MEMORANDUM
US NRC RESIDENT INSPECTOR OFFICE
VERMONT YANKEE

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DATE: March 22, 1982

FOR: File

FROM: William J. Raymond, Senior Resident Inspector, VY

SUBJECT: TRIP REPORT - IAEA ASSISTANCE TO CNEN

BACKGROUND

The Government of Brazil requested technical assistance from the International Atomic Energy Agency (IAEA) in connection with the startup of the country's first nuclear plant at Angra dos Reis (Angra I). The request was approved under the IAEA regular program for technical assistance in 1981 under Project BRA/9/015-07, providing for expert services in various technical disciplines in the field of nuclear safety. The NRC cooperated in the technical assistance program by providing several experts and consultants to the Brazilian Nuclear Energy Commission (CNEN) in the areas of pre-operational testing and inspection; startup testing; operator licensing; instrumentation; electrical inspection; initial criticality; health physics; and, radwaste systems operations.

The purpose of the author's assignment was to provide CNEN with assistance in the review of the Angra I low power core physics measurements and to provide consultation to the CNEN staff on the inspection of initial startup program procedures, test execution and results evaluation. The area of Low Power Physics Testing (LPPT) and results evaluation was addressed extensively to assist in the development of an inspection program.

The assignment began on December 7, 1981, at CNEN Headquarters in Rio de Janeiro with a review of the Angra I, Cycle I core design and performance characteristics, along with the procedures to be used for the low power physics measurements. This effort was continued starting December 9, 1981, at the Angra I site to afford access to the facility, plant records and FURNAS personnel, the operators of the facility. An informational and familiarization tour of portions of the facility was conducted.

While at the Angra I site during the period from December 9-17, 1981, a seminar was held to discuss the conduct and inspection of initial startup tests. A joint seminar presentation to all CNEN site personnel was given with Mr. P. J. Kellogg of the NRCs Region II Office, who was on a concurrent mission to CNEN. The seminar was supplemented by a four day working/review session with three CNEN representatives to discuss low power physics measurements and procedures in detail. Comments arising from the LPPT program review were presented to FURNAS representatives for consideration and were summarized at an exit meeting held with Angra site upper management representatives on December 17, 1981. Both the seminar and working sessions served to identify areas of importance that should receive inspection emphasis while testing is in progress.

The assignment concluded on December 18, 1981, at CNEN Headquarters with discussions with the CNEN staff on inspection program implementation and confirmatory analyses to verify Angra I nuclear design characteristics.

GENERAL OBSERVATIONS

The following comments stem from some general observations made during the trip and are offered for consideration in regard to future NRC cooperation in the Brazil technical assistance program.

A. NRC assistance has been and will continue to be beneficial to CNEN in the formulation and development of its regulatory programs, particularly in the area of low power physics and startup testing. This conclusion is based on CNEN comments as well as the author's observations.

B. CNEN has brought together a commendable group of talented, theoretically-orientated professionals in the area of core design and analysis, whose most obvious shortcoming stems from a lack of experience in the practical aspects of plant startup testing and operations. This lack of experience appears to make it hard at times for the CNEN staff to differentiate between more important items and those of lesser significance. Continued NRC assistance can serve to identify important issues and direct CNEN resources toward their resolutions. Additional assistance in LPPT program results evaluation and startup program test methodologies, execution and evaluation would be beneficial.

   Notwithstanding the above, it was found that, overall, the Initial Criticality and LPPT procedures were technically correct and would result in an acceptable zero power physics program that meets the stated objectives. Comments provided to CNEN/FURNAS for consideration concerned suggestions to make execution of the low power test program safer and more efficient.

C. In addition to the above assistance on technical aspects of startup testing, CNEN can benefit from NRC guidance to establish and implement a viable inspection program for startup testing, and beyond that, for routine operations as well. This assistance is required in spite of the fact that CNEN has had the IE Manual and its associated 2500 series inspection procedures for some time. My impression was that the sheer size of the IE Manual and its apparent complexity has inhibited any serious attempts to study, extract and implement the program procedures. Further NRC assistance can serve to instruct CNEN staff in the organization and use of the IE Manual and provide guidance on inspection program implementation under 2514 and 2515.

D. The timing of the trip to review the LPPT program and procedures was appropriate. All LPPT procedures had been approved and issued for testing by FURNAS and initial criticality was expected to occur in December, 1981. The original CNEN plan was to schedule this visit to allow test witnessing and LPPT results review of testing in progress. The delay in initial criticality beyond January, 1982, was attributable, in part, to unforeseen problems with the Westinghouse D3 steam generator.

E. I recommended to CNEN that they obtain further technical assistance on the review of Initial Startup Test Program results and Inspection Program implementation. The assistance would involve one expert for a minimum period of three weeks, on an assignment scheduled at or near the completion of the 30% power test plateau. The purpose of the assignment would be to provide assistance in the review of completed LPPT program results and testing completed during the initial phases of power ascension, and to provide assistance in the planning of inspections for the remainder of the power ascension program.

F. The number of experts requested by CNEN in the past and the duration of the assignments appears appropriate - examples are one person for one month to review the pre-operational program; one person for 2 weeks for initial criticality and post-core load hot functional testing; and, this assignment for two weeks to review LPPT. CNEN perhaps could have asked for another person concurrent with this visit to review the power ascension program (or alternately, one person for a longer period to cover both areas); but, if the overall adequacy of the LPPT program procedures is indicative of the quality of the power ascension procedures, then the additional assistance I recommended in E above should suffice.

G. If (or when) CNEN requests assistance for the 2515 phase, I believe an additional 1.5 man-months would be required to clean-up startup program reviews and help CNEN off to a good start on operational inspection. The assignment time could be provided by either one individual who could cover both areas or be split between two or more specialists.

H. It is difficult to quantify the direct benefits to the NRC from participation in such technical assistance programs, since the technical aid and flow of information is principally one way - to the developing agency. But, some general considerations may apply. The collective missions of NRC personnel who participate present a forum for the exchange of ideas, information and technical data, plant operation and regulation of the industry. This forum also provides the opportunity for exchanges that could enhance new insights and perspectives on identified safety issues. Also, the NRC benefits indirectly through the professional development of its staff and the broadened personnel experiences and perspectives offered by participation in the program.

Overall, I would say that NRC stands to benefit from continued participation in the technical assistance program.

for/ Eileen C. Lawrence
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