

ABBREVIATIONS

ACGIH	-	AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS
AEC	_	AHMADABAD ELECTRIC CORPORATION
APHA	_	AMERICAN PUBLIC HEALTH ASSOCIATION
BDL	_	BELOW DETECTABLE LIMIT
BOD	_	BIOLOGICAL OXYGEN DEMAND
BOO	_	BUILD, OWN, OPERATE
CEA	_	CENTRAL ELECTRICITY AUTHORITY
CEIA	_	COMPREHENSIVE ENVIRONMENTAL IMPACT ASSESSMENT
CGPL	_	COASTAL GUJARAT POWER LIMITED
CO	_	CARBON MONOXIDE
CO ₂	_	CARBON DIOXIDE
CPCB	_	CENTRAL POLLUTION CONTROL BOARD
CPR	_	CARDIOPULMONARY RESUSCITATION
CRZ	_	COASTAL REGULATORY ZONE
CW	-	COOLING WATER
CWPRS	-	CENTRAL WATER AND POWER RESEARCH STATION
DMP	_	DISASTER MANAGEMENT PLAN
EMD	-	ENVIRONMENTAL MANAGEMENT DIVISION
EMP	-	ENVIRONMENTAL MANAGEMENT PLAN
EPA	—	ENVIRONMENTAL PROTECTION AGENCY
ESP	-	ELECTROSTATIC PRECIPITATOR
FAM	-	FLY ASH MISSION
FCC	—	FALSE COMPOSITE COLOR
FGD	—	FLUE GAS DESULPHURIZATION
GCP	—	GROUND CONTROL POINTS
GCV	—	GROSS CALORIFIC VALUE
GLC	_	GROUND LEVEL CONCENTRATION
GOI	-	GOVERNMENT OF INDIA
GPCB	—	GUJARAT POLLUTION CONTROL BOARD
GPS	_	GLOBAL POSITIONING SYSTEM
HMIS	-	HAZARDOUS MATERIALS IDENTIFICATION SYSTEM



ABBREVIATIONS

HTL	_	HIGH TIDE LINE
IMD	_	INDIAN METEOROLOGICAL DEPARTMENT
IS	_	INDIAN STANDARD
ISCST	_	INDUSTRIAL SOURCE COMPLEX SHORT TERM
LTL	_	LOW TIDE LINE
MCR	_	MAXIMUM CONTINUOUS RATING
MGR	_	MERRY GO ROUND
MoEF	_	MINISTRY OF ENVIRONMENT AND FORESTS
MSDS	_	MATERIAL SAFETY DATA SHEET
MSL	_	MEAN SEA LEVEL
NAAQS	-	NATIONAL AMBIENT AIR QUALITY STANDARD
NFPA	-	NATIONAL FIRE PROTECTION ASSOCIATION
NIO	-	NATIONAL INSTITUTE OF OCEANOGRAPHY
NOx	-	OXIDES OF NITROGEN
NRSA	-	NATIONAL REMOTE SENSING AGENCY
PFC	-	POWER FINANCE CORPORATION
PHAST	-	PROCESS HAZARDS ANALYSIS SOFTWARE TOOLS
PLF	-	PLANT LOAD FACTOR
PM10	-	PARTICULATE MATTER UP TO 10 MICROMETERS
PVC	-	POLYVINYL CHLORIDE
R &R	-	REHABILITATION AND RESETTLEMENT
RA	-	RISK ANALYSIS
RO	-	REVERSE OSMOSIS
RPM	-	RESPIRABLE PARTICULATE MATTER
SC	-	SCHEDULED CASTE
SCBA	-	SELF CONTAINED BREATHING APPARATUS
SEZ	-	SPECIAL ECONOMIC ZONE
SG	-	STEAM GENERATOR
SH	-	STATE HIGHWAY
SO ₂	-	SULPHUR DIOXIDE
SPCB	_	STATE POLLUTION CONTROL BOARD
SPM	_	SUSPENDED PARTICULATE MATTER
SPV	_	SPECIAL PURPOSE VEHICLE
ST	_	SCHEDULED TRIBES

TCE

ABBREVIATIONS

- STEL SHORT TERM EXPOSURE LIMIT
- STG STEAM TURBINE GENERATOR
- TLV THRESHOLD LIMIT VALUE
- TPH TONES PER HOUR
- TWA TIME WEIGHTED AVERAGE
- UDM UNIFIED DISPERSION MODEL
- UMPP ULTRA MEGA POWER PLANT
- WHMIS WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM

WEIGHTS AND MEASURES

dB(A)	_	TIME WEIGHTED AVG. IN DECIBELS ON SCALE A
ha	_	HECTARE
km	_	KILOMETER
kW	_	KILOWATT
Leq	_	EQUIVALENT SOUND PRESSURE LEVEL
m	_	METER
mg/l	_	MILLIGRAM PER LITER
MW	_	MEGAWATT
µg/m3	_	MICROGRAMS PER CUBIC METER
рН	_	POTENTIAL OF HYDROGEN
t	_	METRIC TON



CONTENTS

CHAPTER	CONTENT	PAGE NO.
Ι.	EXECUTIVE SUMMARY	1
Н.	INTRODUCTION	13
III.	PROJECT DESCRIPTION	18
IV.	BASELINE ENVIRONMENTAL CONDITION	37
V.	ENVIRONMENTAL IMPACT ASSESSMENT	94
VI.	RISK AND CONSEQUENCE ANALYSIS	123
VII.	DISASTER MANAGEMENT PLAN	124
VIII.	ENVIRONMENTAL MANAGEMENT PLAN	128
IX.	POLICY, INDIAN LEGAL AND ADMINISTRATIVE FRAMEWORK	135



LIST OF FIGURES

FIGURE NO.	TITLE	PAGE NO.
II.1	VICINITY PLAN	17
III.1	GENERAL LAYOUT MAP OF THE PROPOSED ULTRA MEGA POWER PLANT	19
III.1a	LOCATION OF INTAKE AND OUTFALL STRUCTURE	20
III.2	PROCESS FLOW DIAGRAM FOR POWER GENERATION FROM PULVERISED COAL	21
III.2a	WATER BALANCE DIAGRAM FOR ONCE THROUGH COOLING SYSTEM	23
III.2b	HEAT BALANCE DIAGRAM	33
IV.1	PANORAMIC VIEW OF STUDY AREA WITHIN 30KM RADIUS	41
IV.2a	MONTHLY TEMPERATURE VARIATION AT IMD BHUJ	42
IV.2b	MAXIMUM AND MINIMUM RH VARIATION AT IMD BHUJ	42
IV.2c	MONTHLY RAINFALL VARIATION AT IMD BHUJ	43
IV.2d	MAXIMUM AND MINIMUM TEMPERATURE VARIATION AT MUNDRA PORT	43
IV.2e	MAXIMUM AND MINIMUM VARIATION OF RELATIVE HUMIDITY AT MUNDRA PORT	44
IV.2f	MONTHLY RAINFALL VARIATION AT MUNDRA PORT	44
IV.3a	WIND-ROSE DIAGRAM FOR SUMMER (MARCH TO MAY) – 2006	45
IV.3b	WIND-ROSE DIAGRAM FOR MONSOON (JUNE TO SEPTEMBER) – 2006	46
IV.3c	WIND-ROSE DIAGRAM FOR POST-MONSOON (OCTOBER TO NOVEMBER) – 2006	46
IV.3d	WIND-ROSE DIAGRAM FOR WINTER (DECEMBER 2006 TO FEBRUARY 2007)	47
IV.3e	ANNUAL WIND-ROSE DIAGRAM (PERIOD MAR'06 TO FEB' 07)	47
IV.4a	HOURLY VARIATION OF TEMPERATURE AT TUNDAWAND VILLAGE	48



FIGURE NO.	TITLE	PAGE NO.
	FOR SUMMER 2006	
IV.4b	HOURLY VARIATION OF TEMPERATURE FOR MONSOON 2006 AT TUNDAWAND VILLAGE	48
IV.4c	HOURLY VARIATION OF TEMPERATURE FOR POST-MONSOON – 2006 AT TUNDAWAND VILLAGE	49
IV.4d	HOURLY VARIATION OF TEMPERATURE FOR WINTER 2007 AT TUNDAWAND VILLAGE	49
IV.5	LOCATIONS FOR AAQMS, NOISE, WATER AND SOIL SAMPLING STATIONS	51
IV.6a	VARIATION OF SPM CONCENTRATION IN THE STUDY AREA	57
IV.6b	VARIATION OF RPM CONCENTRATION IN THE STUDY AREA	57
IV.6c	VARIATION OF SO2 CONCENTRATION IN THE STUDY AREA	58
IV.6d	VARIATION OF NOX CONCENTRATION IN THE STUDY AREA	58
IV.6e	VARIATION OF CO CONCENTRATION IN THE STUDY AREA	59
IV.7a	TRAFFIC TREND IN BHOJPUR HIGHWAY DURING POST-MONSOON 2006	66
IV.7b	TRAFFIC TREND IN BIDADA HIGHWAY DURING POST-MONSOON 2006	66
IV.7c	TRAFFIC TREND IN KANDAGRA HIGHWAY DURING POST MONSOON 2006	67
IV.7d	TRAFFIC TREND IN DESALPUR HIGHWAY DURING POST- MONSOON 2006	67
IV.7e	TRAFFIC TREND IN BHOJPUR HIGHWAY DURING WINTER 2006	68
IV.7f	TRAFFIC TREND IN BIDADA HIGHWAY DURING WINTER 2006	68
IV.7g	TRAFFIC TREND IN KANDAGRA HIGHWAY DURING WINTER 2006	69
IV.7h	TRAFFIC TREND IN DESALPUR HIGHWAY DURING WINTER 2006	69
IV.8a	POPULATION PROJECTION YEAR 2010	72
IV.8b	POPULATION DISTRIBUTION FOR 0-6 YEAR AGE GROUP	72
IV.8c	POPULATION DISTRIBUTION FOR SC AND ST	73
IV.9a	WORKER DISTRIBUTION PATTERN	73

FIGURE NO.	TITLE	PAGE NO.
IV.9b	DISTRIBUTION OF WORKERS (2001)	74
IV.10	LAND USE PATTERN	75
IV.11	LITERACY PATTERN IN THE STUDY AREA	76
V.1a	ISOPLETH OF PREDICTED INCREMENTAL GLC OF SO2 FOR SUMMER 2006	103
V.1b	ISOPLETH OF PREDICTED INCREMENTAL GLC OF SO2 FOR POST- MONSOON 2006	103
V.1c	ISOPLETH OF PREDICTED INCREMENTAL GLC OF SO2 FOR WINTER 2006	104
V.1d	ISOPLETHS OF PREDICTED INCREMENTAL GLC OF SO2 FOR THE PERIOD FROM MARCH 2006 TO FEBRUARY 2007	104
V.2a	ISOPLETH OF PREDICTED INCREMENTAL GLC OF NO2 FOR SUMMER 2006	108
V.2b	ISOPLETH OF PREDICTED INCREMENTAL GLC OF NO2 FOR POST- MONSOON 2006	108
V.2c	ISOPLETH OF PREDICTED INCREMENTAL GLC OF NO2 FOR WINTER 2006	109
V.2d	ISOPLETH OF PREDICTED INCREMENTAL GLC OF NO2 FOR THE PERIOD FROM MARCH 2006 TO FEBRUARY 2007	109
V.3a	ISOPLETH OF PREDICTED INCREMENTAL GLC OF SPM FOR SUMMER 2006	113
V.3b	ISOPLETH OF PREDICTED INCREMENTAL GLC OF SPM FOR POST- MONSOON 2006	113
V.3c	ISOPLETH OF PREDICTED INCREMENTAL GLC OF SPM FOR WINTER 2006	114
V.3d	ISOPLETH OF PREDICTED INCREMENTAL GLC OF SPM FOR THE PERIOD FROM MARCH 2006 TO FEBRUARY 2007	114
VII.1	STRUCTURE OF DISASTER MANAGEMENT TEAM	127

TCE

LIST OF TABLES

TABLE NO.	TITLE	PAGE NO.
l.1	OVERALL WORST CASE PREDICTED GLCS AT ALL AAQMS	8
II.1	PROJECTED PEAK POWER DEMAND & ENERGY REQUIREMENT OF GUJARAT	14
II.2	DEFICIT IN INSTALLED CAPACITY FOR THE STATE OF GUJARAT	15
II.3	DEFICIT IN ENERGY DEMAND FOR THE STATE OFGUJARAT	15
III.1	BUILDINGS / STRUCTURES 5x800MW UNITS (ILLUSTRATIVE)	29
IV.1	SUMMARISED METEOROLOGICAL DATA AT TUNDAWAND VILLAGE	50
IV.2	DETAILS OF AAQMS	52
IV.3	ANALYTICAL / MEASUREMENT METHODS	53
IV.4a	AMBIENT AIR QUALITY IN THE STUDY AREA FOR SUMMER 2006	53
IV.4b	AMBIENT AIR QUALITY IN THE STUDY AREA FOR POST-MONSOON 2006	54
IV.4c	AMBIENT AIR QUALITY IN THE STUDY AREA FOR WINTER 2007	55
IV.4d	OVERALL SUMMERY OF AMBIENT AIR QUALITY DATA (PERIOD MARCH'06 TO FEBRUARY 07)	56
IV.5	DETAILS OF NOISE MONITORING STATIONS	59
IV.6a	EQUIVALENT NOISE LEVELS (LEQ) OF THE STUDY AREA FOR SUMMER 2006	60
IV.6b	EQUIVALENT NOISE LEVELS OF THE STUDY AREA FOR MONSOON 2006	60
IV.6c	EQUIVALENT NOISE LEVELS OF THE STUDY AREA FOR POST- MONSOON 2006	61
IV.6d	EQUIVALENT NOISE LEVELS OF THE STUDY AREA FOR WINTER 2006	61
IV.7	DETAILS OF SOIL SAMPLING LOCATIONS	63
IV.7a	SUMMARY OF SOIL QUALITY DURING SUMMER 2006	64
IV.7b	SUMMARY OF SOIL QUALITY DURING POST MONSOON 2006	64



TABLE NO.	TITLE	PAGE NO.
IV.7c	SUMMARY OF SOIL QUALITY DURING WINTER 2006	65
IV.8	SUMMARY OF DEMOGRAPHIC DETAILS WITHIN 10 KM RADIUS OF THE STUDY AREA	70
IV.9	EDUCATION FACILITIES WITHIN 10 KM RADIUS OF THE STUDY AREA	76
IV.10	MEDICAL FACILITIES WITHIN 10 KM OF STUDY AREA	77
IV.11	AVERAGE YEILD OF CROPS PER HECTARE	78
IV.12	TALUKA WISE SURFACE WATER STORAGE AND IRRIGATION POTENTIAL	79
IV.13	AVERAGE OF PHYTOPLANKTON PIGMENTS AT STUDY AREA (SURFACE)	85
IV.14	PRIMARY PRODUCTIVITY AT VARIOUS SAMPLING LOCATION	85
IV.15	PHYTOPLANKTON DIVERSITY AT VARIOUS SAMPLING LOCATIONS (SURFACE)	86
IV.16	ZOOPLANKTON DIVERSITY AT VARIOUS SAMPLING LOCATIONS (SURFACE)	87
IV.17	WATER QUALITY OF THE STUDY AREA	88
IV.18	METAL CONCENTRATIONS IN WATER SAMPLES FROM STUDY AREA	89
IV.19	METAL CONCENTRATION IN SEDIMENTS FROM THE STUDY AREA	90
IV.20	LIST OF PLANTS RECORDED FROM STUDY REGION	91
V.1	NUMBER OF PERSONS TO BE EMPOLYED	96
V.2	EMISSION RATE AND STACK DETAILS	98
V.3a	TOTAL PREDICTIVE GLCS OF SO2 FOR SUMMER 2006	100
V.3b	TOTAL PREDICTIVE GLCS OF SO2 FOR WINTER 2006	101
V.3c	TOTAL PREDICTIVE GLCS OF SO2 FOR POST-MONSOON 2006	101
V.3d	TOTAL PREDICTIVE GLCS OF SO_2 FOR PERIOD FROM MARCH 2006 TO FEBRUARY 2007 (YEARLY)	102
V.4a	TOTAL PREDICTIVE GLCS OF NO2 FOR SUMMER 2006	105



TABLE NO.	TITLE	PAGE NO.
V.4b	TOTAL PREDICTIVE GLCS OF NO2 FOR WINTER 2006	105
V.4c	TOTAL PREDICTIVE GLCS OF NO2 FOR POST-MONSOON 2006	106
V.4d	TOTAL PREDICTIVE GLCS OF NO ₂ FOR PERIOD FROM MARCH 2006 TO FEBRUARY 2007 (YEARLY)	107
V.5a	TOTAL PREDICTIVE GLCS OF SPM FOR SUMMER 2006	110
V.5b	TOTAL PREDICTIVE GLCS OF SPM FOR WINTER 2006	110
V.5c	TOTAL PREDICTIVE GLCS OF SPM FOR POST-MONSOON 2006	111
V.5d	TOTAL PREDICTIVE GLCS OF SPM FOR PERIOD FROM MARCH 2006 TO FEBRUARY 2007 (YEARLY)	112
V.6	OVERALL WORST CASE PREDICTED GLC'S AT ALL AAQMS	115
V.7	IMPACT MATRIX FOR CONSTRUCTION AND OPERATION PHASE	122
VIII.1	AIR QUALITY MONITORING SCHEDULE	130
VIII.2	WATER AND WASTEWATER MONITORING SCHEDULE	130

A TATA Enterprise



LIST OF APPENDICES

APPENI NO.	DIX TITLE	PAGE NO.
1	ANALYSIS OF SEA WATER FROM GULF OF KUTCH	144
2	SATELLITE MAP INDICATING HTL AND LTL	145
3	METEOROLOGICAL STATION ESTABLISHED IN TUNDAWAND (PHOTOGRAPH)	146
4a	AMBIENT AIR QUALITY MONITORING REPORT FOR SUMMER- 2006	147
4b	AMBIENT AIR QUALITY MONITORING REPORT FOR POST- MONSOON-2006	155
4c	AMBIENT AIR QUALITY MONITORING REPORT FOR WINTER- 2006	163
5	NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)	171
6	NATIONAL AMBIENT NOISE QUALITY STANDARDS	172
7	GROUND WATER SAMPLING AT VILLAGE DESALPAR AND AT VILLAGE KANDAGARA (PHOTOGRAPH)	173
7a	GROUND WATER QUALITY IN THE STUDY AREA DURING MARCH 2006	174
7b	GROUND WATER QUALITY IN THE STUDY AREA DURING APRIL 2006	176
7c	GROUND WATER QUALITY IN THE STUDY AREA DURING MAY 2006	178
7d	GROUND WATER QUALITY IN THE STUDY AREA DURING JUNE 2006	180
7e	GROUND WATER QUALITY IN THE STUDY AREA DURING JULY 2006	182
7f	GROUND WATER QUALITY IN THE STUDY AREA DURING AUGUST 2006	184
7g	GROUND WATER QUALITY IN THE STUDY AREA DURING SEPTEMBER 2006	186
7h	GROUND WATER QUALITY IN THE STUDY AREA DURING NOVEMBER 2006	188
7i	GROUND WATER QUALITY IN THE STUDY AREA DURING	190



DECEMBER 2006

7j	GROUND WATER QUALITY IN THE STUDY AREA DURING JANUARY 2007	192
7k	GROUND WATER QUALITY IN THE STUDY AREA DURING FEBRUARY 2007	194
8a	SOIL QUALITY IN THE STUDY AREA DURING SUMMER 2006	196
8b	SOIL QUALITY IN THE STUDY AREA DURING POST MONSOON 2006	198
8c	SOIL QUALITY IN THE STUDY AREA DURING WINTER 2006	200
9	LIST OF SURVEY NO. IN THE MAIN PLANT AREA	202
10	POPULATION DISTRIBUTION WITHIN THE STUDY AREA	204
11	WORKERS DISTRIBUTION PATTERN IN THE STUDY AREA	205
12	LANDUSE PATTERN OF THE STUDY AREA (In Hectare)	206
13	LITERACY PATTERN OF THE STUDY AREA	207
14	COAL PRODUCTION BY VILLAGERS FROM WOOD NEAR TRAGADI VILLAGE	208
15	AMENITIES OF THE VILLAGES OF THE STUDY AREA	209
15a	IMPORTANT COMMODITIES MANUFACTURED IN THE STUDY AREA	213
15b	LOCAL TRANSPORTATION SYSTEM (CHHAKKADA) FOR GOODS AND VILLAGERS	214
16	SATELLITE DATA ANALYSIS AND INTERPRETATION	215
17	VIEW OF BARREN PROJECT SITE AREA WITHOUT TREE AND HABITATION	245
18	A TYPICAL OPEN SCRUB VEGETATION OF THE STUDY AREA	246
19	TYPICAL PHOTOGRAPH OF SAND DUNE AROUND THE SPECIES OF <i>Prospis juliflora</i>	247
20	TOPOGRAPHIC FEATURE OF THE AREA COVERED FOR MARINE ECOLOGICAL STUDY	248
21	THE BOATS USED FOR MARINE SAMPLING	249
22	BIRDS SEEN AT MANDVI BEACH	250
23	A VIEW OF THE BEACH LOCATED NEAREST TO THE PROJECT SITE	251



24	DOMINANT MANGROVE <i>Avicennia marina</i> SPECIES OF THE STUDY AREA	252
25a	STABILITY CLASS AND MIXING HEIGHT DATA FOR SUMMER- 2006	253
25b	STABILITY CLASS AND MIXING HEIGHT DATA FOR POST MONSOON-2006	254
25c	STABILITY CLASS AND MIXING HEIGHT DATA FOR WINTER - 2006	255
26	ENVIRONMENTAL STANDRADS FOR THERMAL POWER PLANTS	256
27	TEMPERATURE LIMIT FOR DISCHARGE OF CONDENSER COOLING WATER FROM THERMAL POWER PLANT	257
28	DELETED	
29	ASH UTILISATION PLAN	258
30	USE OF FLY ASH IN AGRICULTURE & WASTE LAND MANAGEMENT	263
31	QUESTIONNAIRE FOR FLY ASH MANAGEMENT	269
32	CERTIFICATE OF INCORPORATION OF CGPL	270
33	SOCIO-ECONOMIC ASSESSMENT STUDY REPORT	54 PAGES
34	ECOLOGICAL STUDY REPORT FOR MGR SYSTEM	19 PAGES



REVISION STATUS SHEET

REVISION NO.	MONTH AND YEAR OF ISSUE	DETAILS OF REVISION
R1	JUNE 2007	Draft report
R2	AUGUST 2007	Final report