

# **SECURITY OF PFBR**

&

# **CONTROLS IN PFBR CIVIL CONSTRUCTION**

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# Design of Security System

Guidelines followed:

- DAE manual on Security
- AERB manual on Security
- Inputs obtained from IAEA-INFCIRC/225 Rev.IV

All threats and vulnerabilities of the site are evaluated for deciding the level / extend of security system requirement.

All war like situations are not covered by the system. They are handled by competent defense establishments of India

# Dimensions of Security System

- The effective implementation of PPS is covered in **three dimensions of technical, operation and administrative aspects.**
- **A robust engineered system backed by sound operational and administrative measures** are essential to build a complete physical protection system which can take care of threats formulated for a nuclear facility.

# ENGINEERED SYSTEMS OF SECURITY

- **Graded approach** - classify plant locations.
- Define **physical limits** of various security areas
- **Multiple barriers** and security checks

*Entire plant area of PFBR is divided in multiple areas like **protected boundaries, vital areas and inner area** depending on their significance and importance from security point of view.*

# Design of Security System

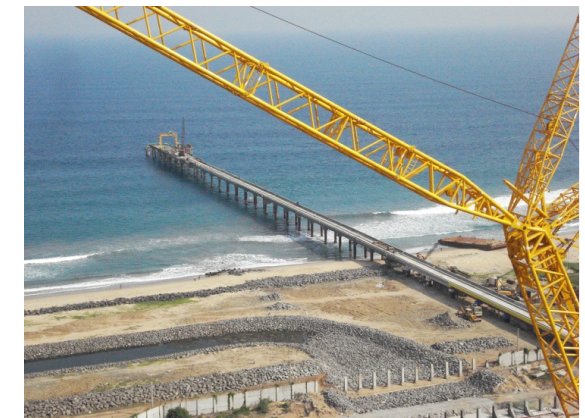
The security system for PFBR thus evolved includes

- Physical protection system
- Access control
- Personnel identification
- Plant configuration control
- Communication
- Response force
- Training licensing and certification of plant and security staff
- Documentation and reporting
- Surveillance
- Regulatory inspection.
- Integrated multipronged

State of art tech  
Graded approach  
Information to security  
All domain-const, op  
Intrusion detection  
Blend Admn & tech.  
Diverse Communication  
Trained , rehearsed  
Computerised access  
Material movement  
Vehicle Movement  
Key management  
Safety critical equip  
Password protection  
Hand operated valves  
Cameras  
Contingency Plan  
Monitoring, audit  
Civil defense



- **NICB**
  - Excavation
  - Raft
  - Reactor Vault
- **TG PCC**
- **TG mat**
- **Tunnel**
- **Jetty**
- **Seal pit**
- **Outfall**





Consolidation grouting



Geotechnical Investigation

Cyclic plate load test



Core drilling



Pressure meter test



Interface bond shear test



Jacking test uniaxial



# EXCAVATION

Hard Rock	
Weathered Rock	
Sand and Clay	
Size	216mX268m
Depth	Upto 24m (19m below mean sea level)



## Dewatering, Safety



# RAFT

Mix design

No of cubes

Placement Temperature

Spa-

Material Transport

Concrete Placement

Green Cutting

Large Pour

Shrinkage

Heat of Hydration

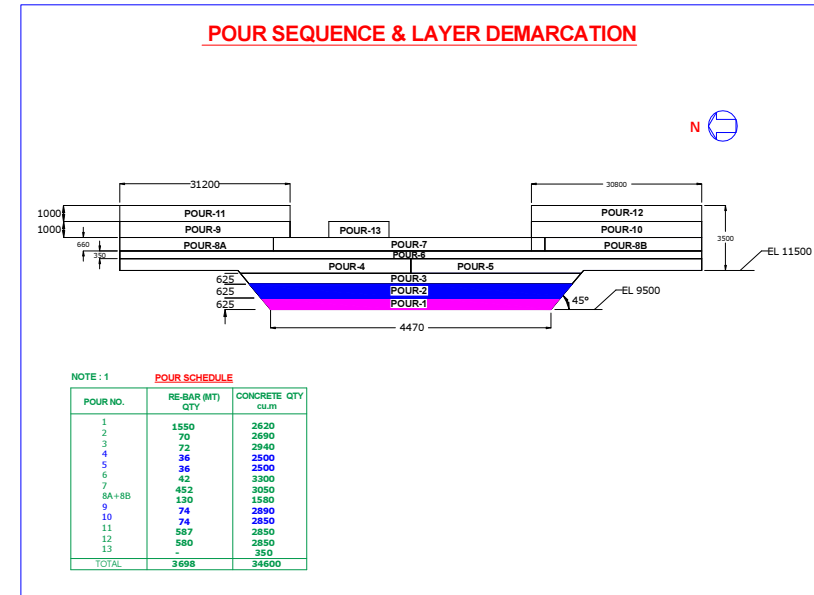
Cold Joint

Time Span

Eps-

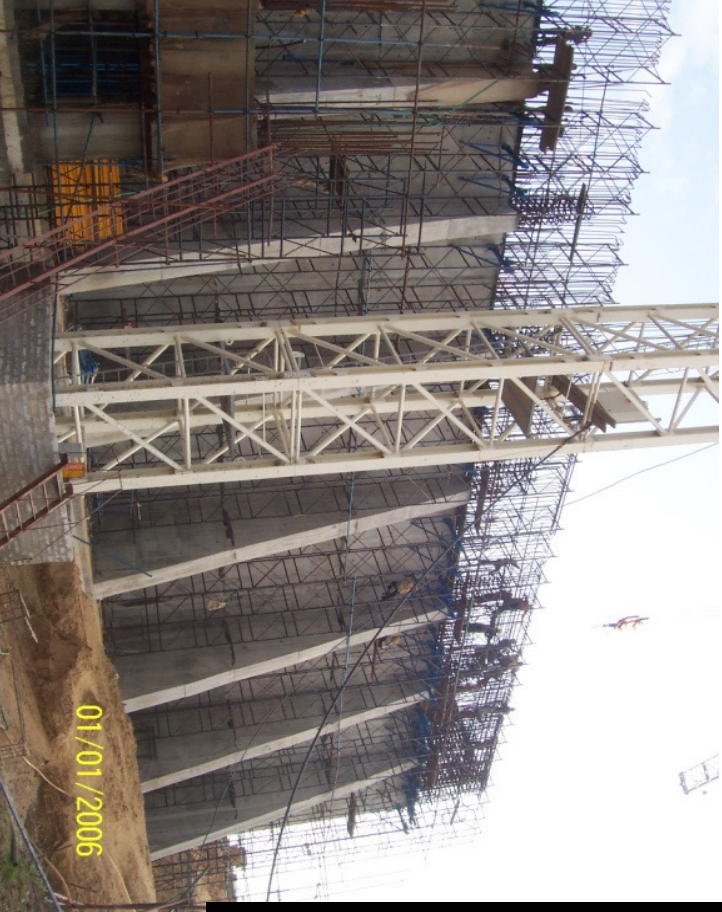
Nos

Accuracy





APP Membrane



Liquid Membrane





## Green Cutting- Muck Removal



## Grouting-Bone Dry Condition



## Concrete placement





**Indian Concrete Institute**

Ocean Crest, (Old No. 35) No. 79, Third Main Road, Gandhi Nagar, Adyar, Chennai - 600 030.  
 Ph : Off - 91-44-24912602, Res : 24911187 Telefax : 91-44-24436148 e-mail : ics@icoin

D. SRINIVASAN  
 Secretary General

ICI/24.05.2005

04114280116

FAX

FOR: DR PRABHAT KUMAR, PROJECT DIRECTOR,  
 BHAVINI, KALPAKKAM  
 FROM: D SRINIVASAN SECRETARY GENERAL,  
 INDIAN CONCRETE INSTITUTE, CHENNAI-20.

A continuous pour of 5000 m3 of concrete is definitely India's record in terms of total pour

But for the rate of pour it can not be a record as 5000 m3 has taken 5 days Earlier 2200 m3 has been laid in 28 hours for Delhi Metro.

As regards global record I have to verify and inform in a couple of days as I would be away from Chennai for the next two days.

Regards,

Yours sincerely,

(D. SRINIVASAN)



Massive  
And  
Critical  
Structures

Biological Shield Cooling  
System

Critical Contour

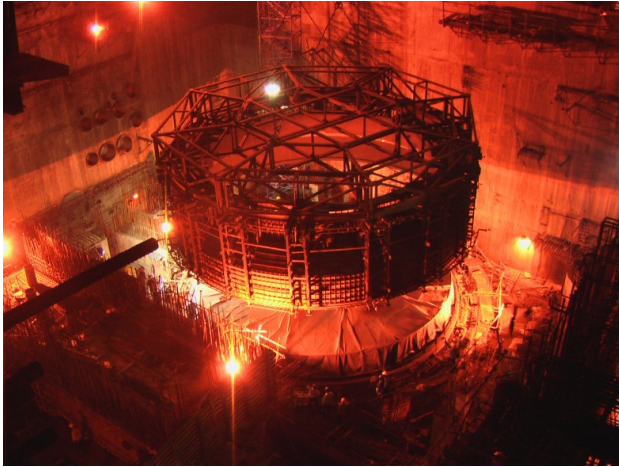
Transportation and Handling



## Mock-ups

## Precision





**Equipment Erection in Parallel to Construction**  
**Sodium Transfer in Parallel to Civil Construction**







