 1979	Ear protectors.
IS: 1179-1967	Eye & Face protection during welding
IS: 3521 – 1983	Industrial Safety Belts and Harness
IS:8519 -1977	Guide for selection of industrial Safety equipment for body protection
IS:9473-2002,14166-1994,14746-1999	Respiratory Protective Devices

The list is not exhaustive. The safety officer may demand additional PPEs based on specific requirement.



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- Where workers are employed in sewers and manholes, which are in use, the subcontractor shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into manhole, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent incident to the public
- Besides the PPEs mentioned above, the persons shall use helmet and safety shoe. The visitors shall use Helmet and any other PPEs as deemed appropriate for the area of work.

**Colour scheme for Helmets:**

1. Workmen: Yellow
  2. Safety staff: Green or white with green band
  3. Electrician: Red
  4. Others including visitors: White
- All the PPEs shall be checked for its quality before issue and the same shall be periodically checked. The users shall be advised to check the PPEs themselves for any defect before putting on. The defective ones shall be repaired/ replaced.
  - The issuing agency shall maintain register for issue and receipt of PPEs.
  - The Helmets shall have logo or name (abbreviation of agency name permitted) affixed or printed on the front.
  - The body harnesses shall be serial numbered.

## **8.4 ARRANGEMENT OF INFRASTRUCTURE**

### **8.4.1 DRINKING WATER**

- Drinking water shall be provided and maintained at suitable places at different elevations.
- Container should be labeled as " Drinking Water"
- Cleaning of the storage tank shall be ensured atleast once in 3 months indicating date of cleaning and next due date.
- Potability of water should be tested as per IS10500 at least once in a year.

### **8.4.2 WASHING FACILITIES**

- In every workplace, adequate and suitable facilities for washing shall be provided and maintained.
- Separate and adequate cleaning facilities shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic condition and dully illuminated for night use.
- Overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the painters and other workers to wash during the cessation of work.

### **8.4.3 LATRINES AND URINALS**

- Latrines and urinals shall be provided in every work place.
- Urinals shall also be provided at different elevations.
- They shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times, by appointing designated person.
- Separate facilities shall be provided for the use of male and female worker if any.



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**8.4.4 PROVISION OF SHELTER DURING REST**

Proper Shed & Shelter shall be provided for rest during break

**8.4.5 MEDICAL FACILITIES**

**8.4.5.1 MEDICAL CENTRE (As per Schedule V, X and XI of BOCW central Rules, 1998)**

- A medical centre shall be ensured/identified at site with basic facilities for handling medical emergencies. The medical center can be jointly developed on proportionate sharing basis with permission from BHEL
- A qualified medical professional, not less than MBBS, shall be deployed at the medical centre
- The medical centre shall be equipped with one ambulance, with trained driver and oxygen cylinder.
- Medical waste shall be disposed as per prevailing legislation (Bio-Medical Waste –Management and Handling Rules, 1998)

**8.4.5.2 FIRST AIDER**

- Ensure availability of Qualified First-aider throughout the working hours.
- Every injury shall be treated, recorded and reported.
- Refresher course on first aid shall be conducted as necessary.
- List of Qualified first aiders and their contact numbers should be displayed at conspicuous places.

**8.4.5.3 FIRST AID BOX (as per schedule III of BOCW)**

- The subcontractor shall provide necessary first aid facilities as per schedule III of BOCW. At every work place first aid facilities shall be provided and maintained.
- The first aid box shall be kept by first aider who shall always be readily available during the working hours of the work place. His name and contact no to be displayed on the box.
- The first aid boxes should be placed at various elevations so as to make them available within the reach and at the quickest possible time.
- The first aid box shall be distinctly marked with a Green Cross on white background.
- Details of contents of first aid box is given in Annexure No. 01
- Monthly inspection of First Aid Box shall be carried out by the owner as per format no. HSEP:13-F01
- The subcontractor should conduct periodical first –aid classes to keep his supervisor and Engineers properly trained for attending to any emergency.

**8.4.5.4 HEALTH CHECK UP (As per schedule VII and Form XI)**

The persons engaged at the site shall undergo health checkup as per the format no. HSEP:13-F02 before induction. The persons engaged in the following works shall undergo health checkup at least once in a year:

- a. Height workers
- b. Drivers/crane operators/riggers



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- c. Confined space workers
- d. Shot/sand blaster
- e. Welding and NDE personnel

**8.4.6 PROVISION OF CANTEEN FACILITY**

- Canteen facilities shall be provided for the workmen of the project inside the project site.
- Proper cleaning and hygienic condition shall be maintained.
- Proper care should be taken to prevent biological contamination.
- Adequate drinking water should be available at canteen.
- Fire extinguisher shall be provided inside canteen.
- Regular health check-up and medication to the canteen workers shall be ensured.

**8.4.7 PROVISION OF ACCOMODATION/LABOUR COLONY**

- The subcontractor shall arrange for the accommodation of workmen at nearby localities or by making a labour colony.
- Regular housekeeping of the labour colony shall be ensured.
- Proper sanitation and hygienic conditions to be maintained.
- Drinking water and electricity to be provided at the labour colony.
- Bathing/ washing bay
- Room ventilation and electrification.

**8.4.8 PROVISION OF EMERGENCY VEHICLE**

- Dedicated emergency vehicle shall be made available at workplace by each subcontractor to handle any emergency

**8.4.9 PEST CONTROL**

Regular pest control should be carried out at all offices, mainly laboratories, canteen, labour colony and stores.

**8.4.10 SCRAPYARD**

- In consultation with customer, scrapyard shall be developed to store metal scrap, wooden scrap, waste, hazardous waste.
- Scrap/Waste shall be segregated as Bio-degradable and non-bio-degradable and stored separately.

**8.4.11 ILLUMINATION**

- The subcontractor shall arrange at his cost adequate lighting facilities e.g. flood lighting, hand lamps, area lighting etc. at various levels for safe and proper working operations at dark places and during night hours at the work spot as well as at the pre-assembly area.
- Adequate and suitable light shall be provided at all work places & their approaches including passage ways as per IS: 3646 (Part-II). Some recommended values are given below:



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S. No.	Location	Illumination (Lux)
<b>A. Construction Area</b>		
1.	Outdoor areas like store yards, entrance and exit roads	20
2.	Platforms	50
3.	Entrances, corridors and stairs	100
4.	General illumination of work area	150
5.	Rough work like fabrication, assembly of major items	150
6.	Medium work like assembly of small machined parts	300
	rough measurements etc.	
7.	Fine work like precision assembly, precision measurements etc.	700
8.	Sheet metal works	200
9.	Electrical and instrument labs	450
<b>B. Office</b>		
1.	Outdoor area like entrance and exit roads	20
2.	Entrance halls	150
3.	Corridors and lift cars	70
4.	Lift landing	150
5.	Stairs	100
6.	Office rooms, conference rooms, library reading tables	300
7.	Drawing table	450
8.	Manual telephone exchange	200

- Lamp (hand held) shall not be powered by mains supply but either by 24V or dry cells.
- Lamps shall be protected by suitable guards where necessary to prevent danger, in case of breakage of lamp.
- Emergency lighting provision for night work shall be made to minimise danger in case of main supply failure.

If the subcontractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions issued by the authorized BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the subcontractor

## 9.0 HSE TRAINING & AWARENESS

### 9.1 HSE INDUCTION TRAINING

All persons entering into project site shall be given HSE induction training by the HSE officer of BHEL /subcontractor before being assigned to work.

In-house induction training subjects shall include but not limited to:

- Briefing of the Project details.
- Safety objectives and targets.
- Site HSE rules.
- Site HSE hazards and aspects.
- First aid facility.
- Emergency Contact No.
- Incident reporting.
- Fire prevention and emergency response.
- Rules to be followed in the labour colony (if applicable)



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- Proper safety wear & gear must be issued to all the workers being registered for the induction (i.e., Shoes/Helmets/Goggles/Leg guard/Apron etc.)
- They must arrive fully dressed in safety wear & gear to attend the induction.
- Any one failing to conform to this safety wear& gear requirement shall not qualify to attend.
- On completing attending subcontractor's in-house HSE induction, each employee shall sign an induction training form (format no. HSEP:13-F03) to declare that he had understood the content and shall abide to follow and comply with safe work practices. They may only then be qualified to be issued with a personal I.D. card, for access to the work site.

## 9.2 HSE TOOLBOX TALK

- HSE tool Box talk shall be conducted by frontline foreman/supervisor of subcontractor to specific work groups prior to the start of work. The agenda shall consist of the followings:
  - Details of the job being intended for immediate execution.
  - The relevant hazards and risks involved in executing the job and their control and mitigating measures.
  - Specific site condition to be considered while executing the job like high temperature, humidity, unfavorable weather etc.
  - Recent non-compliances observed.
  - Appreciation of good work done by any person.
  - Any doubt clearing session at the end.
- Record of Tool box talk shall be maintained as per format no. HSEP:13-F04
- Tool box talk to be conducted at least once a week for the specific work.

## 9.3 TRAINING ON HEIGHT WORK

Training on height work shall be imparted to all workers working at height by in-house/external faculty at least twice in a year. The training shall include following topics:

- Use of PPEs
- Use of fall arrester, retractable fall arrester, life line, safety nets etc.
- Safe climbing through monkey ladders.
- Inspection of PPEs.
- Medical fitness requirements.
- Mock drill on rescue at height.
- Dos & Don'ts during height work.

## 9.4 HSE TRAINING DURING PROJECT EXECUTION

- Other HSE training shall be arranged by BHEL/ subcontractor as per the need of the project execution and recommendation of HSE committee of site.
- The topics of the HSE training shall be as follows but not limited to:
  - Hazards identification and risk analysis (HIRA)
  - Work Permit System
  - Incident investigation and reporting
  - Fire fighting
  - First aid
  - Fire-warden training
  - EMS and OHSMS
  - T & Ps fitness and operation



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- Electrical safety
- Welding, NDE & Radiological safety
- Storage, preservation & material handling.
- A matrix shall be maintained to keep an up-to-date record of attendance of training sessions carried out.

**9.5 HSE PROMOTION-SIGNAGE, POSTERS, COMPETITION, AWARDS ETC**

**9.5.1 Display of HSE posters and banners**

- Site shall arrange appropriate posters, banners, slogans in local/Hindi/English languages at work place

**9.5.2 Display of HSE signage**

- Appropriate HSE signage shall be displayed at the work area to aware workmen and passersby about the work going on and do's and don'ts to be followed

**9.5.3 Competition on HSE and award**

- Site will arrange different competition (slogan, poster, essay etc.) on HSE time to time (Safety day, BHEL day, World Environment Day etc.) and winners will be suitably awarded.

**9.5.4 HSE awareness programme**

- Subcontractor shall arrange HSE awareness programme periodically on different topics including medical awareness for all personnel working at site

**10.0 HSE COMMUNICATION**

**10.1 INCIDENT REPORTING**

- The subcontractor shall submit report of all incidents, fires and property damage etc to the Engineer immediately after such occurrence, but in any case not later than 24 hours of the occurrence. Such reports shall be furnished in the manner prescribed by BHEL. ( Refer HSE procedure for incident investigation, analysis and reporting for details)
- In addition, periodic reports on safety shall also be submitted by the subcontractor to BHEL from time to time as prescribed by the Engineer. Compiled monthly reports of all kinds of incidents, fire and property damage to be submitted to BHEL safety officer as per prescribed formats.
- HSE incidents of site shall be reported to BHEL site Management as per Procedure for Incident Investigation and Reporting in format no. HSEP:14-F15. Corrective action shall be immediately implemented at the work place and compliance shall be verified by BHEL HSE officer and until then, work shall be put on hold by Construction Manager.

**10.2 HSE EVENT REPORTING**

- Important HSE events like HSE training, Medical camp etc. organized at site shall be reported to BHEL site management in detail with photographs for publication in different in-house magazines
- Celebration of important days like National Safety Day, World Environment Day etc. shall also be reported as mentioned above.



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**11.0 OPERATIONAL CONTROL**

All applicable OCPs (Operational control procedures) will be followed by subcontractor as per BHEL instructions. This will be done as part of normal scope of work. List of such OCPs is given below. In case any other OCP is found to be applicable during the execution of work at site, then subcontractor will follow this as well, within quoted rate. These OCPs (applicable ones) will be made available to subcontractor during work execution at site. However for reference purpose, these are kept with Safety Officer of BHEL at the Power Sector Regional HQ, or available in downloadable format in the website, which may be referred by subcontractor, if they so desire.

**LIST OF OCPs**

Safe handling of chemicals	Safety in use of cranes	Hydraulic test
Electrical safety	Storage and handing of gas cylinders	Spray insulation
Energy conservation	Manual arc welding	Trial run of rotary equipment
Safe welding and gas cutting operation	Safe use of helmets	Stress relieving
Fire safety	Good house keeping	Material preservation
Safety in use of hand tools	Working at height	Cable laying/tray work
First aid	Safe excavation	Transformer charging
Food safety at canteen	Safe filling of hydrogen in cylinder	Electrical maintenance
Illumination	Vehicle maintenance	Safe handling of battery system
Handling and erection of heavy metals	Safe radiography	Computer operation
Safe acid cleaning	Waste disposal	Storage in open yard
Safe alkali boil out	Working at night	For sanitary maintenance
Safe oil flushing	Blasting	Batching
Steam blowing	DG set	Piling rig operation
Safe working in confined area	Handling & storage of mineral wool	Gas distribution test
Safe operation of passenger lift, material hoists & cages	Drilling, reaming and grinding(machining)	Cleaning of hotwell / deaerator
Electro-resistance heating	Compressor operation	O&M of control of AC plant & system
Air compressor	Passivation	Safe Loading of Unit
Safe EDTA Cleaning	Safe Chemical cleaning of Pre boiler system	Safe Boiler Light up
Safe Rolling and Synchronisation		

**11.1 HSE ACTIVITIES**

HSE activities shall be conducted at site based on the HSEMSM developed by Power Sector and issued to site by Regions.

While planning for any activity the following documents shall be referred for infrastructural requirements to establish control measures:

- 1) HSE Procedure for Register of OHS Hazards and Risks
- 2) HSE Procedure for Register of Environmental Aspects and Impacts
- 3) HSE Procedure for Register of Regulations



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- 4) Operational Control Procedures
- 5) HSE Procedure for Emergency Preparedness and Response Plan
- 6) Contract documents

### 11.2 WORK PERMIT SYSTEM

- The following activities shall come under Work Permit System
  - a. Height working above 2 metres
  - b. Hot working at height
  - c. Confined space
  - d. Radiography
  - e. Excavation more than 4 meter depth
  - f. Heavy lifting above 50 tonRefer Annexure 05 for Work permit formats.
- "HSE Procedure for Work Permit System" shall be followed while implementing permit system. Where customer is having separate Work Permit System the same shall be followed.
- Permit applicant shall apply for work permit of particular work activity at particular location before starting of the work with Job Hazard Analysis.
- Permit signatory shall check that all the control measures necessary for the activity are in place and issue the permit to the permit holder.
- Permit holder shall implement and maintain all control measures during the period of permit .He will close the permit after completion of the work. The closed permit shall be archived in HSE Department of site.

### 11.3 SAFETY DURING WORK EXECUTION

Respective OCPS are to be followed and adherence to the same would be contractually binding

#### 11.3.1 WELDING SAFETY

All safety precautions shall be taken for welding and cutting operations as per IS-818. All safety precautions shall be taken for foundation and other excavation marks as per IS-3764.

#### 11.3.2 RIGGING

Rigging equipment shall not be loaded in excess of its recommended safe working load. Rigging equipment, when not in use, shall be removed from the original work area so as not to present a hazard to employees.

#### 11.3.3 CYLINDERS STORAGE AND MOVEMENT

All gas cylinders shall be stored in upright position. Suitable trolley shall be used. There shall be flash-back arrestors conforming to IS-11006 at both cylinder and burner ends. Damaged tube and regulators must be immediately replaced. No of cylinders shall not exceed the specified quantity as per OCP

Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dragged, struck or permitted to strike each other violently.

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When cylinders are transported by powered vehicle they shall be secured in a vertical position.

#### 11.3.4 DEMOLITION WORK

Before any demolition work is commenced and also during the process of the work the following shall be ensured:

- All roads and open areas adjacent to the work site shall either be closed or suitably protected.
- No electric cable or apparatus which is liable to be a source of danger nor a cable or an apparatus used by the operator shall remain electrically charged.
- All practical steps shall be taken to prevent danger to persons employed from the risks of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render them unsafe.

#### 11.3.5 T&Ps

All T&Ps/ MMEs should be of reputed brand/appropriate quality & must have valid test/calibration certificates bearing endorsement from competent authority of BHEL..Subcontractor to also submit monthly reports of T&Ps deployed and validity test certificates to BHEL safety Officer as per the format/procedure of BHEL.

#### 11.3.6 CHEMICAL HANDLING

Displaying safe handling procedures for all chemicals such as lube oil, acid, alkali, sealing compounds etc , at work place. Where it is necessary to provide and/or store petroleum products or petroleum mixture & explosives, the subcontractor shall be responsible for carrying out such provision / storage in accordance with the rules & regulations laid down in the relevant petroleum act, explosive act and petroleum and carbide of calcium manual, published by the chief inspector of explosives of India. All such storage shall have prior approval if necessary from the chief inspector of explosives or any other statutory authority. The subcontractor shall be responsible for obtaining the same.

#### 11.3.7 ELECTRICAL SAFETY

- Providing adequate no. of 24 V sources and ensure that no hand lamps are operating at voltage level above 24 Volts.
- Fulfilling safety requirements at all power tapping points.
- High/ Low pressure welders to be identified with separate colour clothings. No welders will be deployed without passing appropriate tests and holding valid welding certificates. Approved welding procedure should be displayed at work place.
- The subcontractor shall not use any hand lamp energized by Electric power with supply voltage of more than 24 volts in confined spaces like inside water boxes, turbine casings, condensers etc.
- All portable electric tools used by the subcontractor shall have safe plugging system to source of power and be appropriately earthed. Only electricians licensed by appropriate statutory authority shall be employed by the subcontractor to carry out all types of electrical works. Details of earth resource and their test date to be given to BHEL safety officer as per the prescribed formats of BHEL
- The subcontractor shall use only properly insulated and armored cables which conform to the requirement of Indian Electricity Act and Rules for all wiring, electrical applications at site.



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- BHEL reserves the right to replace any unsafe electrical installations, wiring, cabling etc. at the cost of the subcontractor.
- All electrical appliances used in the work shall be in good working condition and shall be properly earthed.
- No maintenance work shall be carried out on live equipment.
- The subcontractor shall maintain adequate number of qualified electricians to maintain his temporary electrical installations.
- Area wise Electrical safety inspection is to be carried out on monthly basis as per "Electrical Safety Inspection checklist" and the report is to be submitted to BHEL safety officer
- Adequate precautions shall be taken to prevent danger for electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public
- The subcontractor shall carefully follow the safety requirement of BHEL/ the purchaser with the regard to voltages used in critical areas.

**11.3.8 FIRE SAFETY**

- Providing appropriate fire fighting equipment at designated work place and nominate a fire officer/warden adequately trained for his job.
- Subcontractor shall provide enough fire protecting equipment of the types and numbers at his office, stores, temporary structure in labor colony etc. Such fire protection equipment shall be easy and kept open at all times.
- The fire extinguishers shall be properly refilled and kept ready which should be certified at periodic intervals. The date of changing should be marked on the Cylinders.
- All other fire safety measures as laid down in the "codes for fire safety at construction site" issued by safety coordinator of BHEL shall be followed.
- Non-compliance of the above requirement under fire protection shall in no way relieve the subcontractor of any of his responsibility and liabilities to fire incident occurring either to his materials or equipment or those of others.
- Emergency contacts nos must be displayed at prominent locations
- Tarpaulin being inflammable should not be used (instead, only non infusible covering materials shall be used) as protective cover while preheating, welding, stress relieving etc. at site.

**11.3.9 SCAFFOLDING**

- Suitable scaffolds shall be provided for workman for all works that cannot safely be done from the ground, or from solid construction except in the case of short duration of work which can be done safely from ladders.
- When a ladder is used, it shall be of rigid construction made of steel. The steps shall have a minimum width of 45 cm and a maximum rise of 30 cm. Suitable handholds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than ¼ horizontal and 1 vertical.
- Scaffolding or staging more than 3.6 m above the ground floor, swung or suspended from an overhead support or erected with stationery support shall have a guard rail properly bolted, braced or otherwise secured, at least 90 cm above the floor or platform of such scaffolding or staging and extending along the entire length of the out side and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from savor, from swaying, from the building or structure.

**11.3.10 WORK AT HEIGHT:**

- Guardrails and toe-board/barricades and sound platform conforming to IS:4912-1978 should be provided.



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- Wherever necessary, life-line(pp or metallic) and fall arrestor along with Polyamide rope or Retractable lifeline should be provided.
- Safety Net as per IS:11057:1984 should be used extensively for prevention/ arrest of men and materials falling from height. The safety nets shall be fire resistant, duly tested and shall be of ISI marked and the nets shall be located as per site requirements to arrest or to reduce the consequences of a possible fall of persons working at different heights.
- Reaching beyond barricaded area without lifeline support, moving with support of bracings, walking on beams without support, jumping from one level to another, throwing objects and taking shortcut must be discouraged.
- Use of Rebar steel for making Jhoola and monkey-ladder (Rods welded to vertical or inclined structural members), temporary platform etc. must be avoided.
- Monkey Ladder should be properly made and fitted with cages.
- Jhoola should be made with angles and flats and tested like any lifting tools before use.
- Lanyard must be anchored always and in case of double lanyard, each should be anchored separately.
- In case of pipe-rack, persons should not walk on pipes and walk on platforms only.
- In case of roof work, walking ladder/ platform should be provided along with lifeline and/ or fall arrestor.
- Empty drums must not be used.
- For chimney or structure painting, both hanging platform and men should be anchored separately to a firm structure alongwith separate fall arrestor. Rope ladder should be discouraged.

#### 11.3.11 WORKING PLATFORM

Working platforms, gangways and stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform gangways provided is more than 3.6 m above ground level or floor level, they shall be closely boarded and shall have adequate width which shall not be less than 750 mm and be suitably fenced as described above. Every opening in the floor or a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 90 cm.

#### 11.3.12 EXCAVATION

Wherever there are open excavation in ground, they shall be fenced off by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.

#### 11.3.13 LADDER SAFETY

Safe means of access shall be provided to all working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 m in the length while the width between side rails in rung ladder shall in no case be less than app. 29.2 cm for ladder upto and including 3 m in length. For longer ladders this width shall be increased at least ¼" for each additional foot of length.

A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Engineer obtained prior to Construction.

#### 11.3.14 LIFTING SAFETY

- It will be the responsibility of the subcontractor to ensure safe lifting of the equipment, taking due precaution to avoid any incident and damage to other equipment and personnel.



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- All requisite tests and inspection of handling equipment, tools & tackle shall be periodically done by the subcontractor by engaging only the Competent Persons as per law.
- Defective equipment or uncertified shall be removed from service.
- Any equipment shall not be loaded in excess of its recommended safe working load.

**11.3.15 HOISTING APPLIANCE**

- Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safe guards.
- Hoisting appliance should be provided with such means as will reduce to the minimum the risk of any part of a suspended load becoming incidentally displaced.
- When workers employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary should be provided.
- The worker should not wear any rings, watches and carry keys or other materials which are good conductor of electricity.

**11.4 ENVIRONMENTAL CONTROL**

Environment protection has always been given prime importance by BHEL. Environmental damage is a major concern of the principal subcontractor and every effort shall be made, to have effective control measures in place to avoid pollution of Air, Water and Land and associated life. Chlorofluorocarbons such as carbon tetrachloride and trichloroethylene shall not be used. Waste disposal shall be done in accordance with the guidelines laid down in the project specification.

Any chemical including solvents and paints, required for construction shall be stored in designated bonded areas around the site as per Material Safety Data Sheet (MSDS).

In the event of any spillage, the principle is to recover as much material as possible before it enters drainage system and to take all possible action to prevent spilled materials from running off the site. The subcontractor shall use appropriate MSDS for clean-up technique

All subcontractors shall be responsible for the cleanliness of their own areas.

The subcontractors shall ensure that noise levels generated by plant or machinery are as low as reasonably practicable. Where the subcontractor anticipates the generation of excessive noise levels from his operations the subcontractor shall inform to Construction Manager of BHEL accordingly so that reasonable & practicable precautions can be taken to protect other persons who may be affected.

It is imperative on the part of the subcontractor to join and effectively contribute in joint measures such as tree plantation, environment protection, contributing towards social upliftment, conversion of packing woods to school furniture, keeping good relation with local populace etc.

The subcontractor shall carry out periodic air and water quality check and illumination level checking in his area of work place and take suitable control measure.

**11.5 HOUSEKEEPING**

- Keeping the work area clean/ free from debris, removed scaffoldings, scraps, insulation/sheeting wastage /cut pieces, temporary structures, packing woods etc. will be in the scope of the subcontractor. Such cleanings has to be done by



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subcontractor within quoted rate, on daily basis by an identified group. If such activity is not carried out by subcontractor / BHEL is not satisfied, then BHEL may get it done by other agency and actual cost along with BHEL overheads will be deducted from contractor's bill. Such decisions of BHEL shall be binding on the subcontractor

- Proper housekeeping to be maintained at work place and the following are to be taken care of on daily basis.
- All surplus earth and debris are removed/disposed off from the working areas to identified locations.
- Unused/Surplus cables, steel items and steel scrap lying scattered at different places/elevation within the working areas are removed to identified locations.
- All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from workplace to identified locations. Sufficient waste bins shall be provided at
- Different work places for easy collection of scrap/waste. Scrap chute shall be installed to remove scrap from high location.
- Access and egress (stair case, gangways, ladders etc.) path should be free from all scrap and other hindrances.
- Workmen shall be educated through tool box talk about the importance of housekeeping and encourage not to litter.
- Labour camp area shall be kept clear and materials like pipes, steel, sand, concrete, chips and bricks, etc. shall not be allowed in the camp to obstruct free movement of men and machineries.
- Fabricated steel structures, pipes & piping materials shall be stacked properly.
- No parking of trucks/trolleys, cranes and trailers etc. shall be allowed in the camp, which may obstruct the traffic movement as well as below LT/HT power line.
- Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas

#### **11.6 WASTE MANAGEMENT**

Take suitable measures for waste management and environment related laws/legislation as a part of normal construction activities. Compliance with the legal requirements on storage/ disposal of paint drums (including the empty ones), Lubricant containers, Chemical Containers, and transportation and storage of hazardous chemicals will be strictly maintained.

##### **11.6.1 BINS AT WORK PLACE**

- Sufficient rubbish bins shall be provided close to workplaces.
- Bins should be painted yellow and numbered.
- Sufficient nos. of drip trays shall be provided to collect oil and grease.
- Sufficient qty. of broomsticks with handle shall be provided.
- Adequate strength of employees should be deployed to ensure daily monitoring and service for waste management.

##### **11.6.2 STORAGE AND COLLECTION**

- Different types of rubbish/waste should be collected and stored separately.
- Paper, oily rags, smoking material, flammable, metal pieces should be collected in separate bins with close fitting lids.
- Rubbish should not be left or allowed to accumulate on construction and other work places.
- Do not burn construction rubbish near working site.

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### 11.6.3 SEGREGATION

- Earmark the scrap area for different types of waste.
- Store wastes away from building.
- Oil spill absorbed by non-combustible absorbent should be kept in separate bin.
- Clinical and first aid waste stored and incinerated separately.

### 11.6.4 DISPOSAL

- Sufficient containers and scrap disposal area should be allocated.
- All scrap bin and containers should be conveniently located.
- Provide self-closing containers for flammable/spontaneously combustible material.
- Keep drainage channels free from choking.
- Make schedule for collection and disposal of waste.

### 11.6.5 WARNING AND SIGNS

- Appropriate sign to be displayed at scrap storage area
- No toxic, corrosive or flammable substance to be discarded into public sewage system.
- Waste disposal shall be in accordance with best practice.
- Comply with all the requirements of Pollution Control Board (PCB) for storage and disposal of hazardous waste.

## 11.7 TRAFFIC MANAGEMENT SYSTEM

### 11.7.1 SAFE WORKPLACE TRANSPORT SYSTEM

- Traffic routes in a work place shall be suitable for the persons or vehicles using them. This shall be sufficient in number and of sufficient size. This shall reflect the suitability of traffic routes for vehicles and pedestrians.
- Where vehicles and pedestrians use the same traffic routes there shall be sufficient space between them. Where necessary all traffic routes must be suitably indicated. Pedestrians or vehicles must be able to use traffic routes without endangering those at work. There must be sufficient separation of traffic routes from doors, gates and pedestrian traffic routes.
- For internal traffic, lines marked on roads / access routes and between buildings shall clearly indicate where vehicles are to pass.
- Temporary obstacles shall be brought to the attention of drivers by warning signs or hazard cones.
- Speed limits shall be clearly displayed. Speed ramps preceded by a warning signs or marker are necessary.
- The traffic route should be wide enough to allow vehicles to pass and re-pass oncoming or parked traffic and it may be advisable to introduce on-way system or parking restrictions.
- Safest route shall be provided between places where vehicles have to call or deliver.
- Avoid vulnerable areas/items such as fuel or chemicals tanks or pipes, open or unprotected edges and structures likely to collapse



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- Safe areas shall be provided for loading and unloading.
- Avoid sharp or blind bends. If this is not possible hazards should be indicated e.g. blind corner.
- Ensure road crossings are minimum and clearly signed.
- Entrance and gateways shall be wide enough to accommodate a second vehicle without causing obstruction.
- Set sensible speed limits which are clearly sign posted.
- Where necessary ramps should be used to retard speed. This shall be preceded by a warning sign or mark on the road.
- Forklift trucks shall not pass over road hump unless of a type capable of doing so.
- Overhead electric cable, pipes containing flammable hazardous chemical shall be shielded by using goal posts height gauge posts or barriers.
- Road traffic signs shall be provided on prominent locations for prevention of incidents and hazards and for quick guidance and warning to employees and public. Safety signs shall be displayed as per the project working requirement and guideline of the state in which project is done. Vehicles hired or used shall not be parked within the 15m radius of any working area. Any vehicle, that is required to be at the immediate/near the vicinity, shall be approved by the person in-charge of the site.

**11.7.2 TRAFFIC ROUTE FOR PEDESTRIANS**

- Where traffic routes are used by both pedestrians and vehicles road shall be wide enough to allow vehicles and pedestrians safely.
- Separate routes shall be provided for pedestrians to keep them away from vehicles. Provide suitable barriers/guard at entrances/exit and the corners or buildings.
- Where pedestrian and vehicle routes cross, appropriate crossing shall be provided.
- Where crowd is likely to use roadway e.g. at the end of shift, stop vehicles from using them at such times.
- Provide high visibility clothing for people permitted in delivery area.

**11.7.3 WORK VEHICLE**

Work vehicle shall be as safe stable efficient and roadworthy as private vehicles on public roads. Site management shall ensure that drivers are suitably trained. All vehicle e.g. heavy motor vehicle forklift trucks dump trucks mobile cranes shall ensure that the work equipment conforms to the following:

- A high level of stability.
- A safe means of access/egress.
- Suitable and effective service and parking brakes.
- Windscreens with wipers and external mirrors giving optimum all round visibility.
- Provision of horn, vehicle lights, reflectors, reversing lights, reversing alarms.
- Provision of seat belts.
- Guards on dangerous parts.
- Driver protection - to prevent injury from overturning and from falling objects/materials.
- Driver protection from adverse weather.
- No vehicle shall be parked below HT/LT power lines.
- Valid Pollution Under Control certification for all vehicles



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**11.7.4 DAILY CHECK BY DRIVER**

- There should also be daily safety checks containing below mentioned points by the driver before the vehicle is used.
  - Brakes.
  - Tires.
  - Steering.
  - Mirrors.
  - Windscreen waters.
  - Wipers.
  - Warning signals.
  - Specific safety system i.e. control interlocks
- Management should ensure that drivers carry out these checks.

**11.7.5 TRANSPORTATION OF PERSONNEL AND MATERIALS BY VEHICLES**

- All drivers shall hold a valid driving License for the class of vehicle to be driven and be registered as an authorized BHEL driver with the Administration Department.
- Securing of the load shall be by established and approved methods, i.e. chains with patented tightening equipment for steel/heavy loads. Sharp corners on loads shall be avoided when employing ropes for securing.
- All overhangs shall be made clearly visible and restricted to acceptable limits
- Load shall be checked before moving off and after traveling a suitable distance.
- On no account is construction site to be blocked by parked vehicles Drivers of vehicles shall only stop or park in the areas designate by the stringing foreman.
- Warning signs shall be displayed during transportation of material.  
All vehicles used by BHEL shall be in worthy condition and in conformance to the Land Transport requirement.

**11.7.6 MAINTENANCE**

All Vehicles used for transportation of man and material shall undergo scheduled inspections on frequent intervals to secure safe operation. Such inspections shall be conducted in particular for steering, brakes, lights, horn, doors etc. Site management shall ensure that work equipment is maintained in an efficient, working order and in good repair. Inspections and services carried out at regular intervals of time and or mileage. No maintenance shall be carried below HT/LT power lines.

**11.8 EMERGENCY PREPAREDNESS AND RESPONSE**

- Emergency preparedness and response capability of site shall be developed as per Emergency Preparedness and Response plan issued by Regional HQ
- Availability of adequate number of first aiders and fire warden shall be ensured with BHEL and its subcontractors
- All the subcontractor's supervisory personnel and sufficient number of workers shall be trained for fire protection systems. Enough number of such trained personnel must be available during the tenure of contract. Subcontractor should nominate his supervisor to coordinate and implement the safety measures.
- Assembly point shall be earmarked and access to the same from different location shall be shown
- Fire exit shall be identified and pathway shall be clear for emergency escape.



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- Appropriate type and number of fire extinguisher shall be deployed as per Fire extinguisher deployment plan and validity shall be ensured periodically through inspection
- Adequate number of first aid boxes shall be strategically placed at different work places to cater emergency need. Holder of the first aid box shall be identified on the box itself who will have the responsibility to maintain the same.
- First aid center shall be developed at site with trained medical personnel and ambulance
- Emergency contact numbers (format given in EPRP) of the site shall be displayed at prominent locations.
- Tie up with fire brigade shall be done in case customer is not having fire station.
- Tie up with hospital shall be done in case customer is not having hospital.
- Disaster Management group shall be formed at site
- Mock drill shall be arranged at regular intervals. Monthly report of the above to be given to BHEL safety Officer as per prescribed BHEL formats
- Mock drill shall be conducted on different emergencies periodically to find out gaps in emergency preparedness and taking necessary corrective action

## 12.0 HSE INSPECTION

Inspection on HSE for different activities being carried out at site shall be done to ensure compliance to HSEMS requirements. The subcontractor shall maintain and ensure necessary safety measures as required for inspection and tests HV test, Pneumatic test, Hydraulic test, Spring test, Bend test etc as applicable, to enable inspection agency for performing Inspection. If any test equipment is found not complying with proper safety requirements then the Inspection Agency may withhold inspection, till such time the desired safety requirements are met.

### 12.1 DAILY HSE CHECKS

Both the Site Supervisors and safety officer of Subcontractor are to conduct daily site Safety inspection around work activities and premises to ensure that work methods and the sites are maintained to an acceptable standard. The following are to form the common subjects of a daily safety inspection:

- Personal Safety wears & gear compliance.
- Complying with site safety rules and permit-to-work (PTW).
- Positions and postures of workers.
- Use of tools and equipment etc. by the workers.

The inspection should be carried out just when work starts in beginning of the day, during peak activities period of the day and just before the day's work ends.

### 12.2 INSPECTION OF PPE

- PPEs shall be inspected by HSE officer at random once in a week as per format no. HSEP:13-F06 for its compliance to standard and compliance to use and any adverse observation shall be recorded in the PPE register.
- The applicable PPEs for carrying out particular activities are listed below.



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### 12.3 INSPECTION OF T&Ps

- A master list of T&Ps shall be maintained by each subcontractor.
- All T&Ps being used at site shall be inspected by HSE officer once in a month as per format no. HSEP:13-F07 for its healthiness and maintenance.
- The T&Ps which require third party inspection shall be checked for its validity during inspection. The third party test certificate should be accompanied with a copy of the concerned competent person's valid qualification record.
- The validity of T&P shall be monitored as per "Status of T&Ps" format no. HSEP:13-F08

### 12.4 INSPECTION OF CRANES AND WINCHES

- Cranes and winches shall be inspected by the operator through a daily checklist for its safe condition (as provided by the equipment manufacturer) before first use of the day.
- Cranes and Winches shall be inspected by HSE officer once in a month as per format no. HSEP:13-F09 for healthiness, maintenance and validity of third party inspection.
- The date of third party inspection and next due date shall be painted on cranes and winches.
- The operators/drivers shall be authorized by sub-contractor based on their competency and experience and shall carry the I-card.
- The operator should be above 18 years of age and should be in possession of driving license of HMV man & goods), vision test certificate and should have minimum qualification so that he can read the instructions and check list.

### 12.5 INSPECTION ON HEIGHT WORKING

- Inspection on height working shall be conducted daily by supervisors before start of work to ensure safe working condition including provision of
  - Fall arrestor
  - Lifelines
  - Safety nets
  - Fencing and barricading
  - Warning signage
  - Covering of opening
  - Proper scaffolding with access and egress.
  - Illumination
- Inspection on height working shall be conducted once in a week by HSE officer as per format no. HSEP:14-F10.
- Medical fitness of height worker shall be ensured.
- Height working shall not be allowed during adverse weather.

### 12.6 INSPECTION ON WELDING AND GAS CUTTING OPERATION

- Supervisor shall ensure that no flammable items are available in near vicinity during welding and gas cutting activity.
- Gas cylinders shall be kept upright.
- Use of Flash back arrestor shall be ensured at both ends.



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- Inspection during welding and gas cutting operations shall be carried out by HSE officer once a month as per format no. HSEP:14-F11.
- Use of fire blanket to be ensured to avoid falling of splatters during welding or gas cutting operation at height.
- Availability of fire extinguisher at vicinity shall be ensured.

**12.7 INSPECTION ON ELECTRICAL INSTALLATION / APPLIANCES**

- Ensure proper earthing in electrical installation
- Use ELCB at electrical booth
- Electrical installation shall be properly covered at top where required
- Use appropriate PPEs while working
- Use portable electrical light < 24 V in confined space and potentially wet area.
- Monthly inspection shall be carried out as per format no. HSEP:14-F12.

**12.8 INSPECTION OF ELEVATOR**

- Elevators shall be inspected by concerned supervisors once in a week as per format no. HSEP:14-F13.
- All elevators shall be inspected by competent person and validity shall be ensured.
- The date of third party inspection and next due date shall be painted on elevator.

**13.0 HSE PERFORMANCE**

HSE performance of the subcontractor shall be monitored as per the following parameters:

Sl. No.	Parameters of measurement
1	Timely deployment of qualified safety officer and cumulative number of days in a month the required no. of qualified safety officer is available
2	Shortfall in number of meetings in the month conducted or attended by the safety officer
3	Level of compliance wrt decisions taken in previous meetings/audit/inspection/as reported.
4	Delay in submission of monthly report on safety in the prescribed format
5	Delay in reporting any incident including near-miss to BHEL /Customer/statutory authority( if required)
6	Degree of PPE non-compliance
7	Non- conducting of health check-up as per BOCW requirements
8	Non availability of proper first-aid facility , ambulance, adequate labour welfare initiatives
9	Non conductance of induction training and tool box meeting
10	Total number of instances in the month, House keeping NOT attended inspite of instructions by BHEL i.e. removal/disposal of surplus earth/ debris/scrap/unused/surplus cable drums/other electrical items/surplus steel items/packing material

- Suitable HSE reward system shall be developed at site level to promote HSE compliance amongst workmen.
- To decide HSE reward performance towards HSE shall be evaluated for workmen and it shall be awarded regularly in public gathering.
- If safety record of the subcontractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognize the safety performance of the subcontractor may be considered by BHEL after completion of the job.



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#### 14.0 HSE PENALTIES

- As per contractual provision HSE penalties shall be imposed on subcontractors for non-compliance on HSE requirement as per format no. HSEP:14-F14. The list in the format is only indicative. For any other violation, not listed in the format, the minimum penalty amount is to be decided as per BOCW act.
- If principal customer/statutory and regulatory bodies impose some penalty on HSE due to the non-compliance of the subcontractor the same shall be passed on to them.
- The penalty amount shall be recovered by Site Finance department from subcontractors from the RA/Final bill.

#### 15.0 OTHER REQUIREMENTS

- In case of any delay in completion of a job due to mishaps attributable to lapses by the subcontractor, BHEL shall have the right to recover cost of such delay from the payments due to the subcontractor, after notifying the subcontractor suitably.
- If the subcontractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given reasonable opportunity to do so and/or if the subcontractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instruction regarding safety issued by BHEL, BHEL shall have the right to take corrective steps at the risk and cost of the subcontractor after giving a notice of not less than 7 days indicating the steps that would be taken by BHEL.
- If the subcontractor succeeds in carrying out its job in time without any fatal or disabling injury incident and without any damage to property BHEL may, at its sole discretion, favorably consider to reward the subcontractor suitably for the performance.
- In case of any damage to property due to lapses by the subcontractor, BHEL shall have the right to recover the cost of such damages from the subcontractor after holding an appropriate enquiry.
- The subcontractor shall take all measures at the sites of the work to protect all persons from incidents and shall be bound to bear the expenses of defense of every suit, action or other proceeding of law that may be brought by any persons for injury sustained or death owing to neglect of the above precautions and to pay any such persons such compensation or which may with the consent of the subcontractor be paid to compromise any claim by any such person, should such claim proceeding be filed against BHEL, the subcontractor hereby agrees to indemnify BHEL against the same.
- The subcontractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.
- The subcontractor shall notify BHEL of his intention to bring to site any equipment or material which may create hazard.
- BHEL shall have the right to prescribe the conditions under which such equipment or materials may be handled and the subcontractor shall adhere to such instructions.



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- BHEL may prohibit the use of any construction machinery, which according to the organization is unsafe. No claim for compensation due to such prohibition will be entertained by BHEL.

#### 16. NON COMPLIANCE

NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND BHEL HAS RIGHT TO IMPOSE FINES ON THE SUBCONTRACTOR AS UNDER FOR EVERY INSTANCE OF VIOLATION NOTICED:

SN	Violation of Safety Norms	Fine (in Rs)
01	Not Wearing Safety Helmet	200/- *
02.	Not wearing Safety Belt or not anchoring life line	500/-*
03	Not wearing safety shoe	200/-*
04	Not keeping gas cylinders vertically	200/-
05	Not using flash back arrestors	100/-
06	Not wearing gloves	50/- *
07.	Grinding Without Goggles	50/- *
08.	Not using 24 V Supply For Internal Work	500/-
09.	Electrical Plugs Not used for hand Machine	100/-
10.	Not Slings properly	200/-
11.	Using Damaged Sling	200/-
12.	Lifting Cylinders Without Cage	500/-
13.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
14.	Not Removing Small Scrap From Platforms	500/-
15.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	500/-
16.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
17.	Improper Earthing Of Electrical T&P	500/-
18	No or improper barricading	500/-
19.	Activity carried out without Safety work permit (Height work, Lifting activity, Hot work-each person/case)	1000/-
20.	Incident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
21.	Fatal Incident Resulting in total loss in Earning Capacity	1,00,000/- per victim for first instance #

- Legend:-

\*: per head. For repeated violation by the same person, the penalty would be double of the previous penalty. Date of "Repeated violation" will be counted from subsequent days.

#: or as deducted by customer, whichever is higher. For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the subcontractor. The amount collected above will be utilized for giving award to the employees who could avoid incident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.



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#### 17.0 HSE AUDIT/INSPECTION

- Regular HSE Audit/inspection shall be carried out by Subcontractor as per Site HSE audit calendar.
- HSE checklist(**Annexure 02**)shall be used for carrying out audit/inspection and report shall be submitted to BHEL sitemangement
- All non-conformities and observations on HSE identified during internal or external HSE audit shall be disposed off by site in a time bound manner and reported back the implementation status
- Corrective action and Preventive action on HSE issues raised by certification body issued by Regional HQs shall be implemented by site and reported to Site management.

#### 18.0 MONTHLY HSE REVIEW MEETING

- Site shall hold HSE review meeting every month to discuss and resolve HSE issues of site and improve HSE performance. It will also discuss the incidents occurred since previous meeting,its root causeand Corrective action and Preventive action.The agenda is given below:
  - Implementation of earlier MOM
  - HSE performance
  - HSE inspection
  - HSE audit and CAPA
  - HSE training
  - Health check-up camp
  - HSE planning for the erection and commissioning and installation activities in the coming month
  - HSE reward and promotional activities
- The meeting shall be chaired by Construction Manager, convened by HSE coordinator and attended by all HOS, Site Incharge of Subcontractors and HSE officer of Subcontractors.
- MOM on the discussion will be circulated to the concerned for implementation.

#### 19.0 FORMATS USED(Details available in Annexure-04)

SL. No.	Format Name	Format No.	Rev No.
01	Inspection of First Aid Box	HSEP:13-F01	00
02	Health Check Up	HSEP:13-F02	00
03	HSE Induction Training	HSEP:13-F03	00
04	Tool Box Talk	HSEP:13-F04	00
05	Monthly Site HSE Report	HSEP:13-F05	00
06	Inspection of PPE	HSEP:13-F06	00



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07	Inspection of T&Ps	HSEP:13-F07	00
08	Status of T&Ps	HSEP:13-F08	00
09	Inspection of Cranes and Winches	HSEP:13-F09	00
10	Inspection on Height Working	HSEP:13-F10	00
11	Inspection on Welding & Gas Cutting	HSEP:13-F11	00
12	Inspection on Electrical Installation	HSEP:13-F12	00
13	Inspection on Elevator	HSEP:13-F13	00
14	HSE Penalty	HSEP:13-F14	00
15	Accident /incident / property damage /fire incident report	HSEP:13-F15	00



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**20.0 ANNEXURES**

**ANNEXURE 01**

**As per Contract Labour (Regulation & Abolition Act), Central Rules, 1971,**

- (1) The first-aid box shall be distinctively marked with a Red Cross on a white background and shall contain the following items, namely:

**(a) For establishments in which the number of contract labour employed does not exceed fifty, each first aid box shall contain the following equipment:**

(i)	6 small sterilized dressings
(ii)	3 medium size sterilized dressings
(iii)	3 large size sterilized dressings
(iv)	6 pieces of sterilized eye pads in separate sealed packets.
(v)	6 roller bandages 10 cm wide.
(vi)	6 roller bandages 5 cm wide.
(vii)	One tourniquet
(viii)	A supply of suitable splints
(ix)	Three packets of safety pins.
(x)	Kidney tray.
(xi)	3 large sterilized burn dressings.
(xii)	1 (30ml) bottle containing a two percent alcoholic solution of iodine
(xiii)	1 (30 ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label
(xiv)	1 snake bite lancet
(xv)	1 (30gms) bottle of potassium permanganate crystals.
(xvi)	1 pair scissors
(xvii)	1 copy of the First-Aid leaflet issued by the Director General, Factory Advice Service and Labour Institutes, Government of India.
(xviii)	A bottle containing 100 tablets (each of 5 grains) of aspirin
(xix)	Ointment for burns
(xx)	A bottle of suitable surgical anti-septic solution

**(b) For establishment in which the number of contract labour exceeds fifty each first-aid box shall contain the following equipment:**

(i)	12 small sterilized dressings
(ii)	6 medium size sterilized dressings
(iii)	6 large size sterilized dressings.
(iv)	6 large size sterilized burn dressings
(v)	6 (15 grams) packets sterilized cotton wool
(vi)	12 pieces of sterilized eye pads in separate sealed packets.



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(vii)	12 roller bandages 10 cm wide.
(viii)	12 roller bandages 5 cm wide.
(ix)	One tourniquet.
(x)	A supply of suitable splints.
(xi)	Three packets of safety pins.
(xii)	Kidney tray.
(xiii)	Sufficient number of eye washes bottles filled with distilled water or suitable liquid clearly indicated by a distinctive sign which shall be visible at all times.
(xiv)	4 per cent Xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops.
(xv)	1 (60ml) bottle containing a two percent alcoholic solution of iodine
(xvi)	One (two hundred ml) bottle of mercurochrome (2 per cent) solution in water.
(xvii)	1 (120ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label.
(xviii)	1 roll of adhesive plaster (6 cmX1 meter)
(xix)	2 rolls of adhesive plaster (2 cmX1 meter)
(xx)	A snake bite lancet.
(xxi)	1 (30 grams) bottle of potassium permanganate crystals.
(xxii)	1 pair scissors
(xxiii)	1 copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labour Institutes, Government of India.
(xxiv)	a bottle containing 100 tablets (each of 5 grains) of aspirin
(xxv)	Ointment for burns
(xxvi)	A bottle of a suitable surgical anti septic solution.

(2) Adequate arrangement shall be made for immediate recoument of the equipment when necessary.



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**ANNEXURE 02**

**HSE AUDIT/INSPECTION CHECKLIST CUM COMPLIANCE REPORT**

PROJECT: \_\_\_\_\_

SUBCONTRACTOR: \_\_\_\_\_

DATE : \_\_\_\_\_

OWNER : \_\_\_\_\_

INSPECTION BY: \_\_\_\_\_

Note : write 'NA' wherever the items is not applicable

Item	Y e s	N o	Remarks	Action
<b>HOUSEKEEPING</b>				
Waste containers provided and used				
Passageways and walkways clear				
General neatness of working area				
Other				
<b>PERSONNEL PROTECTIVE EQUIPMENTS</b>				
Goggles; shields				
Face protection				
Hearing protection				
Respiratory masks etc.				
Safety belts				
Other				
<b>EXCAVATIONS / OPENINGS</b>				
Openings properly covered or barricaded				
Excavations shored				
Excavations barricaded				
Overnight lighting provided				
Other				
<b>WELDING, CUTTING</b>				
Gas cylinders chained upright				
Cable and hoses not obstructing				
Fire extinguisher (s) accessible				
Others				
<b>SCAFFOLDING</b>				
Fully decked platforms				
Guard and intermediate rails in place				
Toe boards in place				
Adequate shoring				
Adequate access				
Others				
<b>LADDER</b>				
Extension side rails 1 m above				
Top of landing				
Properly secured				



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Angle + 70 <sup>0</sup> from horizontal				
Other				
<b>HOISTS, CRANES AND DERRICKS</b>				
Condition of cables and sheaf OK				
Condition of slings, chains, hooks OK				
Inspection & maintenance log maintained				
Outriggers used				
Signals observed and understood				
Qualified operators				
Others				
<b>MACHINERY, TOOLS &amp; EQUIPMENT</b>				
Proper instruction				
Safety devices				
Proper cords				
Inspection and maintenance				
Other				
<b>VEHICLE AND TRAFFIC</b>				
Rules and regulations observed				
Inspection and maintenance				
Licensed drivers				
Other				
<b>TEMPORARY FACILITIES</b>				
Emergency instructions posted				
Fire extinguishers provided				
Fire-aid equipment available				
General neatness				
Others				
<b>FIRE PREVENTION</b>				
Personnel instructed				
Fire extinguishers checked				
No smoking in prohibited areas.				
Hydrants				
Clearance				
Others				
<b>ELECTRICAL</b>				
Proper wiring				
ELCB's provided				
Ground fault circuit interrupters				
Protection against damage				
Prevention of tripping hazards				
Other				
<b>HANDLING &amp; STORAGE OF MATERIALS</b>				
Properly stored or stacked				
Passageways clear				
Other				
<b>FLAMMABLE GASES AND LIQUIDS</b>				
Containers clearly identified				
Proper storage				
Fire extinguisher nearby				



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Other				
<b>WORKING AT HEIGHT</b>				
Safety nets				
Safety belts				
Safety helmets				
Anchoring of safety belt to the life line rope				
<b>ENVIRONMENT</b>				
Lubricant waste/engine oils properly dispose.				
Waste from Canteen, offices, sanitation etc. disposed properly.				
Disposal of surplus earth, stripping materials, expired batteries, oily rags and combustible materials done properly.				
<b>HEALTH CHECKS</b>				
Hygienic conditions at labor camps O.K.				
Availability of first-aid facilities				
Proper sanitation at site, office & labor camps.				
Arrangement of medical facilities.				
Measures for dealing with illness.				
Availability of potable drinking water for workmen & staff.				
Provision of crèches for children.				



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**ANNEXURE 03**

**REFERENCES**

- Contract documents
- Relevant legislations
- HSEMSM
- Relevant Indian standards as listed below (illustrative only):

SL NO	CODE NAME	TITLE
(1)	IS : 818-1888 (Reaffirmed 2003)	Code of Practice for safety and health requirements in Electric and Gas Welding and Cutting operations.
(2)	IS: 1179-1967 (Reaffirmed 2003)	Specification for Equipment for Eye & Face protection during welding.
(3)	IS : 1989 (Part 2):1986 (Reaffirmed 1997)	Specification for Leather Safety Boots & Shoes
(4)	IS:2925 – 1984 (Reaffirmed 2010)	Specification for Industrial Safety Helmets
(5)	IS:3521 : 1999 (Reaffirmed 2002)	Industrial Safety Belts & Harnesses-Specification
(6)	IS:3646(Part II) – 1966 (Reaffirmed 2003)	Code of Practice for Interior Illumination
(7)	IS:3696 (Part I) – 1987 (Reaffirmed 2002)	Safety Code for Scaffolds and Ladders
(8)	IS: 3696(Part 2) : 1991 (Reaffirmed 2002 )	Scaffolds and Ladders-Code of Safety
(9)	IS:3786 – 1983 (Reaffirmed 2002)	Method for Computation of Frequency and Severity Rates for Industrial Injuries and Classification of Industrial Incidents
(10)	IS:4770 : 1991 (Reaffirmed 2006)	Rubber Gloves – Electricals purposes-Specification
(11)	IS:4912 : 1978 (Reaffirmed 2002)	Safety Requirements for Floor and Wall Openings, Railings and Toe Boards
(12)	IS: 5983 – 1980 (Reaffirmed 2002)	Specification for Eye-Protectors
(13)	IS:6519 – 1971 (Reaffirmed 1997)	Code of Practice for Selection, Care and Repair of Safety Footwear
(14)	IS:9167:1979	Specification for Ear-Protectors
(15)	IS:6994(Part I)-1973 (Reaffirmed 1996)	Specification for Industrial Safety Gloves Leather and Cotton Gloves
(16)	IS:8519 – 1977 (Reaffirmed 1983)	Guide for Selection of Industrial Safety Equipment for Body Protection.
(17)	IS 11006 : 2011	Flash Back(Flame Arrestor) Specification



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(18)	IS:8520 – 1977 (Reaffirmed 2002)	Guide for Selection of Industrial Safety Equipment for Eye, Face and Ear Protection.
(19)	IS:9473:2002	Respiratory Protective Devices-Filtering Half Masks to protect against Particles-Specification.
(20)	IS:9944:1992 (Reaffirmed 2003)	Natural and Man-made Fiber Rope Slings-Recommendations on Safe working loads.
(21)	IS:11057 – 1884 (Reaffirmed 2001)	Specification for Industrial Safety Nets
(22)	IS:12254:1993 (Reaffirmed 2002)	Polyvinyl Chloride (PVC) Industrial Boots-Specification
(23)	IS:13367(Part 1):1992 (Reaffirmed 20030)	Safe Use of Cranes-Code of Practice
(24)	IS:14166:1994 (Reaffirmed 2002)	Respiratory Protective Devices-Full Face Masks Specification
(25)	IS:14746 : 1999 (Reaffirmed 2003)	Respiratory Protective Devices-Half Masks and Quarter Masks - Specification
(26)	IS : 15397 :2003 (Reaffirmed 2008)	Portable Extinguisher Mechanical Foam Type(Stored Pressure)-Specification
(27)	IS: 19011:2002	Guidelines for Quality and/or Environmental Management Systems Auditing



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**ANNEXURE 04 : SAFETY FORMATS  
&  
ANNEXURE 05 : WORK PERMIT FORMATS**

**POWER SECTOR****INSPECTION OF FIRST AID BOX**

FORMAT NO: HSEP:13-F01

REV NO.: 00

PAGE NO. 01 OF 02

<b>Name of Site :</b>	
<b>Name of Sub-Contractor :</b>	
<b>Inspected by :</b>	
<b>Date of Inspection :</b>	

Number of employees on the site:- \_\_\_\_\_

Sl.No.	Item	No. Available	Remarks
1	No. of small sterilized dressings		
2	No of medium sized sterilized dressings		
3	No of large sized sterilized dressings.		
4	No of large sized sterilized burn dressings		
5	No of (15 grams) packets sterilized cotton wool		
6	No of pieces of sterilized eye pads in separate sealed packets.		
7	No of roller bandages 10 cm wide.		
8	No of roller bandages 5 cm wide.		
9	Whether tourniquet available		
10	Whether supply of suitable splints available.		
11	No of packets of safety pins.		
12	Whether kidney tray available		
13	Whether sufficient number of eye wash bottles, filled with distilled water or suitable liquid, clearly indicated by a distinctive sign which shall be visible at all times, available.		
14	Whether 4%-xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops available.		
15	Whether (60ml) bottle containing a two percent alcoholic solution of iodine available		
16	Whether (two hundred ml) bottle of mercurochrome (2 per cent) solution in water available.		

**POWER SECTOR****INSPECTION OF FIRST AID BOX**

FORMAT NO: HSEP:13-F01

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Sl.No.	Item	No. Available	Remarks
17	Whether 120ml bottle containing Sal volatile having the dose and mode of administration indicated on the label, available.		
18	Whether roll of adhesive plaster (6 cmX1 meter) available		
19	No of rolls of adhesive plaster (2 cmX1 meter)		
20	Whether snake bite lancet available.		
21	Whether (30 grams) bottle of potassium permanganate crystals available.		
22	Whether a pair scissors available		
23	Whether copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labour Institutes, Government of India available.		
24	Whether bottle containing 100 tablets (each of 5 grains) of aspirin available		
25	Whether Ointment for burns available		
26	Whether bottle of a suitable surgical anti septic solution available		

Signature of Subcontractor's Site I/C::

**POWER SECTOR****HEALTH CHECK UP**

FORMAT NO: HSEP:13-F02

REV NO.: 00

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<b>Name of Site :</b>	
<b>Name of Sub-Contractor :</b>	
<b>Name of Employee :</b>	

**NAME:**

History Of Past Illness	H/O Epilepsy
	H/O Drug Allergy
	H/O Diabetics/ Hypertension
	H/O Unconsciousness

Personal History

<b>EXAMINATION</b>		<b>OBSERVATION</b>	
<b><u>General Physical Examination</u></b>			
Height	:		
Weight	:		
BMI	:		
Built And nourishment	:		
Pallor	:		
Temperature	:		
Chest Expansion	:	Inspiration	Expansion
Lymph Node Enlargement	:		
<b><u>Ear, Nose, Throat</u></b>	:		
Ear	:		
Nose	:		
Throat	:		

**POWER SECTOR****HEALTH CHECK UP**

FORMAT NO: HSEP:13-F02

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EXAMINATION	OBSERVATION
<b><u>Cardiovascular System Examination :</u></b>	
Inspection :	
Palpation :	Pulse BP
Auscultation (Heart Sounds) :	
<b><u>Respiratory System :</u></b>	
Inspection :	Respiratory Rate
Palpation:	
Percussion :	
Auscultation (Breath Sounds) :	
<b><u>Examination of Abdomen :</u></b>	
Inspection :	
Palpation :	
Auscultation (Bowel Sounds) :	
<b>Any Other :</b>	
<b>Clinical Impression</b>	

Signature of the examining doctor







**POWER SECTOR**

**PERSONAL PROTECTIVE EQUIPMENTS**

FORMAT NO: HSEP:13-F06  
REV NO.: 00  
PAGE NO. 01 OF 01

<b>Name of Site :</b>	
<b>Name of Sub-Contractor :</b>	
<b>Inspected by :</b>	
<b>Date of Inspection :</b>	

<b>Item</b>	<b>Issued this Month</b>	<b>Nos. Issued up to the Month</b>	<b>Percentage of usage at site</b>
Safety Helmet			
Safety Shoes			
Full Body Harness			
Fall Arrestor			
Safety Nets			
Other PPEs.			

**Signature of Site I/C of Subcontractor :**

**POWER SECTOR****INSPECTION OF T&Ps**

FORMAT NO: HSEP:13-F07

REV NO.: 00

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<b>Name of Site :</b>	
<b>Name of Sub-Contractor :</b>	
<b>Date of Inspection :</b>	

Sl.No.	Description	Remarks
1.0	Name of equipment	
2.0	Basic Information of equipment	
2.1	Specification	
2.2	Sr. No. of equipment	
2.3	Make	
2.4	Year of manufacture	
3.0	Major repairs / overhauls(Furnish details of work carried out)	Date(s) of major repair/overhaul
3.1		
3.2		
3.3	Repairs carried out at site	
4.0	Any performance test conducted	Yes/No
5.0	Document Submitted	Yes/No
6.0	Manufacturer's test / guarantee certificate	Available/ Not available
7.0	Performance test	Done/ Not Done
8.0	Acceptance Norms	
9.0	Committee Observations	
10.0	Date of next review (if accepted)	

Signature-Site Safety Officer ( BHEL)

Signature-Subcontractor/ Subcontractor's  
Safety Officer

**POWER SECTOR****STATUS OF T&Ps**

FORMAT NO: HSEP:13-F08

REV NO.: 00

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Name of Site	
Name of Sub-Contractor	
Date of Inspection	

Item	Nos. Deployed	Identification No.	Nos. Tested by competent person	Validity of Test Certificate
Winches				
Chain Blocks				
Wire Rope Slings				
Man Cages				
D-Shackles				
Air Compressors				
Crawler Cranes				
Mobile Cranes				
Hydra Cranes				
Others				

Signature of Site I/C of subcontractor :

**POWER SECTOR****INSPECTION OF CRANES AND WINCHES**

FORMAT NO: HSEP:13-F09

REV NO.: 00

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<b>Name of Site :</b>	
<b>Name of Sub-Contractor :</b>	
<b>Inspected by :</b>	
<b>Date of Inspection:</b>	

Crane Reg. No (Make/Model) \_\_\_\_\_

Name of Driver/Operator \_\_\_\_\_

Sl.no.	Description	Observation	Measures
1	Valid Driving license		
2	Hook & Hook Latch		
3	Over Hoist limit switch		
4	Boom limit switch		
5	Boom Angle Indicator		
6	Boom limit cutoff switch		
7	Condition of Boom		
8	Condition of ropes		
9	Number of load lines		
10	Size and condition of the slings		
11	Stability of the cranes		
12	Soil Condition		
13	Swing Break And Lock		
14	Proper Break And Lock		
15	Hoist Break And Lock		
16	Boom Break And Lock		
17	Main Clutch		
18	Leakage in Hydraulic Cylinders		
19	Out riggers fully extendable		
20	Tyre pressure		
21	Condition of Battery And Lamps		

**POWER SECTOR****INSPECTION OF CRANES AND WINCHES**

FORMAT NO: HSEP:13-F09

REV NO.: 00

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Sl.no.	Description	Observation	Measures
22	Guards of moving and rotating parts		
23	Load chart provided		
24	Number and position of pedant ropes		
25	Reverse Horn		
26	Load Test Details		
27	Operator's fitness		
28	Pollution under control certificate		
29	Fire extinguisher of appropriate type.		
30	Training of the operator		

**WINCH**

Sl. No.	Description	YES	NO	NA	Remarks
1	Has the copy of Third Party Inspection certificate been provided in winch machine shed?				
2	Is winch machine operator experienced enough to operate the winch machine?				
3	Is the winch machine operated by someone other than the winch machine operator?				
4	Is there guard provided in all moving parts like wheel and motor's shaft?				
5	Will it protect against unforeseen operational contingencies?				
6	Are brakes, clutch and locking arrangement working properly?				
7	Has it been ensured that the guard does not constitute a hazard by itself?				
8	Are the cranks and the connecting rods protected by guardrails?				
9	Is there provision for fully covered shed with wooden plank roof?				

**POWER SECTOR****INSPECTION OF CRANES AND WINCHES**

FORMAT NO: HSEP:13-F09

REV NO.: 00

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Sl. No.	Description	YES	NO	NA	Remarks
10	Is wire rope free from any kind of damage or wear and tear?				
11	Is split pin provided for the protection of clutch and brake locking arrangement?				
12	Is pulley inspected by competent person and certified before use?				
13	Is pulley free from any wear and tear visually?				
14	Is winch rope barricaded with clipsheet for the protection of rope and person?				
15	Is the wire rope lubricated by cardium oil?				
16	Is there any friction in wire rope which may damage the wire rope rather than the rolling parts?				
17	Is there any oil leakage in the hydraulic system of the winch machine?				
18	Has it been ensured that the guard will not cause discomfort or inconvenience to operator?				
	<b>Total Number of NO:</b>				
	<b>Total Number of NA:</b>				
	<b>% Compliance :</b>				

Signature of Site I/C of subcontractor :

	<b>POWER SECTOR</b>	FORMAT NO: HSEP:13-F10 REV NO.: 00 PAGE NO. 01 OF 02
	<b>INSPECTION OF HEIGHT WORKING</b>	

<b>Name of Site :</b>	
<b>Name of Sub-Contractor :</b>	
<b>Inspected by :</b>	
<b>Date of Inspection:</b>	

Sl. No.	Descriptions	Observation (Yes/No)	Remarks
1	All the workers have been explained safe work method?		
2	An established communication system has been established and explained to the workers.		
3	Adequate illumination has been ensured.		
4	Work area inspected prior to the start of the work.		
5	Area below the work place barricaded, particularly below hot work.		
6	Workers provided with bags /box to carry bolts, nuts and hand tools		
7	Arrangement for fastening hand tools made.		
8	All work platforms ensured to be of adequate strength and ergonomically suitable.		
9	Fabricated makeshift arrangements are checked for quality and type of material welding, anchoring etc.		
10.	Work at more than one elevation at the same segment is restricted.		
	<b>ACCESS/EGRESS</b>		
1	Walkways provided with handrail, mid-rail and toe guard?		
2	All checkered plates, gratings properly welded/ bolted?		
3	Are ladders inspected and they are in good condition?		
4	Are ladders spliced?		
5	Are ladders properly secured to prevent slipping, sliding or falling?		
6	Do side rails extend 36" above top landing?		
7	Are built up ladders constructed of sound materials?		

**POWER SECTOR****INSPECTION OF HEIGHT WORKING**

FORMAT NO: HSEP:13-F10

REV NO.: 00

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Sl. No.	Descriptions	Observation (Yes/No)	Remarks
8	Are rugs and cleats not over 12" on center?		
9	Metal ladders not used around electrical hazards.		
10	Proper maintenance and storage.		
11	Ladders placed at right slope.		
12	Ladders / staircases welded/ bolted properly.		
13	Any obstruction in the stairs.		
14	Are landing provided with handrails, knee rails, toe boards etc.?		
15	Whether ramp is provided with proper slope.		
16	Proper hand rails / guards provided in ramps.		
	<b>Housekeeping</b>		
1	Walkways, aisles & all overhead workplaces cleared of loose material.		
2	Flammable materials, if any, are cleared.		
3	All the de shuttering materials are removed after de shuttering is done.		
4	Platforms and walkways free from oil/grease or other slippery material.		
5	Collected scrap are brought down or lowered down and not dropped from height.		
	<b>PPE And Safety Devices</b>		
1	Use of safety helmet, safety belts ensured for all workers		
2	Anchoring points provided at all places of work.		
3	Common lifeline provided wherever linear movement at height is required.		
4	Safety nets are use wherever required.		
5	Proper fall arrest system is deployed at critical workplaces.		
6	Crawler boards/Safety system or works on fragile roof are used.		

Signature of Site I/C of subcontractor :

**POWER SECTOR****INSPECTION OF WELDING AND GAS  
CUTTING**FORMAT NO: HSEP:13-F11  
REV NO.: 00  
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<b>Name of Site</b>	
<b>Name of Sub-Contractor</b>	
<b>Inspected by</b>	
<b>Date of Inspection</b>	

<b>Welding</b>				
Sl.no.	Description	Y e s	N o	Remarks
1	Is electric connection given through 30 mA ELCB/RCCB to welding m/c?			
2	Is electric cable fitted properly in junction box on m/c?			
3	Is electrical cable free from joints?			
4	Are the joints attached firmly & insulated with tape?			
5	Is double earthing given to body of m/c?			
6	Is the physical condition of the m/c good?			
7	Is ON/OFF switch connected to the m/c is working and in good condition?			
8	Are indication lamps on m/c working?			
9	Is the electrode holder in good condition?			
10	Are the cables of the welding m/c lugged & tight properly?			
11	Are return lead connected properly (Rod, Angle, Channels shall not be used)			
	Total No of NO			
	Total No of YES			

**POWER SECTOR****INSPECTION OF WELDING AND GAS  
CUTTING**

FORMAT NO: HSEP:13-F11

REV NO.: 00

PAGE NO. 02 OF 02

Gas Cutting				
Sl. no	Description	Yes	No	Remarks
1	Are Cylinders kept on trolleys?			
2	Physical condition of Gas cylinders Good?			
3	Is there Oil/Grease on valve of the cylinder?			
4	Are pressure regulators in good condition?			
5	Condition of hose pipe OK?			
6	Are hose pipe clamped with hose clip?			
7	Is flash back arrestor & NRV fitted on torch both for O2 and LPG cylinder?			
8	Is nozzle of the torch cleaned?			
	Total Number of NO			
	Total No of YES			
	<b>% Compliance</b>			

Signature of Site I/C of subcontractor :

**POWER SECTOR****INSPECTION OF ELECTRICAL INSTALLATION**

FORMAT NO: HSEP:13-F12

REV NO.: 00

PAGE NO. 01 OF 02

<b>Name of Site</b>	
<b>Name of Sub-Contractor</b>	
<b>Inspected by</b>	
<b>Date of Inspection:</b>	

Sr. No.	Contents	Yes/No	Remarks
<b>A</b>	<b>Cable</b>		
1.	Whether the condition of cable is checked?		
2.	Are cables received from other sites checked for insulation resistance before putting them into use?		
3.	Are all main cables taken either underground / overhead?		
4.	Are welding cables routed properly above the ground?		
5.	Are welding and electrical cables overlapping?		
6.	Is any improper joining of cables/wires prevailing at site?		
<b>B</b>	<b>DBs/SDBs</b>		
1.	Is earth conductor continued upto DB / SDB?		
2.	Whether DBs and extension boards are protected from rain / water?		
3.	Is there any overloading of DBs / SDBs?		
4.	Are correct / proper fuses & CBs provided at main boards and sub-boards?		
5.	Is energized wiring in junction boxes, CB panels & similar places covered all times?		
<b>C</b>	<b>ELCB</b>		
1.	Whether the connections are routed through ELCB?		
2.	Is ELCB sensitivity maintained at 30 mA?		

**POWER SECTOR****INSPECTION OF ELECTRICAL INSTALLATION**

FORMAT NO: HSEP:13-F12

REV NO.: 00

PAGE NO. 02 OF 02

Sr. No.	Contents	Yes/No	Remarks
3.	Are the ELCB numbered and tested periodically & test results recorded in a logbook countersigned by a competent person?		
<b>D</b>	<b>Grounding</b>		
1.	Is natural earthing ensured at the source of power (main DB at Generator or Transformer)?		
2.	Whether the continuity and tightness of the earth conductor are checked?		
3.	Mention the gauge of the earth conductor used at the site.		
4.	Mention the value of Earth Resistance.		
<b>E</b>	<b>Electrically operated Machines or Accessories.</b>		
1.	Whether the plug top is provided everywhere.		
2.	Are all metal parts of electrical equipment and light fittings / accessories grounded?		
3.	Is there any shed or cover for welding machines?		
4.	Are halogen lamps fixed at proper places?		
5.	Are portable power tools maintained as per norms?		
6.	Any other information:		

Signature of Site I/C of subcontractor :



**POWER SECTOR**  
**INSPECTION OF ELEVATOR**

FORMAT NO: HSEP:13-F13  
REV NO.: 00  
PAGE NO. 01 OF 01

<b>Name of Site</b>	
<b>Name of Sub-Contractor</b>	
<b>Inspected by</b>	
<b>Date of Inspection</b>	

Sr. No.	Description	Remarks
1.0	Name of equipment	
2.0	Basic Information of equipment	
2.1	Specification	
2.2	Sr. No. of equipment	
2.3	Make	
2.4	Year of manufacture	
3.0	Major repairs/overhauls(Furnish details of work carried out)	Date(s) of major repair/overhaul
3.1		
3.2		
3.3	Repairs carried out at site	
4.0	Any performance test conducted	Yes/No
5.0	Document Submitted	Yes/No
6.0	Manufacturer's test / guarantee certificate	Available/ Not available
7.0	Performance test	Done/ Not Done
8.0	Acceptance Norms	
9.0	Committee Observations	
10.0	Date of next review (if accepted)	

<b>Signature-Subcontractor/ Subcontractor's Safety Officer</b>	<b>Signature-Site Safety Officer ( BHEL)</b>
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**POWER SECTOR****HSE PENALTY**

FORMAT NO: HSEP:13-F14

REV NO.: 00

PAGE NO. 01 OF 02

**Sub: MEMO for Penalty for non compliances in Safety**

Following lapse (tick marked) was observed and penalty is imposed as stated at the bottom of this memo. It is requested that such occurrences be please avoided in future.

**Safety Area**

SN	Violation of Safety Norms	Fine (in Rs)
01	Not Wearing Safety Helmet	200/- *
02.	Not wearing Safety Belt or not anchoring life line	500/-*
03	Not wearing safety shoe	200/-*
04	Not keeping gas cylinders vertically	200/-
05	Not using flash back arrestors	100/-
06	Not wearing gloves	50/- *
07.	Grinding Without Goggles	50/- *
08.	Not using 24 V Supply For Internal Work	500/-
09.	Electrical Plugs Not used for hand Machine	100/-
10.	Not Slings properly	200/-
11.	Using Damaged Sling	200/-
12.	Lifting Cylinders Without Cage	500/-
13.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
14.	Not Removing Small Scrap From Platforms	500/-
15.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	500/-
16.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
17.	Improper Earthing Of Electrical T&P	500/-
18	No or improper barricading	500/-
19.	Activity carried out without Safety work permit (Height work, Lifting activity, Hot work-each person/case)	1000/-
20.	Incident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
21.	Fatal Incident Resulting in total loss in Earning Capacity	1,00,000/- per victim for first instance #

**Legend:-**

\*: per head. For repeated violation by the same person, the penalty would be double of the previous penalty. Date of "Repeated violation" will be counted from subsequent days.

#: or as deducted by customer, whichever is higher. For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.



**POWER SECTOR**

**HSE PENALTY**

FORMAT NO: HSEP:13-F14

REV NO.: 00

PAGE NO. 02 OF 02

Details (if any) related to non- compliance (Name of persons, Nature of deficiency, etc.)

\_\_\_\_\_

Penalty imposed:

1, Rate as per above chart \_\_\_\_\_

2. No. of Persons/ machine/ event/ labour \_\_\_\_\_

3. Total Penalty= 1. X 2. = \_\_\_\_\_

Signature :

Witnessed by: (Sub- Contractor representative) (BHEL Personnel)

Name \_\_\_\_\_

Name \_\_\_\_\_

Distribution: 1 Copy: to Sub- contractor,  
1 Copy to Site Construction Manager(BHEL)



**POWER SECTOR- HQ**

**Incident Report**

(To be submitted within 24 hours of time of incident)

FORMAT NO: HSEP:13-F15

REV NO.: 00

PAGE NO. 01 OF 01

Type of incident: Fatal/Major/ Minor/Fire/Property Damage/Near-miss

1	NAME OF SITE		3	ACTIVITY AREA	
2	SCOPE OF WORK		4	NAME OF CONTRACTOR	
			5	NAME & DESIGNATION OF BHEL ACTIVITY I/C	
6	DATE & TIME OF ACCIDENT		7	DATE RESUMED	
8	NO. OF WORK-DAYS LOST BY VICTIM (If duty not resumed, give estimated figure)				
9	NO. OF MANHOURS LOST BY OTHERS				
10	PERSONAL DETAILS OF INJURED AND / OR DETAILS OF MATERIALS / EQUIPMENT / PROPERTY DAMAGED				
NAME			NAME OF MATERIAL / EQUIPMENT / PROPERTY		
PERIOD OF EMPLOYMENT					
AGE	YRS	SEX	MALE/ FEMALE	ESTIMATED COST	ACTUAL COST
MARITAL STATUS		SINGLE / MARRIED			
OCCUPATION			NATURE OF DAMAGE		
PART OF BODY INJURED					
NATURE OF INJURY					
AGENCY ( OBJECT / EQUIPMENT / SUBSTANCE ) MOST RESPONSIBLE FOR CAUSING ACCIDENT / INJURY / DAMAGE					
12	PERSON (NAME & DESIGNATION) WITH MOST CONTROL OVER AGENCY (OBJECT / EQUIPMENT / SUBSTANCE ) CAUSING ACCIDENT INJURY / DAMAGE				
13	DESCRIBE CLEARLY HOW THE ACCIDENT OCCURRED (USE ADDITIONAL SHEET, IF REQUIRED)				
<b>ANALYSIS</b>					
14	WHAT ACTS AND / OR CONDITIONS CONTRIBUTED MOST DIRECTLY TO THIS ACCIDENT				
15	WHAT ARE THE BASIC REASON FOR THE EXISTENCE OF THESE ACTS AND / OR CONDITION ?				
16	WHAT CORRECTIVE ACTIONS HAVE BEEN TAKEN TO PREVENT ACCIDENT RECURRENCE ?				
	DATE :		SIGNATURE OF SITE HSE COORDINATOR		
17	COMMENTS OF HEAD / SOX				
	DATE:		SIGNATURE OF HEAD/SOX		



# SAFETY WORK CLEARANCE

Permit no. \_\_\_\_\_

Project: \_\_\_\_\_

Emergency Contact Nos: \_\_\_\_\_

Subcontractor: \_\_\_\_\_

## BURNING/WELDING /HOT WORK PERMIT

Area : \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of Site Engineer (Permit Requesting Authority): \_\_\_\_\_ Sign: \_\_\_\_\_

Name of Work Performing Contractor: \_\_\_\_\_

Name of Package In charge: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_

Description of Work: \_\_\_\_\_

Work Execution Date: \_\_\_\_\_ Time Valid from: \_\_\_\_\_ to \_\_\_\_\_

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	Proper Access/Exit available		
2.	Proper ventilation and /or lighting provided.		
3.	Proper and safe scaffolding, platform, ladder provided.		
4.	Welding machine located in a clean and dry area.		
5.	Welding machine grounded at the equipment and proper leakage current protection device (ELCB) provided for welding machine.		
6.	Emergency STOP buttons are in working condition. Welder /Helper knows how to operate it.		
7.	Welding machine input/output cables, welding holder and weld return clamp (Holder) are insulated and in good condition.		
8.	Welder & Fitter trained to connect ground/work return clamps (Holder) to work place prior to energization of welding machine.		
9.	Gas cylinders are stacked vertically and not below the welding / cutting area. Regulator key is available with cylinder.		
10.	Pressure gauges/Flash back arrestor provided and in working condition.		
11.	Personal Protective equipment Minimum applicable: safety helmet, safety goggles, welding helmet, safety shoes, leather gloves, long sleeve and nose mask -provided		
12.	In case of pits, water removed from the pit and wood/rubber insulation provided.		
13.	Safety signboards are in place.		
14.	Adequate and Suitable nos. of fire fighting extinguisher provided.		
15.	Nearby combustible material removed. Housekeeping done.		
16.	Other		

Name of Contractor Safety Officer: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

**Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):**

Name: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of BHEL Safety Representative: \_\_\_\_\_ Sign: \_\_\_\_\_

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

**Permit Cancellation:**

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of Site Engr. (Permit Requesting Authority): \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of BHEL Site Engr. (Permit Issuing Authority): \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

(This permit is valid only for the date it is issued)

Original at BHEL site

Second Copy – BHEL SAFETY

Third Copy : Contractor



# SAFETY WORK CLEARANCE

Permit no. \_\_\_\_\_

Project: \_\_\_\_\_

Emergency Contact Nos: \_\_\_\_\_

Subcontractor: \_\_\_\_\_

## LIFTING ACTIVITY PERMIT

Area : \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of Site Engineer (Permit Requesting Authority): \_\_\_\_\_ Sign: \_\_\_\_\_

Name of Work Performing Contractor: \_\_\_\_\_

Name of Package In charge: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_

Description of Work: \_\_\_\_\_

Work Execution Date: \_\_\_\_\_ Time Valid from: \_\_\_\_\_ to \_\_\_\_\_

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	Crane used for lifting activity tested, certified and approved for rated lifting		
2.	All lifting tackles, gears/appliances are tested and certified for lifting works.		
3.	Crane operator is trained and competent for lifting operation.		
4.	Lifting sling/ belt is protected against sharp edge of the jobs to be lifted.		
5.	Access and exit marked and without obstruction.		
6.	Lifting arrangement adequate.		
7.	Uwanted rubbish material removed from work platform.		
8.	Minimum 2 guidelines have been provided for balancing and guiding jobs to be lifted.		
9.	Periphery area of crane booms as well as lifting job is barricaded and unauthorised/no-entry sign board posted.		
10.	Rigger and signal man is trained and competent for lifting work.		
11.	No lifting activity to be carried out during lightening, heavy wind/rain.		
12.	If scaffolding to be used during lift, scaffolding with valid tag available for use.		
13.	Double lanyards safety harness/belt checked an in working condition.		
14.	Safety shoes (non-slip), helmet with chin strap available with employees.		
15.	Others.		

Name of Contractor Safety Officer: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

**Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):**

Name: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of BHEL Safety Representative: \_\_\_\_\_ Sign: \_\_\_\_\_

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

**Name of Work Performing Authority:** \_\_\_\_\_ **Sign:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **Time:** \_\_\_\_\_**Permit Cancellation:**

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of Site Engr. (Permit Requesting Authority): \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of BHEL Site Engr. (Permit Issuing Authority): \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

(This permit is valid only for the date it is issued)

**Original at BHEL site****Second Copy – BHEL SAFETY****Third Copy : Contractor**



# SAFETY WORK CLEARANCE

Permit no. \_\_\_\_\_

Project: \_\_\_\_\_

Emergency Contact Nos: \_\_\_\_\_

Subcontractor: \_\_\_\_\_

## WORKING AT HEIGHT PERMIT

Area : \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of Site Engineer (Permit Requesting Authority): \_\_\_\_\_ Sign: \_\_\_\_\_

Name of Work Performing Contractor: \_\_\_\_\_

Name of Package In charge: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_

Description of Work: \_\_\_\_\_

Work Execution Date: \_\_\_\_\_ Time Valid from: \_\_\_\_\_ to \_\_\_\_\_

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	All workers on job are medically fit for working at height (Person should not have vertigo)		
2.	Scaffolding with valid tag available for use		
3.	Safety harness with life line support/ fall arrester are checked and in working condition		
4.	Safety shoes ( non-slip), Helmet with chin strip available with employees		
5.	Safety nets are provided as per design and provided 25 ft. below working area & extending 8 ft beyond.		
6.	Horizontal life lines are provided to cater to design specification of 2300kg per person.		
7.	Ladders have been inspected and provided as per BHEL standard/contract.		
8.	All lifting / tightening tools, hand tools/equipment checked and in good condition		
9.	Access and exit marked and without obstruction.		
10.	Lighting arrangement adequate.		
11.	Unwanted and rubbish material removed from working platform.		
12.	Electrical cable, welding Hose/Compressed air hose properly secured and lay down without obstruction.		
13.	Signboards provided on working platforms		
14.	Hazards in the vicinity are identified and communicated to the worker.		
15.	Other		

Name of Contractor Safety Officer: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

**Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):**

Name: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of BHEL Safety Representative: \_\_\_\_\_ Sign: \_\_\_\_\_

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

**Permit Cancellation:**

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of Site Engr. (Permit Requesting Authority): \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of BHEL Site Engr. (Permit Issuing Authority): \_\_\_\_\_ Sign: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

(This permit is valid only for the date it is issued)

**Original at BHEL site****Second Copy – BHEL SAFETY****Third Copy : Contractor**

 PSSR	<b>MONTHLY PLAN &amp; REVIEW WITH CONTRACTOR</b>	Page 1 of 6
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Name of Project	Contract No.	
Name of Work	Name of Contractor	

**PART- A: PLAN/ REVIEW OF WORK FOR THE MONTH OF .....**      Date of Plan/ Review.....

SN.	Description of Work	Unit of Measurement	Unit Rate (d)	Planned (QTY Planned for the month as per Part -C of last month)		Cumulative Shortfall attributable to contractor upto last month (Refer Note 1)	Achieved		Shortfall attributable to BHEL w.r.t Plan (as per Col. 3 of Part-D)	Cumulative Shortfall attributable to Contractor upto & including this month E=A+B-C-D	REMARKS (Reasons for Shortfall attributable to Contractor. Supporting documents to be kept as record.)
				Phy.	Financial		Phy.	Financial			
(a)	(b)	(c)	(d)	A	B	C	D	E			
	Value of Other Items not mentioned above but planned to be executed in this month										
	Total			ΣA	ΣB	ΣC	ΣD	ΣE			

BHEL  
(Sign with name, designation and date)

CONTRACTOR  
(Sign with name, designation and date)

 PSSR	<b>MONTHLY PLAN &amp; REVIEW WITH CONTRACTOR</b>	Page <b>2</b> of <b>6</b>
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Name of Project		Contract No.	
Name of Work		Name of Contractor	

**PART- A: Contd.....**

**Note 1: In addition to the work planned as per Col. 'A', Contractor shall also make full efforts to minimize the 'Cumulative shortfall attributable to contractor upto the month' as mentioned in Col. 'B' by enhancing its resources, so as to achieve the completion of activities as per agreed schedule. In case contractor is not able to execute the entire shortfall, then BHEL 'Engineer in-charge', shall decide the priority of work to be executed and it shall be binding on the contractor.**

**Note 2: Percentage Shortfall attributable to contractor w.r.t. "Plan - Shortfall attributable to BHEL" for the month =  $[(\Sigma E - \Sigma B) / (\Sigma A - \Sigma D)] \times 100$**   
 In case,  $(\Sigma E - \Sigma B)$  is negative, then it shall be treated as zero percent."

**Note 3: Form 14 should include all items being planned in the current month, and all items against which shortfall was attributable to contractor till previous month. However, for practical reason, if it is not possible to mention some of the items in Form-14 being planned to be executed in this month, then also value of such items shall necessarily be included in calculation of Total Value.**

**Note 4: In case reason for shortfall attributable to contractor is w.r.t. T&P and Manpower, it should be in conformity with Part B1 and B2.**

BHEL  
 (Sign with name, designation and date)

CONTRACTOR  
 (Sign with name, designation and date)

 PSSR	<b>MONTHLY PLAN &amp; REVIEW WITH CONTRACTOR</b>	Page <b>3</b> of <b>6</b>
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Name of Project		Contract No.	
Name of Work		Name of Contractor	

**PART – B-1: PLAN/REVIEW OF DEPLOYMENT OF MAJOR T&Ps FOR THE MONTH OF .....**      Date of Plan/ Review.....

**CONTRACTOR'S SCOPE: -**

SN.	PLAN			DEPLOYMENT STATUS			REMARKS (Works affected due to non-deployment of T&Ps)
	Major T&P to be deployed as per work planned for the month	QTY	Deployment Period (in days)	Weightage assigned to planned T&P (in fraction such that ΣC =1)	Actual Deployed Quantity	Actual Deployment Period (in days)	
		A	B	C	D	E	$F = (C \times D \times E) / (A \times B)$

Note: In case,  $E > B$ , it shall be considered as  $E = B$ . Similarly, in case  $D > A$ , it shall be considered as  $D = A$ .  
 Percentage of T&P Deployed =  $\Sigma F \times 100$

**BHEL SCOPE: -**

SN.	PLAN			DEPLOYMENT STATUS			REMARKS (Works affected due to non-deployment of T&Ps)
	Major T&P to be deployed as per work planned for the month	QTY	Deployment Period (in days)	Actual Deployed Quantity	Actual Deployment Period (in days)	Weighted T&P Deployed	

BHEL  
 (Sign with name, designation and date)

CONTRACTOR  
 (Sign with name, designation and date)

 PSSR	<b>MONTHLY PLAN &amp; REVIEW WITH CONTRACTOR</b>	Page <b>4</b> of <b>6</b>
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Name of Project	Contract No.
Name of Work	Name of Contractor

**PART – B-2: PLAN/ REVIEW OF DEPLOYMENT OF MANPOWER FOR THE MONTH OF .....** Date of Plan/ Review.....

**CONTRACTOR'S SCOPE: -**

SN.	Area of Work	Category of Labour	No. of Labour required as per category	Deployment Period (in days)	No. of Labour actually deployed		Actual Deployment Period (in days)	REMARKS (Works affected due to non-availability of labour)
					A	B		

Percentage of Manpower Deployed =  $100 \times \frac{\Sigma(C \times D)}{\Sigma(A \times B)}$

BHEL  
(Sign with name, designation and date)

CONTRACTOR  
(Sign with name, designation and date)

 PSSR	<b>MONTHLY PLAN &amp; REVIEW WITH CONTRACTOR</b>	Page 5 of 6
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Name of Project	Contract No.	
Name of Work	Name of Contractor	

**PART – C: PLAN(PHYSICAL) FOR THE NEXT MONTH i.e. ....** Date of Plan .....

SN.	Description of work	Original Planned Quantity	Planned Quantity (excluding shortfalls attributable to contractor till date)	Unit of Measurement	T & Ps Required		Manpower Required		REMARKS (Reasons for difference in Original Planned Quantity w.r.t. Planned quantity to be given)
					Contractor Scope		BHEL Scope		
					Major T&P to be deployed as per work planned for the month	Quantity	Major T&P to be deployed as per work planned for the month	Quantity	

Note 1: Planned quantity should be based on available/ expected fronts/ inputs in the next month

Note 2: “Original Planned Quantity” shall be as per latest jointly agreed programme between BHEL and Contractor before commencement of work or at the time of latest Time Extension, as the case may be.

BHEL  
(Sign with name, designation and date)

CONTRACTOR  
(Sign with name, designation and date)

 PSSR	<h2 style="margin: 0;">MONTHLY PLAN &amp; REVIEW WITH CONTRACTOR</h2>	Page <b>6</b> of <b>6</b>
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Name of Project	Contract No.	
Name of Work	Name of Contractor	

**PART – D: REASONS FOR SHORTEALL ATTRIBUTABLE TO BHEL IN RESPECT OF PLAN FOR THE MONTH.....**

SN.	Description of Work (from Part-A)	Quantities Affected		Reasons for Shortfall attributable to BHEL	Agency responsible for reasons for Shortfall	Remarks (Supporting Documents in respect of agency responsible)
		(Physical Quantity)	Unit of Measu- rement			
1	2	3	4	5	6	7

Note1: Reasons for shortfall shall include non-availability of fronts/ drawings/ materials/ T&P (BHEL Scope)/ clearances etc. and other hindrances for which contractor is not responsible.

Note2: Agency responsible may be BHEL Site/ MUs/ Design Centre/ BHEL Customer/ other Contractors etc.

BHEL  
(Sign with name, designation and date)

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#1.01	Cumulative number of days in the month, the nominated Quality Officer or his authorised nominee was not available	QUALITY	1.5		Quality Officer or his authorised nominee should be available for all the days of working at site	Daily Log Book entry/Incident Registers/letter references
#1.02	Number of instances of non- compliance wrt FQP, Standard Drawings, Specifications, E&C Manuals etc.	QUALITY	1.5		No deviation from FQP, Standard Drawings, Specifications, E&C Manuals etc. is allowed without BHEL Engineer's approval.	Daily Log Book entry/Incident Registers/letter references
#1.03	Percentage submission of test certificates for batches of welding electrodes, cement, sand, aggregate, consumable, Paints etc. as applicable for this month OR In case of MM & MH package, monthly checks for Storage/Preservation of material.	QUALITY	1		Submission of 100% Test certificates for materials as per FQP is mandatory. MM & MH package: Storage/Preservation as per manual/procedure.	Daily Log Book entry/Incident Registers/letter references
#1.04	Number of incidences of improper storage & preservation (not in accordance to the guidelines of BHEL MUs or approved FQP) of materials, consumables (viz. gases, welding electrodes & fluxes, fuel etc.) & bought-out items (paints, fasteners etc.) under the custody of the contractor	QUALITY	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#1.05	Rework/ Rejection instances in a month necessitated due to deviation from Standard Drawings /Specifications /Manuals /E&C procedures /FQPs or due to Poor Workmanship by contractor	QUALITY	2		Reworks/ Rejection should be as minimum as possible. Total number of reworks/ rejections due to reasons attributable to contractor.	Daily Log Book entry/Incident Registers/letter references
#1.06	Delay in preparation & submission of signed protocols / log sheets / site register / NDT test reports as per approved FQP/ Qualified Welder List along with photocopies of Welder ID cards / Welder Performance Evaluation records etc. in the month OR in case of MM / MH package reconciliation statement / verification report.	QUALITY	1		Within 2 days of measurements taken or within first 3 working days of next month, as advised by BHEL Engineer	Daily Log Book entry/Incident Registers/letter references
#1.07	Number of instances for Major equipment/product failure due to negligence/improper work/poor workmanship by contractor	QUALITY	1		No such event should happen	Daily Log Book entry/Incident Registers/letter references
#1.08	Total number of complaints received in the month on the quality of finish / aesthetics	QUALITY	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#2.01	Cumulative number of days of delay in submission of Plan FOR THE MONTH supported by deployment plan of Major T&Ps and Manpower (as per Form F-14) and relevant construction/layout drawings - like A4 plan / elevation views of plan status for structures / pressure parts/Civil Works, Piping isometrics for piping, Layout / PID / System reference sketch, Unloading / storage plans etc.as applicable.	PERFORMANCE	5		Number of days delayed from second working day of the month	Daily Log Book entry/Incident Registers/letter references
#2.02	Percentage of timely submission of Daily Reports for Progress of work, Resources, Consumables etc.	PERFORMANCE	1.5		Percentage of timely submission of daily reports/ Scheduled date is successive next day for each day	Daily Log Book entry/Incident Registers/letter references
#2.03	Number of days delayed for submission of FQP log sheets / protocols / Monthly Progress Reports for the work executed during the month under measurement	PERFORMANCE	1.5		Number of days delayed/Scheduled date is first 2 working days of next month	Daily Log Book entry/Incident Registers/letter references
#2.04	Shortfall attributable to contractor w.r.t. Plan as per Form-14 for the subject month	PERFORMANCE	35		Percentage of shortfall to be calculated w.r.t. Total planned target for the month as per part-A of F-14. If more than one work has been planned in a month then Weightages of works shall be assigned at the time of plan to arrive at plan vs achievement calculation.	Progress review formats
#2.05	Number of days delayed in submission of Running bills with complete supporting documents (including updated reconciliation statement of BHEL issued material) for the month	PERFORMANCE	2		Number of days delayed / Scheduled date is 7th day of next month	Daily Log Book entry/Incident Registers/letter references
#2.06	Number of times the Top Management of contractor did not respond to critical issues of site, for the month	PERFORMANCE	1		Total number of instances	Daily Log Book entry/Incident Registers/letter references
#2.07	Cumulative number of days in the month the works were stopped / refused on interpretation of contract clauses/scope due to tendency of taking undue advantage by interpreting contract clauses in their favour	PERFORMANCE	2		Cumulative number of days lost	Daily Log Book entry/Incident Registers/letter references
#2.08	Number of times rework was refused by contractor	PERFORMANCE	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references

Name and Signature of BHEL Package In-charge

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Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#2.09	Cumulative number of days in the month recording / logging was not done in daily log / history register / hindrance register / soft form in a PC maintained at BHEL Site Office	PERFORMANCE	1		Cumulative number of days recording or logging was not done / all days of the month	Daily Log Book entry/Incident Registers/letter references
#3.01	Number of days of non-availability of required Manpower including supporting staff as per plan submitted in F-14 for the month.	RESOURCES	7		Cumulative number of days Sufficient Manpower was not available as per Plan in F-14	Daily Log Book entry/Incident Registers/letter references
#3.02	Number of days of non-availability of required T&P as per plan submitted in F-14 for the month.	RESOURCES	7		Cumulative number of days Sufficient T&P was not available as per Plan in F-14	Daily Log Book entry/Incident Registers/letter references
#3.03	Cumulative number of major instances in the month hampering / affecting progress of work due to breakdown or non-availability of major T&P and MME for the work, under the scope of Contractor	RESOURCES	3		Cumulative number of instances	Daily Log Book entry/Incident Registers/letter references
#3.04	Cumulative number of major instances in the month hampering / affecting progress of work due to non-availability of Consumables/ use of improper consumables under the scope of contractor	RESOURCES	3		Cumulative number of instances	Daily Log Book entry/Incident Registers/letter references
#4.01	Number of non-compliances during the month for Statutory requirements like validity of Labour Licence, Insurance Policy, Labour Insurance, PF, BOCW Compliance etc. and any other applicable laws/ Regulation, Electrical Licence, T&P fitness certificate, Contractors' All Risk Policy etc. as applicable	SITE INFRASTRUCTURE & SERVICE	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#4.02	Cumulative number of days in a month poor illumination is reported at storage area, erection area, pre-assembly area and other designated areas by BHEL site.	SITE INFRASTRUCTURE & SERVICE	0.5		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references
#4.03	Cumulative number of days of non-availability of well-maintained toilets facilities for workers (separate for men and women) and non-availability of potable drinking water stations for workers in specified areas.	SITE INFRASTRUCTURE & SERVICE	1		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references

Name and Signature of BHEL Package In-charge

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Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#4.04	Total number of instances in the month, Housekeeping NOT attended to in spite of instructions by BHEL -i.e. removal / disposal of surplus earth / debris / scrap / unused / surplus cable drums / other electrical items / surplus steel items / packing materials, thrown out scrap like weld butts, cotton waste etc. from the working area to identified locations	SITE INFRASTRUCTURE & SERVICE	2		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references
#4.05	Total number of instances in a month, Site Office with reasonably good facilities including enough nos. of computers and printers etc. for use by office and supporting staff was not made available/maintained.	SITE INFRASTRUCTURE & SERVICE	0.5		No discrepancy during regular or surprise visits	Photograph and report of the Engineer
#5.01	Number of days delayed in making labour payments for the last month	SITE FINANCE	2		Number of days delayed / Scheduled date is 7th day of next month	Daily Log Book entry/Incident Registers/letter references
#5.02	Number of complaints from labour/ sub supplier/ sub-contractor for non-receipt of payments from contractor	SITE FINANCE	1.5		Total number of complaints or reporting	Daily Log Book entry/Incident Registers/letter references
#5.03	Number of times the site operations were hampered for want of funds at the disposal of site-in-charge.	SITE FINANCE	1.5		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#6.01	Cumulative number of days in a month the nominated Safety Officer was not available	HSE & SA	1		Safety Officer should be available for all the days	Daily Log Book entry/Incident Registers/letter references
#6.02	Shortfall in number of weekly safety meetings in the month conducted or attended by the Safety Officer	HSE & SA	0.5		Safety meetings to be held every week	Copy of Minutes of meeting
#6.03	Level of compliance w.r.t decisions taken in previous Safety meetings	HSE & SA	0.5		Number of consolidated issues discussed in Safety meetings	Copy of Minutes of meeting, Non-compliance intimation documents from BHEL site
#6.04	Delay in submission of monthly report on safety (including electrical safety for equipment & personnel etc.) in the prescribed form	HSE & SA	1		Number of days delayed/Scheduled date is third working day of next month	Daily Log Book entry/Incident Registers/letter references
#6.05	Number of days taken for lodging FIRs from date of occurrence/notice of incident of theft / accident etc.	HSE & SA	0.5		Number of days delayed/Scheduled date is within 24 Hrs of occurrence/notice of incidence	Copy of FIR lodged by Contractor

Name and Signature of BHEL Package In-charge

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Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#6.06	Number of times written(email, letters etc.) warning issued for non-availability/ use of improper Fall protection and rescue arrangement as lifeline, fall arrestors, safety net, hand-railings, covered floors, man-basket, rescue basket & kit etc. by the contractor	HSE & SA	2		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#6.07	Number of times punitive fines imposed for unsafe practices as per contract like non-availability/use of PPEs as safety shoes, helmets, goggles, gloves, lifeline, safety belts etc.	HSE & SA	1		Total number of non-compliances	Non-compliance intimation documents from BHEL site
#6.08	Percentage compliance to Emergency preparedness and response plan: Portable Fire-extinguishers, Buckets, Fire-wardens, display of emergency numbers, mock-drills, Hazard Identification and Risk Assessment(HIRA) etc.	HSE & SA	1		Compliance should be 100% as per HSE Plan or as finalized in Safety Meetings	Non-compliance intimation documents from BHEL site
#6.09	Number of times the agency has defaulted on display of safety posters / safety slogans / safety barriers/emergency numbers etc. in identified areas	HSE & SA	0.5		Total number of instances	Non-compliance intimation documents from BHEL site
#6.10	Non compliances observed during HSE and Safety Audit	HSE & SA	0.5		Total number of non-compliances	Non-compliance intimation documents from BHEL site, Audit Reports
#6.11	Cumulative number of days in the month, non-availability of First Aid Kit, First Aider & Emergency Vehicles/Ambulance.	HSE & SA	0.5		Cumulative number of days	Non-compliance intimation documents from BHEL site
#6.12	Number of days taken for submission of Root Cause analysis (RCA) for the accident from the cut-off date intimated by BHEL for submission of RCA	HSE & SA	0.5		Number of days delayed/Scheduled date is cut-off date intimated by BHEL	Daily Log Book entry/Incident Registers/letter references
#6.13	Non conductance of training (induction, job specific, height work etc.), tool box meeting and health check-up as per Contract requirements	HSE & SA	0.5		Number of incidences of non-conductance during the month	Daily Log Book entry/Incident Registers/letter references
<b>Total</b>			<b>100</b>			

Name and Signature of BHEL Package In-charge

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Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
	Less Deduction in Score Due to Major Accidents (Fatal, Permanent Disability or bodily injury by which person injured is prevented to resume to work within 48 hours or more after accident,, Major Damage to Equipment etc.) @ 3 points/ accident					
	Less Deduction in Score Due to Minor Accidents(All Others) @ 1 point/ accident					
	Less Deduction in Score Due to not Maintaining of Labour Colony (if applicable) as per BHEL HSE policy @2 points in a month on verification any day					
	<b>Final Score</b>					

Performance Score Summary for the Month	Total Score	Score Obtained
QUALITY	10	
PERFORMANCE	50	
RESOURCES	20	
SITE INFRASTRUCTURE & SERVICE	5	
SITE FINANCE	5	
HSE & SA	10	
OTHERS (deductions if any)	0	
<b>TOTAL</b>	<b>100</b>	

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

**REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR  
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

SL NO.	ITEM DESCRIPTION	USEFUL LIFE (IN YRS)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (WITHIN USEFUL LIFE)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (BEYOND USEFUL LIFE)
I.	<b>CRANES :-</b>			
1	Portal Gantry Crane 500T	15	20100.00	19980.00
2	100MT Crawler Crane ZOOMLION CRANE-QUY-100	10	11370.00	11320.00
3	Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800	15	56290.00	55940.00
4	PORTAL CRANE, 360T	15	14070.00	13980.00
5	600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED	15	55460.00	55110.00
6	600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded version)	15	68610.00	68180.00
7	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER)	15	33510.00	33300.00
8	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER)	15	20940.00	20810.00
9	MANITOWOC M-250T TRUCK CRANE	15	30160.00	29970.00
10	270 MT Class Crawler Crane- Manitowoc Model 2250	15	31660.00	31470.00
11	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1	15	26390.00	26220.00
11.A	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED)	15	36110.00	36110.00
12	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2	15	15130.00	15030.00
12.A	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED)	15	18850.00	18850.00
13	LINKBELT LS- 248H CRAWLER CRANE (180T)	15	16750.00	16650.00
14	MANITOWAC MODEL 888 CRAWLER CRANE (200 MT)	15	21780.00	21640.00
15	CRAWLER CRANE SUMITOMO, 150T	15	10890.00	10820.00
16	All Terrain Crane, 150MT- Liebherr Model LTM1150	15	13400.00	13320.00
17	CRAWLER CRANE, 120 T Fushun Model QUY120	10	10830.00	10780.00
18.A	CRAWLER CRANE 135MT Kobelco Model CK1350- 1F	15	10720.00	10650.00
18.B	CRAWLER CRANE 135MT Kobelco Model CK1350	15	8880.00	8820.00
19	CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2	15	10050.00	9990.00
20	CRAWLER CRANE 100 T (KH 500)	15	10050.00	9990.00
21	Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B	10	5410.00	5390.00
22	ROUGH TERRAIN CRANE 75T (RT880)	12	6140.00	6110.00
23	CRAWLER CRANE, 75T -Tata Model 955ALC/TFC280	12	5370.00	5340.00
24	Mobile Crane, 55MT (TIL)	12	4410.00	4390.00
25	CRAWLER CRANE, 25T -Tata Model TFC75	10	3030.00	3010.00
26	MOBILE CRANE, 20MT (TIL)	10	2270.00	2260.00
27	MOBILE CRANE, 20MT (ESCORTS)	10	2270.00	2260.00
28	MOBILE CRANE ESCORTS- 14MT	10	710.00	710.00
29	HYDAULIC PICK & CARRY CRANE, 8/9/10/11/12 MT	10	390.00	380.00
30	ELECTRIC GANTRY CRANE 3T	5	430.00	430.00
31	ELECTRIC GANTRY CRANE 5T	5	540.00	540.00
32	ELECTRIC GANTRY CRANE 30T	5	3640.00	3620.00
33	FORK LIFT 5T	5	650.00	650.00
34	FORK LIFT 3T	5	540.00	540.00

**REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR  
OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	USEFUL LIFE (IN YRS)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (WITHIN USEFUL LIFE)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (BEYOND USEFUL LIFE)
<b>I.</b>	<b>CRANES :-</b>			
1	Portal Gantry Crane 500T	15	22340.00	22200.00
2	100MT Crawler Crane ZOOMLION CRANE-QUY-100	10	12630.00	12570.00
3	Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800	15	62550.00	62160.00
4	PORTAL CRANE, 360T	15	15630.00	15540.00
5	600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED	15	61620.00	61240.00
6	600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded version)	15	76230.00	75760.00
7	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER)	15	37230.00	37000.00
8	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER)	15	23270.00	23120.00
9	MANITOWOC M-250T TRUCK CRANE	15	33510.00	33300.00
10	270 MT Class Crawler Crane- Manitowoc Model 2250	15	35180.00	34960.00
11	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1	15	29320.00	29130.00
11.A	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED)	15	40120.00	40120.00
12	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2	15	16810.00	16700.00
12.A	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED)	15	20950.00	20950.00
13	LINKBELT LS- 248H CRAWLER CRANE (180T)	15	18610.00	18500.00
14	MANITOWAC MODEL 888 CRAWLER CRANE (200 MT)	15	24200.00	24050.00
15	CRAWLER CRANE SUMITOMO, 150T	15	12100.00	12020.00
16	All Terrain Crane, 150MT- Liebherr Model LTM1150	15	14890.00	14800.00
17	CRAWLER CRANE, 120 T Fushun Model QUY120	10	12030.00	11970.00
18.A	CRAWLER CRANE 135MT Kobelco Model CK1350- 1F	15	11910.00	11840.00
18.B	CRAWLER CRANE 135MT Kobelco Model CK1350	15	9860.00	9800.00
19	CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2	15	11170.00	11100.00
20	CRAWLER CRANE 100 T (KH 500)	15	11170.00	11100.00
21	Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B	10	6010.00	5980.00
22	ROUGH TERRAIN CRANE 75T (RT880)	12	6830.00	6790.00
23	CRAWLER CRANE, 75T -Tata Model 955ALC/TFC280	12	5970.00	5940.00
24	Mobile Crane, 55MT (TIL)	12	4900.00	4880.00
25	CRAWLER CRANE, 25T -Tata Model TFC75	10	3370.00	3350.00
26	MOBILE CRANE, 20MT (TIL)	10	2520.00	2510.00
27	MOBILE CRANE, 20MT (ESCORTS)	10	2520.00	2510.00
28	MOBILE CRANE ESCORTS- 14MT	10	790.00	790.00
29	HYDAULIC PICK & CARRY CRANE, 8/9/10/11/12 MT	10	430.00	430.00
30	ELECTRIC GANTRY CRANE 3T	5	480.00	480.00
31	ELECTRIC GANTRY CRANE 5T	5	600.00	600.00
32	ELECTRIC GANTRY CRANE 30T	5	4040.00	4030.00
33	FORK LIFT 5T	5	720.00	720.00
34	FORK LIFT 3T	5	600.00	600.00

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR  
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
<b>I.</b>	<b>LIFTING EQUIPMENTS</b>	
1	Strand Jack System for Boiler Drum Lifting	20930
2	MULTI SHEAVE PULLEY BLOCK 40/50T/60T	310
3	MULTI SHEAVE PULLEY BLOCK 100T	630
4	MULTI SHEAVE PULLEY BLOCK 150T	1260
5	ELCTRIC WINCH 5T	1270
6	ELCTRIC WINCH 10T	2360
7	ELECTRIC WINCH 15 T	2150
8	PASSENGER CUM GOODS HOIST 1T	2270
9	FURNACE MAINTENANCE PLATFORM	5040
10	Gang Operated Hydraulic Jack (Set of 4 Jacks - 175 MT each)	2100
<b>II</b>	<b>WELDING &amp; HEAT TREATMENT EQUIPMENT</b>	
1	125KW, 3KHZ, AIR-COOLED INDUCTION HEATING EQUIPMENT	16380
2	75KW, 10 KHZ, COMPACT INDUCTION HEATING EQUIPMENT	8190
3	WELDING GENERATOR 320/300 A	300
4	WELDING RECTIFIER 400A/300A	300
5	WELDING RECTIFIER 600A	400
6	DIESEL WELDING GENERATOR 400A/300A	400
7	TRANSFORMER,600A	300
8	TRANSFORMER 300/400A	200
<b>III</b>	<b>SERVICE PLANTS &amp; ALLIED EQUIPT.</b>	0
1	500KVA DIESEL GENERATOR	3800
2	TRANSFORMER OIL FILTERATION EQUIPMENT 6000LPH CAPACITY WITHOUT STORAGE TANK	6370
3	-DO- , WITH STORAGE TANK	7280
4	OIL FILTERATION M/C, 250/500 LPH (OTHER THAN SILICON OIL)	910
5	OIL FILTERATION M/C, 250GPH/1000LPH (OTHER THAN SILICON	1360
6	OIL FILTERATION M/C, 500GPH/2500LPH (OTHER THAN SILICON	1820
7	OIL FILTERATION M/C, 1000GPH/5000LPH (OTHER THAN SILICON	3640
8	Portable Lube Oil Purification Unit (Centrifuge M/c) Capacity: 750	1270
9	Low Vacuum de-hydration unit	630
10	DIESEL GENERATING SET,250 KVA	1770
11	DIESEL GENERATING SET,25 KVA	500
12	VACUUM PUMP(ABSOLUTE V.C.)	540
13	ACID CIRCULATING PUMP WITH MOTOR 120M HEAD, 150T/HR	1090
14	ACID TRANSFER PUMP 20/50 T/HR	540
15	DEWATERING PUMP (Kirloskar make,11KW/15HP)	80
16	HP Air compressor (32 Kg/Sq. Cm, 150 CFM)	4240

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR  
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
17	AIR COMPRESSORS 250/300/330/360/350 CFM	2730
18	AIR COMPRESSORS 140/150/190/210 CFM	910
19	ACID CIRCULATING PUMP WITH MOTOR & STARTER, 200T/HR, 150M, 220 HP	1820
20	Industrial Blower 2000CFM	1270
21	Air Leak Test Blower (Flow: 40000 m <sup>3</sup> /Hr)	1160
22	Air Blower (Flow: 20000 m <sup>3</sup> /Hr)	940
IV	METAL FORMING /CUTTING EQUIPMENT	
1	TUBE EXPANDING M/C PNEUMATIC 60-100 MM	630
2	ELECTRO HYDRAULIC PIPE BENDING M/C 4"	1630
3	BOLTING MACHINE (ALCOA/AVLOCK/ HUCK)	1800
4	-do- Gun with nose Assembly only	540
V	TESTING/INSPECTION EQUIPMENT	
1	DATA LOGGER for PG TESTING	36980
2	MOTORISED HYDRAULIC TEST PUMP 250kg/cmsq	800
3	MOTORISED HYDRAULIC TEST PUMP 400-450kg/cmsq	1090
4	MOTORISED HYDRAULIC TEST PUMP 600 KG/CMSQ	1270
5	HYDRAULIC TEST PUMP 800 KG/CMSQ	1330
6	HYDRAULIC TEST PUMP 1000 KG/CMSQ	2230
7	BOLT STRETCHING DEVICE	910
8	BOROSCOPE/FIBROSCOPE FLEXIBLE TYPE (FLEXUX) IMPORTED	3640
9	ULTRASONIC FLAW DETECTOR	2730
10	MPI TEST KIT	360
11	GAS LEAK DETECTOR	270
12	VIBRATION/SOUND LEVEL METER IRD-306	360
13	VIBRATION/SOUND LEVEL METER IRD-308	360
14	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 350	1450
15	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 360	2540
16	SHOCK PULSE METER	630
17	HV.DC TEST KIT UPTO 50 KV	540
18	HV.DC TEST KIT ABOVE 50 KV	1000
19	HV.AC TEST KIT UPTO 50KV	810
20	HV.AC TEST KIT ABOVE 50KV	2910
21	MOTORISED MEGGER 2.5KV	400
22	MOTORISED MEGGAR 5KV	450
23	OSCILLOSCOPE-DUAL BEAM INDIGENOUS	450
24	OSCILLOSCOPE-DUAL BEAM IMPORTED	1090
25	WAVEFORM ANALYSER	910
26	OSCILLOGRAPH/UV RECORDER 24 CHANNEL	1630
27	OSCILLOGRAPH/UV RECORDER 12 CHANNEL	1090
28	OSCILLOGRAPH/UV RECORDER 6 CHANNEL	910
29	DIGITAL LOW RESISTANCE METER	630
30	DC POTENTIOMETER	180
31	PRECISION DEAD WEIGHT TESTER	1000
32	OPTICAL ALIGNMENT KIT	1360
33	BOROSCOPE/FIBROSCOPE(NON FLEXIBLE)	1200
34	VERNIER THEODOLITE,PRECISION	1200
35	VERNIER THEODOLITE,ORDINARY	200
36	ENGINEERS PRECISION LEVEL/DUMPY LEVEL	120
37	ISKAMATIC 'A'	3200
38	CALIBRATOR '03'	1000
39	48 POLE EXTENDER CARD	200

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR  
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
40	MULTIJET NPM	400
41	OSCILLOMETER	10190
42	VOC EQUIPMENT	1400
43	BINARY SIGNAL GENERATOR	290
44	ELECTRIC COUNTER	690
45	FREQUENCY GENERATOR	1000
46	DBF 3 VIBRATION RECORDER/ANALYSER	3270
47	L&T GOULD OSCILLOGRAPH 2-CHANNEL	490
48	L&T GOULD OSCILLOGRAPH 6-CHANNEL	1180
49	VIBROPORT 41/FFT ANALYSER	5460
50	ELCID kit	10010
51	UNIVERSAL CALIBRATION SYSTEM	2730
52	NATURAL FREQUENCY TESTER	2910
53	DIGITAL HARDNESS TESTER	360
54	ADRE 208 VIBRATION ANALYSER	7280
55	PCB DIAGNOSTIC REPAIR KIT	2000
56	SECONDARY INJECTION RELAY TEST KIT	5270
57	MICRO OHM METER	1450
58	DIGITAL MICRO OHM METER MEASURING RANGE: 200 $\mu\Omega$ TO 20K $\Omega$	3230
59	PMI Machine OLYMPUS make	3350
60	Mobile Lighting Mast - 9 metres (4X400 W)	860
61	10KVA RESISTANCE BRAZING MACHINE	140
62	RECURRENT SURGE OSCILLOGRAPH (RSO) TEST KIT WITH PORTABLE HANDHELD OSCILLOSCOPE.	460
63	HYDROGEN GAS LEAK DETECTOR	50
64	STATOR WEDGE ANALYZER KIT WITH COMPLETE ACCESSORIES	4980
65	WEDGE DEFLECTION KIT	80
66	TILE PRESSING MACHINE FOR GAS TURBINE	270
67	INDUCTION BRAZING MACHINE	4870
68	MAGNETIC COHESIVE FORCE (MCF) EQUIPMENT	3640
69	ULTRASONIC FLOW METER	180
70	PORTABLE VIBRATION ANALYSER (MODEL 811T)	40
71	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -14KG/SQ CM. : FLOW 60 M3/HR	470
72	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -30KG/SQ CM. : FLOW 15 M3/HR	430
73	HI SPEED MEMORY RECORDER, MAKE -YOKOGAWA, MODEL DL850E-Q-HE/B5/HD1	1810
74	TROLLEY MOUNTED HYDRAULIC JACK (100 MT)	1260
75	5KV Insulation Tester	450
76	4 Channel Digital Oscilloscope /Fast Recorder	1710
77	4 Channel Oscillographic Recorder	580
78	Sound Level Meter	230
79	Thermal Imaging Camera	770
80	Videoscope (Video Boroscope)	1510
81	DO (Dissolve Oxygen) Meter (0 to 1500 ppb)	1310
82	Conductivity Meter	80
83	Core Flux Test Kit	7280
84	Primary Current Injection Kit (2000A)	870
85	3 Phase Secondary Injection Kit ( Relay Test )	3760
86	FRF Filtration Kit	1330
87	FFT Analyser	2290

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR  
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
88	Flue Gas Analyser	1030
89	Oil Test Kit ( Mineral Oil)-Transformer	1010
90	Winding Resistance kit ( R L C Load)	880
91	SFRA test Kit	1190
92	Tan Delta test Kit	4060
93	PF Meter	330
94	Ultrasonic Flow Meter	830
95	Oil Particle Counter	360

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS  
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
I.	<b>LIFTING EQUIPMENTS</b>	
1	Strand Jack System for Boiler Drum Lifting	23250
2	MULTI SHEAVE PULLEY BLOCK 40/50T/60T	350
3	MULTI SHEAVE PULLEY BLOCK 100T	700
4	MULTI SHEAVE PULLEY BLOCK 150T	1400
5	ELCTRIC WINCH 5T	1410
6	ELCTRIC WINCH 10T	2620
7	ELECTRIC WINCH 15 T	2390
8	PASSENGER CUM GOODS HOIST 1T	2520
9	FURNACE MAINTENANCE PLATFORM	5600
10	Gang Operated Hydraulic Jack (Set of 4 Jacks - 175 MT each)	2330
II	<b>WELDING &amp; HEAT TREATMENT EQUIPMENT</b>	
1	125KW, 3KHZ, AIR-COOLED INDUCTION HEATING EQUIPMENT	18190
2	75KW, 10 KHZ, COMPACT INDUCTION HEATING EQUIPMENT	9090
3	WELDING GENERATOR 320/300 A	330
4	WELDING RECTIFIER 400A/300A	330
5	WELDING RECTIFIER 600A	440
6	DIESEL WELDING GENERATOR 400A/300A	440
7	TRANSFORMER,600A	330
8	TRANSFORMER 300/400A	220
III	<b>SERVICE PLANTS &amp; ALLIED EQUIPT.</b>	
1	500KVA DIESEL GENERATOR	4220
2	TRANSFORMER OIL FILTERATION EQUIPMENT 6000LPH	7070
3	-DO- , WITH STORAGE TANK	8080
4	OIL FILTERATION M/C, 250/500 LPH (OTHER THAN SILICON OIL)	1010
5	OIL FILTERATION M/C, 250GPH/1000LPH (OTHER THAN SILICON	1510
6	OIL FILTERATION M/C, 500GPH/2500LPH (OTHER THAN SILICON	2020
7	OIL FILTERATION M/C, 1000GPH/5000LPH (OTHER THAN SILICON	4040
8	Portable Lube Oil Purification Unit (Centrifuge M/c) Capacity: 750	1410
9	Low Vacuum de-hydration unit	700
10	DIESEL GENERATING SET,250 KVA	1970
11	DIESEL GENERATING SET,25 KVA	560
12	VACUUM PUMP(ABSOLUTE V.C.)	600
13	ACID CIRCULATING PUMP WITH MOTOR 120M HEAD, 150T/HR	1210
14	ACID TRANSFER PUMP 20/50 T/HR	600
15	DEWATERING PUMP (Kirloskar make,11KW/15HP)	90
16	HP Air compressor (32 Kg/Sq. Cm, 150 CFM)	4710

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS  
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
17	AIR COMPRESSORS 250/300/330/360/350 CFM	3030
18	AIR COMPRESSORS 140/150/190/210 CFM	1010
19	ACID CIRCULATING PUMP WITH MOTOR & STARTER, 200T/HR, 150M, 220 HP	2020
20	Industrial Blower 2000CFM	1410
21	Air Leak Test Blower (Flow: 40000 m <sup>3</sup> /Hr)	1290
22	Air Blower (Flow: 20000 m <sup>3</sup> /Hr)	1040
<b>IV</b>	<b>METAL FORMING /CUTTING EQUIPMENT</b>	
1	TUBE EXPANDING M/C PNEUMATIC 60-100 MM	700
2	ELECTRO HYDRAULIC PIPE BENDING M/C 4"	1810
3	BOLTING MACHINE (ALCOA/AVLOCK/ HUCK)	2000
4	-do- Gun with nose Assembly only	600
<b>V</b>	<b>TESTING/INSPECTION EQUIPMENT</b>	
1	DATA LOGGER for PG TESTING	41090
2	MOTORISED HYDRAULIC TEST PUMP 250kg/cmsq	880
3	MOTORISED HYDRAULIC TEST PUMP 400-450kg/cmsq	1210
4	MOTORISED HYDRAULIC TEST PUMP 600 KG/CMSQ	1410
5	HYDRAULIC TEST PUMP 800 KG/CMSQ	1480
6	HYDRAULIC TEST PUMP 1000 KG/CMSQ	2480
7	BOLT STRETCHING DEVICE	1010
8	BOROSCOPE/FIBROSCOPE FLEXIBLE TYPE (FLEXUX) IMPORTED	4040
9	ULTRASONIC FLAW DETECTOR	3030
10	MPI TEST KIT	400
11	GAS LEAK DETECTOR	300
12	VIBRATION/SOUND LEVEL METER IRD-306	400
13	VIBRATION/SOUND LEVEL METER IRD-308	400
14	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 350	1610
15	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 360	2830
16	SHOCK PULSE METER	700
17	HV.DC TEST KIT UPTO 50 KV	600
18	HV.DC TEST KIT ABOVE 50 KV	1110
19	HV.AC TEST KIT UPTO 50KV	900
20	HV.AC TEST KIT ABOVE 50KV	3230
21	MOTORISED MEGGER 2.5KV	440
22	MOTORISED MEGGAR 5KV	500
23	OSCILLOSCOPE-DUAL BEAM INDIGENOUS	500
24	OSCILLOSCOPE-DUAL BEAM IMPORTED	1210

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS  
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
25	WAVEFORM ANALYSER	1010
26	OSCILLOGRAPH/UV RECORDER 24 CHANNEL	1810
27	OSCILLOGRAPH/UV RECORDER 12 CHANNEL	1210
28	OSCILLOGRAPH/UV RECORDER 6 CHANNEL	1010
29	DIGITAL LOW RESISTANCE METER	700
30	DC POTENTIOMETER	200
31	PRECISION DEAD WEIGHT TESTER	1110
32	OPTICAL ALIGNMENT KIT	1510
33	BOROSCOPE/FIBROSCOPE(NON FLEXIBLE)	1330
34	VERNIER THEODOLITE,PRECISION	1330
35	VERNIER THEODOLITE,ORDINARY	220
36	ENGINEERS PRECISION LEVEL/DUMPY LEVEL	130
37	ISKAMATIC 'A'	3550
38	CALIBRATOR '03'	1110
39	48 POLE EXTENDER CARD	220
40	MULTIJET NPM	440
41	OSCILLOMETER	11320
42	VOC EQUIPMENT	1550
43	BINARY SIGNAL GENERATOR	320
44	ELECTRIC COUNTER	760
45	FREQUENCY GENERATOR	1110
46	DBF 3 VIBRATION RECORDER/ANALYSER	3630
47	L&T GOULD OSCILLOGRAPH 2-CHANNEL	540
48	L&T GOULD OSCILLOGRAPH 6-CHANNEL	1310
49	VIBROPORT 41/FFT ANALYSER	6060
50	ELCID kit	11120
51	UNIVERSAL CALIBRATION SYSTEM	3030
52	NATURAL FREQUENCY TESTER	3230
53	DIGITAL HARDNESS TESTER	400
54	ADRE 208 VIBRATION ANALYSER	8080
55	PCB DIAGONISTIC REPAIR KIT	2220
56	SECONDARY INJECTION RELAY TEST KIT	5860
57	MICRO OHM METER	1610
58	DIGITAL MICRO OHM METER	3590
59	PMI Machine OLYMPUS make	3730
60	Mobile Lighting Mast -	960
61	10KVA RESISTANCE BRAZING MACHINE	160
62	RECURRENT SURGE OSCILLOGRAPH (RSO) TEST KIT WITH	510

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS  
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
63	HYDROGEN GAS LEAK DETECTOR	60
64	STATOR WEDGE ANALYZER KIT WITH COMPLETE	5530
65	WEDGE DEFLECTION KIT	90
66	TILE PRESSING MACHINE FOR GAS TURBINE	300
67	INDUCTION BRAZING MACHINE	5410
68	MAGNETIC COHESIVE FORCE (MCF) EQUIPMENT	4040
69	ULTRASONIC FLOW METER	200
70	PORTABLE VIBRATION ANALYSER (MODEL 811T)	50
71	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR	520
72	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR	480
73	HI SPEED MEMORY RECORDER, MAKE -YOKOGAWA, MODEL	2010
74	TROLLEY MOUNTED HYDRAULIC JACK (100 MT)	1400
75	5KV Insulation Tester	500
76	4 Channel Digital Oscilloscope /Fast Recorder	1900
77	4 Channel Oscillographic Recorder	650
78	Sound Level Meter	260
79	Thermal imaging Camera	860
80	Videoscope (Video Boroscope)	1680
81	DO (Dissolve Oxygen) Meter (0 to 1500 ppb)	1460
82	Conductivity Meter	90
83	Core Flux Test Kit	8090
84	Primary Current Injection Kit (2000A)	960
85	3 Phase Secondary Injection Kit ( Relay Test )	4180
86	FRF Filtration Kit	1480
87	FFT Analyser	2550
88	Flue Gas Analyser	1140
89	Oil Test Kit ( Mineral Oil)-Transformer	1120
90	Winding Resistance kit ( R L C Load)	970
91	SFRA test Kit	1320
92	Tan Delta test Kit	4510
93	PF Meter	360
94	Ultrasonic Flow Meter	920
95	Oil Particle Counter	400

## PROFORMA OF BANK GUARANTEE (in lieu of EARNEST MONEY if permissible under Works Policy)

(On non-Judicial paper of appropriate value)  
(Para 4.7.6 of Works Accounts Manual)

Bank Guarantee No.....

Date.....

To  
(Employer's Name and Address)

.....

Dear Sirs,

In accordance with the terms and conditions of Invitation for Bids/Notice Inviting Tender No.....<sup>1</sup> (Tender Conditions), M/s. ....<sup>2</sup> having its registered office at .....<sup>3</sup> (hereinafter referred to as the 'Tenderer'), is submitting its bid for the work of.....<sup>4</sup> invited by Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at *BHEL House, Siri Fort, Asiad, New Delhi – 110049* through its unit at *Bharat Heavy Electricals Limited, Power Sector Southern Region, 690, Anna Salai, Nandanam, Chennai 600035*

The Tender Conditions provide that the Tenderer shall pay a sum of Rs .....<sup>5</sup> as Earnest Money Deposit in the form therein mentioned. The form of payment of Earnest Money Deposit includes Bank Guarantee executed by a Scheduled Bank.

In lieu of the stipulations contained in the aforesaid Tender Conditions that an irrevocable and unconditional Bank Guarantee against Earnest Money Deposit for an amount of .....<sup>6</sup> is required to be submitted by the Tenderer as a condition precedent for participation in the said Tender and the Tenderer having approached us for giving the said Guarantee,

we, the .....(Name & address of the Bank)  
..... having our Head Office at  
.....(hereinafter referred to as the Bank) being the Guarantor under this Guarantee, hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer without any demur, merely on your first demand any sum or sums of Rs.....<sup>6</sup> (in words Rupees.....) without any reservation, protest, and recourse and without the beneficiary needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. ....<sup>6</sup>

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Tenderer in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment hereunder and the Tenderer shall have no claim against us for making such payment.

We ..... Bank further agree that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Tender or to extend the time of submission of from time to time or to postpone

for any time or from time to time any of the powers exercisable by the Employer against the said Tenderer and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Tenderer or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Tenderer or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Tenderer and notwithstanding any security or other guarantee that the Employer may have in relation to the Tenderer's liabilities.

This Guarantee shall be irrevocable and shall remain in force upto and including.....<sup>7</sup> and shall be extended from time to time for such period as may be desired by the Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Tenderer but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms hereof. However, unless a demand or claim under this Guarantee is made on us in writing on or before the .....<sup>8</sup> we shall be discharged from all liabilities under this Guarantee.

We, ..... Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....<sup>6</sup>
- b) This Guarantee shall be valid up to .....<sup>7</sup>
- c) Unless the Bank is served a written claim or demand on or before .....<sup>8</sup> all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank

We, \_\_\_\_\_ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of  
(Name of the Bank)

(Signature of Authorised signatory)

Date.....

Place of Issue.....

- <sup>1</sup> Details of the Invitation to Bid/Notice Inviting Tender (Tender Ref. No. Eg. - BHEL PSSR SCT XXXX)
- <sup>2</sup> Name of Tenderer
- <sup>3</sup> REGISTERED Office Address of the Tenderer
- <sup>4</sup> Details of the Work i.e Tender Description
- <sup>5</sup> EMD Amount as mentioned in Notice Inviting Tender
- <sup>6</sup> BG Amount in words and Figures (BG Amount shall be Minimum of EMD amount less Rs. 2 Lakhs)
- <sup>7</sup> Validity Date
- <sup>8</sup> Date of Expiry of Claim Period (Claim Period shall be minimum of 3 Months after the validity date of Bank Guarantee)

Note:

- 1. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.

2. In Case of Bank Guarantees submitted by Foreign Vendors-
  - a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
  - b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)
    - b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.
    - b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 will required to be followed.
    - b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

PROFORMA OF BANK GUARANTEE (in lieu of SECURITY DEPOSIT)  
 (On non-Judicial paper of appropriate value)  
 (Para 4.7.6 of Works Accounts Manual)

Bank Guarantee No.....  
 Date.....

To  
 (Employer's Name and Address)  
 .....

In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at *BHEL House, Siri Fort, Asiad, New Delhi – 110049* through its unit at *Bharat Heavy Electricals Limited, Power Sector Southern Region, 690, Anna Salai, Nandanam, Chennai 600035* having agreed to exempt \_\_\_\_\_<sup>1</sup> (Name of the Vendor / Contractor / Supplier) with its registered office at \_\_\_\_\_<sup>2</sup> (hereinafter called the said "Contractor" which term includes supplier), from demand under the terms and conditions of the Contract arising vide Letter of Intent (LOI) reference No. \_\_\_\_\_ dated \_\_\_\_\_<sup>3</sup> valued at Rs. \_\_\_\_\_<sup>4</sup> (Rupees \_\_\_\_\_ only)<sup>4</sup> (hereinafter called the said Contract), of Security Deposit for the due fulfilment by the said Contractor of the terms and conditions contained in the said Contract, on production of a Bank Guarantee for Rs. \_\_\_\_\_<sup>5</sup> (Rupees \_\_\_\_\_ only),

We, the .....(Name & address of the Bank)  
 ..... having our Head Office at  
 .....(hereinafter referred to as the Bank), at the request of  
 \_\_\_\_\_ [Contractor(s)], being the Guarantor under this Guarantee, do hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer, an amount not exceeding Rs. \_\_\_\_\_ without any demur, immediately on demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand

Any such demand made on the bank, shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. \_\_\_\_\_<sup>5</sup>.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any Court or Tribunal or Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this guarantee shall be a valid discharge of our liability for payment hereunder and the Contractor(s) shall have no claim against us for making such payment.

We, further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied & the Employer certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said contractor(s) or acceptance of the final bill or discharge of this guarantee by the Employer, whichever is earlier. This guarantee shall initially remain in force upto and including \_\_\_\_\_<sup>6</sup> and shall be extended from time to time for such period as may

be desired by the Employer. Unless a demand or claim under this guarantee is made on us in writing on or before the \_\_\_\_\_<sup>7</sup>, we shall be discharged from all the liability under this guarantee thereafter.

We, \_\_\_\_\_(indicate the name of the Bank) further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

We, ..... BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.  
Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....<sup>5</sup>
- b) This Guarantee shall be valid up to .....<sup>6</sup>
- c) Unless the Bank is served a written claim or demand on or before \_\_\_\_\_<sup>7</sup> all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, \_\_\_\_\_ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

Date \_\_\_\_\_ Day of \_\_\_\_\_  
for \_\_\_\_\_ (indicate the name of the Bank)

(Signature of Authorised signatory)

<sup>1</sup> NAME OF VENDOR /CONTRACTOR / SUPPLIER  
<sup>2</sup> REGISTERED OFFICE ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.  
<sup>3</sup> LETTER OF INTENT(LOI) REFERENCE NO. WITH DATE  
<sup>4</sup> CONTRACT VALUE (AS MENTIONED IN LOI)  
<sup>5</sup> BG AMOUNT IN FIGURES AND WORDS  
<sup>6</sup> VALIDITY DATE  
<sup>7</sup> DATE OF EXPIRY OF CLAIM PERIOD (CLAIM PERIOD SHALL BE MINIMUM OF 3 MONTHS AFTER VALIDITY DATE)

Note:

1. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.
2. In Case of Bank Guarantees submitted by Foreign Vendors-
  - a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
  - b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)
    - b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.
    - b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 will required to be followed.
    - b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

**PROCEDURE FOR CONDUCT OF CONCILIATION PROCEEDINGS**

1. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided herein:
2. The party desirous of resorting to Conciliation shall send an invitation/notice in writing to the other party to conciliate specifying all points of Disputes with details of the amount claimed. The party concerned shall not raise any new issue thereafter. Parties shall also not claim any interest on claims/counter-claims from the date of notice invoking Conciliation till the conclusion of the Conciliation proceedings. If BHEL is to initiate Conciliation, then, the invitation to Conciliate shall be extended to the concerned Stakeholder in **Format 7** hereto. Where the stakeholder is to initiate the Conciliation, the notice for initiation of Conciliation shall be sent in **Format-8** hereto.
3. The party receiving the invitation/notice for Conciliation shall within 30 days of receipt of the notice of Conciliation intimate its consent for Conciliation along with its counter-claims, if any.
4. The Conciliation in a matter involving claim or counter-claim (whichever is higher) up to Rs 5 crores shall be carried out by sole Conciliator nominated by BHEL while in a matter involving claim or counter-claim (whichever is higher) of more than Rs 5 crores Conciliation shall be carried out by 3 Conciliators nominated by BHEL. The appointment of Conciliator(s) shall be completed and communicated by the concerned Department/Group of BHEL Unit/Division/Region/Business Group to the other party and the Conciliator(s) within 30 days from the date of acceptance of the invitation to conciliate by the concerned party in the **Format-9**. The details of the Claim, and counter-claim, if any, shall be intimated to the Conciliator(s) simultaneously in **Format-5**.
5. The Parties shall be represented by only their duly authorized in-house executives/officers and neither Party shall be represented by a Lawyer.
6. The first meeting of the IEC shall be convened by the IEC by sending appropriate communication/notice to both the parties as soon as possible but not later than 30 days from the date of his/their appointment. The hearings in the Conciliation proceeding shall ordinarily be concluded within two (2) months and, in exceptional cases where parties have expressed willingness to settle the matter or there exists possibility of settlement in the matter, the proceedings may be extended by the IEC by a maximum of further 2 months with the consent of the Parties subject to cogent reasons being recorded in writing.

- 7.** The IEC shall thereafter formulate recommendations for settlement of the Disputes supported by reasons at the earliest but in any case within 15 days from the date of conclusion of the last hearing. The recommendations so formulated along with the reasons shall be furnished by the IEC to both the Parties at the earliest but in any case within 1 month from the date of conclusion of the last hearing.
- 8.** Response/modifications/suggestions of the Parties on the recommendations of the IEC are to be submitted to the IEC within time limit stipulated by the IEC but not more than 15 days from the date of receipt of the recommendations from the IEC.
- 9.** In the event, upon consideration, further review of the recommendations is considered necessary, whether by BHEL or by the other Party, then, the matter can be remitted back to the IEC with request to reconsider the same in light of the issues projected by either/both the Parties and to submit its recommendations thereon within the following 15 days from the date of remitting of the case by either of the Parties.
- 10.** Upon the recommendations by the Parties, with or without modifications, as considered necessary, the IEC shall be called upon to draw up the Draft Settlement Agreement in terms of the recommendations.
- 11.** When a consensus can be arrived at between the parties only in regard to any one or some of the issues referred for Conciliation the draft Settlement Agreement shall be accordingly formulated in regard to the said Issue(s), and the said Settlement Agreement, if signed, by the parties, shall be valid only for the said issues. As regards the balance issues not settled, the parties may seek to resolve them further as per terms and conditions provided in the contract.
- 12.** In case no settlement can be reached between the parties, the IEC shall by a written declaration, pronounce that the Conciliation between the parties has failed and is accordingly terminated.
- 13.** Unless the Conciliation proceedings are terminated in terms of para 22 (b), (c) & (d) herein below, the IEC shall forward his/its recommendations as to possible terms of settlement within one (1) month from the date of last hearing. The date of first hearing of Conciliation shall be the starting date for calculating the period of 2 months.
- 14.** In case of 3 members IEC, 2 members of IEC present will constitute a valid quorum for IEC and meeting can take place to proceed in the matter after

seeking consent from the member who is not available. If necessary, videoconferencing may be arranged for facilitating participation of the members. However, the IEC recommendations will be signed by all members. Where there is more than one (1) Conciliator, as a general rule they shall act jointly. In the event of differences between the Members of IEC, the decision/recommendations of the majority of the Members of IEC shall prevail and be construed as the recommendation of the IEC.

- 15.** The Draft Settlement Agreement prepared by the IEC in terms of the consensus arrived at during the Conciliation proceedings between the Parties shall be given by the IEC to both the parties for putting up for approval of their respective Competent Authority.
- 16.** Before submitting the draft settlement agreement to BHEL's Competent Authority viz. the Board Level Committee on Alternative Dispute Resolution (BLCADR) for approval, concurrence of the other party's Competent Authority to the draft settlement agreement shall be obtained by the other party and informed to BHEL within 15 days of receipt of the final draft settlement agreement by it. Upon approval by the Competent Authority, the Settlement Agreement would thereafter be signed by the authorized representatives of both the Parties and authenticated by the members of the IEC.
- 17.** In case the Draft Settlement Agreement is rejected by the Competent Authority of BHEL or the other Party, the Conciliation proceedings would stand terminated.
- 18.** A Settlement Agreement shall contain a statement to the effect that each of the person(s) signing thereto (i) is fully authorized by the respective Party(ies) he/she represents, (ii) has fully understood the contents of the same and (iii) is signing on the same out of complete freewill and consent, without any pressure, undue influence.
- 19.** The Settlement Agreement shall thereafter have the same legal status and effect as an arbitration award on agreed terms on the substance of the dispute rendered by an arbitral tribunal passed under section 30 of the Arbitration and Conciliation Act, 1996.
- 20.** Acceptance of the Draft Settlement Agreement/recommendations of the Conciliator and/or signing of the Settlement Agreement by BHEL shall however, be subject to withdrawal/closure of any arbitral and/or judicial proceedings initiated by the concerned Party in regard to such settled issues.
- 21.** Unless otherwise provided for in the agreement, contract or the Memorandum of Understanding, as the case may be, in the event of likelihood of prolonged

absence of the Conciliator or any member of IEC, for any reason/incapacity, the Competent Authority/Head of Unit/Division/Region/Business Group of BHEL may substitute the Conciliator or such member at any stage of the proceedings. Upon appointment of the substitute Conciliator(s), such reconstituted IEC may, with the consent of the Parties, proceed with further Conciliation into the matter either de-novo or from the stage already reached by the previous IEC before the substitution.

**22.** The proceedings of Conciliation under this Scheme may be terminated as follows:

- a.** On the date of signing of the Settlement agreement by the Parties; or,
- b.** By a written declaration of the IEC, after consultation with the parties, to the effect that further efforts at conciliation are no longer justified, on the date of the declaration; or,
- c.** By a written declaration of the Parties addressed to the IEC to the effect that the Conciliation proceedings are terminated, on the date of the declaration; or,
- d.** By a written declaration of a Party to the other Party and the IEC, if appointed, to the effect that the Conciliation proceedings are terminated, on the date of the declaration; or,
- e.** On rejection of the Draft Settlement Agreement by the Competent Authority of BHEL or the other Party.

**23.** The Conciliator(s) shall be entitled to following fees and facilities:

<b>Sl No</b>	<b>Particulars</b>	<b>Amount</b>
1	Sitting fees	Each Member shall be paid a Lump Sum fee of Rs 75,000/- for the whole case payable in terms of paragraph No. 27 herein below.
2	Towards drafting of settlement agreement	In cases involving claim and/or counter-claim of up to Rs 5crores. Rs 50,000/- (Sole Conciliator) In cases involving claim and/or counter-claim of exceeding Rs 5 crores but less than Rs 10 crores. Rs 75,000 (per Conciliator)

<b>Sl No</b>	<b>Particulars</b>	<b>Amount</b>
		<p>In cases involving claim and/or counter-claim of more than Rs 10 crores.</p> <p>Rs 1,00,000/- (per Conciliator)</p> <p>Note: The aforesaid fees for the drafting of the Settlement Agreement shall be paid on the,</p> <p>Signing of the Settlement Agreement after approval of the Competent Authority</p> <p>or</p> <p>Rejection of the proposed Settlement Agreement by the Competent Authority of BHEL.</p>
<b>3</b>	Secretarial expenses	<p>Rs 10,000/- (one time) for the whole case for Conciliation by a Sole Member IEC.</p> <p>Where Conciliation is by multi member Conciliators –Rs 30,000/- (one time)- to be paid to the IEC</p>
<b>4</b>	<p>Travel and transportation and stay at outstation Retired Senior Officials of other Public Sector Undertakings (pay scale wise equivalent to or more than E-8 level of BHEL)</p> <p>Others</p>	<p>As per entitlement of the equivalent officer (pay scale wise) in BHEL.</p> <p>As per the extant entitlement of whole time Functional Directors in BHEL.</p> <p>Ordinarily, the IEC Member(s) would be entitled to travel by air Economy Class.</p>
<b>5</b>	Venue for meeting	<p>Unless otherwise agreed in the agreement, contract or the Memorandum of Understanding, as the case may be, the venue/seat of proceedings shall be the location of the concerned Unit / Division / Region /</p>

Sl No	Particulars	Amount
		Business Group of BHEL. Without prejudice to the seat/venue of the Conciliation being at the location of concerned BHEL Unit / Division / Region / Business Group, the IEC after consulting the Parties may decide to hold the proceedings at any other place/venue to facilitate the proceedings. Unless, Parties agree to conduct Conciliation at BHEL premises, the venue is to be arranged by either Party alternately.

- 24.** The parties will bear their own costs including cost of presenting their cases/evidence/witness(es)/expert(s) on their behalf. The parties agree to rely upon documentary evidence in support of their claims and not to bring any oral evidence in IEC proceedings.
- 25.** If any witness(es) or expert(s) is/are, with the consent of the parties, called upon to appear at the instance of the IEC in connection with the matter, then, the costs towards such witness(es)/expert(s) shall be determined by the IEC with the consent of the Parties and the cost so determined shall be borne equally by the Parties.
- 26.** The other expenditures/costs in connection with the Conciliation proceedings as well as the IEC's fees and expenses shall be shared by the Parties equally.
- 27.** Out of the lump sum fees of Rs 75,000/- for Sitting Fees, 50% shall be payable after the first meeting of the IEC and the remaining 50% of the Sitting Fees shall be payable only after termination of the conciliation proceedings in terms of para 22 hereinabove.
- 28.** The travelling, transportation and stay at outstation shall be arranged by concerned Unit as per entitlements as per Serial No. 4 of the Table at para 23 above, and in case such arrangements are not made by the BHEL Unit, the same shall be reimbursed to the IEC on actuals limited to their entitlement as per Serial No. 4 of the Table at Para 23 above against supporting documents. The IEC Member(s) shall submit necessary invoice for claiming the fees/reimbursements.
- 29.** The Parties shall keep confidential all matters relating to the conciliation proceedings. Confidentiality shall extend also to the settlement agreement,

except where its disclosure is necessary for purposes of its implementation and enforcement or as required by or under a law or as per directions of a Court/Governmental authority/ regulatory body, as the case may be.

- 30.** The Parties shall not rely upon or introduce as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the Disputes that is the subject of the Conciliation proceedings:
  - a.** Views expressed or suggestions made by the other party in respect of a possible settlement of the Disputes;
  - b.** admissions made by the other party in the course of the Conciliator proceedings;
  - c.** proposals made by the Conciliator;
  - d.** The fact that the other Party had indicated his willingness to accept a proposal for settlement made by the Conciliator.
- 31.** The Parties shall not present the Conciliator(s) as witness in any Alternative Dispute Resolution or Judicial proceedings in respect of a Disputes that is/was the subject of that particular Conciliation proceeding.
- 32.** None of the Conciliators shall act as an arbitrator or as a representative or counsel of a Party in any arbitral or judicial proceeding in respect of a Disputes that is/was the subject of that particular Conciliation proceeding.
- 33.** The Parties shall not initiate, during the Conciliation proceedings, any arbitral or judicial proceedings in respect of a Disputes that is the subject matter of the Conciliation proceedings except that a Party may initiate arbitral or judicial proceedings where, in his opinion, such proceedings are necessary for preserving his rights including for preventing expiry of period of limitation. Unless terminated as per the provisions of this Scheme, the Conciliation proceedings shall continue notwithstanding the commencement of the arbitral or judicial proceedings and the arbitral or judicial proceedings shall be primarily for the purpose of preserving rights including preventing expiry of period of limitation.
- 34.** The official language of Conciliation proceedings under this Scheme shall be English unless the Parties agree to some other language.

**STATEMENT OF CLAIMS/COUNTER CLAIMS TO BE SUBMITTED TO THE  
IEC BY BOTH THE PARTIES**

1. Chronology of the Disputes
2. Brief of the Contract/MoU/Agreement/LOI/LOA
3. Brief history of the Disputes:
4. Issues:
5. Details of Clam(s)/Counter Claim(s):

<b>SI. No.</b>	<b>Description of claim(s)/Counter Claim</b>	<b>Amount (in INR)Or currency applicable in the contract</b>	<b>Relevant contract clause</b>

6. Basis/Ground of claim(s)/counter claim(s) (along with relevant clause of contract)

**Note**– *The Statement of Claims/ Counter Claims may ideally be restricted to maximum limit of 20 pages. Relevant documents may be compiled and submitted along with the statement of Claims/ Counter Claims. The statement of Claims/ Counter Claims is to be submitted to all IEC members and to the other party by post as well as by email.*

**FORMAT FOR NOTICE INVOKING CONCILIATION CLAUSE BY BHEL FOR REFERRING THE DISPUTES TO CONCILIATION THROUGH IEC**

To,

M/s. (Stakeholder's name)

Subject: **NOTICE FOR INVOCATION OF THE CONCILIATION CLAUSE OF THE CONTRACT BY BHEL**

Ref: Contract No/MoU/Agreement/LOI/LOA& date \_\_\_\_\_.

Dear Sir/Madam,

As you are aware, with reference to above referred Contract/MoU/Agreement/LOI/LOA, certain disputes have arisen, which, in spite of several rounds of mutual discussions and various correspondences have remained unresolved. The brief particulars of our claims which arise out of the above- referred Contract/MoU/Agreement/LOI/LOA are reproduced hereunder:

Sl. No.	Claim description	Amount involved

As you are aware, there is a provision in the captioned Contract/MoU/Agreement/LOI/ LOA for referring disputes to conciliation.

In terms of Clause -----of Procedure i.e., Annexure ----- to the Contract/MoU /Agreement / LOI / LOA, we hereby seek your consent to refer the matter to Conciliation by Independent Experts Committee to be appointed by BHEL. You are invited to provide your consent in writing to proceed with conciliation into the above mentioned disputes within a period of 30 days from the date of this letter along with details of counter-claims, if any, which you might have with regard to the subject Contract/ MoU/ Agreement/ LOI/ LOA.

Please note that upon receipt of your consent in writing within 30 days of the date of receipt of this letter by you, BHEL shall appoint suitable person(s) from the BHEL Panel of Conciliators.

This letter is being issued without prejudice to our rights and contentions available under the contract and law.

Thanking you  
Yours faithfully

**Representative of BHEL**

**Note:** The Format may be suitably modified, as required, based on facts and circumstances of the case.

**FORMAT FOR NOTICE INVOKING CONCILIATION CLAUSE BY A  
STAKEHOLDER FOR REFERRING THE DISPUTES TO CONCILIATION  
THROUGH IEC**

To,

BHEL (Head of the Unit/Division/Region/Business Group)

Subject: **NOTICE FOR INVOCATION OF THE CONCILIATION CLAUSE OF THE  
CONTRACT BY A STAKEHOLDER**

Ref: Contract No/MoU/Agreement/LOI/LOA& date \_\_\_\_\_.

Dear Sir/Madam,

As you are aware, with reference to above referred Contract/MoU/Agreement/LOI/LOA, certain disputes have arisen, which, in spite of several rounds of mutual discussions and various correspondences have remained unresolved. The brief particulars of our claims which have arisen out of the above-referred Contract/MoU/Agreement/LOI/LOA are enumerated hereunder:

Sl. No.	Claim description	Amount involved

As you are aware, there is a provision in the captioned Contract/MoU/Agreement/LOI/ LOA for referring inter-se disputes of the Parties to conciliation.

We wish to refer the above-said disputes to Conciliation as per the said Clause of the captioned Contract/MoU/Agreement/LOI/ LOA. In terms of Clause -----of Procedure i.e., Annexure ----- to the Contract/MoU /Agreement / LOI / LOA, we hereby invite BHEL to provide its consent in writing to proceed with conciliation into the above mentioned disputes within a period of 30 days from the date of this letter along with details of counter-claims, if any, which it might have with regard to the subject Contract/ MoU/ Agreement/ LOI/ LOA and to appoint suitable person(s) as Conciliator(s) from the BHEL Panel of Conciliators.

This letter is being issued without prejudice to our rights and contentions available under the contract and law.

Thanking you  
Yours faithfully

**Representative of the Stakeholder**

**Note:** The Format may be suitably modified, as required, based on facts and circumstances of the case.

**FORMAT FOR INTIMATION TO THE STAKEHOLDER ABOUT APPOINTMENT OF CONCILIATOR/IEC**

To,

M/s. (Stakeholder's name)

Subject: **INTIMATION BY BHEL TO THE STAKEHOLDER AND CONCILIATOR(S) ABOUT APPOINTMENT OF CONCILIATOR/IEC**

Ref: Contract No/MoU/Agreement/LOI/LOA& date \_\_\_\_\_.

Sir,

This is with reference to letter dated ----- regarding reference of the disputes arising in connection with the subject Contract No /MoU/Agreement/LOI/LOA to conciliation and appointment of Conciliator(s).

In pursuance of the said letter, the said disputes are assigned to conciliation and the following persons are nominated as Conciliator(s) for conciliating and assisting the Parties to amicably resolve the disputes in terms of the Arbitration & Conciliation Act, 1996 and the Procedure ---- to the subject Contract ...../MoU/Agreement/LOI/LOA, if possible.

Name and contact details of Conciliator(s)

a) .....

b) .....

c) .....

You are requested to submit the Statement of Claims or Counter-Claims (strike off whichever is inapplicable) before the Conciliator(s) in Format 5 (enclosed herewith) as per the time limit as prescribed by the Conciliator(s).

Yours faithfully,

**Representative of BHEL**

CC: To Conciliator(s)... for Kind Information please.

Encl: As above

**Note:** The Format may be suitably modified, as required, based on facts and circumstances of the case.

## **NO DEVIATION CERTIFICATE**

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

---

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub : **No Deviation Certificate**

Ref : 1) NIT/Tender Specification No: .....,  
2) All other pertinent issues till date

We hereby confirm that we have not changed / modified / materially altered any of the tender documents as downloaded from the website/ issued by BHEL and in case of such observance at any stage, it shall be treated as null and void.

We also hereby confirm that we have neither set any Terms and Conditions and nor have we taken any deviation from the Tender conditions together with other references applicable for the above referred NIT/Tender Specification.

We further confirm our unqualified acceptance to all Terms and Conditions, unqualified compliance to Tender Conditions, Integrity Pact (if applicable) and opening of price bid submitted in the E-tendering portal <https://www.bhel.abcprocure.com>.

We confirm to have submitted offer in accordance with tender instructions and as per aforesaid references.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized  
representative of the bidder)

## INTEGRITY PACT

**Between**

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

**and**

\_\_\_\_\_, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

### Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for BHEL: PSSR: SCT: 1869 - Civil, Architectural, Mechanical, Electrical, C&I And Other Allied Works of Natural Draught Cooling Towers (NDCTs) including Supply of Materials, Labour, Tools & Plants, etc. required at 2X660 MW Udangudi STPP. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

### **Section 1- Commitments of the Principal**

- 1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-
- 1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
- 1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
- 1.1.3 The Principal will exclude from the process all known prejudiced persons.
- 1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

### **Section 2 - Commitments of the Bidder(s)/ Contractor(s)**

*Shmi*

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
- 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- 2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

### **Section 3 - Disqualification from tender process and exclusion from future contracts**

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

### **Section 4 - Compensation for Damages**

- 4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value

or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

### **Section 5 - Previous Transgression**

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

### **Section 6 - Equal treatment of all Bidders/ Contractors / Sub-contractors**

- 6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.
- 6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

### **Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors**

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

### **Section 8 -Independent External Monitor(s)**

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non- disclosure agreement.
- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
- 8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood

that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

- 8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.
- 8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.
- 8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.9 IEM should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.
- 8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.
- 8.12 The word 'Monitor' would include both singular and plural.

### **Section 9 - Pact Duration**

- 9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.
- 9.2 If any claim is made/ lodged during currency of IP, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

### **Section 10 - Other Provisions**

- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.
- 10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- 10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.



10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders / contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

  
12/11/2019

For & On behalf of the Principal

संदीपन बिस्वास  
SANDIPAN BISWAS  
अपर महापबंधक - उप संविदा एवं क्रय  
Addl. General Manager - Sub Contracting & Purchase  
Bharat Heavy Electricals Limited  
Power Sector - Southern Region  
690, Anna Salai, Nandanam,  
Chennai - 600 035.

For & On behalf of the Bidder/

Contractor

(Office Seal)

Place-----

Date-----

Witness:\_\_\_\_\_

(Name & Address) \_\_\_\_\_

\_\_\_\_\_

Witness:\_\_\_\_\_

(Name & Address) \_\_\_\_\_

\_\_\_\_\_