भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
जल विद्युत परियोजना प्रबोधन प्रभाग
Hydro Projects Monitoring Division

विषय : **Report of the visit of Shri Manoj Tripathi, Chief Engineer I/c (HPM), CEA to Vyasi Hydro Electric Project (2x60MW=120MW) in Uttarakhand on 18th October ,2021 to review the physical progress of the project.**

The Vyasi Hydro Electric Project (VHEP) being executed by Uttarakhand Jal Vidyut Nigam Limited (UJVNL) was visited on 18th October ,2021 to review the physical progress of various works of the project. The status of works, critical areas / activities and observations during the visit are as under: -

Status Of Various Works:

The project is presently scheduled for commissioning by December, 21. The project is in advance stage of completion/ construction and at present the major civil works of Dam, HRT, Surge Shaft, Pressure shaft and Power House are completed. One unit is boxed up and boxing up of the second unit is under progress. The works on transmission line is in advanced stage.

Critical works/ Commissioning Schedule :

As per the civil contracts awarded for various packages, the project was scheduled to be commissioned by January, 2017, however, mainly due to frequent stoppage of works by local villagers, funds constraints with the contractor and slow progress of works, the progress suffered and accordingly the schedule of commissioning has been revised by UJVNL and now the units are programmed to be commissioned by Dec, 2021.Considering the present status of the project and remaining critical works, it is anticipated that commissioning of the units can be

achieved by March, 2022 i.e 2021-22 by expediting the following critical / important activities:

- ***The E&M works of Power House viz. GIS equipment erection, boxing up of Unit-2, Fire fighting equipment, pot head yard, control, protection and instrumentation works, etc. are the most critical items for commissioning of units by March-22. The project authorities may plan to provide water (at rated head) at MIV to M/s BHEL at an early date so that proper testing and commissioning time is available to commission the unit by March-22.***

- ***Completion of transmission line also needs to be expedited by PTCUL.***

It is estimated that the water will be available at the MIV at rated head for spinning and commissioning of the units by 31st January,22. Unit-1 is likely to be commissioned during Feb,22 and Unit-2 by March,22. Further the State Government may extend further support (related to law and problem issues) to the project during the reservoir filling which is planned during November,21.

The detailed tour report is enclosed herewith for kind perusal please.

संलग्न : ऊपरोक्त अनुसार

मनोज 8/11/2021

(मनोज त्रिपाठी)
मुख्य अभियंता प्रभारी

संयुक्त सचिव (जल विद्युत), विद्युत मंत्रालय, भारत सरकार

सं0 CEA/ HPM/138/8/2021/219-225 दिनांक :8-11-2021

प्रतिलिपि :

1. Secretary (Power), Government of Uttarakhand
2. Secretary, CEA
3. CE (PSPM), CEA
4. Managing Director, UJVN Limited, Maharani Bagh, Dehradun, Uttarakhand- 248006
5. ED (Civil) &HoP- Lakhwar-Vyasi HEP
6. SA to Member (Hydro), CEA

Report of the visit of Shri Manoj Tripathi, Chief Engineer I/c (HPM), CEA to Vyasi Hydro Electric Project (2x60MW=120MW) in Uttarakhand on 18th October ,2021 to review the physical progress of the project

The Vyasi Hydro Electric Project (VHEP) being executed by Uttarakhand Jal Vidyut Nigam Limited (UJVNL) was visited on 18th October ,2021 to review the physical progress of various works of the project. Executive Director (Civil), Lakhwar-Vyasi, UJVNL also accompanied me during the visit. Discussions were also held with the Officers / Site Engineers and Contractors of VHEP on various aspects of the on-going works, problem areas and measures taken/necessary to accelerate the pace of works with the aim of timely commissioning of the units as per schedule. The status of works, critical areas / activities and observations during the visit are as under: -

1.0 Introduction:

Initially, Lakhwar Vyasi Project was conceived by Uttar Pradesh Government as a multipurpose project having three components; two dams (Lakhwar and Vyasi), two power houses (Lakhwar and Vyasi) and a balancing barrage (Kathapathar) with total installed capacity of 540 MW. The initial work on Lakhwar Vyasi Project was started in 1979 for infrastructural development and preliminary works. The major civil works of the project were commenced in 1987 and the works progressed up to 1992 and part construction works on both Lakhwar dam scheme and Vyasi dam scheme were completed. However, all the works on this project were suspended in 1992 due to paucity of funds.

After formation of Uttarakhand State, the Lakhwar Vyasi Project by virtue of its location in Uttarakhand stood transferred to UJVNL in 2001. GoU allocated the project to M/s NHPC Limited in October, 2002 as a multipurpose project. Later, Uttarakhand Government decided to implement the project by State funding and project was entrusted to UJNVL. UJNVL submitted DPR of the generation scheme of Vyasi Hydro Electric Project (2 x 60 = 120 MW) in Uttarakhand on 05.07.2010 and concurrence of DPR was accorded by CEA in Oct 2011. The environment clearance of the project has been transferred in favour of UJVNL by MoEF on 22.04.2010. The formal final stage forest clearance has been received from MoEF in Oct-2013 and GO was issued on 19.11.2013 for granting the lease of 99.93 ha forest land out of 868.08 ha diverted forest land for construction of Vyasi HEP to UJVN Limited for 30 years.

The Civil works of Dam and Power House were awarded in Jan, 2014 and Oct, 2013 respectively. The EM and HM works were subsequently awarded in July, 2014 and Dec, 2015 respectively.

The project is presently scheduled for commissioning by December, 21. The major issues affecting the progress of works are frequent stoppage of works by locals demanding better rehabilitation package, cash flow issues with the civil contractors, etc.

The general layout of the project is placed at **Annex-I.**

2.0 Salient Features:

The 120 MW Vyasi Hydroelectric Project is a run-of-the river scheme (diurnal storage), located on river Yamuna in Dehradun District of Uttarakhand. The project envisages construction of Concrete Gravity Dam (Height 86 m above deepest foundation level, top length 207 m); Power Intake (with 2 service and 2 bulkhead gates of size 4.25 m x 5.20 m); one HRT (Circular type, dia. 7.0 m, length 2.7 km); one Upstream Surge Shaft (dia. 18 m, Height 63.50 m); 2 nos. Pressure Shafts (steel lined, dia 4.0 m, length 209 m each) ; Surface Power House (size 72 m x 24m x 40.2 m); Francis Turbine, Rated Head 111.0 m and rated discharge of 59.89 cumecs each; Tail Race Channel (rectangular shape, size 24.20 m to 32.00 m (w) and 13.50 to 1.50 m (d), length 39.67m).

The detailed salient features of the project, as per TEC, are enclosed at **Annex-II.**

Observations:

- ***The total power generation envisaged from project is 375.24 MU with Vyasi Stand-alone operation and 439.80 MU with integrated operation of Vyasi & Lakhwar Projects. In order to reap the full benefits of the project and provide benefits of electricity, drinking water and irrigation to 5 states viz. U.P, H.P, Delhi, Haryana and Rajasthan the work on Lakhwar National Project (30% works of the Lakhwar project stands completed during the period 1987 to 1992) needs to be re-started.***

- ***It was observed that there are some changes/ modifications in the design of some of the project components considering the site conditions and geology and based on the recommendations from the Technical Advisory Committee (TAC) for Vyasi Project. The project authorities have submitted the reasons of changes to CEA and the matter is under consideration in CEA.***

3.0 Award of Works:

1.	Intake, Dam half portion of HRT 1.35 km	M/s Gammon India Ltd. Mumbai Contract Value: Rs 317 Cr (PL 2013) Date of award of contract: 20.01.2014 Contractual Completion date: 19.01.2017
2.	Remaining half portion of HRT 1.35 km, surge shaft, penstock, power house, TRC	M/s NPCC Contract value: Rs 114.59 Cr (PL Nov 2009) Date of award of contract: 17.10.2013 Contractual Completion date: 16.07.2016
3.	E&M Works	M/s BHEL Contract Value: Rs 125 Cr (PL Aug 2012) Date of award of contract: 31.07.2014 Contractual Completion date: 15.06.2017
4.	HM Works	M/s OM Metals Infra Projects Ltd. Contract Value: Rs 106 Cr (PL 2015) Date of award of contract:30.12.2015 Contractual Completion date: 29.01.2018

4.0 Status *Of Various Works / Activities*:

About 30% works in Vyasi project already stands completed by UP Irrigation Department from 1987-1992. The details of the completed works are as under:

- Excavation of 110 m length of diversion channel out of total 416 m.
- Abutment striping & stabilization of both abutments up to river bed level.
- Full length excavation of overt portion of HRT (2.7 km).
- Full depth excavation of 3.0 m dia pilot hole and 50% slashing of surge shaft.
- 50% excavation of both inclined pressure shafts each of 209 m length.
- Valve chamber of size 40m x 10m x 19m provided down stream of surge shaft has been partially excavated.
- 70% excavation of surface power house has been completed.

The project is in advance stage of completion/ construction and at present the major civil works of Dam, HRT, Surge Shaft, Pressure shaft and Power House are completed. One unit is boxed up and boxing up of the second unit is under progress. The works on transmission line is in advanced stage. Some photographs taken during the site visit are enclosed at **Annex-III**.

The detailed status is as under:

A) CIVIL WORKS:

4.1 Plugging of River Diversion works:-

The river diversion works consists of One no. Diversion channel (390 m long, 8.6m width and 8 m height), 2 nos diversion conduits (size 4.25 m x 5.20 m and length 46 m), upstream coffer dam (10.5 m high, Colcrete type) & downstream coffer dam (10m high, rock fill type).

The river was diverted through the diversion channel in January, 2016 and after completion of Dam works now plugging of the two conduits inside dam body was taken up on 17th Oct,21, however, due to high discharge because of heavy rainfall on 18th Oct,21, the plugging was unsuccessful. Now, project authorities have planned for plugging of conduits during Nov-21, after the the river discharge decreases.

4.2 Dam: -

The dam is a concrete gravity dam with maximum height of 86.0m above deepest foundation level. The overburden (max) at dam foundation was found to be around 40 m. At present dam civil works are completed with regard to reservoir filling. The radial gates erection has been completed and presently fixation and adjustment of rubber seals is in progress. The filling of the reservoir is planned during November, 21. The civil works of Dam control Room is complete and Instrumentation and Control works planned to be completed by Nov,21.

4.3 Power Intake:-

Works of Intake and it's gate/ trash rack cleaning machine is complete.

4.4 Desilting Chambers:-

There is no provision of desilting chambers since the project is just downstream of Lakhwar Dam. For protection from erosion of underwater parts related to turbine, tungsten carbide coating using HVOF process is planned. Further, the low level sluice type spillway and operation of reservoir at MDDL level during the monsoon season are likely to help in silt control in the water conductor system.

Observations: -

Since Lakhwar Dam is yet to start, and Vyasi will be the first project on Yamuna river so chance of high silt concentrations during monsoon season will be there. The project authorities may accordingly plan the spare parts related to underwater parts of turbine, considering the concentration of silt during monsoons and petrographic report of silt particles.

4.5 Head Race Tunnel: -

The Head Race Tunnel (HRT) is 2.7 km. long, 7.0m dia, circular type. A total of 1.33 km. length is under Dam package & 1.32 km. is under Power House package. The excavation of the adits and heading excavation had been completed earlier. HRT works are complete and plugging of the Adit is in advance stage.

4.6 Surge shaft: -

The surge shaft is restricted orifice type with dia of 18m and height of 51m. The surge shaft works are complete.

4.7 Pressure shafts: -

There are 2 no. pressure shafts of combined length 418m. The Pressure shaft works are complete.

4.8 Power House:-

The power is surface type. The Power House excavation had got delayed due to the extensive measure taken for stabilization/strengthening of the steep hill slope adjacent to the Power House. The major slope protection measures have been completed which includes installation of 70T cable anchors. The civil works of Power House are almost complete.

4.9 Tail Race Channel:-

The works of TRC and DT gates are almost complete.

4.10 Switchyard:-

The conventional switchyard planned initially has been replaced by GIS. The GIS civil works are complete.The preparation for placement of GIS equipment is in progress.

The overall physical progress of civil works upto Sept,21 is 98.88%.

B. Electro-Mechanical Works:

Boxing up of Unit 1 is almost completed and alignment is in progress for Unit 2. In pot head yard foundation laying is in progress. Control Room work is in progress. The status of pending works and the completion schedule is as under-

SL. No	Activity	Status	Target
1	Panel Placement and Testing	Panel Placement Completed, Testing is in progress	20 Nov 2021
2	Common Auxiliaries	-	20 Nov 2021
3	Pot Head Yard	Foundation laying in progress	05 Dec 2021
4	GIS Indoor	Work in progress	30 Nov 2021
5	Boxing up of Unit # 1	98% completed	20 Nov 2021
6	Spinning of Unit # 1		26 Nov 2021
7	Commissioning of Unit # 1	-	5 Dec 2021
8	Commissioning of Unit # 2	Alignment is in progress	30 Jan 2022

C. Hydro Mechanical Works:-

The status of various gates and completion schedule is as under-

SL. No	Activity	Status	Target
1	Seal works of ORG	In progress	20 Nov 2021
2	Intake and bulk head gates	Completed	-
3	TRC Out fall Gate	Erection completed, dry testing to be done	11 Nov 2021
4	Draft Tube Gates	Erection completed, dry testing in progress	11 Nov 2021
5	Hinge Gate	Erection in progress	10 Nov 2021
6	Surge Tank Gates	Completed	-

D. Transmission line:

The status of the 71 Ckm 220 KV DC Lakhwad-Dehradun (LILO at Vyasi) transmission line being constructed by PTCUL is as under:

SL. No	Activity	Nos.	Status
1	Tower Foundation	113	101
2	Tower Erection	113	91
3	Stringing	34.68 km	25.53 km

The line needs to be tested and inspected before synchronization schedule as identified by M/s UJVNL.

5.0 Early Warning System:

The project is in lower reaches of Himalaya, however, being the upstream most project & the only project in the river Yamuna, the EWS/ Inflow forecasting mechanism needs to be established by M/s UJVNL. Further, the Lakhwar Dam is

also planned upstream of Vyasi and will help in advance warning to the Lakhwar project also during the cosntruction stage.

6.0 Financial Progress:

The approved cost of the project is INR 936.23 crores (February 2010 price level) with debt equity ratio of 70:30. The revised cost of Rs. 1777.30 crores (with IDC upto Sept,21) has been approved by the BoD of UJVNL. The entire debt has been tied up with M/s REC ltd. A total expenditure of about Rs.1693.54 Crores have been incurred till Sept,21. ***The tariff based on the completion cost is likely to be more than Rs.10 per unit. The power from the project can be made saleable likely through bundling with solar. UJVNL has number of canal based hydro stations and therefore may find out technical feasibility and financial viability to construct canal based solar PV plants.***

7.0 Commissioning Schedule/ Critical areas:

As per the civil contracts awarded for various packages, the project was scheduled to be commissioned by January, 2017, however, mainly due to frequent stoppage of works by local villagers, funds constraints with the contractor and slow progress of works, the progress suffered and accordingly the schedule of commissioning has been revised by UJVNL and now the units are programmed to be commissioned by Dec, 2021.Considering the present status of the project and remaining critical works, it is anticipated that commissioning of the units can be achieved by March, 2022 i.e 2021-22 by expediting the following critical / important activities:

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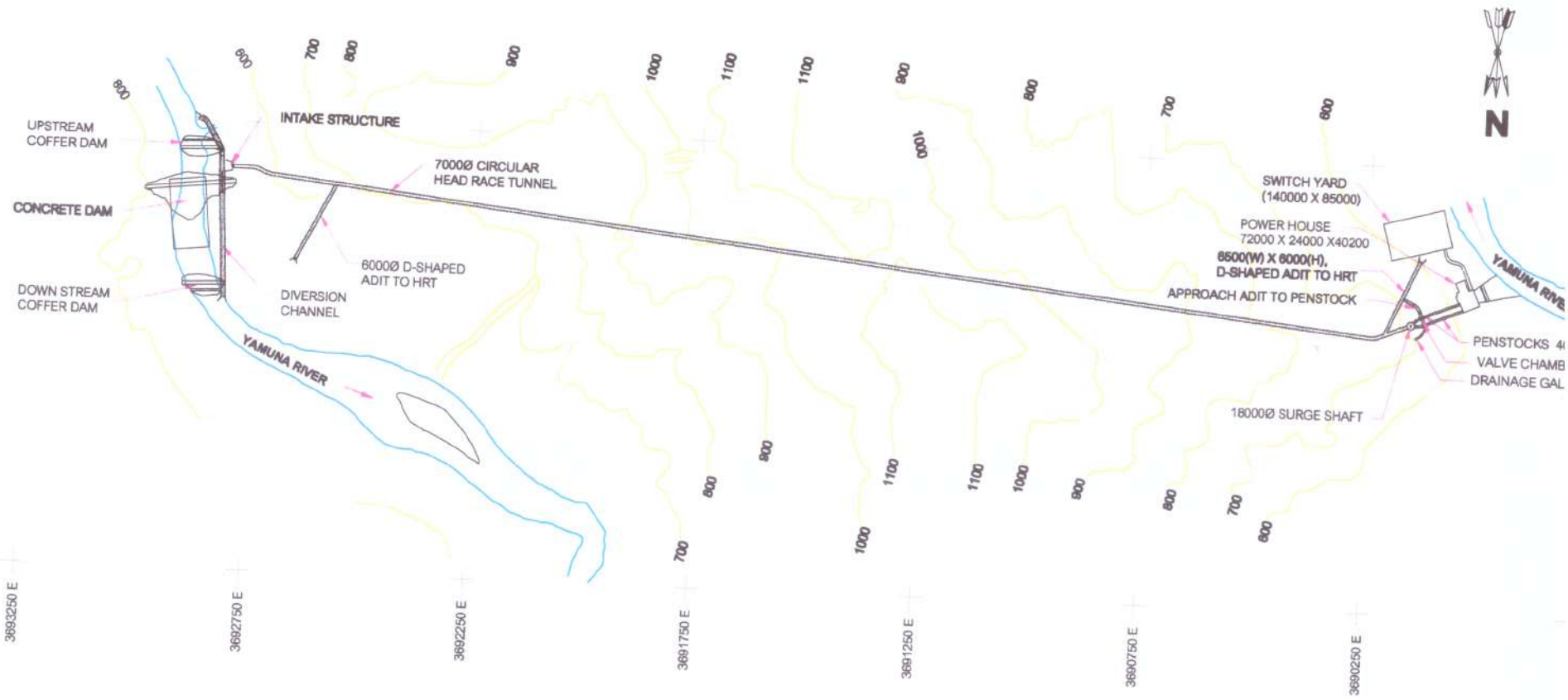


THIS IS A DPR DRAWING
NOT FOR CONSTRUCTION

SCALE:-

0 100 200 300 400 500 ME

NOTES:-

1. ALL DIMENSIONS ARE IN MM AND LEVELS IN METERS.

REFERENCE :-
NHPC DRG NO. NHVY-1AD-41-GA 002

UJVN LIMITED

2x60 MW
VYASI HYDROELECTRIC PROJECT (U

GENERAL LAYOUT PL

DRG NO :-UJVNL - V-GA-002

Annex- II

SALIENT FEATURES

LOCATION	
State	Uttarakhand
District	Dehradun
River	Yamuna
Location of Dam	Village Vyasi, 5.0 Km. d/s of Lakhwar
Location of Power House	Village Hathiari 9.5 Km. d/s of Lakhwar
Nearest Airport & Railhead	Dehradun
Latitude	30^0 31' 00'' N
Longitude	77^0 53' 00'' E
HYDROLOGY	
Catchment area (including snow catchment)	2100 Sq. Km.
Snow catchment	60 Sq. Km.
Normal rainfall in the catchment	1250-2000 mm
Design flood	8850 Cumecs
Maximum annual runoff (1988-89)	3763 $M.m^3$
Average annual runoff (1963-64)	2318 $M.m^3$
Minimum annual runoff (1965-66)	1222 $M.m^3$
DIVERSION CHANNEL	
Location.	On the left bank
Number & size	One, 8.6W m x 6.0 to 8.0 m H.
Length	390 m
DIVERSION CONDUITS	
Location	On the left bank
Number and size.	2 Nos. 4.25 m x 5.20 m.
Length	46 m
UPSTREAM COFFER DAM	
Top of Dam	EL. 594.50m
River bed level	EL 584.00 m
Top width.	7.00 m
Upstream slope	1.75(H) : 1 (V)
Downstream slope	1.5(H) : 1 (V)
DOWN STREAM COFFER DAM	
Top of Dam	EL. 591 m
Riverbed level	EL. 581 m
Top width.	7.00 m

DAM

Type	Concrete Gravity type
Maximum height above deepest foundation	86.0 m
Top of Dam	EL 634.0 m
River bed level at dam site	EL 584.0 m
Expected deepest foundation level	EL 548.0 m
Top road width	8.25 m
Top length	207.20 m
Upstream slope	0.3 (H): 1 (V)
Downstream slope	0.7 (H): 1 (V)

SPILLWAYS

Type of Spillway	Orifice Type Spillway
No. & size of openings	4 Nos. of 9.6 m x14.4 m
Crest elevation	590.0 m.
Design flood	8850.00 Cumecs
Energy dissipation	Flip Bucket type with plunge pool.
Plunge pool floor level	EL 542.00 m

RESERVOIR

Reservoir Level (FRL/MWL)	El. 631.50 m
Minimum Draw Down Level (MDDL)	El. 626.00 m
Gross Storage at FRL/MWL	13.69 $M.m^3$
Dead Storage at MDDL	9.98 $M.m^3$
Reservoir Area at FRL/MWL	72.9 Hectare
Live Storage	3.71 $M.m^3$

INTAKE

Location	27.5m from dam axis
Intake type	Bell mouth intake
Invert level	El. 611.00 m
Trash racks	Inclined.
Bulkhead gate size	4.5 x 7.0 m (2 nos.)
Service gate size	4.5 x 7.0 m (2 nos.)

HEADRACE TUNNEL

Size	7 m dia circular
Length	2.7 Km. Long
Design discharge	119.78 m^3/sec.

SURGE SHAFT

Type	Restricted Orifice type.
Size	18 m dia

PRESSURE SHAFT

No. of pressure shaft	2
Diameter of pressure shaft Size	4.0 m Circular
Length of pressure shaft	209m

POWER HOUSE

Type	Surface Power House
Machine Location	Near village Hathiari
Nos. & size of units	2 units of 60 MW each
Dimensions of the power house	72 m (L) x 24 m(W) x 40.2 m (H)
Deepest foundation level	El. 496.80 m
Machine centre line.	El. 510.30 m.
Machine & Erection bay floor level.	El. 522.00 m.

Turbines

No. & type	2 Nos. Francis type
Maximum gross head.	115.31 m.
Rated net head	111.00 m.
Design discharge	59.89 Cumecs
Generator	Semi Umebrella.

Transformer Hall

Location	El.535.0 m, deck d/s.of Machine hall

Draft Tubes

Nos. & Size	2 Nos. of size 7.0 m (w) x 5.0 m (h)
Gate openings	2 Nos. of size 3.106 m (w) x 5.0 m (h) (for each draft tube)
Gate Operation Floor level	El. 535.00 m.
TWL (1 unit running)	El. 513.80 m
TWL (2 unit running)	El. 514.00 m

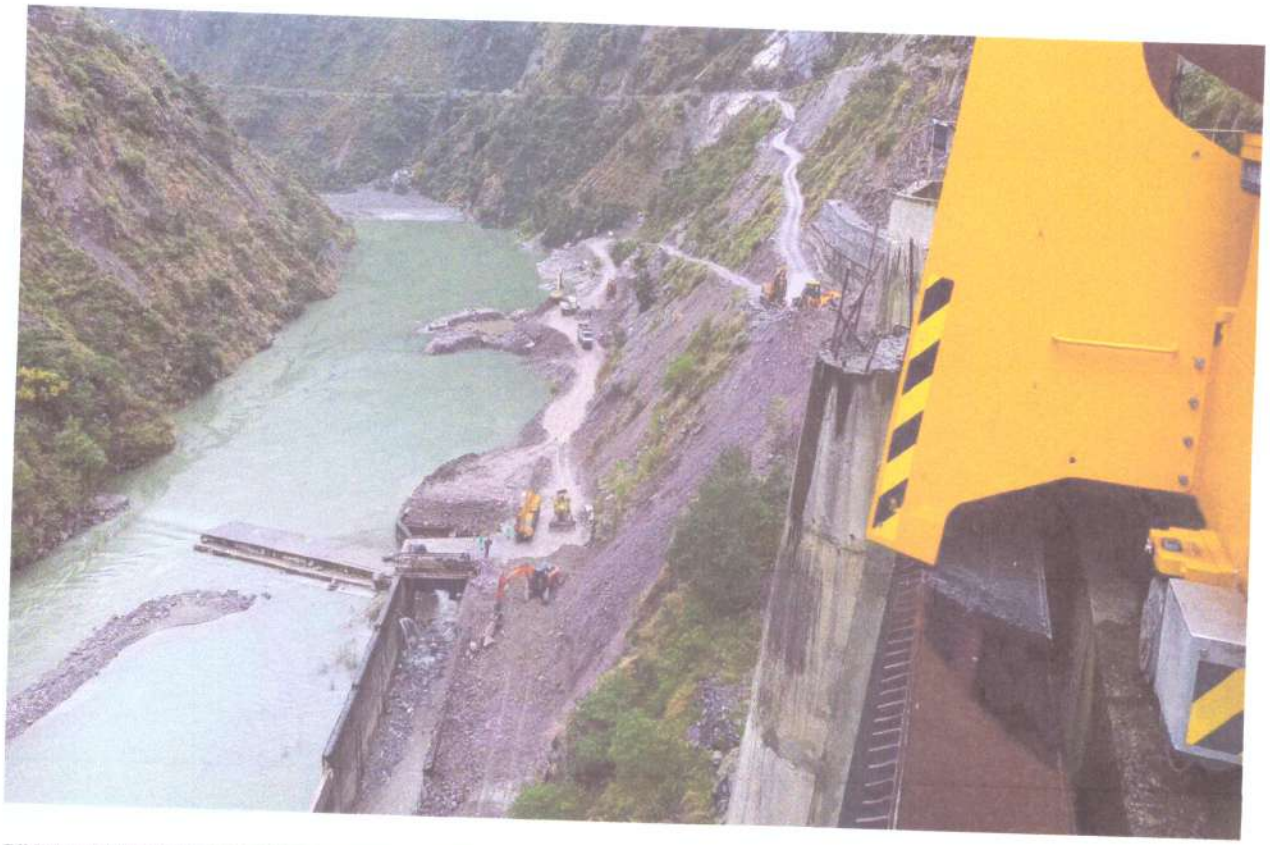
SWITCHYARD

Location	U/s of Power House.
Size	140 m x 85 m
Level	El. 570.00 m

POWER GENERATION

Installed capacity	120 MW
Annual energy generation (90% dependable year with Vyasi Stand alone operation)	375.24 MU.
Annual energy generation	

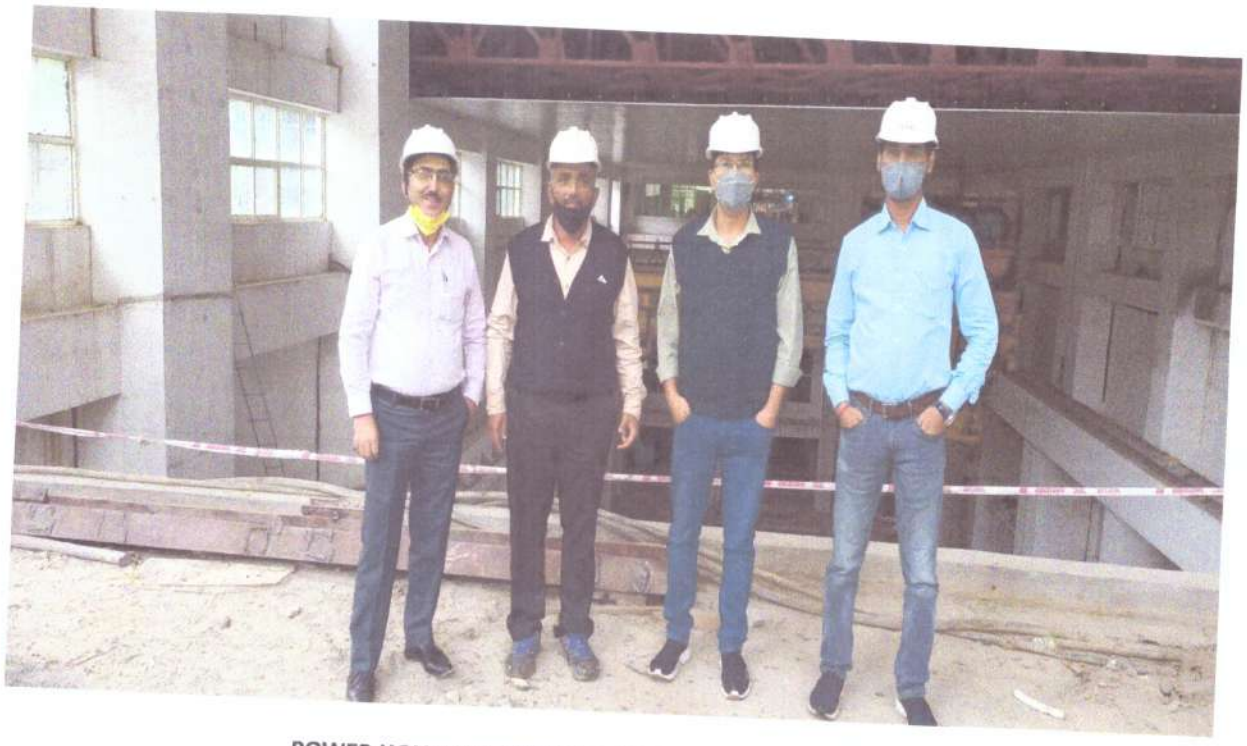
COMPLETED DAM IN THE BACKGROUND



RIVER DIVERTED THROUGH SPILLWAY GATES & ARRANGEMENT FOR DIVERSION PLUGGING- VIEW FROM NEAR TRASH RACK CLEANING MACHINE

SURGE SHAFT TOP

VIEW OF POWER HOUSE AREA FROM SURGE SHAFT TOP



POWER HOUSE- VIEW FROM UNLOADING BAY

RUNNER -UNIT1