

DCIPS

Technologies for Tough Materials



DC INDUSTRIAL PLANT SERVICES PRIVATE LIMITED
Headquarters in Kolkata, India



Main Activities

Supplies and Services

- ▶ Turnkey contract execution of Integrated bottom ash, fly ash & pyrites handling plants: concept to commissioning, including electrical & civil works
- ▶ Supply of ash plant Spare Parts
- ▶ Upgrades & revamping of existing ash plants & equipment, including custom-made speciality solutions
- ▶ Ash system retrofits for pollution/corrosion control and for utilization of fly ash & bottom ash
- ▶ Operation & maintenance of ash plants
- ▶ Specialised engineering, consulting & manpower support
- ▶ Capability in International operations



Foreign Associates

Partners in Progress

DCIPS is committed to continuously upgrading technology through its own R & D efforts and tie-ups with world-leaders in their respective areas.

- ▶ DCIPS had a technical collaboration and upgradation-exchange agreement with UNITED CONVEYOR CORPORATION, USA from 1984 to 2000. Our in-house know-how was supplemented by the complete absorption of UCC's design, manufacturing & materials technologies. DCIPS developed design & material upgrades for some critical equipment which were passed on to UCC., DCIPS also supplied selected ash-equipment to UCC and performed detail engineering & designs for their export orders. The close-out agreement with UCC allows DCIPS to continue using all absorbed technology & designs.
- ▶ DCIPS has a tie-up with TECHNIP SEIFFERT GmbH, GERMANY for submerged scraper chain conveyor systems used for B.A. handling.
- ▶ DCIPS manufactures abrasion-resistant cast basalt lined pipe fittings with technology and critical components from KALENBORN KALPROTECT, GERMANY.
- ▶ DCIPS has introduced in India the dry bottom ash handling metallic belt conveyor technology of MAGALDI POWER S.p.A., ITALY. As for this first Magaldi system for a new 300 MW Unit, Magaldi - DCIPS have a tie-up for jointly implementing more such eco-friendly & coal / energy-saving plants in India including retrofits.
- ▶ DCIPS can provide HCSD (high concentration slurry disposal) systems with technology from experienced European / Australian companies. DCIPS has tested this technology in its own pilot plant.



Resources

The Specialised Team

More than 400 motivated and experienced professionals perform various activities of the company. DCIPS works through the following functional units which are structured for specialisation in their respective areas.

- ▶ Marketing & Project Sales
- ▶ Project Management
- ▶ Technology Control, New Technologies, R&D, Office & Project Management Systems with Software
- ▶ Equipment Design & Development - Mechanical
- ▶ Project Engineering - Mechanical
- ▶ Project Engineering - Civil, Structural, Architecture
- ▶ Engineering & Purchase - Electrical
- ▶ Purchase - Mechanical & Structural
- ▶ Production Planning & Manufacturing Procurements
- ▶ Manufacturing (GangaNagar Factory)
- ▶ Quality Control & Inspection (In - house & External)
- ▶ Construction / Installation & Commissioning
- ▶ Finance, Accounts & Legal
- ▶ Operation & Maintenance
- ▶ Spare Parts - Sales, Procurement & Delivery

A substantial pool of highly qualified manpower having diverse experience is available from our parent organisation, DCPL, for extending support to DCIPS when needed.

Manufacturing Facilities



All DCIPS equipment are manufactured and tested at its GangaNagar factory. The state-of-the-art facility near Kolkata Airport is built on 3 acres (over 12,000 sq.m.) of land, and has covered manufacturing area of 4500 sq.m. A 150 KV silent Diesel Generator provides standby power.

The GangaNagar factory has

- ▶ Machine Shop
- ▶ Assembly Shop
- ▶ Light Fabrication Shop
- ▶ Heavy Fabrication Shop
- ▶ Quality Control Unit
- ▶ Performance & Other Test Facilities



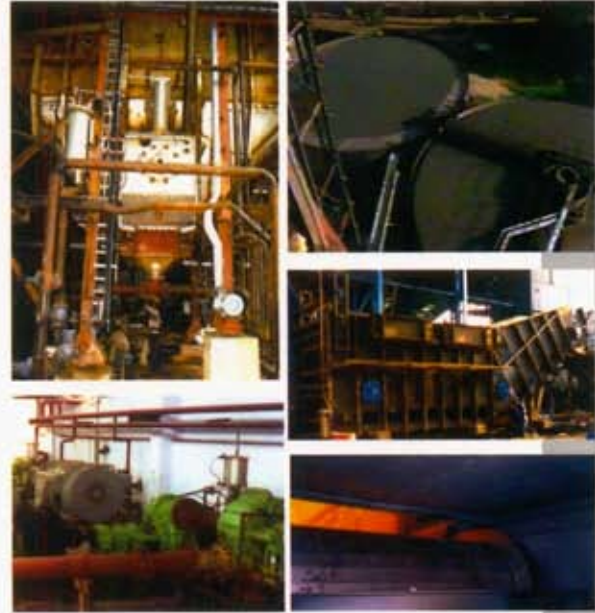
Sophisticated computer controlled machinery include CNC vertical milling, horizontal boring, centre lathe and profile cutting machines.



Ash Plant Sub-systems

An ash handling plant consists of several sub-systems & facilities, which are duly coordinated and optimised with respect to each other :

- ▶ Bottom ash storage & transportation system
- ▶ Economiser ash removal & transportation system
- ▶ Fly ash (Air preheater & ESP ash) removal & transportation system
- ▶ Ash slurry & dry ash disposal systems
- ▶ Water recovery (from ash pond), clarification & recirculation system
- ▶ Water pumping systems
- ▶ Transport air (vacuum/pressure) system
- ▶ Fluidising air system
- ▶ Instrument/actuation air system
- ▶ Effluent water/drainage pumping system
- ▶ Electrical power handling and distribution system
- ▶ Electrical instrumentation & PLC control system
- ▶ Civil & structural facilities

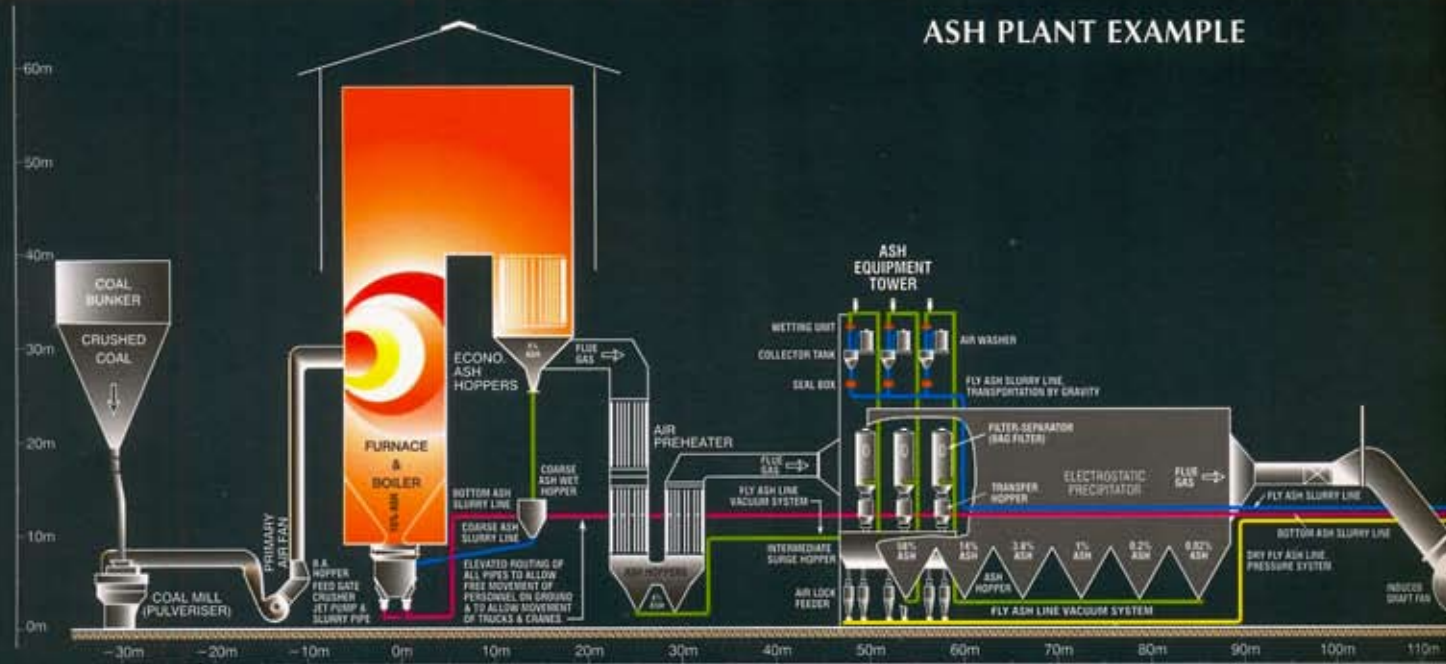


Bottom Ash Systems

We can provide different types of B.A. systems for dry, moist or slurry disposal :

- ▶ Intermittently operating JET PUMP system using water-filled storage hopper
 - with Centrifugal Slurry Pumping (disposal) system or
 - with closed-loop Dewatering Bin system
- ▶ Continuously operating Submerged BELT CONVEYOR, generally for small boilers
- ▶ Continuously operating Submerged SCRAPER (Chain) CONVEYOR using spray-quenched transition hopper
 - with Centrifugal Slurry Pumping (disposal) system or
 - with Ramp-dewatering & Belt Conveyor system
- ▶ Continuously operating Dry Metallic Belt Conveyor System (MAC form Magaldi Power, under Indian license)
 - with Bucket Elevators, Post Coolers, Ecomags and Pneumatic Conveyors, as required

ASH PLANT EXAMPLE



LONGITUDINAL ELEVATION OF ASH HANDLING PLANT : THE WAY ASH TRAVELS

Controls & Electricals

Ash handling plants are provided with remote control facilities as desired by customer. Necessary electrical interlocks, panel-indications and alarms are provided for safety and convenience of operation. Current plants

generally use PLC controls with HMI graphics. Control desks with mimic indications, meters, actuator push-buttons/switches and illuminated-window alarm annunciations are also provided

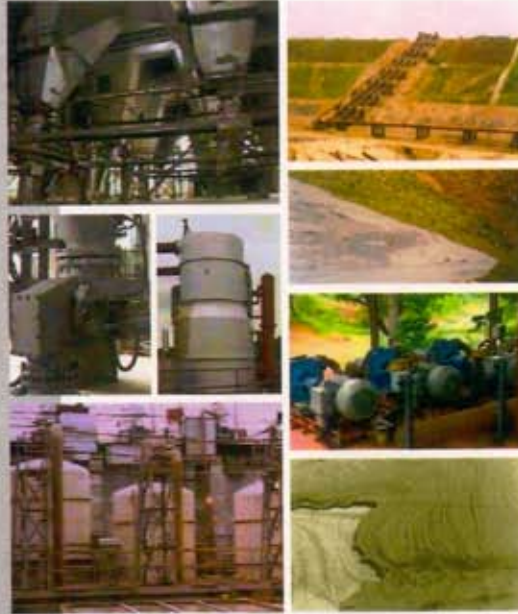
Turnkey Electrical installations include :

- ▶ PLC controls
- ▶ HMI and / or Control Desk operation
- ▶ Central and regional control desks
- ▶ Mimic or LVS process display
- ▶ Local operation / locking facilities for each equipment

Fly Ash Systems

Different types of systems can be used in different combinations or sequence :

- ▶ Dry pneumatic vacuum conveying
 - with WET separation & slurry disposal by gravity or by Centrifugal Slurry Pump and/or
 - with DRY separation & delivery to storage Silo or to Pressure Conveyor.
- ▶ Dry pneumatic pressure conveying
 - from boiler hoppers to in-plant Silo or
 - from vacuum system to in-plant distant Silo with provision of Wet Disposal
 - Pressure systems can be Lean-phase or Medium-dense-phase or Dense-phase
- ▶ Wet removal from boiler hoppers by
 - continuously operating Flushing Apparatus or
 - intermittent/cont. optg. Feeder Ejectors.
- ▶ Silo Unloading Systems for dry disposal (in closed tankers), or for moistened (dust-suppressed) disposal



Slurry Disposal, Water Recovery

Lean slurry systems are still used in India. High concentration slurry disposal system can also be provided :

- ▶ Lean slurry disposal system
 - with water-powered Jet Pumps for short distances or
 - with Centrifugal Slurry Pumps for longer distances.
- ▶ Water Recovery system (for lean slurry disposal)
 - with collection wells, recovery water pumps, Clariflocculator, sludge pumps & clear water pumps.
 - Barge-mounted recovery pumps are used where appropriate.
 - To avoid ground-water pollution, untreated pond water is not allowed to overflow & reach natural water-bodies.
- ▶ High Conc. Slurry Disposal (HCSD) system
 - with high pressure Piston or Diaphragm Pump, mixing tank having mechanical agitator, metering equipment & loops for ash & water, and a slurry pipeline of smaller diameter

**TURNKEY ASH HANDLING SYSTEM WITH ELECTRICAL & CIVIL WORKS
PROVIDED BY DCIPS FOR 3 X 210 MW UNITS OF
BAKRESWAR THERMAL POWER STATION, WEST BENGAL, INDIA
ORDER VALUE : Rs. 64.4 CRORES (US\$ 13 MILLION)**



- ▶ Data acquisition & logging
- ▶ I/O racks and data highways
- ▶ Power supply transformers
- ▶ High voltage switchgear
- ▶ Low voltage motor control centre

- ▶ Power, control & instrumentation Cable network
- ▶ Illumination
- ▶ Earthing
- ▶ Lightning protection



Project Engineering

Tailored to Fit & Deliver

Ash handling plants are configured in many different ways, involving different system-types, to suit User's needs / preferences, boiler-plant layout, local conditions, transportation distances and consequent economics. An ash handling plant also consists of several sub-systems for bottom ash, coarse fly ash, fine fly ash, transport air, transport water, cooling water, sealing water, effluents, water recovery & cleaning, etc. Transportation of ash requires special technologies and layout considerations backed by extensive operating experience. The entire "process" is separately engineered for each plant, integrating & optimizing each sub-system for overall reliability & economy. Matching electrical and civil facilities are provided for each plant, which also involve tailor-made designs and optimization.

Functions :

- System Design & Calculations
- Schematic & Layout Drawings
- Controls & Protections
- Fabrication & Manufacturing drawings
- Installation Drawings, O & M Manuals
- Procurement Engineering
- Field / User Feedback Processing

Performing disciplines :

- Mechanical
- Ventilation & Air Conditioning
- Electrical
- Controls & Instrumentation
- Civil & Structural
- Architecture

DCIPS uses a fully computerised system of design engineering, and CAD stations connected by LAN and WAN. Advanced software are used for drafting and also for the design of processes & equipment, some of which are proprietary.

Engineering remains the core strength of DCIPS, which is acknowledged by customers.

Quality Control

In-house & External

Quality Control Department functions independently at our GangaNagar factory, where it has its own testing equipment & personnel for in-process checks. Quality checks are performed at the point of manufacture. Purchased equipment / components are inspected at the respective Vendor's facilities. Destructive and non-destructive tests are conducted. Service of outside specialized laboratories are used when required.

Q.A. Functions include :

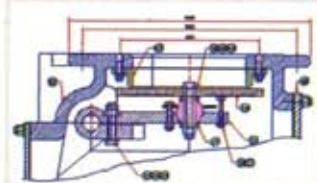
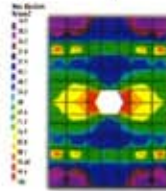
- Finalising own & customer Quality Plans
 - for DCIPS products
 - for Purchased equipment / products
- In-process / stage inspections
- Material property tests
- Final product inspections
- Equipment performance tests
- Handling customer inspections
- Vendor appraisal & quality-rating
- Manufacturing process & material development/upgrades
- User feedback processing for product upgradation



Equipment Design

Understanding Ash

The highly-abrasive nature of ash combined with its varying flow/dragging characteristics makes equipment design an intricate job, often requiring innovations. Special designs are evolved by veterans for reliable functioning, for extending component-life and for making maintenance easier. Special construction-materials are used and developed to minimize & resist abrasive wear. Several ancillary items or system-components can require design adaptations to suit individual plants.



Field Services For Turnkey Projects

- Setting-up and management of
 - Site office
 - Stores : halls & yards
 - Fabrication yards
 - Security, worker safety
- Civil works
- Structural fabrication & erection
- Mechanical erection
- Electrical equipment / system erection & cabling
- Dynamic scheduling for multiple-island coordination
- Field quality assurance
- Customer or third party inspection / testing protocols
- Pre-commissioning tests & trial runs
- Plant commissioning in unison with boiler plant
- Plant performance test, operator training & handing over



Operation & Maintenance

DCIPS performs plant operation & maintenance, where required, usually under separate contracts. A 200 MW unit in India produces about 1500 tonnes of ash per day. For handling large quantities of abrasive solids that are susceptible to property change and also have the potential to pollute, proper operating procedures & timely attention under our expert supervision provides a welcome relief to users which is economic too.

Bottom Ash Equipment

- Hopper / Bin outlet Gates
 - Vertical Slide
 - Inclined Slide
 - Horizontal Slide
 - Swing Flap
- 2-way Diverter Gates
- Crusher / Clinker Grinder
 - Single Roll
 - Double Roll
- Jet Pump
- Rotary Feeder
- Wetting Unit
- Contact Coolers
- Submerged Belt Conveyor
- Scraper Conveyor

Fly Ash Equipment

- Slide Gates
 - Linear
 - Rotary
- Air Intake Valves
- Swing Disc Ash Valves
 - Vertical Disc
 - Horizontal Disc
 - Diffuser Feeder
- Hopper Fluidizers
- Vacuum Breakers
- Wetting Unit
- Collector Tank
- Air Washer
- Air Separator
- Hydraulic Exhauster
- Dust Collector
- Bag Filter-Separator
- Pressure Feeder
 - Eccentric Vessel
 - Concentric Vessel
- Flushing Apparatus
- Feeder Ejectors

Produced to Perform Born Tough

DCIPS manufactures most of the speciality equipment which actually handle ash including many that are proprietary. Most equipment use special designs and materials to minimize & resist abrasive wear. The use of special materials results in specialized manufacturing processes for narrow-band composition control, microstructure control, heat treatment, work hardening, machining & matching, assembly, etc. Many of these processes have been developed or improved by DCIPS, both for its own factory and for its dedicated sub-vendors.

F. A. Silo Equipment

- Vent (Bag) Filter
- Pressure / Vacuum Relief Doors
- Floor Diffusers
- Plate Valves
- Air Slides
- Orifice Feeder
- Rotary Unloader
- Telescopic Dry Spout
- Rotary Feeder
- Feeder Ejector

Hoppers and Bins

- Bottom Ash Hoppers, refractory lined
- Coarse Ash Wet Tanks
- BA Dewatering Bins
- Settling Tanks
- Surge Tanks
- Pressure - Vacuum Transfer Hoppers
- Plate / Tube Settler Tanks
- Dry FA Silos (RCC / Steel)
- Dry BA Silos / Wet BA Bins

Miscellaneous

- Plug Gates
- Sleeve Couplings
- Adaptor Couplings
- Expansion Couplings
- Ash Pipe Fittings
 - Impact
 - Long Radius
 - Extra-long Radius
 - Basalt lined
- Wall/Sluiceway Liners
- Pneumatic Cylinders





Abbreviations

APGENCO	Andhra Pradesh Power Generation Corp. Ltd.
APSEB	Andhra Pradesh State Electricity Board
BHEL	Bharat Heavy Electricals Ltd.
CESC	The Central Electric Supply Corporation Ltd.
DEC	Dongfang Electric Corporation, China
DPL	The Durgapur Projects Ltd.
DWC	Damodar Valley Corporation
GER	Gujarat Electricity Board
GIPCL	Gujarat Industries Power Co. Ltd.
KPCL	Karnataka Power Corporation Ltd.
MPEB	Madhya Pradesh Electricity Board
MPL	Majhi Power S.p.A., Italy
NFL	National Fertilizers Ltd.
NTPC	National Thermal Power Corporation Ltd.
PPIL	Powerplant Performance Improvement Ltd.
PSB	Punjab State Electricity Board
RSEB	Rajasthan State Electricity Board
SFC	Shreeam Fertilizer & Chemicals Ltd.
TISCO	The Tata Iron & Steel Company Ltd.
UCC	United Company Corp., USA
WBPDCL	West Bengal Power Devision, Corp. Ltd.
WRSEB	West Bengal State Electricity Board
ZPEFB	Zhejiang Provincial Ele. Power Bureau, China
CFBC	Circulating Fluidized Bed Combustion
CPP	Captive Power Plant
FC	Fluidized Bed Combustion
GS	Generating Station
PH	Power House
PP	Power Plant
Stg	Stage
STPP	Super Thermal Power Project
TPS	Thermal Power Station

Owner	Plant/Unit	MW	Value *	Order of	Start up Date
APSEB (thru' BHEL)	Kothagudem TPS	1 x 67.5	0.7	Sep-86	Dec-87
NFL	Bathinda CPP	1 x 210 T/Hr.	21.7	Apr-87	Apr-88
NFL	Panipat CPP	1 x 210 T/Hr.	29.0	Sep-87	Jul-88
APSEB	Nellore TPS	1 x 35	26.7	Jan-88	Dec-90
CESC	Southern GS	2 x 67.5	14.8	May-88	Apr-91
WBPDCL	Kolaghat TPS Stg.II	3 x 210	34.4	Jun-88	1991, 93&94
GER	Gondhinagar TPS	2 x 210	8.8	Sep-88	1992
SFC	Kota CPP	1 x 35	2.6	Sep-88	Jan-89
TISCO	Jamshedpur PP	1 x 30	11.0	Dec-88	
PSEB (thru' BHEL)	Jalkhri PS (FBC)	1 x 10	9.0	May-89	Jan-92
Coal India Ltd. (thru' BHEL)	Karharu & Moonidih (FBC)	2 x 10		Jul-89	Sep-92
NTPC	Farakka STPP	3 x 210	22.0	Mar-90	Dec-91
DVC	Majhi TPS # 1,2,3	3 x 210	16.4	Apr-90	1996, 98, 99
ZPEFB - China (thru' UCC)	Bailungang TPS	1 x 600	US \$ 0.18	Jun-90	1992
APSEB	Nellore TPS	1 x 30	2.2	Aug-90	Feb-91
CESC	Southern GS	2 x 67.5	13.5	Nov-90	Mar-93
WBSEB	Santalidih TPS	1 x 120	0.9		Jan-92
NFL	Bathinda CPP	1 x 180 T/Hr.	6.8	Feb-92	Jun-93
MPEB	Sonjay Gandhi TPS # 1,2	2 x 210	32.0	Jun-92	Oct-93, May-94
RSEB	Kota TPS, Stg.III	1 x 210	71.7	Jul-92	Apr-94
TISCO	Jamshedpur PH # 4	1 x 15	20.9	Sep-92	1993
NFL	Panipat CPP	2 x 210 T/Hr.	6.8	Dec-92	Jul-93
WBSEB	Bardol TPS # 1,2,3,4	4 x 80	97.5	Dec-92	
TISCO	Jajobara CPP	1 x 67.5	20.4	Jul-93	Jan-96
TISCO	Jamshedpur PH # 4	4 x 15	19.3	Jun-94	Dec-95
GER	Kutch Lignite TPS	1 x 75	53.0	Aug-94	Apr-97
CESC	Budge Budge GS	2 x 250	276.0	Apr-95	Jan-98, Mar-99
PSEB	Gum. Hangabid TPP	2 x 210	280.7	Nov-95	Mar-98, Sep-98
GER	Gandhinagar TPS # 5	1 x 210	96.1	May-96	Jun-98
GIPCL	Surat Lignite PP (CFBC)	2 x 125	42.5	Jan-97	Mar-2000
MPEB	Sonjay Gandhi TPS # 2,4	2 x 210	398.5	Mar-97	Apr-99, Nov-99
WBPDCL (thru' BHEL)	Bakreswar TPS # 1,2	2 x 210	424.0	Apr-98	Oct-99, July-2000
WBPDCL (thru' BHEL)	Bakreswar TPS # 3	1 x 210	270.1	Jan-99	Mar-2001
NTPC	Kutch STPP Stg. I	3 x 200	183.3	Mar-99	Mar-2001
DPL (thru' PPIL)	Durgapur # 1,2	2 x 30	20.0	Sep-99	Mar-2001
	# 3,4,5	3 x 75			Aug-2000
NTPC (thru' BHEL)	Talchar STPP Stg. II	4 x 500	207.5	Feb-2K	Feb-03 to Mar-05
APGENCO (thru' BHEL)	Kothagudem TPS	4 x 110	33.9	Mar-2K	May-01 to May-04
APGENCO (thru' BHEL)	Wajaywada TPS	2 x 210	10.3	Jun-01	Sep-2002
PSEB	Guru Hanak Dev TPS	4 x 110	66.8	Aug-01	Apr-2004
PSEB	Guru Gobind Singh STPS	6 x 210	95.0	Sep-01	Mar-2004
NTPC (thru' BHEL)	Ramagundam STPP Stg. III	1 x 500	227.3	Dec-01	Oct-2004
KPCL	Raichur TPS # 7	1 x 210	124.5	Jan-02	Mar-2003
DVC (thru' BHEL-ISG)	Majhi TPS # 4	1 x 210	62.1	Apr-03	May-2003
GER (thru' NASI)	Gondhinagar TPS	2 x 120	228.1	Feb-03	Due
		3 x 210			
NTPC (thru' BHEL-ISG)	Rihand STPP, Stg. II	2 x 500	37.5	Apr-03	Due
NTPC	Vindhyachal STPP, Stg. III	2 x 500	564.3	Dec-03	Due
DVC (thru' BHEL)	Chandrapura TPS # 7,8	2 x 250	202.3	Apr-05	Due
DVC (thru' BHEL)	Majhi TPS # 5,6	2 x 250	287.1	May-05	Due
WBPDCL (thru' DEC)	Sagaridighi TPS, # 1,2	2 x 300	432.1	Sep-05	Due
DPL (thru' MPL)	Durgapur TPS # 7	1 x 300	40.5	Mar-06	Due
NTPC	Bath STPP	3 x 660	960.0	Mar-06	Due



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