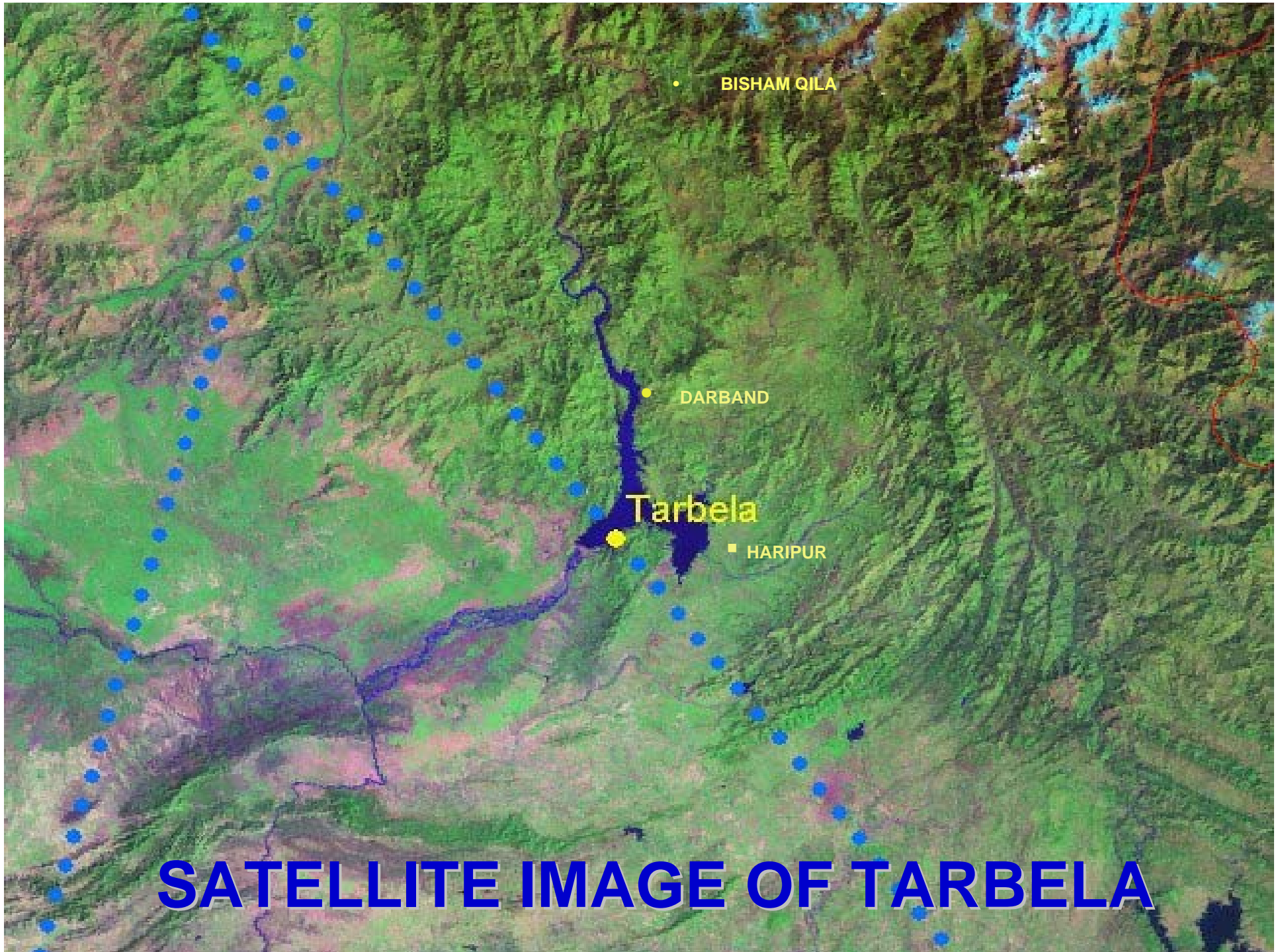




# TARBELA DAM PROJECT



**SATELLITE IMAGE OF TARBELA**







# PROJECT FEATURES

**PROJECT COST**

**US\$ 2.85 BILLIONS**

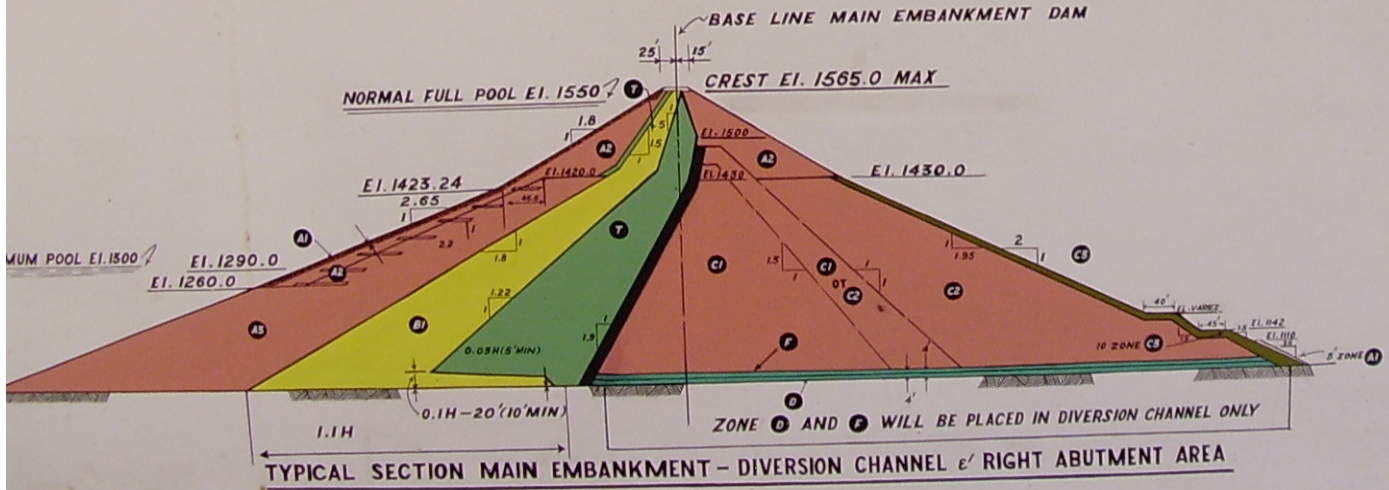
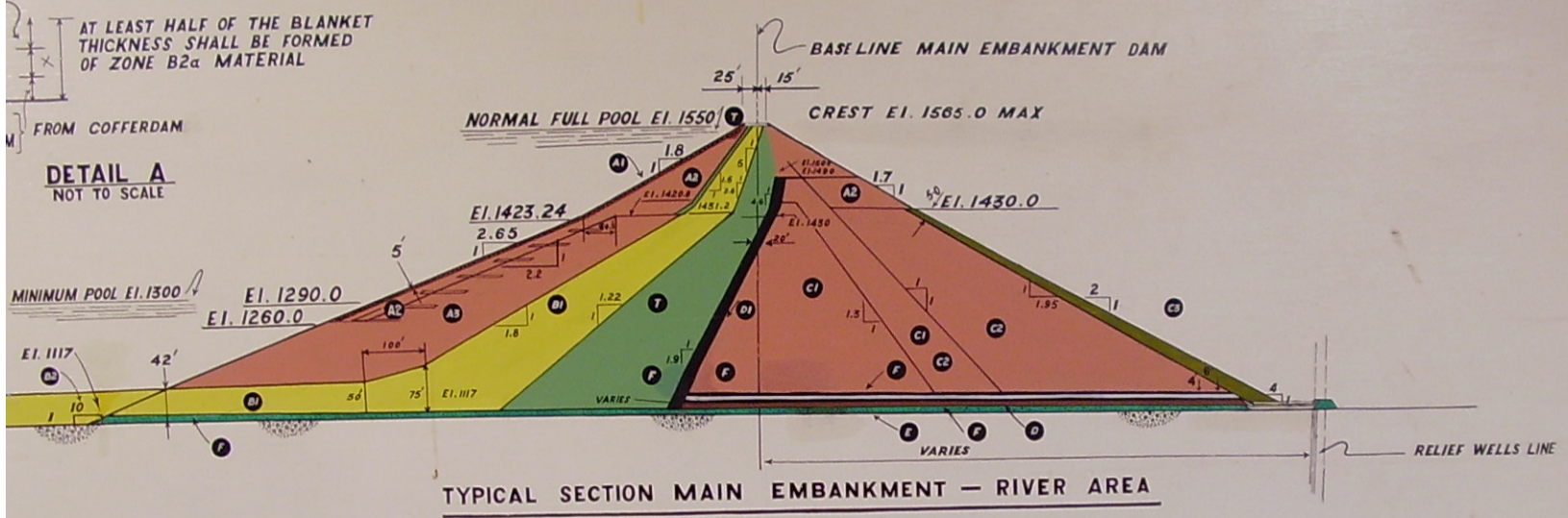
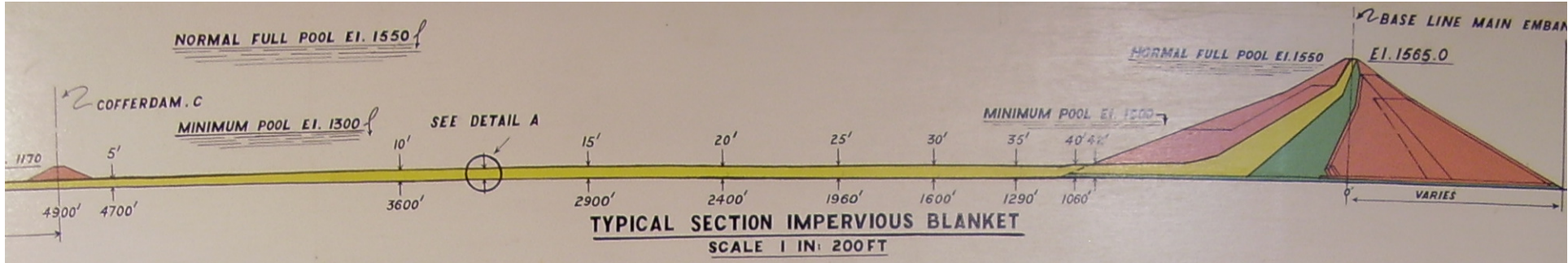
## PROJECT VOLUME

<b>Total Embankments and Fills</b>	<b>200 M cu Yds</b>
<b>Excavation Required</b>	<b>106 M cu Yds</b>
<b>Excavation Borrow</b>	<b>98 M cu Yds</b>

## MAIN EMBANKMENT

<b>Length at Crest El. 1,565 ft</b>	<b>9000 ft</b>
<b>Max. Height (from lowest foundation point)</b>	<b>470 ft</b>
<b>Embankment Volume</b>	<b>139 M cu Yds</b>
<b>Blanket Volume</b>	<b>30 M cu Yds</b>





**REFERENCE DRAWINGS**  
 11 NY 200 - GENERAL PROJECT PLAN  
 22 NY 130 - MAIN EMBANKMENT DAM DETAILS  
 22 NY 200 - MAIN EMBANKMENT DAM - DRAINAGE

NO 10 0  
SCALE  
UNLESS OTHERWISE NOTED

5	
4	
3	
2	
1	
REV	



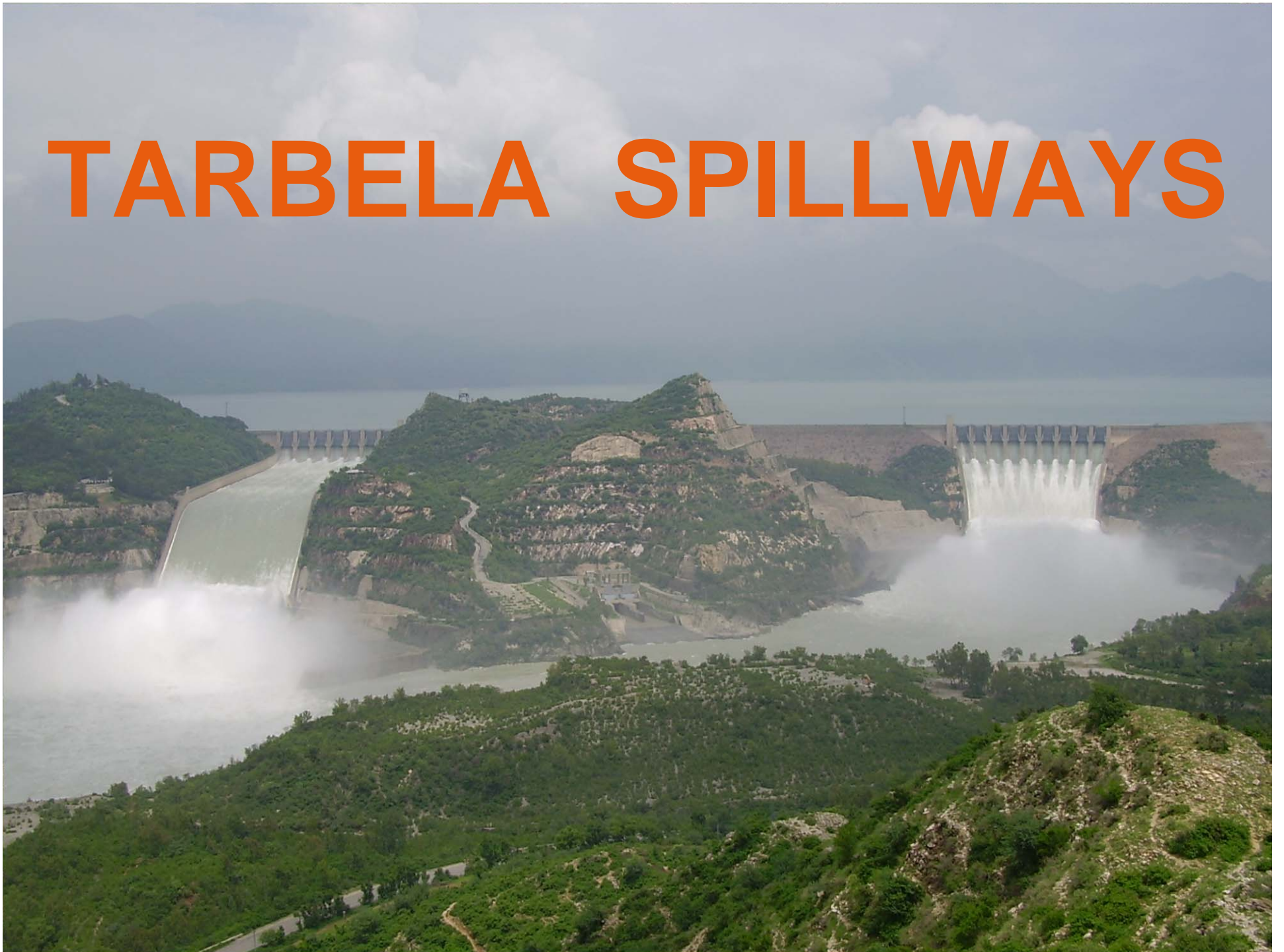
## AUXILIARY DAM NO. 1

- Length at Crest El. 1,565 ft. **2,340 feet**
- Maximum Height **345 feet**

## AUXILIARY DAM NO. 2

- Length at Crest El. 1,565ft. **960 feet**
- Maximum Height **220 feet**

# TARBELA SPILLWAYS





## SERVICE SPILLWAY

<b>Gates</b>	<b>7(50 feet wide x 61 feet high)</b>
<b>Discharge</b>	<b>650,000 cusec</b>

## AUXILIARY SPILLWAY

<b>Gates</b>	<b>9(50 feet wide x 61 feet high)</b>
<b>Discharge</b>	<b>850,000 cusec</b>



- **TUNNELS AT RIGHT BANK (04 Nos.)**

Tunnels 1 to 4 Dia.	<b>45 ft</b> (U/S gate shafts)
Tunnels 1 to 3 Dia.	<b>43.5 ft</b> (D/S gate shaft)
Tunnel 4 Dia.	<b>36 ft</b> (D/S gate shaft)
Lengths	<b>2,400 to 2,700 ft</b>

**LEFT BANK IRRIGATION TUNNEL**

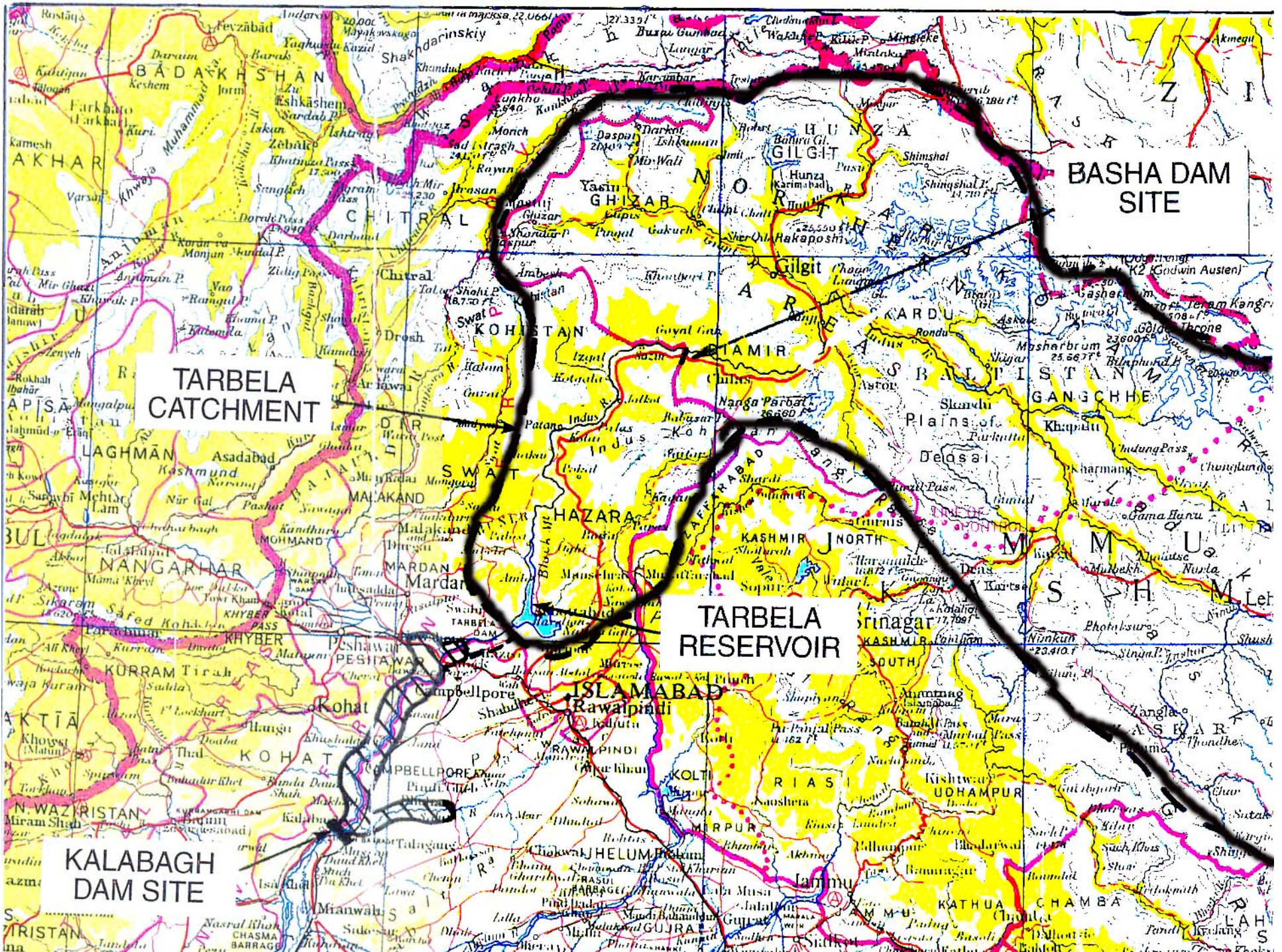
Diameter	<b>45 ft</b> (U/S gate shafts)
Diameter	<b>36 ft</b> (D/S gate shafts)
Length	<b>3,675 ft</b>





TARBELA LAKE





TARBELA  
CATCHMENT

BASHA DAM  
SITE

TARBELA  
RESERVOIR

KALABAGH  
DAM SITE



# TARBELA RESERVOIR

<b>Catchment Area</b>	<b>65500 Sq Miles (169600 Sq KM)</b>
<b>Anuual Flow at Tarbela</b>	<b>63 MAF (78 BCM)</b>
<b>Area of Lake</b>	<b>100 Sq. Miles (259 Sq. KM)</b>
<b>Max Depth</b>	<b>450 ft (137 Meter)</b>
<b>Max Elevation</b>	<b>1550 ft (472.44 Meter)</b>
<b>Min Operating Elevation</b>	<b>1369 ft (417.27 Meter)</b>



## RESERVOIR CAPACITY

	<b>Designed (Min El.1300 ft)</b>	<b>Present (2006) (Min. Operating El. 1369 ft)</b>	<b>Reduction %</b>
<b>Gross MAF</b>	<b>11.62</b>	<b>8.192</b>	<b>(29.48%)</b>
<b>Live MAF</b>	<b>9.68</b>	<b>6.932</b>	<b>(28.38%)</b>
<b>Dead MAF</b>	<b>1.94</b>	<b>1.244</b>	<b>(35.08%)</b>



# RESERVOIR OPERATION

## 1. Basic Principles

- Safety of Works - Highest Priority
- Reservoir Releases - Directed by IRSA

## 2. Operation Rule

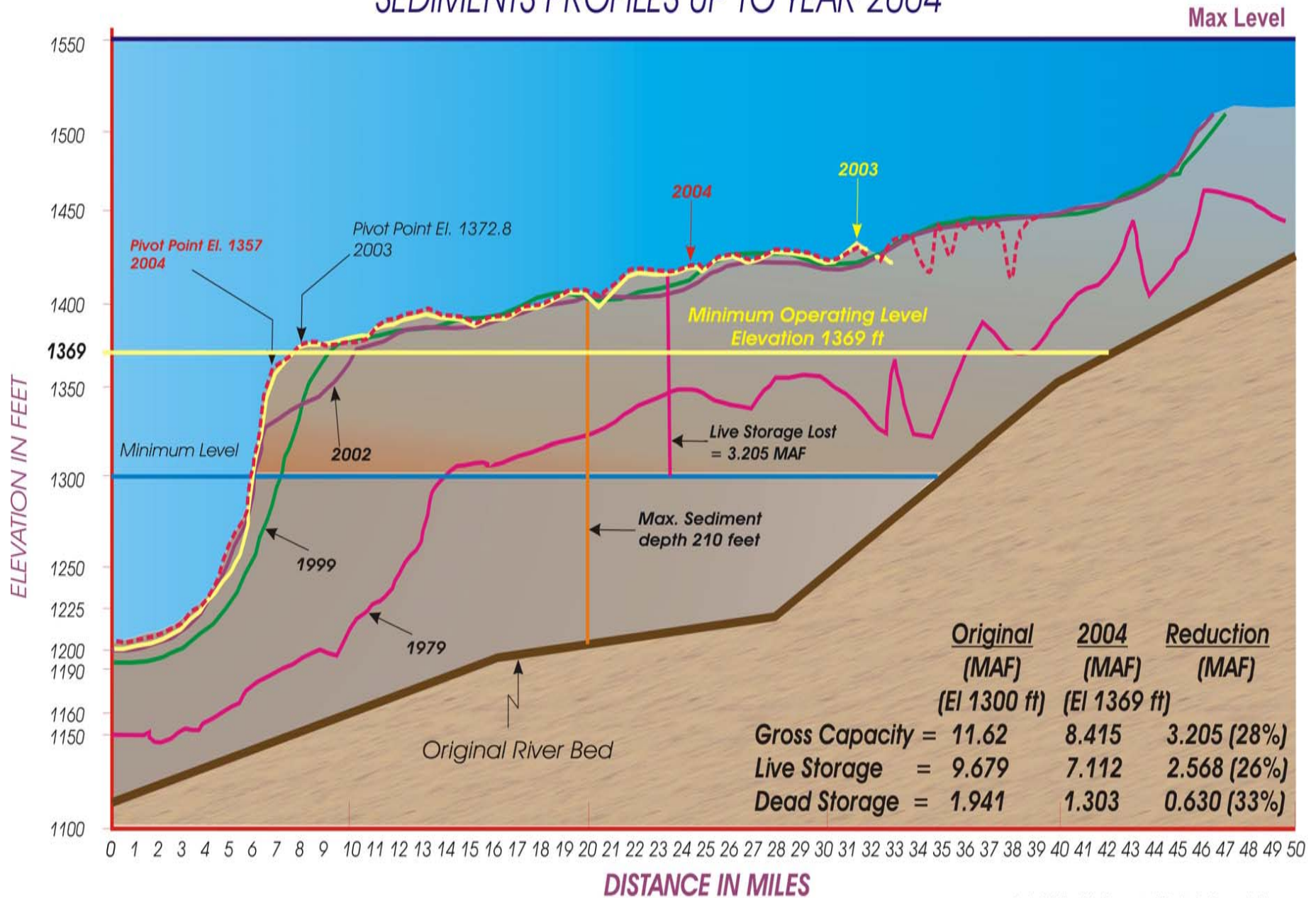
- Min Safe level 1369 ft
- Filling to EI 1510 ft July 10  
(Inflow > Outflow) @10 Ft / D
- Filling EI 1510 to 1550 ft @ 1 Ft / D
- Max Res Level (1550) August, 20
- Res Drawdown Max 3 Ft / D
- Conservation Level 1550 ft

## 3. Operation Levels

- Tunnel 4/5 upto EI 1505
- Spillways Operation Above EI 1505
- Auxiliary Spillway Discharge Min 50,000 Cfs
- Service Spillway Discharge Min 90,000 Cfs



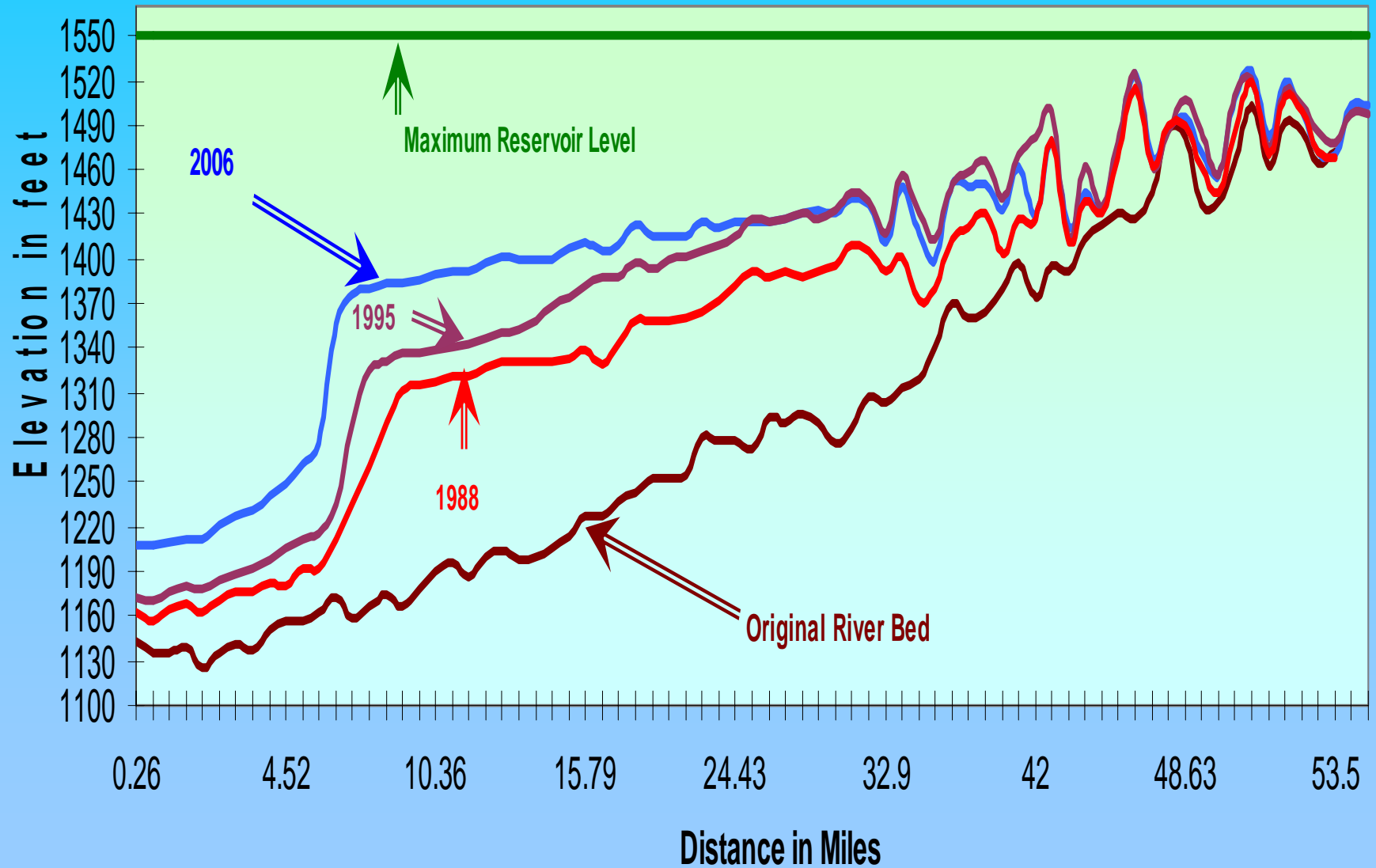
# TARBELA RESERVOIR SEDIMENTS PROFILES UP TO YEAR 2004



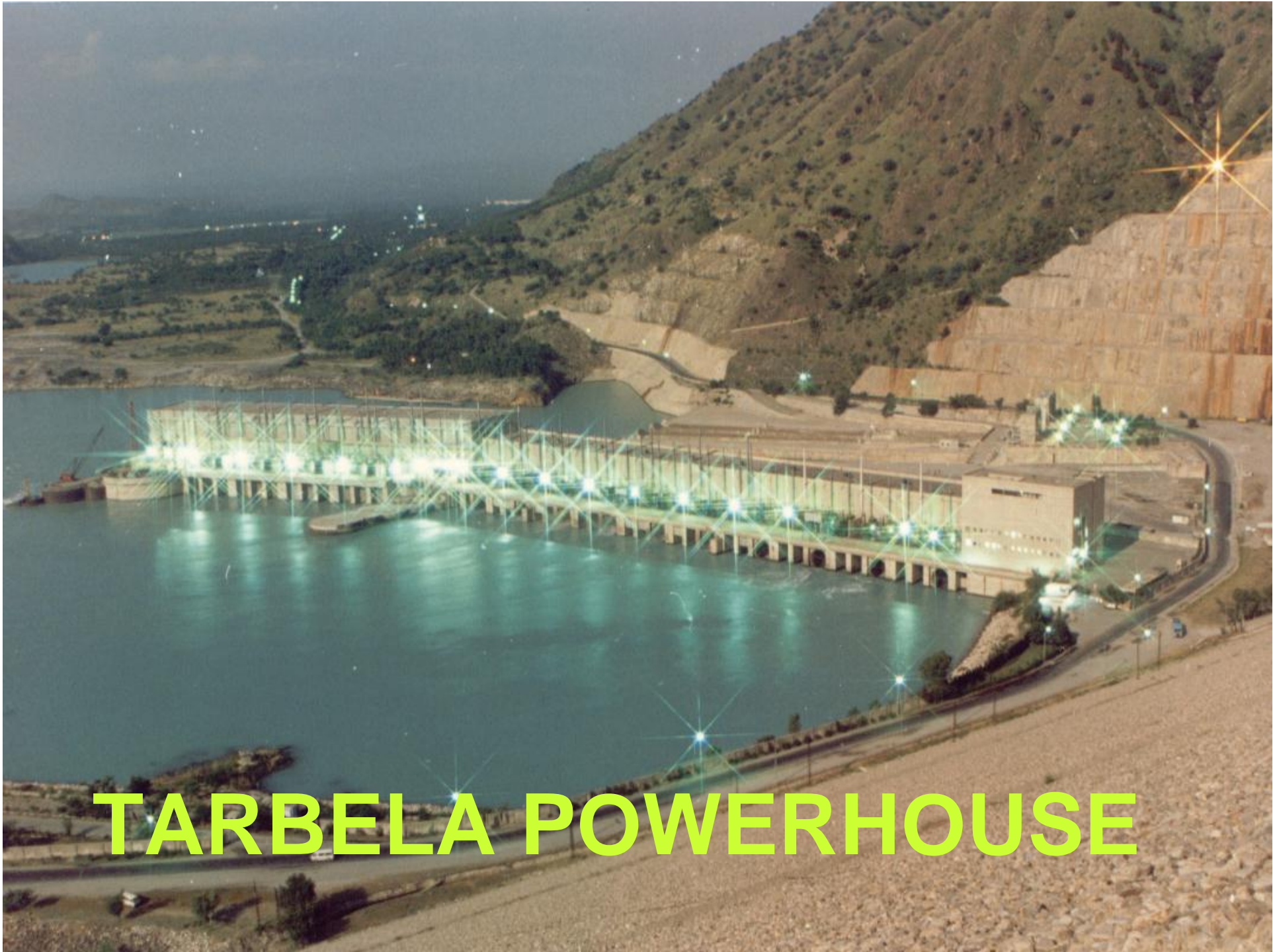
Average Loss in Live Storage  $\cong$  0.12 MAF/Year



# SEDIMENTATION PROFILE UPTO 2006







# TARBELA POWERHOUSE



# TARBELA DAM PROJECT WATER AND POWER BENEFITS

Period	* WATER		POWER		Total (Rs. Million)
	Releases (MAF)	Benefits (Rs. Million)	Generation (MKWH)	Benefits (Rs. Million) @ Rs. 0.30 per KWH	
1975-2007	272.814	124,126	325,919	97,775	221,902

\* Calculated @

- ◆ Rs. 200 per acre foot upto 1991-92
- ✦ Rs. 300 per acre foot during 1992-93 to 1995-96
- Rs. 900 per acre foot 1996-97 onwards

## PRINCIPAL DATA - POWER HOUSE

	<u>Units (1-4)</u>	<u>Units (5-8)</u>	<u>Units (9-10)</u>	<u>Units (11-14)</u>
○ <u>Commissioning Year</u>	1977	1982	1985	1992-93
○ <u>Total Cost (Billion Rs (16.38))</u>	0.516	2.872	1.198	11.794
○ <u>Turbine</u> Make	Hitachi Japan	D.E.W. Canada	D.B.S. Canada	D.B.S. Canada
○ <u>Generator</u> (Design 3478 MW) (Design Head 378 Ft) Make	4 x 175  Hitachi Japan	4 x 175  C.G.E. Canada	2 x 175  Hitachi Japan	4 x 432  Siemens Germany
○ <u>Civil Contractors</u>	M/S TJV Italy	M/S Dillingham Australia	M/S Dillingham Australia	M/S Hyundai South Korea