



**SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY,
Dr. R.K. Desai Marg, Opp. Mission Hospital, Athwalines,
Surat - 395001
Gujarat, India**

**REPORT
ON
POWER PLANT VISIT
(UKAI HYDRO POWER PLANT)**

DATE: 19 september,2019

**B.E.3rd year ELECTRICAL ENGINEERING
SCET, SURAT**

DETAILS OF VISIT:

Date: 19-09-19

Duration: 9 hours

Faculty Coordinator: Prof. Krishna Vakharia

Prof. Urvi jariwala

Prof: Chinmay naik

Visitors: Students of 5 semester Eletrical shift-2

POWER PLANT PROFILE:

Power Plant Name: Ukai Hydro power plant

Address: Ukai Dam

Gujarat, India

Work profile: Power generation and flood control

Installed capacity (300 Mw)

Conventional type power plant

Hydraulic head (190 ft to 110ft)

Storage capacity (46%)

07:00 am

The journey started from SCET,surat. The 53 students along with 3 faculties were ready for an exciting visit. Sharp at 07:30 am ,one bus of Ukai Dam arrived. It was about to getting afternoon but the students created a very energetic and disciplined environment. The bus were well maintained and comfortable. Within an two hour we were on power plant visit road and our speed geared up. We were yet to cover around 96 kms to reach our destination. After travelling this fun filled journey we were on the entrance to the plant.





❖ **Introduction of Ukai Dam:**

Ukai is the largest multi-purpose project under taken by the state government. Development of the lower Tapi is done by the Gujarat government in two stages. The kakrapar weir and the canals project having an estimated cost of Rs. 18/- crores form the first stage. This project was commissioned in the year 1954 and the canal system provided seasonal irrigation facilities to 2, 27,530 hectares (526,250 Acres) from the run of the river.

The Second stage is the Ukai Multipurpose project estimated to cost Rs. 136/- crores. The dam is located across the river Tapi about 29 K.M. upstream of the kakrapar weir. The opening Ceremony was performed by Late Prime Minister Smt.Indira Gandhi in 1972.



→**Dam Length:**

- (i) 4057.96 meters – Rolled filled earth embankment.
 - (ii) 863.86 meters – masonry
- 4926.83 meter total Dam Length

→**Dam Height :** : 345 feet from river bed.

→**Catchments area :** : 62225 Sq. K.M. (24025 miles.)

→**Maximum possible flood :** : 21.16 lac cusec

→**Reservoir:** : 120 K.M. Length and 5 K.M average width
: 280 K.M. shoreline.

→ **Villagers area:** : 170 Villagers affected, 138 villagers shifted.

❖ **SPILL WAY**

- **Spill way Canal length:** = 1524 meter (5000')
- Width :** = 259 meter (850')
- Depth :** = 18.29 meter (60')
- **Spill way gates Numbers :** = 22
- Types:** = Radial Gates
- Area:** = 15.545 m x 14.783m (51' x 48.5')
- Weight :** = 100 Tones each
- **Discharge Capacity minimum:** = 49490 m³/sec (17.48 lac Cusec)
- Maximum :** = 59920 m³/sec (21.16 lac Cusec)
- **Over all crest length:** = 425.19 m

❖ **TAIL RACE CANAL:**

- **T.R.C. Length:** = 1220 m (4000')
- **T.R.C. Width:** = 30.5 m (100')
- **Discharge Capacity:** = 736.24 m³/sec (26000 Cusecs)
- **T.R.C. Water Level:**
- Maximum: = 65.00 m (213')
- Minimum: = 47.85 m (157')
- Normal : = 48.35 m (159')

❖ **PEN STOCK:**

- **Numbers :** = 4
- **Diameter :** = 7.01 m (23')
- **Thickness:** = 18 to 22 mm
- **Length:** = 60

❖ **UKAI HYDRO SALIENT FEATURES: (MAIN HYDRO)**

Main Hydro Total cost	22.87 Cr	
Commissioning date of Main Hydro Units		
Unit # 1 (75 MW)	08-07-1974	
Unit # 2 (75 MW)	13-12-1974	
Unit # 3 (75 MW)	22-04-1975	
Unit # 4 (75 MW)	04-03-1976	
Yearly Max. Generation (for Monsoon year)	1976-77	1261.217 Mus
Monthly Maximum Generation	August 2013	221.267 Mus
Daily Maximum Generation	25/9/1998	7.689 Mus

Ukai Hydro Power Station has been declared 3rd best performing station in India during 2006-2007 year and awarded Bronze shield for the same by Ministry of Power, New Delhi.

❖ **PENSTOCK GATES:**

4 Nos. one for each Penstock having 17 minutes opening time and 72 seconds closing time. Gates can be closed from hoist gallery and / or from power house control room. But gates can be opened from hoist gallery only.

❖ **TURBINE:**

- 1. Type** = Reaction type, Kaplan, vertical shaft, feathering propeller type.
- 2. Make** = Bharat Heavy Electricals Ltd.
- 3. Head** = 47.8 m (156.82 ft.) Rated head.
= 57.2 m (187.66 ft.) Max head.
= 34.4 m (112.86 ft.) Min head.
- 4. Output power** = 1,05,000 Metric HP
= 1,20,750 Metric HP Max.
- 5. Speed** = 150 RPM (clockwise rotation)
- 6. Run away speed** = 300 RPM with cam
= 350 RPM without cam
- 7. Water discharge** = 6000 cusec ($101 \text{ m}^3/\text{sec}$) at 75 MW.
- 8. Nos. of guide vanes** = 24 nos.
- 9. Size of guide vanes** = 6660 mm x 19.4 mm
- 10. Main shaft dia.** = 900 mm
- 11. Runner hub dia.** = 3160 mm
- 12. Runner blades** = 6 nos. Each having weight of 5 tones & design to withstand 1700 tones hydraulic.
- 13. Spiral inlet dia** = 6500 mm
- 14. Largest transport item of turbine** = inner top cover half size 6.1 m x 3.5 m x 3.0 m
- 15. Efficiency** = 98 % at the full water level
- 16. Weight of turbine with shaft and runner disc** = 140 MT.
- 17. Bearing:** turbine guide bearing 1 no having 8 nos. pads.

❖ **GENERATOR:**

- | | |
|----------------------------------|---|
| 1. Nos. of generators | = 4 nos. |
| 2. Sr. no. of generators | = 3000107, 3000108, 3000109, 3000110 respectively. |
| 3. Type | = G25 vertical umbrella type salient pole rated 83333 KVA , 0.9 p.f. 11 KV ($\pm 5\%$) 3 phase 4370 AMPS. Rated KVAR 56000 at zero leading P.F. |
| 4. Make | = Bharat Heavy Electricals Ltd. |
| 5. Stator windings: slots | = 384, winding coils 384 |
| Joint | |
| 1) series joint | = 264 |
| 2) Pole to pole joint | =108 |
| 3) Bus bar joints | = 12 |

Stator resistance per phase at 20°C= 0.003415 ohm. , Field resistance at 20°C= 0.15 ohm.. Rotor excitation at no load & 100 % voltage= 608 amp. Rotor excitation at rated output & voltage= 1052 Amp. Excitation voltage = 180 v.

- 6. Speed** = 150 RPM.
- 7. Overall dia.** = $4127.5 \times 2 = 8255.0 \text{ m}$

8. Heaviest package for shipment

Thrust bearing housing size 04. 34 m long x 4.12 m width x 2.6 m high having weight 55 tones.

- 9. Weight of generator side** = 275 MT.
- 10. Heaviest assembly to be lifted by crane rotor weighting:** = 220 tones.
- 11. Bearing** = 1 no. - Thrust bearing having 12 pads.
1 no. - Generator guide bearing having 24 Pads.

❖ **SPILL WAY:**

1. **Spill way Chanal Length** = 1524 Meter, Width = 259 Meter, Depth = 18.29 Meter.
2. **Spill way Gates :**
 - (1) Numbers = 22 nos.
 - (2) Types = Radial Gates.
 - (3) Area = 15.545 m x 14.783 m.
 - (4) Weight = 100 Tones Each.
3. **Discharge Capacity** = 49490 m³/sec., Maximum = 59920 m³/sec.
4. **Over all crest length** = 425.195 m.

❖ **TAIL RACE CANAL:**

1. **T.R.C. Length** = 1220 m.
2. **T.R.C. Width** = 30.5 m.
3. **Discharge Capacity** = 736.24 m³/sec.
4. **T.R.C. Water level**
 - = 65.00 m. Maximum.
 - = 47.85 m. Minimum.
 - = 48.35 m. Normal.
5. **PEN-STOCK (4 Nos.)**
 - (1) Diameter: 7.01 m (23').
 - (2) Thickness: 18 to 22 mm.
 - (3) Length: 60 m.

❖ **PENSTOCK GATES:**

4 Nos. one for each penstock having 17 minutes opening time and 72 seconds closing time. Gates can be closed from Hoist gallery and/ or from power house control room. But gates can be opened from Hoist gallery only.

❖ **SWITCHYARD 220KV lines:**

1. Achhalia feeder-1
2. Achhalia feeder-2
3. Hydro – Thermal tie feeder-1
4. Hydro – Thermal tie feeder-2

❖ **66 KV Lines:**

1. Songadh -1
2. Songadh -2
3. Nizzer
4. Sagbara
5. Vadibhesrot

1:30pm

The visit was about to end but without a group photo it was incomplete. After the photo-session we left for Surat. The visit ended quite comfortably.



We are very much thankful to prof Dr. Hiren patel (I/C Principal-SCET) for a kind of permission. We are thankful to Prof Dr. Aditi Hajari (Head of the Elec. Dept.) for always motivating us in curricular and activities. We are also very much thankful to Prof. Krishna Vakharia (Elec. Dept.) , Prof. Urvi jariwala (Elec. Dept.) and Prof.chinmay naik who has actively planned the great visit.

We are very much thankful to Ukai dam Academic Co-ordinator, Ukai Corporation and Electrical Department, SCET for organizing such a resourceful power plant visit which not only helped us getting acknowledged with corporate power plant work but also taught us the way to live life in a healthy and disciplined manner.

CONCLUSION: The power plant visit of Ukai Dam in Gujrat was very informative and helpful in providing real life exposure to us. The state of the art system at ukai dam and their automation by using IT to improve decision making and efficiency. Power plant visit proved to be learning and fruitful experience for both students and faculty members.

Students Report Complied by:-
CHEVLI YASH (Electrical, 5th Sem)

