

INSAG FORUM 2020

Implications of COVID 19 Pandemic  
on Nuclear Facilities:  
Indian Experience

Shridhar Chande, India

# Background

- All of us, around the world, are facing unprecedented circumstances due to the pandemic of COVID 19
- Millions of people around the world are affected
- All our normal activities have been suspended or severely affected.
- Businesses, factories, educational institutes as well as transport and travel have been affected around the world.
- However, as reported by the IAEA and also mentioned in the INSAG letter, the Nuclear facilities, particularly the NPPs around the world have managed to keep operating safely, providing much needed electric power
- This presentation shares the Indian experience about the problems we faced and how we managed to keep the nuclear plants operating

# Status of Nuclear Power in India

- The current nuclear fleet in India consists of 21 operating NPPs, at *seven* locations, owned and operated by **NPCIL**
  - BWR 2 units of 160 MW
  - PHWR 15 units of 220 MW
  - PHWR 2 units of 540 MW
  - PWR 2 units of 1000 MW
- A 700 MW PHWR has just gone critical and would be operational soon
- In addition, 6 NPPs : 3 units of 700 MW PHWR, 2 units 1000 MW PWR and a Prototype fast reactor, are under various stages of construction

Further to support these NPPs, there are associated nuclear facilities for mining, ore processing, fuel fabrication etc.

# Initial Response to COVID19

- The Government of India imposed complete lock-down , over whole of India, on 24th March, closing all schools, colleges, offices, factories, workshops, intercity and intra-city transport and movement of people, except for medical emergencies and other essential services
- Initially , the lock-down was for 21 days, but was extended in phases for about three months.
- **AERB** also alerted all Licensees asking them to ensure safety of their installations while implementing COVID 19 prevention/protection measures
- AERB also shared information received from IAEA with Licensees

# Initial Response to COVID19: NPPs-(1/2)

- Informed all employees of COVID 19 prevention/protection measures to be adopted
- Curtailed number of employees to minimum needed for safe operation of the plant and maintain essential services at the plant and *the township*
- All other staff was asked to work from home and be ready for call duty
- All seminars, meetings, trainings and visits cancelled, essential meetings through video conferencing
- All travel banned except for emergencies
- Canteens, crèches, gyms, pools closed
- At work places, social distancing, masks and frequent sanitisation of panels and work stations was ensured

# Initial Response to COVID19: NPPs-(2/2)

- All planned outages/preventive maintenance deferred, essential maintenance optimised
- Access control by RFID cards instead of biometric control; temperature monitoring/hand sanitisation at the gate
- Transport buses sanitised after every trip, only limited number of people per bus
- Arrangements at plant site to house essential staff for prolonged period, if it becomes necessary
- Isolation ward established at site hospitals
- All employees returning from outstations to undergo medical examination, quarantined if there are any flu like symptoms
- Transport of essential material and equipment with special permission of authorities

# Response to COVID19: AERB

- At AERB, the safety review and assessment activities remain fully functional with following measures
  - Limited staff comes to office , the majority working from home
  - Continuous communication with plants through telephone, periodic reports, video conferencing
  - ***On site observers***, provide on the spot assessments of safety status of the plant, carry out necessary inspection and provide inputs to AERB head quarters
- Review of all safety proposals including Commissioning activities was successfully carried out
  - Internal review by staff meetings (held with COVID precautions)
  - On site observers witnessed the important commissioning tests and provided inputs
  - Expert Advisory committee meetings and the Board meeting held through video conferencing

# The current status

- It is gratifying to note that , in spite of the constraints imposed due to COVID, the NPPs have been operating normally
- The commissioning of a newly constructed 700 MW PHWR is proceeding normally, with required reviews/clearances from AERB
- Work at NPPs under construction was stopped during the initial period to ensure safety of large number of workers
- All associated fuel cycle facilities, faced some initial difficulties, but tweaked their processes and continued to operate normally
- There has been no difficulty in regular supply of radiopharmaceuticals for medical purposes
- At AERB, all activities related to safety monitoring, reviews and clearances continue uninterrupted



# We are still passing through the Pandemic

- From July, there has been gradual relaxation of lock-down
- By September first week almost all commercial activities have been started , barring some restrictions such as on travel and large gatherings
- As a result the spread of COVID continues unabated, and the situation is likely to continue for some more time
- Under these circumstances, the main concern is to protect people, and in our case the focus is on the work force at the NPPs

# Action plan to continue operation on longer time frame

- The normal operation of NPPs can be continued safely under the current and near foreseeable future.
  - *For PHWRs, the refuelling is continuous normal operational activity and poses no problems*
  - *For non-PHWR NPPs refuelling needs shut down but has been carried out when due , without any significant problem, though it took little longer*
- However, to ensure reliability and safety for continued long term operation, certain surveillances tests , ISI and PM activities, **requiring shut down**, have to be carried out. Current practice calls for a shut down, once every two years
- Normally 10 to12 such **Biennial Shut Downs** (BSD) are planned in a year.

# Constraints for taking up major shutdown activities

- Mobilisation of expert manpower (from other units, and in some cases from equipment suppliers) and contract workers in large numbers
- Timely delivery of spares, equipment and other required material
- The main concern is to protect the plant staff and the contract workers from the Pandemic
- Implementing COVID prevention measures for increased manpower during work
- Monitoring, Testing and Quarantine facilities for large numbers

# Deferring the BSD

An exhaustive review of the safety status of the unit is carried out

- Findings of the previous three surveillances and ISIs
- Operating performance of safety and safety related systems
- Performance of equipment based on results of on-line condition monitoring, surveillance tests and any preventive maintenance carried out
- Chemistry performance of major system fluids
- Fuel integrity by Iodine monitoring
- Integrity assessment of PHT, moderator and containment by leakage monitoring/trending
- Radiological conditions in various areas of the plant

Based on positive outcome of the review a BSD can be deferred with approval of RB

# Planning BSD

If however BSD becomes necessary during this period it will be carried out with following arrangements

- Ensure availability of all required spares, equipment and supplies
- Ensure availability of experts and contract manpower
- Following protective measures will be implemented
  - Testing all new workers to ensure that they are COVID negative
  - Training and awareness regarding COVID guidelines
  - Arrangements to house them separately near the plant-site
  - Augment transport arrangements
  - Arrangements to monitor workers and quarantine them if needed
- The work will be done with all precaution and protection measures as indicated earlier
- The schedules will be prolonged if necessary

# In Summary

- The operation of NPPs and related nuclear facilities has continued normally and plans are in place to continue the operation under the prevailing conditions
- BSDs, where essential, are being taken up with proper planning. *Currently BSD is in progress at two NPPs*
- Commissioning of a new NPP is in progress with required reviews, monitoring and approvals from AERB. The plant achieved criticality on 22<sup>nd</sup> July and expected to go on power shortly
- The work at NPPs under construction was halted initially, but has now resumed though at slower pace due to shortage of adequate skilled and unskilled manpower

Thank you for your attention