IAEA/UNDP-CPR/91/221 - 12
Technical Report 12

MANPOWER DEVELOPMENT FOR SAFE OPERATION OF NUCLEAR POWER PLANT

CHINA

EMERGENCY OPERATING PROCEDURES

UNITED NATIONS DEVELOPMENT PROGRAMME
INTERNATIONAL ATOMIC ENERGY AGENCY

VIENNA 1994

IAEA/UNDP-CPR/91/221
Technical Report 12

MANPOWER DEVELOPMENT FOR SAFE OPERATION OF NUCLEAR POWER PLANT

CHINA

EMERGENCY OPERATING PROCEDURES
(Activity: 5.1.4 - Task-11)

Report prepared for
the Government of China

by

the International Atomic Energy Agency
acting as Executing Agency for
the United Nations Development Programme

UNITED NATIONS DEVELOPMENT PROGRAMME
INTERNATIONAL ATOMIC ENERGY AGENCY

VIENNA 1994

END OF MISSION REPORT

CPR/91/221 - ACT. 5.1.4 (CPR/4/015-11)

TASK TITLE: **EMERGENCY OPERATING PROCEDURES**

EXPERT: **LAWRENCE A. WALSH**

This report covers the period of engagement from July 11, 1994 through July22 ,1994. The events and topics of discussion are as follows:

1. Agenda preparation
2. Plant tour
3. Formal presentations (Lectures)
   a). History of Emergency Operating Procedure EOP Development
   b). Emergency Operating Procedures (Event Based,Critical Safe Function Status Trees and Functional Recovery Response Procedures)
   c). Verification and Validation
   d). Transition from Emergency Operating Procedures to Severe Accident Management Guidelines (SAMG)
4. Special topic discussions (EOP , s)
   a),. Reactor Coolant Pump Trip Criteria
   b). Pressurized Thermal Shock (PTS)
   c). Anticipated Transient Without Scram (ATWS)
5. Special Topic Discussion (SAMG' s)
   a). External Vessel Cooling
   b). Direct Containment Heating (High pressure melt ejection)
   c). Steam Explosions
   d). Steam Generator Tube Creep
6. Question and Answer Sessions
7. Summary Session

Upon arrival the first work day was spent developing an agenda of events and presentations for the two week period. This was followed by a plant tour. I was very pleased by several things that I saw Because of their company self design,I believe they gave themselves sufficient space for ease maintenance of components both large and small. The control board layout was well designed. The board was spacious and had good mimics. Additional the amount of personnel in

the control room could handle any situation, If there is acceptance of the Westinghouse Owners Group Type procedures,manpower. in the control room will not need any changes. The plant looked very clean and well maintained.

The formal presentation took a full five (5) days. The attendance varied from a maximum of 30 to a minimum of 18. The number was dependent on there daily responsibilities. A strong interest was evident on the use of computer analysis, as was the case in procedure development in the US. There was an even stronger interest in simulator usage for procedure validation and operator training. During the procedure presentation the following attributes were presented:

a. the reference plant used for procedure development
b. the instruments necessary for procedure usage
c. the format of procedures
d. the suggested style for procedure writers
e. the rules of usage for the operators

When the procedures were presented, each had three areas of presentation, purpose, entry conditions and general steps for plant recovery.

To elaborate on the differences between a generic set of procedures and a plant specific set, two Seabrook Nuclear Power Plant procedures were covered in detail. One event based procedure and one symptom based procedure were covered. During this discussion the concept of instrument decalibration was review. Seabrook station has evaluated certain instrument drift due to containment harsh environment. They have establish setpoint for normal and adverse containment conditions. The last formal lecture dealt with the transition from EOP to Severe Accident Management Guidelines. This program is at its completion in the U. S. for all pressurized water 'reactors owners groups, and within the year for 'the boiling Water reactor owners group. For the sake of comparison, I presented the Babcocks and Wilcox overview, the Combustion Engineering overview and with a little more detail of Westinghouse Owners Group Programs. Two guidelines were reviewed on step by step bases . During this discussion there were many questions as to the need and the composition of a Technical Support Center. I therefore described Seabrook Station' s Technical. Support Center and added a description of our Emergency Plan for communication and assistance the outside agencies and state representatives.

The special topics presentations were not detailed, but general descriptions. No physics calculation were shown, but we used graphical presentations to justify the theories. They were described as best engineering judgement conclusions.

During the question and answer portion of the programme the majority of the questions were in the area **of** the tube rupture procedure. Additionally, Natural Circulation Cooldown with a void in the vessel head was discussed. This discussion brought out several questions dealing with the Reactor Vessel Level System.

In summary, I believe the mission was very successful. The group asked good engineering questions and the operators specificly showed a strong understand of all the presentations. The question that were asked showed a proper level of concern for the safety of the plant. I believe this mission confirmed concept already understood by the Qin Shan plant personnel. One area that I would recommend for-follow up would be on information showing different computer models for nuclear plant performance. If integrate procedures are to be developed,a good analysis program will be necessary. Therefore the presentation of computer programmes that model varies aspects of plant performance will' be necessary for adequate procedure development. Secondly,the lectures and discussion the past two weeks have been mainly on the Westinghouse Owners Group procedures. Additional experts should be sent to discuss other types of EOP. The French programme has some similarities to the WOG EOP' s and would be a good following lecture for evaluation of the two different types. My next recommendation would be that once the Qin Shan group is established for procedure development,some expert visitations should be considered for further assistance during stages of development. If possible assistance with visitations **for** Qin Shan NPP personnel to see EOP ' s in use at active simulators and also discussion with personnel who have validated their procedures on a simulator. If QinShan completes its simulator project prior to completing the full set of EOP, then the best method of validation and operator training will be that simulator.

. The Qin Shan Nuclear Power Plant management group wants to develop an integrated set of EOP's, but is concerned that they are not sure which type to develop.They know that there are different types available but have nothing to compare with. While there desire is strong,I think additional presentations would be extremely helpful. If there is any other information that I can supply you please contact me.

Regards

Lawrence A. Walsh.