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CORE LOGGING WITH CORE LOSS AND CORE RECOVERY OF UPPER TUNGA PROJECT AT GAJANUR, SHIMOGA DISTRICT, KARNATAKA

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Abstract:

The Core logging frequency for most structures in first core logging per substructure unit under 100 feet long and 2nd core logging for footings longer than 100 feet. The important properties to be consider are permeability, compacted density, shear strength, compressibility, flexibility, grain size, distribution and resistance to internal erosion. The earthquake prone areas thicker core is desirable core thickness with 30% to 50% of water head has proved satisfactory for any type of soil and any Dam height provided the soil is reasonable impervious,

Key Words: Core Logging, Percentage of Core Loss, Core Recovery, Earthquake, Stability, Permeability, Lithology & Structures.

Introduction:

The actual location, spacing and depth of core logging shall be dictated by the topography, geological conditions, visible soil conditions and design consideration. The core logging should be extended through any unsuitable foundation materials and sufficiently deep into stable soils that the potential for settlement from compression of that layer and the depth underlying soil is determined, if deep excavations are required for building structures, the exploration should be carried out at least 1.5 times depth of the excavation in order to locate and determine ground water levels in any aquifer that may exist below the level of exaction. This is necessary to design a dewatering system that may be required in such deep excavation and to avoid the disturbance to the bottom of the excavation.

Materials and Methods of Study Area:

Properties of Core Materials and Core Thickness:

Properties of Core Materials: The important properties to be consider are Permeability, Compacted density, Shear strength, Compressibility, Flexibility, grain size, distribution and resistance to internal erosion.

Core Thickness: The permeability of the core material is one of the criteria while designing of the core thickness, from the stability point of view, it is desirable to have a core of minimum thickness consideration of reducing seepage and preventing any cracking and thicker of core is preferred 5.5 cms diameter.

Methods of Core Logging & Results:

Table 1: Trial core logging recovery analysis of Upper Tunga Project (Samples 1-5)

Equation

$$\text{Percentage of Core Loss Recovery} = \frac{\text{Core recovery}}{\text{Total depth of core}} * 100$$

Depth in Mtrs.	Structure	Lithology	Core recovery	Core loss	% of recovery	Remarks
0-1.50		Hard granitic gneiss rock	1.15	0.35		
1.50-3.00			1.20	0.30		
3.00-4.50		Hard gneiss rock	1.36	0.14		
4.50-6.00			1.23	0.27		
6.00-7.50		Hard granitic gneiss rock	1.23	0.27		In this section of 13.50 mtrs lithology fully hard rock exist
7.50-9.00			1.40	0.10		
9.00-10.50		Hard granitic gneiss rock	1.35	0.15		
10.50-12.00			1.50	-		
12.00-13.50		Hard granitic gneiss rock	0.90	0.78		
			11.32%	2.36%	84%	

$$\text{Percentage of Core Loss Recovery} = \frac{11.32}{13.50} = 84\%$$

Table 2: Trial core logging recovery analysis of Upper Tunga Project

Depth in Mtrs.	**Structure**	**Lithology**	**Core recovery**	**Core loss**	**% of recovery**	**Remarks**
0-1.50		Chlorite schist	1.16	0.34		In this section 7.50-15.25 hard granitic gneiss rock and minor Quartz veins
1.50-3.00		Gneiss rock	1.16	0.34		
3.00-4.50		Hard granitic & gneiss rock	1.17	0.33		
4.50-6.00		Quartz & Chlorite schist	1.16	0.34		
6.00-7.50		Hard gneiss rock	1.12	0.38		
7.50-9.00		Hard granitic gneiss rock	1.12	0.38		
9.00-10.50		Hard granitic gneiss rock	1.20	0.30		
10.50-12.00		Hard granitic gneiss rock	1.23	0.27		
12.00-13.50		Hard granitic gneiss rock	1.17	0.33		
13.50-15.25		Hard granitic gneiss rock	1.41	0.09		
			12.18%	3.10%	80.%	

$$\text{Percentage of Core Loss Recovery} = \frac{12.18}{15.25} * 100 = 80\%$$

Table 3: Trial core logging recovery analysis of Upper Tunga Project

Depth in Mtrs.	**Structure**	**Lithology**	**Core recovery**	**Core loss**	**% of recovery**	**Remarks**
0-1.50		Chlorite schist	1.16	0.34		In this section 7.25-11.20 hard granitic gneiss rock and minor Quartz veins
1.50-3.00		Quartz & Chlorite schist	1.16	0.34		
3.00-4.50		Hard granitic & gneiss rock	1.17	0.33		
4.50-6.00		Gneiss rock	1.16	0.34		
6.00-7.50		Hard gneiss rock	1.12	0.38		
7.50-9.00		Hard granitic gneiss rock	1.12	0.38		
9.00-10.50		Hard granitic gneiss rock	1.20	0.30		
10.50-11.20		Hard granitic gneiss rock	1.23	0.27		
			10.32%	3.10%	80.%	

$$\text{Percentage of Core Loss Recovery} = \frac{10.32}{11.20} * 100 = 92\%$$

Table 4: Trial core logging recovery analysis of Upper Tunga Project

Depth in Mtrs.	**Structure**	**Lithology**	**Core recovery**	**Core loss**	**% of recovery**	**Remarks**
0-1.50		Hard granitic with gneiss rock	1.15	0.35		In this section upto 3 mtrs hard granite with gneiss rock and fresh rock is
1.50-3.00		Gneiss Hard rock	1.20	0.30		
3.00-4.50		Gneiss Hard rock	1.36	0.14		

4.50-6.00		Gneiss Hard rock	1.23	0.27		encountered from 3 mtr to 14.05 mtrs as well as quartz vein is appeared at the depth of 9 mtrs
6.00-7.50		Gneiss Hard rock	1.23	0.27		
7.50-9.00		Gneiss Hard rock	1.40	0.10		
9.00-10.50		Quartz with chlorite schist	1.35	0.15		
10.50-12.00		Quartz with chlorite schist	1.50	0.15		
12.00-13.50		Quartz with chlorite schist	0.90	0.15		
13.50-14.01		Hard granite & gneiss with bred rock	0.33	0.05		
			11.65%	2.83%	83.00%	

$$\text{Percentage of Core Loss Recovery} = \frac{11.65}{14.01} * 100 = 83.15\%$$

Table 5: Trial core logging recovery analysis of Upper Tunga Project

Depth in Mtrs.	Structure	Lithology	Core recovery	Core loss	% of recovery	Remarks
0-1.50		Gneiss Hard rock	1.16	0.34		In this section Quartz vein is appeared at the dept of 3 mtrs and Gneiss Hard rock depth upto 12 mtrs
1.50-3.00		Chlorite schist	1.17	0.33		
3.00-4.50		Quartz with chlorite schist	1.16	0.34		
4.50-6.00		Quartz with chlorite schist	1.14	0.36		
6.00-7.50		Gneiss Hard rock	1.19	0.31		
7.50-9.00		Gneiss Hard rock	1.23	0.27		
9.00-10.50		Hard granitic & gneiss rock	1.18	0.32		
10.50-12.00		Hard granitic & gneiss rock	1.31	0.19		
			9.62%	2.46%	80.00%	

$$\text{Percentage of Core Loss Recovery} = \frac{9.62}{12.00} * 10 = 80.17\%$$

Core Log Samples:

Figure 1: Core Log Samples

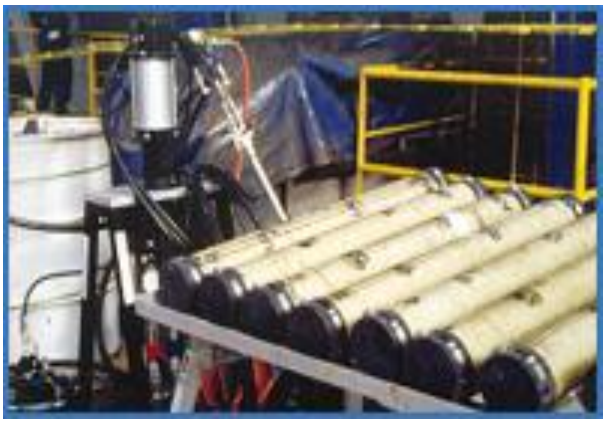

Figure 2: Core Log Samples

Location of Upper Tunga Project:

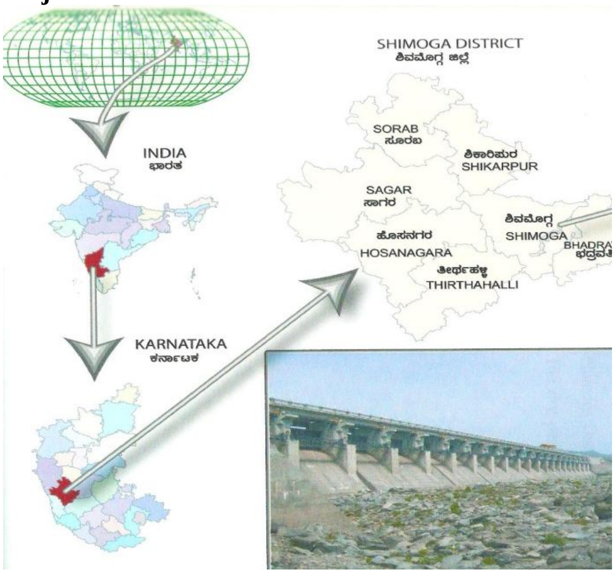

Figure 3: Location of Upper Tunga Project

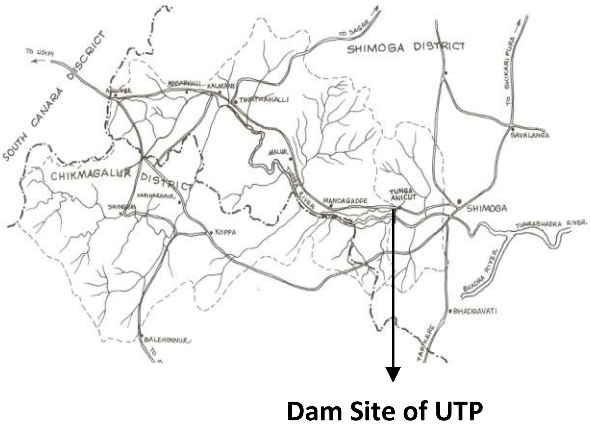

Figure 4: Dam site of UTP

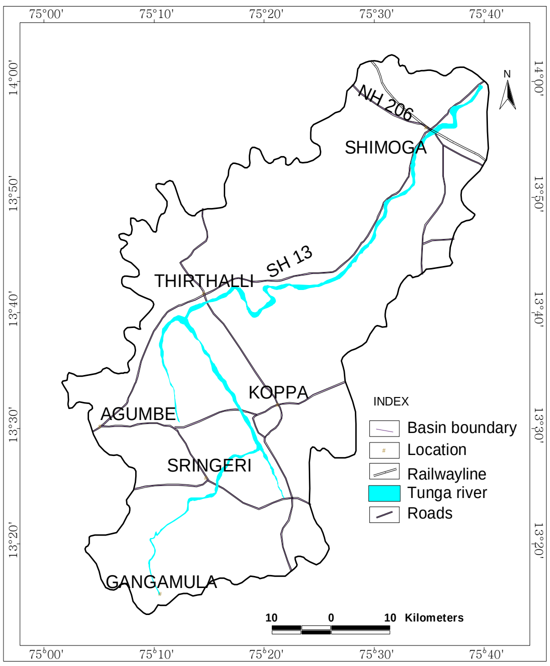

Figure 5: Location of Tunga River System

Conclusion and Recommendation:

According to subsurface geology and geological features of Upper Tunga Project as well as logging and core loss recovery analysis is represented core loss recovery is 80%. So, the core recovery is good, therefore, the foundation construction is not effecting to the load bearing capacity of storage water. According to Upper Tunga foundation block-wise lithological observation and the rock type exposed in this area is foliated Hornblende-chlorite-sercite schist with inclusion of quartz veins at same places, the general strike of the bed rock is NNW-SSE dipping 80° to vertical. Therefore the lithological formations are hard, fresh and good for foundation construction and structural condition of Upper Tunga Project is normal. Upper Tunga Project of core recovery is greater than 80% as well as the dam site area is geologically considered as granite-gneissic and domal structures, fresh and hard rock formations. Therefore, the stability of basement rock formation is strong from Compressive strength for foundations construction and to predict the stability of the dam site.

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