**Proposal for benchmarking schedule for the areas SAM and EP & stress test**

The benchmarking program will be conducted in five working days beginning from 11 January 2016 up to 15 January 2016. The proposal of Bushehr Nuclear power plant for the conduction of the benchmarking program is as follows. Since we do not know the conditions of the plant, therefore it is kindly requested that the program be corrected in accordance with the conditions and possibility of conduction. Also hours and time necessary for each question or program should be corrected by the host representatives considering the conditions.

As the flight schedule and necessary preliminaries have not been determined yet, it is requested that three weeks be considered for issuing the letter of invitation (one week before and one week after working program).

The working language of benchmarking program can be English and Russian. Some of the participants have good command of English and some of them have good command of Russian. Therefore I think there would not be any special problem in this regard.

Please keep us informed of the results after your correction of the program and contemplation about it.

**BM Schedule:**

**2016.01.10 : Arrive at hotel and accommodation**

**First day 2016.01.11:**

1- Opening meeting+ acquaintance and giving presentation about general status of the plant

2- Giving presentation of the process of establishing the SAM and EP system

3- Giving presentation about current status of EP and SAM

4- SAM strategy

**Second day 2016.01.12:**

1. Managerial documents and internal and external communications during accident
2. SAM procedures and guidelines
3. Paying visit to crisis center inside the plant
4. Paying visit to the emergency equipment – storehouses related to necessary instruments in emergency
5. Paying visit to safety systems and the location of the connections of the SAM equipment to these systems

**Third day 2016.01.13:**

1. Drills and scenarios related to EP and SAM
2. Emergency operation teams, technical support inside and outside NPP site during accident
3. The process of modernization and application of equipment related to EP and SA
4. Periodical tests , maintenance of the EP and SA equipment
5. Paying visit to MCR

**Fourth day 2016.01.14:**

1. Paying visit to simulator and the training process of the MCR staff and training scenarios
2. Paying visit to crisis center outside the site and its equipment and facilities

**Fifrth day 2016.01.15:**

1. Talk and Discussion about the unfinished and the remaining areas.

**2016.01.16 : leave the hotel and departure**

**The issues which are proposed for be addressed and discussed:**

1. Procedure of controlling the accident related to reactor and procedure of controlling beyond design accident. The type of these procedures. (Are the procedures symptom-based or event-based?)
2. Process of transfer from design-base accidents and beyond-design base accidents to procedures and guidelines of severe accidents (SA)
3. Structural organization during accidents
4. The process of calling the emergency operation teams
5. Technical support during accident and the process of receiving technical support during accident inside and outside the site
6. Paying visit to crisis center inside the site and, if possible, crisis center outside the site
7. Dividing the duties during the accident
8. The process of developing and approving the SAM strategies and SAM guidelines
9. Drills and trainings planned in the area of EP and SAM
10. Training the staff of MCR staff in the area of SAM
11. Paying visit to simulator and training the staff of MCR in the area of SAM
12. Paying visit to equipment which are related to EP and SAM
13. Modernizations performed for the establishment of SAM
14. Communication between technical support group or committee and crisis center and operational teams and MCR
15. Communication instruments in during accidents
16. Paying visit to MCR and locations which have been modernized and portables can be connected there.
17. Modernization implemented in the area of I&C
18. Periods of test and technical service and maintenance and procedures related to the equipment EP and SAM
19. Sources of internal and external accidents considered in SAM strategies
20. Management of reactor core during accident and management of spent fuel pool
21. Making use of normal operation systems and safety systems during accidents
22. Emergency operation teams related to repairs and organizing them
23. Potential threats to plant ( natural events) and how to take them into account in the EP and SAM programs
24. Strategy of the plant regarding every one of these equipment
25. Updating the documents related to EP and SAM
26. Submission of NPP conditions to the head of technical support group
27. The number of staff participating in the emergency operation teams and during accident
28. Training the technical support staff and repairs and operational teams
29. Training scenarios for operators- technical support and repairs
30. Criteria for evaluating the trainings and drills performed
31. Lessons learned from drills and scenarios
32. Requirements of crisis center and its equipment and facilities
33. NPP staff shelters
34. Technical services and testing the communication instruments during accidents
35. Equipment and facilities related to emergency operation tests ( repair instruments and storing them) , visits to storehouse
36. The process of changing the working shift during accident and all the managerial documents related to accident conditions
37. Communication with RCC. Has any drill been performed in this regard?
38. Questions about portable and electrical equipment:

-What are the equipment and systems for emergency power supply in addition to diesel generator?

- Have the consumers which are to be run during accidents been designated?

-Have special scenarios been anticipated for different accidents in a way that according to those scenarios it will be determined that which system or equipment should be electrically supplied?

 - For how many hours of function the fuel reserve of diesel generator has been anticipated?

 - How the cable connection between feeding source and consumers is provided when it is necessary to use emergency power?

- Since the consumers have process-based protection, is any procedure available for dealing with the signals when the consumer is electrically supplied from the emergency feeder?

 - Are there special feature other than features designated for safety trains?

 -Is the location of the emergency power supply equipment temporary or permanent when they are needed to be used and based on the different scenarios?

 -What about the speed of power loading of diesel generator? Is it step by step or is it connected to power all at once?

 -How are technical services performed?

 -Has any group been designated for performing technical services of these equipment in the NPP operation structure? Or has it been added to the current job description?

1. What are the main consideration and key points in selecting the storage location of emergency mobile equipment? (As an example on site vs. offsite storage, distance from main buildings , etc).
2. What is the worldwide dominant approach regarding storage of mobile equipment inside a building vs. storage in open areas?
3. In case of storing mobile equipment inside a building, what are requirements of the storage building (especially in terms of seismic stability )?
4. In case of loss of ultimate heat sink, what are the key points and considerations in utilizing on site water sources , determining priority and requirements of utilization of candidate water sources in terms of volume, stability , accessibility, etc.?
5. Familiar with conceptual and basic design of water injection into the steam generator, spent fuel pool and primary circuit by mobile diesel pump during severe accident condition.
6. Using mobile diesel generator for providing the electrical power source into important safety system and equipment of plant during the SBO.
7. In stress test program, how the residual heat form the core can removed through feeding (supplying) water to related systems and equipment ? In this case, is it possible to use fixed pipelines from feeding of water into the equipment which are located in reactor building? Could new penetrations through buildings of safety class I (i.e. annulus) to be considered as an option and this will challenged the safety requirement of systems and equipment?
8. What is the main criteria for direct injection of water into the primary circuit through mobile equipment, during the stress test program? (for instance, coolant level in reactor , cladding temperature, time, etc.)
9. What are the probable scenarios for losing accessibility to the ultimate heat sink?
10. In case of necessity or injection of water into the primary circuit by mobile equipment :
11. Is it necessary to inject primary circuit with borated water for a long duration?
12. If yes, what are the provisions and methods to provide borated water from available demineralized water sources during the accident condition?