

INDIRA SAGAR PROJECT

33rd STATUS REPORT

(As on 30th September, 2006)

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CHAPTER -1: INTRODUCTION

1. GENERAL

The Narmada River is the fifth largest river in India and the largest west flowing river of Indian peninsula. It is known as the life line of Madhya Pradesh & Gujarat. Originating from Amarkantak in district Shahdol of Madhya Pradesh, it travels a distance of 1312 Km. before meeting the Arabian sea in Gulf of cambay in Gujarat, out of which 1077 Km. is in the State of Madhya Pradesh covering the districts of Shahdol, Dindori, Mandla, Jabalpur, Hoshangabad, Harda, Khandawa, Khargone, Barwani, Dhar and Jhabua. Narmada river is an inter-state river. Narmada Water Disputes Tribunal has assessed the utilizable flow of Narmada at 28 MAF (34357 Mcum) at 75% dependability, out of which 18.25 MAF has been allocated for utilization in the state of Madhya Pradesh. In order to utilize their share of water, Govt. of Madhya Pradesh has proposed 30 major, 158 medium and about 3000 minor projects in Narmada basin.

Indira Sagar Project (ISP) is one of the 30 major proposed projects in Narmada Basin with the largest storage capacity in the country and has been commissioned and generating 1000 MW. The project is located near Punasa Village in Khandwa district of Madhya Pradesh. It is a multipurpose River Valley Project for development of water resources of Narmada which also envisages an annual irrigation potential of 1.69 lakh ha. The project shall also provide supply of 0.06 MAF (74M.cum) of drinking water to rural areas in Khandwa district. The regulated releases from this project shall help in providing 8.12 MAF (10015 M.cum) of water to Sardar Sarovar Project ex-Maheshwar project after generation of power at down stream projects viz. Omkareshwar Project and Maheshwar

Project in Madhya Pradesh. The salient features of Indira Sagar Project are given in **Annexure-I**.

1.2 PROJECT FEATURES

The main components of the project are as follows

- (i) A concrete gravity dam, 653 m long with a slightly curved alignment in plan and 92 m high above the deepest foundation level. It has a centrally located spillway with 20 radial crest gates of size 20 m (width) x 17 m (height) to pass a design flood outflow (PMF) of 83,534 cumec (29.47 lakh cusec).

The gross storage capacity of the reservoir is 12,220 M.cum (9.9 MAF) and live storage of 9,750 M.cum (7.9MAF). A saddle dam has also been constructed on the right flank of the dam, which forms a portion of the road between Narmada Nagar and Bhopal.

- (ii) A 1000 MW sub-surface powerhouse on the right flank of dam with eight Francis turbine units of 125 MW each.
- (iii) 400 KV open switchyard on the right bank of river Narmada.
- (iv) River diversion arrangement comprising of upstream and downstream coffer dams and 390 m long diversion tunnel of 8 m dia on the left bank. The tunnel has been plugged.
- (v) Construction of a tunnel of 8.25 m dia & 3.677 km long, popularly known as "Punasa Tunnel" with appurtenant structures taking off from the reservoir, designed to carry a discharge of 185 cumec inclusive of 25 cumec for Punasa lift irrigation scheme. This is followed by a 248.65 km long gravity flow left bank main canal with a head discharge of 160 cumec to irrigate 1.23 lakh ha of CCA, comprising 19000 ha in Khandwa District, 68000 ha in Khargone District

and 36000 ha. in Barwani District, with an irrigation intensity of 138%.

- (vi) The Punasa lift irrigation scheme will irrigate additional 35,008 ha of CCA in the higher cultivated areas of Khandwa District. A canal head powerhouse with three units of 5 MW each has also been planned at control structure of ISP Main Canal.

PLATE-1 shows the index map of the Project showing command area and phase wise development of irrigation. PLATE-2 shows the general layout of Indira Sagar dam. PLATE-3 shows the L section of Indira Sagar dam.

1.3 REGULATED RELEASES TO SSP

In accordance with Clause-IX of Narmada Water Dispute Tribunal (NWDT) award, an annual regulated flow of 8.12 MAF (10015 M,cum) shall be released to Sardar Sarovar Project (SSP), ex-Maheshwar Project. Making uniform monthly releases, the amount of water to be released by Madhya Pradesh per month would be 834.65 M.cum (0.677 MAF). The operation of Indira Sagar Project shall be carried out in such a way so as to facilitate the regulation at Sardar Sarovar Project.

1.4 SETTING UP OF NARMADA HYDRO ELECTRIC DEVELOPMENT CORPORATION (NHDC) FOR IMPLEMENTATION OF THE PROJECT

Initially the project was under Govt. sector and was being executed by Narmada Valley Development Authority, (Govt. of M.P.). Subsequently a Memorandum of Understanding (MOU) was signed between National Hydroelectric Power Corporation (NHPC) and Government of Madhya Pradesh (GOMP) on May 16, 2000 for harnessing the hydro electric potential of the Narmada basin by executing the Indira Sagar Project and Omkareshwar Project

through Narmada Hydro-electric Development Corporation (NHDC) - a joint venture of NHPC and Govt. of MP. As per this MOU, execution of works on Unit-I (Dam) and Unit-III (Power House) have been transferred to NHDC.

According to the MOU, the joint venture NHDC registered under the Companies Act 1956 has been set up to complete and manage the Dam (Unit-I) and the Power House (Unit-III) of the Indira Sagar Project and Omkareshwar Project. The NHPC would have the major share i.e. not less than 51% of the share holding in the joint venture. The equity contribution by GOMP to the joint venture is the expenditure incurred by GOMP on Dam (Unit-I) and Power House (Unit-III) of the Indira Sagar Project and Omkareshwar Project before transferring these projects to NHDC.

According to the MOU the joint venture would comply with the provisions of Narmada Water Disputes Tribunal (NWDT) Award and the directions of Narmada Control Authority, (NCA), its various Sub-groups and Review Committee of the Narmada Control Authority (RCNCA) given from time to time.

The works under Unit-I (Dam) and Unit-III (Power House) of Indira Sagar project were taken over by NHDC in October 2000 and completed by May, 2005. The project is generating 1000 MW of Power.

- 1.4.1 The works of Unit-II (Canal) is being executed by NVDA that would bear the cost of canal network i.e. Unit-II. In addition the irrigation component cost of Unit-I i.e. 16.75% of cost of dam after deducting the share of SSP in dam cost would also be borne by NVDA.

1.5 PROJECT COST

The Planning Commission has accorded investment clearance to the project for a cost of Rs.1,993.67 crores at 1988

price level. The Govt. of Madhya Pradesh has further given revised administrative approval to the project for Rs.2,167.67 crores, comprising Rs.832.32 crores for Unit-I (Dam), Rs. 619.37 crores for Unit-III (Power House), Rs.541.98 crores for Unit-II (Canal) and Rs. 174 crores as cost of command area development and catchment area treatment.

After taking over of Unit-I & Unit-III of ISP by the NHDC, the project estimate was further revised. Cabinet Committee on economic affairs, Govt. of India in March, 2002 accorded approval to the cost estimate of Rs.4,355.57 crore (including IDC of Rs.488.37 crore) at September, 2000 price level for Unit-I and Unit-III. As per NWDI Award, 17.63% of the expenditure on account of Narmada Sagar Dam (Indira Sagar Dam) is chargeable to Sardar Sarovar Project in lieu of regulated releases to be made from Indira Sagar Project.

The tentative cost estimate of Rs.1,200 crore at September, 2000 price level has been projected by NVDA for Unit-II (Canal) works. The revised cost estimate of Unit-II (Canal) is yet to be approved by the Planning Commission.

1.6 SCOPE OF THE PRESENT STATUS REPORT

The present report contains physical and financial progress of various components of Indira Sagar Project (ISP) for the half yearly period ending September, 2006 vis-à-vis the implementation schedule. This report is based on the field visits undertaken by the officers of Narmada Control Authority and the progress reports received from NHDC and NVDA for the monitoring period.

CHAPTER -2 : DAM COMPLEX

2.1 GENERAL

The main dam is a concrete gravity dam, 92.0 m high and 653.0 m long along its curved axis. It comprises 35 blocks, of which blocks no. 4 (part) to 16 (part) constitute the main spillway and blocks no. 16 (part) to 24 (part), the auxiliary spillway. Blocks no. 1 to 4 (part) and blocks no. 24 (part) to 35 form the non-over flow portion of the dam.

The progress of works is as given in the following paragraphs.

2.2 STATUS OF DAM, SPILLWAY & APPURTENANT WORK

The construction of the dam is complete. Erection of all the 20 gates along with seals is over. All gates were operated and tested successfully. River diversion works comprising diversion tunnel & goose neck tunnel along with the commissioning of its gate are also complete. The construction of infrastructural facilities at the dam site has also been completed.

2.3 WRIT PETITION IN HON'BLE HIGH COURT

A PIL (W.P.No. 3022 of 2005) was filed by the Narmada Bachao Andolan (NBA) in the Hon'ble High Court of M.P. Jabalpur in 2005 against NHDC & others regarding just rehabilitation, legal and human rights of the oustees families affected by Indira Sagar Project. The Hon'ble High Court has delivered final judgment on 8.9.06 and disposed of the above writ petition with the conclusion and directions as under:

- (a) The present litigation is maintainable as a public interest one and not to be thrown overboard on the ground of delay and laches.
- (b) The orders passed in the earlier writ petitions do not operate as res judicata.

(c) The award passed by the Narmada Water Disputes Tribunal is not applicable to the Indira Sagar Project except what has been stated therein and what has been clarified hereinbefore.

(d) The Narmada Control Authority has fundamentally no role vis-à-vis Indira Sagar Project. In any case the same has paled and melted into insignificance because of the interlocutory orders passed by this Court from time to time ascribing the role to the said authority and the sub-Group of the same.

(e) The awards passed by the Land Acquisition Officers are not nullities and have been passed by the competent Officers under the Land Acquisition Act, 1894.

(f) The persons who have not filed the applications under Section 18 of the Land Acquisition Act seeking reference would be entitled to the benefit as engrafted under Section 28-A of the aforesaid Act.

(g) The policy evolved by the State Government from time to time is constitutionally valid.

(h) The Hindi version of letter dated 20.5.2000 would prevail and the same should be followed in letter and spirit.

(i) The adult sons and the adult unmarried daughters would be treated as separate units for grant of R&R and Special Rehabilitation Grant and other benefits provided under the policy.

(j) The encroachers who have been there prior to the cut off date shall be extended all the benefits under the policy. The State

shall endeavour to create a further land bank to provide the benefit of land for land as far as possible.

(k) The persons who have not accepted the compensation in lieu of land would be at liberty to ask the authorities to grant land for land and the same shall be adhered to in terms of the policy;

(l) The sites which have been demarcated by the respondents No.1 and 2 should be developed so that the civic amenities are available and the oustees live with dignity.

(m) The persons who are aggrieved by the awards under the Land Acquisition Act can prosecute their grievances under the provisions of the said statute.

(n) The State Government would not advance a plea before the Civil Court that as the SRG has been granted there should be no enhancement of the award passed by the Land Acquisition Officer if the same is permissible within the parameters of said enactment

(o) The R&R group of Narmada Control Authority would do the field study and apprise the Grievance Redressal Authority with regard to the grievance of the affected persons.

(p) The Grievance Redressal Authority should be broad based by inducting a retired District Judge. Ordinarily we would have left it to the State Government, but we think it condign to name Shri M.R. Kasania, a retired District Judge to be a Member of G.R.A.

(q) The Grievance Redressal Authority shall deal with the grievances applications with utmost objectivity.

(r) The Grievance Redressal Authority shall at least meet once a week in the affected area and do the needful which include the computation of R&R as well as SRG.

(s) The order passed by the Grievance Redressal Authority shall be subject to judicial scrutiny of this Court.

(t) The Central Water Commission shall study further with regard to the persons and the houses which are likely to be affected by the back water level.

(u) The Grievance Redressal Authority and Central Water Commission would make close study whether the persons whose houses have been acquired barring the land whether it is justified or not, and if not so, recommend to the State Government for its appropriate decision.

(v) The oustees whose lands have not been acquired and, if not to be acquired, but lose their houses in the process acquisition should be given sites within the distance of 1 Km. along with the civic amenities relating to education, health and hygiene and other necessary facilities.

(w) The persons whose lands have been acquired to the extent of 75% and seek indulgence with regard to the balance 25% the same should be acquired and award should be passed.

(x) The pondage of the dam should be raised upto 260 metres in praesenti. Be it clarified, we do not say in regard to the height of the dam or the capacity of the reservoir. The capacity of the reservoir is 262.13 metres, but in praesenti we permit this much as certain rehabilitation packages are yet to be carried out. The same shall be carried out by the respondents No.1 and 2 in quite promptitude with utmost objectivity in consultation with Grievance Redressal Authority and suggestions given by the Central Water Commission. We may further add the Central Water Commission, Grievance Redressal Authority and the respondents No. 1 & 2 should evaluate the effect of the pondage on the backwater level

and thereafter proceed pari-passu with regard to raising of height of the water and rehabilitation programme.

In pursuance of the above directions NHDC has filled the Indira Sagar Reservoir during the monsoon of 2006. The maximum reservoir level in September 2006 was EL 258.94 m. The reservoir level as on 30.09.2006 was also EL 258.94 m.

2.4 STATUS OF RESETTLEMENT AND REHABILITATION WORKS

- Due to construction of ISP, a total of 249 villages are affected, out of which 38 villages having only Govt. land and 59 villages having only agricultural land are affected and in balance 152 villages there are 39,289 PAFs. This number may vary due to ongoing surveys in pursuance to the orders of the Hon'ble High Court of Madhya Pradesh given in September-2006.
- According to NHDC report, out of total 39,289 families to be rehabilitated due to the project, 39,236 families were rehabilitated so far, leaving a balance of 53 PAFs.

CHAPTER - 3 : POWER HOUSE COMPLEX

3.1 GENERAL

The Power House Complex of Indira Sagar Project has 8 units of 125 MW each in a sub-surface powerhouse. The water to the powerhouse is fed through a 530 m long Head Race Channel (HRC). The Tail Race Channel (TRC) of 850 m length discharges water back to the river.

3.2 STATUS OF WORK

All the Civil / Electrical works related to Power House Complex comprising Head race channel, intake structure, tail race channel, erection of TG sets, 400 KV switchyard. Power evacuation system, Generator transformers, 12 KV Bus duct, Hydromechanical works like intake gates, draft tube gates etc are all complete. Finishing / architectural works of unit 5 to 8 remained in progress during the period under report and are almost complete. All the 8 units of the Power House are already commissioned (last unit commissioned on 30.3.05). The Power generation has commenced since 18.1.04.

3.3 POWER GENERATION

The power generation from Indira Sagar Project till 30-09-2006 since inception is 5280.62 MU. Against the yearly target of 2698 MU 2006-07, 1178.87 MU was generated from ISP up to September 2006. Monthly Generation (Target/Actual) during the year 2005-06 and the year wise generation since the commissioning of 1st unit are shown in the bar chart.

CHAPTER - 4 : PUNASA FACILITIES

4.1 INTRODUCTION

The component of water conveyance system connecting the Reservoir with the main canal of Indira Sagar Project to facilitate the withdrawal of water for irrigation requirements is known as Punasa Facilities. This component, which is 9360 m long and takes off from the reservoir comprises of the works as detailed below:

- (i) A 3045 m long approach channel (from RD 0 m. to RD 3045 m.) and a 26 m. high control structure (at RD 3045 m.) for regulating the flows into the canal with 179.5 m. long Stilling Basin (RD 3045 m. to RD 3224.5 m.)
- (ii) A 8.25 m. diameter and 3677.25 m. long (RD 3232.75 m. to RD 6910 m.) tunnel known as "Punasa Tunnel" designed to carry a discharge of 185 Cumecs for irrigation including Punasa Lift Irrigation Scheme. Transition sections have been provided from RD 3224.5 m to RD 3232.75 m.
- (iii) A 2450 m. long exit channel after the Punasa tunnel (from RD 6910 m. to RD 9360 m.) to feed the water to main canal.

Construction of all these components of Punasa facilities are complete.

4.2 PUNASA LIFT SCHEME

The Punasa Lift Irrigation Scheme is proposed to irrigate 35,008 ha in the head reaches of canal in District Khandwa. The

GOMP had accorded administrative approval to the survey estimates for Rs.14.50 lakhs, in

October 2001. On completion of survey & investigation the D.P.R. of Punasa Lift Irrigation Scheme was submitted to C.W.C. & Planning Commission by Government of M.P., N.V.D.D. vide Memo No. 2/16/27/02/2003/308 dated 10.03.2003. Advisory Committee of Planning Commission in its 84th meeting held on 12.05.2005 conditionally cleared the scheme.

The Govt. of M.P., NVDD Bhopal has accorded the administrative approval of Rs. 185.04 crores vide No. F-2/28/27/2/2005/2817 dtd. 19.9.05. Funding the proposal of Govt. of M.P. is under active consideration with NABARD & JBIC. The case for according of environment clearance to the project is still being processed in Ministry of Environment & Forest, GOI and need to be got expedited.

CHAPTER - 5 : MAIN CANAL & DISTRIBUTARIES

5.1 GENERAL

The main canal of Indira Sagar Project is 248.65 km long. The project envisages annual irrigation of 1.69 lakh Ha in a CCA of 1.23 Lakh Ha in 571 villages of Khandwa, Khargone and Barwani districts as per details given below.

S.No.	District	Irrigation in Lakh ha	No. of villages
1.	Khandwa	0.31	76
2.	Khargone	0.90	345
3.	Barwani	0.48	150
	Total	1.69	571

5.2 PHASING OF CANAL SYSTEM

The ultimate creation of potential from the project has been planned in three phases as tabulated below:

S.No.	Phase	Description of canal reach.	Irrigated Area (ha.) CCA	Revised construction period.
1.	Phase - I	Main canal from km 0 to km 71 (inclusive of 16 distributaries)	36100	June 2007
2.	Phase - II	Main canal from km 71 to km 206	46800	June 2009
3.	Phase - III	Main Canal from km 206 to km 248.65, including Khargone Lift Scheme	40100	June 2011
		Total	1,23,000	-

5.3 SURVEY AND ALIGNMENT

The alignment of main canal has been finalized upto km 160. Survey of the Main Canal RD 161.0 to R.D. 206 km is under progress.. The alignment of the distributaries namely, Gudariya, Bijapur, Kelwa, Julwania, Atud Kalmukhi,

Sanawad, Lohari, Roopkhera, Delgaon, Baswa, Dhakalgaon, Nalwa, Neelkanth, Jhirbar, Ratanpura, Borgaon, and Raipura have been finalised and approved. Samurai and Khamkheda distributary is under finalization.

Technical sanction has been given for the work of Main Canals from 0 to 130.935 Km and works are in progress.

5.4 STATUS OF PROGRESS OF THE MAIN CANAL: FIRST PHASE OF IRRIGATION

As per the revised implementation schedule of NVDA, the first phase of irrigation development is envisaged to be completed by June 2007 by completing main canal, distributaries, minors and sub-minors from km 0 to 71 km for irrigating 36100 ha. of command area. In order to streamline the construction activities, the work of Main Canal from km 0 to 71 has been distributed in four reaches viz. km 0 to 20, km 20 to 41.25, km 41.25 to 58.856 and km 58.856 to 71.00 km considering each reach as a block for comprehensive development.

The target date of completion of this phase was June 2006 but the same could not be achieved due to various bottlenecks. It is now planned to provide irrigation to 5000 Ha. of Rabi crops in 2006-07 and also to create full irrigation potential of 36100 Ha. by June 2007.

Reach wise progress of main canal in this phase is as follows:

5.5 CANAL REACH : km 0.0 to km 20.00

5.5.1 MAIN CANAL

The earth work of the main canal up to 20.00 km has already been completed. 34 Nos. structures planned in this reach have been completed. One additional C.R. at R.D. 17025 has been proposed which is under construction. The work of paver lining of main canal has been completed in 19 km length in this reach.

5.5.2 DISTRIBUTRIES, MINORS & SUB MINORS

Altogether five distributaries are proposed between chainage km 0 to 20 to irrigate an area of 9169 ha. as per details given below:

S. No.	Name of distributaries	Length (km)	Proposed Irrigated Area (Ha.)	Off taking Chainage on Main Canal (RD in km)
01	Gudariya	11.92	3097	1.750
02	Bijapur	3.72	610	5.900
03	Kelwa	10.51	4887	9.200
04	Phiparad	1.72	150	12.880
05	Julwaniya	3.0	425	17.00
Total		30.87	9169	

Out of the five distributaries, earth work of Gudariya distributary has been completed. The construction of remaining four distributaries has been included in the scope of work for construction of paver lining work of main canal distributed into two reaches from km 0 to 7 and 7 to 17.00 along with its structures. The survey for distributaries and its minor and sub-minor has been completed.

5.5.3 CANAL LINING WORK WITH CONSTRUCTION OF DISTRIBUTARIES, MINORS, SUB-MINORS AND W.B.M. ROAD ALONG CANAL

- (i) The construction of canal lining from km 0 to 7.0 with structures of Gudariya Distributary, minors, sub-minors and W.B.M. Road on canal bank of main canal is awarded to M/s. Gayatri Engineering, Hyderabad for Rs.2099.93 lakhs vide agreement No.01 of 03-04 dated 2.5.03. The work is in progress and out of 558 Th. Cum of earthwork 294 Th. Cum and out of 69 Th.Cum, of cement concrete 49 Th. Cum have been achieved. The expenditure for Rs.1573 lakhs has been incurred on work. The work is scheduled for completion by February 2007.
- (ii) The construction of canal lining from km 7 to 17 along with construction of Distributaries/Minors/Sub-minors and W.B.M. road on Main canal bank & 2 Nos. Head Regulator etc. is awarded to M/s. B.C. Biyani, Bhusawal, for Rs.2008.00 lakhs vide agreement No.01/03-04 dated 11.07.2003. The work is in progress. Out of 897 Th. Cum of earth work 514 Th.cum and out of 70 th. Cum. of cement concrete, 57 Th. Cum have

been achieved. The expenditure of Rs. 1616 lakhs have been incurred on this work. The work is scheduled for completion by February 2007.

5.6 CANAL REACH: km 20.0 – km 41.25

5.6.1 LAND ACQUISITION

Land acquisition is completed for main canal. For distribution system, out of 49 Nos. of L.A. cases, 42 cases are awarded.

5.6.2 EARTHWORK, LINING AND STRUCTURES

The work in the reach from km 20.00 to km 41.25 has been divided in twelve groups. Out of these twelve reaches, work in 5 reaches i.e 8 B (31.019-31.284 Km.) 9 B (33.269-31.168 Km), 9 D (35.98-38.033 Km), 10 A (38.2-39.04 Km) and 10 B (39.64-40.807 Km) has been completed up to Sept.06. The work in the remaining 7 reaches was under progress during the period March 06-Sept.06 and the details of the progress in these reaches up to Sept. 2006 are furnished in the following table:

Sr. No.	Name of works (Canal)	Award date/ Date of start	Likely completion date	Received Tender Amount in Lakhs	Total Quantity in Th. Cum.	Progress		
						Upto Mar-06	Upto Sept-06	%
1.	ME-7 A : Earth work (24.729 km to 27.286 km) including 3 nos. structures	26.06.01	31.03.05	390.78	EW:397.70C C : 4.170	EW385.76 CC: 4.307	completed	100%

2.	ME-7 B : Earth work (27.286 km to 29.419 km) including 7 nos. structures	17.12.04	30.11.05	213.53	EW:47.11 CC: 6.930	EW : 47.11 CC : 6.55	completed	100%
3.	ME-9 C : Earth work (33.168 km to 35.90 km) ME-6B Earth work with Bakur Aqueduct (23.0 to 24.608 Km)	04.02.02	31.03.06	1263.20	EW:702.668 CC 30.512	EW:683.13 CC:28.156	completed	100%
4.	ME-10 B : Earth work (39.64 km to 40.807 km) including 3 nos. structures	10.12.04	30.06.05 31.5.06	111.00	EW:27.33 CC : 2.70	EW : 5.83 CC : 2.04	completed	100%
5.	Kaveri Aqueduct at 24608 m	19.06.01	30.11.05	343	EW:8.649 CC:15.53	EW:13.908 CC : 12.26	completed	100%
6.	Paver lining of ISP main canal from 17.00 to 31.284 km Construction of W.B.M. road on service Bank & Earth Work Jalwania, Atud, Kalmukhi distributary alongwith their minors & sub-minor i/c C.C. lining & construction of structure.	01.04.03	01.04.06 30.06.07	1943.54	EW:779 CC:8.612 Lining: 68.513	EW:559 CC :1.37 Lining: 33.71	EW: 586.00 CC : 2.79 Lining : 43.8	75.2% 32.4% 64%
7.	Paver lining of iSP main canal from 31.284 to 41.250 km Construction of W.B.M. road of on service Bank & Earth Work Sanawad distributary R.D.15.00 to 19.645 km & Lohari distributary along with their minors & sub-minor i/c C.C. lining & construction of structure.	04.07.03	06.01.07	1822.59	EW:660 CC:7.72 Lining 51.50	EW:444 CC : -6.11 Lining:18.5	EW : 556 CC : - 1.63 Lining: 24.436	EW: 84% CC:21.1 0% Lining: 47.4%
8.	Earth work & concrete lining & construction of structure of ISP Sanawad distributary from RD..0.00 to 15.00 km its minor & sub minor	16.10.03	02.10.05 31.03.07	1993.74	EW:1378.54 CC:27.590 Liing:29.789	EW:743 CC : 10.3 str: 4.4	EW:1040 CC : 12.21 Lining:6.6	78% 44% 24%

5.6.3 STRUCTURES

Out of 39 structures of main canal 38 nos. have already been completed remaining 1 structure is scheduled to be completed by March2007.

5.6.4 DISTRIBUTARIES AND MINORS

The work of distributaries, minors & sub-minors in this reach are awarded and the construction is in progress.

5.7 CANAL REACH: km 41.25 – km 58.856

5.7.1 LAND ACQUISITION

Land acquisition completed for main canal & Distribution system.

5.7.2 EARTH WORK, LINING AND STRUCTURES

The earthwork in the reach between km 41.25 to km 42.007 is completed and is under progress between 42.007 to 58.856 km. The status of progress of works in this reach is furnished in the following table:

S. No	Name of works	Award date/date of start	Schedule d completion date	Tender cost Rs. Crores	Total Quantity Th. Cum	Progress		
						Upto 3/06 (Th.cum)	Upto 9/06 (Th.cum)	% progress
1	Earth work (RD 42.007 km to 45.256 km) including four structures	12.12.00 29.12.00	30.07.06	8.56	EW: 740 CC : 6.06	EW: 825 CC : 4.73	EW: 850 CC : 4.83	EW114.8% CC: 79.7%
2	Earth work between (51.50 km to 58.856 km) including construction of 10 Nos. structures & lining works	02.06.03	1.12.05 1.1.06	15.56	EW: 1060 Lining :24.549 Str. 10 Nos.	EW: 1059 Lining:24.60 Str. 10 Nos	Completed	100%

3	Construction of 6 Nos of distributaries and its minors (41.25 km to 58.356 km)	02.04.03	30.06.06	23.92	EW: 1409 CC : 46 Lining : 8.1	EW: 915.85 CC : 14.26 Lining : 0.45	EW: 935.88 CC : 25.46 Lining:1.487	EW: 66.4% CC:55.34% Lining: 18.36%
4	Construction of CC lining by paver machine in ISP Main Canal between 41.25 km to 51.500 km and WBM road between 41.25 km to 58.856 km of ISP Main canal.	20.11.03	30.06.06	8.97	EW: 92 Lining : 34.4	EW: 80.06 Lining:22.12	EW: 84.06% Lining:27.46	EW91.37% Lining 79.82%

5.7.3 Out of 30 structures planned in this reach 29 have already been completed. Remaining 1 structure is planned for completion by March

5.7.4 DISTRIBUTARIES

The works of construction of Roopkheda, Baswa, Delgaon, Nalwa, Dhakalgaon, Nalwa, Neelkanth distributory and its minors and sub minors are in progress.

5.8 CANAL REACH FROM km 58.856 to km 107.0

5.8.1 LAND ACQUISITION

Total 1016 ha land required has been acquired for canal in this reach between Km 58.856 and 107.

5.8.2 EARTHWORK, LINING AND STRUCTURES

S No	Name of work (Canal)	Date of work order	Target date of completion of work	Amount of Contract (Rs. Lakh)	Percentage of Progress upto Sept.2006	
					Physical	Financial
1	Excavation of main canal from km 58.856 to km 64.50 of ISP	04.05.02	Contractor filed the case in the Court	955.91	31%	23%
2	Excavation of main canal from km 64.50 to km 70.54 of ISP.	25.06.02	24.12.04 30.12.06	1027.83	79%	88%

3	Construction of Amba tunnel with its approach and exit channel between RD 70540 m. to RD 73370m. of ISP main canal				Completed	
4	Construction of 31 Nos. Concrete structure alongwith CC lining with paver machine on main canal of ISP between km 58.856 to km 82.395	23.10.0 3	22.04.06	4675.15	(A) Earth work -100% (B) Structure – 35% (C) Lining – 30%	35.5%
5	Excavation and earth work of main canal between km 75.820 to km 79.520 of ISP				Completed	
6	Construction of Ahirkheda tunnel with its approach and exit channel between RD 79520m to RD 82395m of ISP main canal	10.01.0 3	09.06.06	3953.47	100%	99%
7	Earth work of main canal construction of 10 Nos. CC Structure of CC lining work with paver machine on main canal of ISP between km 82.395 to km 89.710	01.09.0 3	27.07.06	3921.34	100%	99%
8	Earth work construction of 16 Nos. Structure & CC lining of main canal of ISP between km 89.710 to km 95.770	09.09.0 4	8.03.07	1841.85	(A) Earth work – 87% (B) Structure – 75%. (C) Lining – 87%	93.7%
9	Earth work, construction of 11 Nos. structures & C.C. lining of Main Canal from km 96.030 to 107.30	09.09.0 4	08.03.07	2397.25	(A) Earth work – 101% (B) Structure – 73% (C) Lining- 74.3%	97.3%
10	Construction of feeder channel for Khamkheda and Samurai Dist. at R.D.77.700				Completed	
11	Construction of Zirbar Distributory, it's minor and sub minor with earth work and Structures and lining Km 0,00 to 22.853	5.01.05	04.12.07	2154.76	(A) Earth work –60% (B) Lining - NIL (B) Structure – 13%	41.5%

There are 74 structures out of which 36 Nos have been completed and 38 structures are in progress.

5.9 CANAL REACH : Km 107 to Km 125

The alignment of main canal from km 107 to km 125 has been finalised and technical sanction to the estimate has also been accorded. As per directives of NVDA, Tenders in two groups i.e. between Km 107.74 to 114.73 km for Rs. 2506 lakhs and Km 114.073 to Km 125.0 for Rs. 4608 lakhs are under process and agencies are likely to be fixed. The 13 cases for land acquisition to acquire of 200 ha have been submitted to L.A.O., out of which the awards for 2 Nos. cases have been passed up to Sept 2006.

5.10 KHARGONE LIFT AND CANAL DISTRIBUTARIES/MINORS BETWEEN KM 80.0 TO KM 125 OF ISP MAIN CANAL.

Khargone Lift Canal 83 Km long off taking at 79.72 Km of Main Canal with a head discharge of 31.566 cumecs would irrigate 24232 Ha. in the Khargone district. Preliminary survey of the Khargone Lift Branch canal from Km 0.0 to Km 83 has been completed and alignment is under finalization. Tenders for survey of Khargone lift canal (in three groups) and for all distributaries and minor off taking from km 80.0 to 125 of ISP main canal (one group) have been awarded by NVDA and works have started. Status of progress of works up to September. 06 are as follows:

S . N o	Name of Work	Agreement No.	Date of Work Order	Name of Contractor	Stipulated Date of comple tion	Status of		Status of	
						Survey	Design & Drawing	Estimate	L.A.
1	2	3	4	5	7	8	9	10	11
1	Survey, Planning, Design & Estimate of Khargone lift Canal System from km 0 to 18 – Group-I	5/2002- 03	16.01. 03	Hydropne um Systems, Pune (M.S.)	<u>16.07.0 3</u> 31.12.0 6 Revised Date	Completed	Under Progress	Under Progress	Under Progress

2	Survey, Planning, Design & Estimate of Khargone lift Canal System from km 18 to 56 – Group-II	6/2002-03	16.01.03	M/s. Tritesh Engineering Project, Pune (M.S.)	<u>16.07.03</u> 31.12.06 Revised Date	Completed	Under Progress	Under Progress	Under Progress
3	Survey, Planning, Design & Estimate of Khargone lift Canal system from km 56 to 83 – Group-III	7/2002-03	16.01.03	Hydropneum Systems Pune (M.S.)	<u>16.07.03</u> 31.12.06 Revised Date	Completed	Under Progress	Under Progress	Under Progress
4	Survey, Planning, Design & Estimate of Indira Sagar Project Main Canal from km 80 to 125- Group IV	8/2002-03	06.01.03	M/s. Tritesh Engineering Project, Pune (M.S.)	<u>16.07.03</u> 31.12.06 Revised Date	Completed	Under Progress	Under Progress	Under Progress

5.11 ANAL REACH : Km 125 to Km 206

The main canal alignment has been finalized up to RD 160 km and the technical sanction to the estimate has been accorded for reach R.D.125.0 to 130.935 km. Tenders were invited and submitted to NVDA for approval. Alignment between Km 161 to 206 Km is under finalization. The status of works is as under:

S. No	Name of Work	Agreement No.	Date of Work Order	Name of Contractor	Stipulated Date of completion	Status of	
						Survey	Design
1	2	3	4	5	6	7	8
1	Survey, Design, Drawing & Estimate of main canal from RD 125 to 150 km and distribution network right from main canal down to 40 ha. chak for command area in this reach.	4/DL/02-03 dt. 13.3.03	No. 683 dt 13.3.03	M/s Samarth Engineers U.D.Kande, Manoj Deshpande Pune(J.V.)	<u>13.09.03</u> 31.12.06 Revised	Completed	Under progress

2	Survey, Design, Drawing & Estimate of main canal from RD 150 to 176 km and distribution network right from main canal down to 40 ha. chak for command area in this reach.	4/ of 02-03 dt. 28.8.03	No. 437 dt 28.2.03	M/s Samarth Engineers U.D.Kande, Manoj Deshpande Pune(J.V.)	<u>27.8.03</u> 31.12.06 Revised	Completed	Under progress
3	Survey, Design, Drawing & Estimate of main canal from RD 176 to 182 km and distribution network right from main canal down to 40 ha. chak for command area in this reach.	1 of 02-03 dt. 18.02.03	No. 217 dt 18.2.03	M/s Tritech Engineering Project Pune (M.S.)	<u>17.08.03</u> 31.12.06 Revised	Completed	Under progress
4	Survey, Design, Drawing & Estimate of main canal from RD 182 to 190 km and distribution network right from main canal down to 40 ha. chak for command area in this reach.	2 of 02-03 dt. 18.2.03	No. 219 dt 18.2.03	Hydropneum Systems Pune (M.S.)	<u>17.08.03</u> 31.12.06 Revised	Under progress	Under progress
5	Survey, Design, Drawing & Estimate of main canal from RD 190 to 206 km and distribution network right from main canal down to 40 ha. chak for command area in this reach.	3 of 02-03 dt. 18.02.03	No.221 dt 18.2.03	M/s Tritech Engineering Project Pune (M.S.)	<u>17.08.03</u> 31.12.06 Revised	Under progress	Under progress
6	Survey, Design, Drawing & Estimate of Anjanimatta distributory (off taking @ 131	3/DL/02-03 dt. 24.02.03	No. 559 dt 28.2.03	Hydropneum Systems Pune (M.S.)	<u>27.08.03</u> 31.12.06 Revised	Completed	Under progress

	Km of canal), minors, minors provide distribution system 40 ha. chak.	Main its sub and					
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CHAPTER - 6: INSTRUMENTATION & SEISMOLOGICAL OBSERVATIONS

6.1 GENERAL

In order to study and conduct regular monitoring of various parameters and behavior of dam under different reservoir operation conditions, the dam instruments have been installed in over flow block No.24 & 25 on the right flank of dam and overflow block No. 13,14 in the river portion and overflow block no. 5 in the left flank of the dam.

6.2 INSTRUMENTS DEPLOYED FOR MONITORING

The details of instruments deployed for monitoring of various parameters such as uplift pressure, movement in foundation, stresses strains, temperature in the body of dam, differential movement of block of dam, inclination etc. are given in table below.

INSTRUMENTS DEPLOYED FOR MONITORING OF
VARIOUS PARAMETERS

Sl. No	Description	Location				Total
		O.F. Block 13/14	N.O.F Block 24/25	Block No.5	Block No.6	
1	Foundation Piezometer	15	08	-	-	23
2	Pore Pressure Cell	05	04	-	-	09
3	Stress Meter	08	07	-	-	15
4	Strain Meter Spider (set of 5)	04	08	-	-	12
5	No Stress Strain Meter	04	08	-	-	12
6	Joint meter	28	10	-	-	38
7	Thermometer	30	16	03	04	53
8	Extensometer	01	01	-	-	02
9	Clinometers	03	02	-	-	05
10	Plumb Line	01	01	-	-	02
11	Seepage Water Meter	02	-	-	-	02
12	Reservoir Water Level Transducer	01	01	-	-	02
13	Uplift Pressure meter	10	05	-	-	15
Total						190

6.3 In order to have on line data monitoring facilities, the latest version of Central Data Acquisition System is proposed to be installed which is under procurement process.

6.4 ACQUISITION & ANALYSIS OF INSTRUMENTATION DATA

The acquisition and analysis of data are being done by M/s Encardio Rite Electronics Pvt. Ltd., Lucknow on fortnightly basis as per the provisions of the Dam instrumentation Contract. CWPRS, Pune has been appointed as consultant for advice, selection, testing, supervision during installation and data analysis & interpretation of Dam Instrumentation data for a period of 3 years i.e. up to Dec. 2005 and the same is being extended for another period of two year i.e. up to Dec. 2007. Final technical report on 'Analysis & interpretation of Dam instrumentation data for a period from Jan. 2003, to Dec. 2005, for non overflow block 25 & overflow block 13 has been received from CWPRS, Pune.

6.5 SEISMOLOGICAL OBSERVATIONS

In order to study the effects of seismic events on Narmada Sagar Complex projects, a network of ten seismological observatories with sophisticated instruments is established based on the recommendations of Dam Review Panel, Central Water and Power Research Station, (CWPRS) Pune and Indian Meteorological department (IMD) for monitoring pre and post impoundment seismic parameters in the vicinity with the view to assess the adequacy of seismic parameters adopted for designs.

6.6 SEISMIC MONITORING

Various activities being undertaken for seismic monitoring are as follows:

1. Seismic Data acquisition from Micro-Earthquake Recorders: As per the recommendation of CWC and IMD New Delhi, 11 Micro Earthquake (MEQ) recorders of 800B Model were procured, of which 10 are installed at (i) Narmada Nagar (ii) Omkareshwar (iii)

Maheshwar (iv) Khandwa (v) Barwani (vi) Chhanera (vii) Indore (viii) Kannod (ix) Hirapur (Handia) and (x) Bagli. At present, seismic data are being observed at these locations. The pre and post impoundment data are collected and significant local earthquakes are analyzed. It is also being ensured that seismic data from the MEQ recorders are collected without interruption as the Indira Sagar reservoir is partially impounded upto RL 260.00 m. as per the Court decision. The reservoir may be filled up to FRL during the coming monsoon 2007 depending upon High Court decision in this regard.

2. Data Acquisition and analysis of Digital/Analog seismic recorders: The complete package of digital and analog seismic recorders and sensors had been procured from M/s. Sprengnether Inst. Inc. USA and installed at ten observatories. Due to irregular A.C. power supplies at most of the seismic stations, the digital data could not be recorded.
3. Wood Anderson Seismograph: IMD had recommended to install Wood Anderson seismographs at six locations namely Narmada Nagar, Omkareshwar Khandwa, Maheshwar etc. The seismologist visiting ISP suggested that seismic data collected through digital seismograph are more reliable as compared to the Wood Anderson seismograph hence further installation is not required.
4. Procurement of Solar Photovoltaic System: The A.C. power supply at the stations is affected by power cuts, hence to ensure reliable power supply, Installation of Solar Photovoltaic system at five seismic observatories Narmada Nagar, Kothi, Chhanera, Hirapur and Kannod have been installed on experimental basis and upon their successful performance, the same shall be installed in other observatories as well.
5. Upgradation of existing digital recorders: The existing digital recorders have 2 MB data recording capacity and manual time

synchronization. On the recommendations of the experts, Digital Recorders of 10 GB capacity with GPS facility for automatic time synchronization are proposed to be procured.

6. Seismicity studies of ISP: The seismic data so collected are pre analyzed by the NHDC officials and the same data along with the original recorded data sheet are being sent to CWPRS, Pune for detailed analysis and interpretation. Till date original data along with pre analysis done by NHDC officials for the period from year 1995 to 2005 has already been sent to them for detailed analysis and interpretation. CWPRS, Pune has sent the analysis report for the year 2002 and the report for the year 2003 is received recently on dated 04.04.2006. However the report for year 2004&2005 are under examination by CWPRS, Pune and analysis report for the same is also expected to be received from CWPRS, Pune shortly. For this purpose NHDC is in close contact with the authorities of CWPRS, Pune. The pre analysis of data for the year 2006 is under preparation by NHDC officials and is being forwarded to CWPRS.

7. SEDIMENTATION STUDIES OF INDIRA SAGAR RESERVOIR

The partial impoundment has been done in Indira Sagar after plugging of diversion tunnel from 18th Nov, 2003. In order to estimate the rate of sediment deposition in the reservoir sedimentation studies assignment have been entrusted to CWPRS, Pune by NHDC. The remote sensing technique and Integrated Bathymetric Survey (IBM technique) are being adopted for assessment of sediment deposition. The bathymetric survey has been carried out by CWPRS. The final report will be submitted after attainment of FRL. The outcome of the study along with results in detail is required to be sent to NCA for needful.

8. PROPOSAL OF I.M.D. TO ACQUIRE OBSERVATORY OF NARMADA NAGAR

Indian Meteorological Department (IMD) has shown their interest to acquire one of the observatories situated at Narmada Nagar, to set up an unmanned seismological observatory which shall be equipped with state of the art seismological equipment and V-SAT, based communication facilities. For this, IMD shall bear the cost of equipment and recurring expenditure. NHDC has already agreed for the same. The representative of IMD visited this observatory on 24/03/2006 for this purpose.

Environmental sub-group of Narmada Control Authority during their visit to the project on 22/3/2006-25/3/2006 suggested that other observatories of ISP be also handed over to IMD. However, IMD have shown their inability for the same & the matter has now been taken up by NHDC with GSI to consider taking over the seismic observatories of ISP.

CHAPTER -7 : REAL TIME DATA ACQUISITION SYSTEM FOR INFLOW FORECASTE

NCA has taken up implementation of initial phase of Real Time Data Acquisition System (RTDAS) comprising of 26 Stations of different categories in Narmada basin. As reported earlier, the work has been awarded to M/s ECIL in September 1996 for carrying out the installation and commissioning of the system on a turnkey basis. PSC of SSCAC in its 92nd meeting has granted time extension to ECIL to complete and handover the project to NCA by 31st December 2006. Indira Sagar is one of the key stations of the network. At this station, eight parameters viz. rainfall, wind speed, wind direction, ambient temperature, relative humidity, reservoir water level, evaporation and solar radiation is automatically measured through sensors and communicated in real time mode to Master Control Center (MCC) at Indore through Data Relay Transponder (DRT) on board KALPANA-I launched in Sept-02. At M.C.C. the data are compiled, processed and interpreted through appropriate hydrological models.

The remote station at ISP is also equipped with e-mail facility for two-way exchange of data/information between the Project station and MCC at Indore round the clock through this network.

Installation of MS pipe with cabin for permanent stilling well of RTDAS has been completed in the non-overflow Block No.3 of the main dam by NHDC. The optical shaft encoder type water level sensor has been installed there for communicating water level data to MCC. The dam block No.3 has been raised to RL 266.25 m.

NHDC have installed micro wave level measurement based micro pilot instrument, for measuring water level at dam site during monsoon 2004

and they communicate its power generator machine operation data through Fax /Telephone to MCC at Indore.

The RTDAS Project is being retested continuously during the monsoon 2006 period as per the contractual terms.

The process of simultaneous tuning and testing of forecasting software, SSMA and reservoir operation HEC-5, by M/s. ECIL has also been made.

As reported earlier, this station is communicating data to MCC, Indore in respect of temperature, relative humidity, wind velocity, wind direction, solar radiation, rainfall, water level & evaporation round the clock (hourly basis).

The RTDAS is under process of installation and re-scheduled to be commissioned during monsoon 2006 after its testing. All the 26 Remote Stations had already been installed and made functional for data communications with Master Control Centre (MCC) at Indore. The testing of the project is being carried out during monsoon 2006 for which arrangement was made by ECIL for the demonstration of Assured Performances in respect of Data Communications and inflow/level forecast. The foreign consultants of ECIL for software had also visited MCC, Indore for the tuning & refinement of softwares. The successful testing of the whole project during a complete monsoon period is a contractual requirement for its taking over by NCA. All the stations are presently communicating data with MCC at Indore and in between failures if any are being attended to by ECIL. The system will be very useful in getting all hydro-meteorological information, including issue of inflows and flood forecasts upstream of ISP, upstream reservoir regulation and contemplating advance action for safety of dam and allied structures downstream. It will also facilitate decision making for releases to be made down stream of Indira Sagar dam to meet requirement of down stream project in terms of the provisions under Narmada Water Dispute Tribunal (NWDT) Award.

1996-97	50.00	37.50	72.22	13.31	85.53	1:1	NIL
1997-98	52.00	51.00	79.89	16.28	96.17	1:1	5.83
1998-99	75.00	37.50	80.43	17.64	98.07	1:1	NIL
1999-00	40.00	40.00	35.77	24.22	59.99	2:1	NIL
2000-01	80.00	80.00	57.85	31.10	88.95	2:1	31.05
2001-02	23.00	23.00	NA	68.28	68.28	2:1	NIL
2002-03	124.56	74.01	22.00	105.02	127.02	4:1	NIL
2003-04	133.08	129.63	NA	136.28	136.28	4:1	34.07
2004-05	124.94	124.94	NA	166.09	166.09	4:1	NIL
2005-06	139.84	41.95	-	147.94	147.94	4:1	52.38
2006-07	-	-	-	41.81	41.81	4:1	
Total	842.42	639.53	348.16	767.97	1116.13	-	-

Source : (Narmada Basin Organisation, CWC, Bhopal)

8.2 EXPENDITURE INCURRED DURING FINANCIAL YEAR 2006-07

Unit wise expenditure during the half yearly period ending September-2006 and cumulative expenditure up to March, 2006 on this project is as below:

(Rs. In crore)

Sl. No	Major Head	Cumulative Expenditure up to March, 2006	Expenditure during Financial year (2006 -2007) up to Sept.2006	Cumulative expenditure up to Sept.2006	Remarks
1	Unit -I : Dam	2624.38*	70.74	2695.12	Expenditure incurred by NHDC
2.	Unit-III : Power House	1225.43*	0.99	1226.42	
3.	Unit-II : Canal	890.87	41.80	932.67	Expenditure incurred by NVDA, GOMP

*NOTE :

Audited expenditure figures without current Assets and Liabilities as communicated by NHDC vide their Letter No. NHDC/1/S/046/07/63 dated 15.2.07. The expenditure figures as given in March-2006 Report were provisional as intimated by NHDC.

**Annexure
- I**

INDIRA SAGAR PROJECT

SALIENT FEATURES

A. LOCATION

1.	State	Madhya Pradesh
2.	District	Khandwa
3.	River	Narmada
4.	Latitude	22 ⁰ 17' 00"
5.	Longitude	76 ⁰ 28' 00"

B. HYDROLOGY

1.	Catchment Area (sq. km)	61,642
2.	Rainfall:	
	a) Maximum (mm)	1,879
	b) Minimum (mm)	603
	c) Average (mm)	1,288

3.	Annual Yield [Bm ³ /MAF]	
	a) On 75% dependability	26.465 (21.47)
	b) On 90% dependability	18.184 (14.74)
4.	Standard Project Flood outflow (cumecs)	65,670
5.	Probable Maximum Flood outflow (cumecs)	83,534

C. RESERVOIR LEVELS

1.	TBL (m)	267.00
2.	MWL (m)	263.35
3.	FRL.(m)	262.13
4.	MDDL(m)	243.23
5.	Crest level of Spillway (m)	245.13
6.	Tail water level	
	a) min (m)	193.54
	b) max (m)	196.15
	c) corresponding to PMF (m)	220.00
7.	Water Spread Area at FRL (sq. km)	913.48

D. STORAGE CAPACITY

1.	Gross Storage [B m ³ /(MAF)]	12.220 (9.90)
2.	Live Storage [B m ³ /(MAF)]	9.750 (7.90)
3.	Dead Storage [Bm ³ /(MAF)]	2.470 (2.00)

E. CONCRETE GRAVITY DAM

1.	Total Length (m)	653
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	(a) Non- Overflow (m)	158
	(b) Overflow portion (spillway) (m)	495
	(c) Power Dam (m)	-
2.	Maximum height (m)	92
F. RIVER DIVERSION WORK (DIVERSION TUNNEL)		
1.	Length of diversion tunnel (m)	390
2.	Diameter of diversion tunnel (m)	8
3.	Design discharge (cumec)	368
4.	Invert level of Diversion tunnel (in metre)	190
5.	Length of GNT (in metre)	46
6.	Invert level of GNT (in metre)	218
G. EARTH (SADDLE) DAM		
1.	Length (m)	688
2.	Height (m)	9.03
H. RADIAL CREST GATES		
1.	Number	20
2.	Length (m)	20
3.	Height (m)	17
4.	Type of Hoisting system	Hydraulic operation
I. POWER HOUSE		
1.	Type of power house	Sub-surface
2.	Installed Capacity (MW)	1000 (8x125)

3. Turbine Generator

a)	Type of turbine	Francis
b)	Make	BHEL, India
c)	Generating voltage	11 + 10% KV
d)	Synchronous speed	115.4 RPM

4. Water Conductor System

a)	Penstocks (No.)	8
b)	Diameter of Penstock (m)	8

5. Head Race Channel

a)	Length (m)	530
b)	Width (m) (Average)	75
c)	Bed Level (m)	222.43
d)	Discharge capacity (Cumec)	2200

6. Intake Structure

a)	Length (m)	208
b)	Intake gates	8 Nos (5792x8871mm)

7. Machine Hall

a)	Length (m)	200
b)	Width (m)	23
c)	Height (m)	53

8. Service Bag

a)	Length (m)	42
b)	Width (m)	23
c)	Height (m)	24

9. Transformer Yard

a)	Length (m)	202
b)	Width (m)	20

10. Tail Race Channel

a)	Length (m)	850
b)	Width (m) (Average)	30
c)	Bed Level (m)	172
d)	Discharge capacity (Cumec)	2200

11. Switch Yard

a)	Type	Open
b)	Voltage	400 KV
c)	Circuit Breakers	SF6 Type

J. SUBMERGENCE

1. Villages affected due to Submergence at FRL

a)	Fully submerged (No)	69
b)	Partially affected (No)	180
	Total	249

2. Population affected 1,29,000

3. Land

a. Cultivated area (Ha) 44,345

b. Other area (Ha)	6,653
c. Forest area (Ha)	40,350
Total	91,348

4. Diversion of railway line (km) 57

K. CANALS

1. Left Bank Canal

(i) Length (kms.)	248.65
(ii) Head Discharge (cumec)	160
(iii) Full Supply Level at head (m)	239.15
(iv) Bed width(m)	16.4 (Normal reach) 9.0 (Deep reach)
(v) Full Supply Depth (m)	5.0

2. Khargone Lift Canal (Left Bank)

(i) Length (km)	83.0
(ii) Head Discharge (Cumec)	31.0

3. Command Area Details

(i) Gross Command area (Lakh Ha)	2.10
(ii) Annual Irrigation	1.69
(iii) Irrigated area (Lakh Ha)	1.23

4. Tunnel Diameter (m)/total length (km)]

(i) Punasa	8.25/3.677
(ii) Amba	7.9/2.16
(iii) Ahirkheda	6.5/2.16
(IV) Gulania	4.8/1.73

5. C.D. Works (No.)

(i)	Main flow canal	311
(ii)	Khargone Lift Canal	126

L. COST ESTIMATES (in crores)

	At 1988 price	At 9/2000
	level	Price level as approved by CCEA in March,2002

	Unit-I Head Work 2634.77	832.32
	Unit-II Canals 1200.00	541.98 (Tentative at September, and yet to be approved by Gol)
2000		
	Unit-III Power 1232.43	619.37
	Command Area Development 306.53	50.00
	(included in Catchment Area Treatment above)	124.00 Unit I

Grand Total

2167.67

M. COST ALLOCATION

Rs. in Crore

Rs. in Crore

Irrigation

652.13

1563.52

Power

1275.15

3527.52
(including
IDC 488.37)

Omkareshwar Project (in case of Indira Sagar Project)	71.79	----
Sardar Sarovar Project (in case of Indira Sagar Project)	168.60	464.51
Total	2167.67	5555.57

N. BENEFITS

(i) Installed Power (MW)	1000	
(ii) Firm Power Generation		
Initial Phase (MW)	223.50	
Final Phase (MW)	118.30	
(iii) Irrigation proposed (Lakh Ha.)	1.23 (Only left bank)	
(iv) No. of Villages benefited in the command (Nos.)	571 (Left bank command)	
(v) Production of food grains (Lakh Tons)		4.00
(vi) Production of others grains (Lakh Tons)		10.55
(vii) Municipal and industrial water Supply (MCM/MAF)		74 (0.06)
(viii) Energy generation (GWH)		2698

