General Electric Advanced Technology Manual

Chapter 1.0

Introduction

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1.0 INTRODUCTION

1.0.1 Course Description

This 2 week classroom course provides a working knowledge of the General Electric (GE) BWR/4 design with emphasis in the following areas: systems interrelationships; analysis of integrated plant response to normal operating and transient conditions; technical issues; plant procedures and their applications; facility abnormal events; and technical specifications including limiting conditions for operation, limiting safety system settings, safety limits, and bases. Presentations include analysis of transient curves and data from actual plant events to show integrated facility operation during normal and transient conditions. Technical specifications, plant procedures, actual plant events, and technical issues are discussed.

1.0.2 Course Objectives

The GE advanced technology course is designed to provide the student with practical exercises to reinforce the ability to recognize and analyze system responses to normal, abnormal, and emergency transients. This purpose is accomplished by providing lectures, case studies, transient responses, and technical specification examples with emphasis in the following areas:

- Technical issues
- Analyses of integrated plant responses to normal operating and transient conditions
- Facility abnormal events
- Technical specification utilization
- Major differences in Boiling Water Reactors
  - reactor isolation and inventory control
  - emergency core cooling systems
  - containments

Students are required to prepare for the lectures by reading the appropriate course material, by participating in practical exercises, and by responding to questions during lectures.

Students will demonstrate understanding of the course material in a comprehensive final examination by:

- Analyzing conditional points on transient curves and changes in plant/system state given specific initial conditions;
- Answering questions concerned with industry issues and events; and
- Using technical specifications and their bases to determine the status of plant/system/component operability and required actions.

1.0.3 Use of the Manual during Course Presentation

Proper use of the manual during class presentations can greatly aid the student in understanding the material presented. The student should follow the presentation using the figures and diagrams provided. Properly noting minor and major points on these figures should eliminate the necessity for taking comprehensive notes during the lecture.

1.0.4 Conduct of Operations

Each utility provides guidance and instructions to ensure shift operations are conducted in a safe and conservative manner and in accordance with plant operating licenses, plant procedures, and applicable regulatory requirements. This guidance can be disseminated as a single administrative procedure or may be contained in several topic-specific procedures. Students are presented with a typical Conduct of Operations procedure which contains direction for a number of operational aspects and processes including the use of human performance tools, operations shift staffing and responsibilities, risk management, reactivity management and equipment status control.

1.0.5 Case Studies

Case studies are presented to reinforce use of Technical Specifications and transient responses as well as lessons learned from technical issues and plant events. Operator logs, corrective action documents, operability determination evaluations and other licensee documents are presented and the students will discuss the regulatory impact and potential courses of action that an NRC inspector might engage in to further investigate the situation and resolve it.

1.0.6 Technical Specifications

The requirement for including Technical Specifications as part of the license application is set forth in 10 CFR 50.36. The NRC-approved Technical Specifications are issued to the facility as part of the operating license. The Technical Specifications establish minimum operating limits for the facility.

The format for technical specifications evolved over time. There are three technical specification formats that are currently being used. The oldest of these formats is called "custom" technical specifications because the format that was used was decided by the individual utility. In the mid seventies, the format for technical specifications was changed to a Astandard@ format. The third version of technical specifications is the improved Standard Technical Specifications (STS), documented in NUREG-1433. Revision 3 of the STS incorporates the cumulative changes to Revision 1 and 2, which was published in April 1995 and April 2001, respectively. It incorporates the cumulative changes resulting from the experience gained from license amendment applications. Many licensees have or plan to convert to these improved Standard Technical Specifications or to adopt partial improvements to existing technical specifications.

For the purpose of this course, the improved standard Technical Specifications will be used and will be provided as an open reference in both the lectures and examination.

1.0.7 Technical Issues

As operating experience was gained and tools became available to better understand potential risks, certain plant performance issues have developed which require additional regulation and/or inspection. The technical issues provided in this manual are certainly not all inclusive, but try to capture some relevant issues that impact current regulation and/or inspection efforts. In addition, some issues and/or processes are presented to help understand how utilities comply with regulations, including operability determinations, emergency planning and dry cask fuel storage.

1.0.8 Transients

The transient curves contained in this manual were compiled and analyzed by members of the NRC's Technical Training Division and were produced from data supplied from the GE BWR/4 Simulator. Caution is advised when trying to apply these simulator curves to any operating plant. Even relatively minor changes in set points, capacities, or operating history could cause significant differences in indicated responses. The student should concentrate on understanding changes in various parameters caused by the initiating event, subsequent automatic operation of associated control systems and system response to the event.

1.0.9 BWR Differences

The seven week BWR full series is based on BWR/4 design. Significant differences in earlier and subsequent designs are presented. Significant deviations from the “standard” design may be present at each individual plant. The purpose is to provide the student with an overall familiarization of BWR design. It should not be inferred that all BWRs of a specific type are identical.

1.0.10 Plant Events

Certain plant events have significantly impacted the regulatory environment. Several of these events are contained in the manual to allow the students to understand the circumstances surrounding the event, what caused the events and any lessons learned and/or changes in regulation that occurred as a result of the events.