



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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AUG 23 1991

MEMORANDUM FOR: Thomas M. Novak, Director
Division of Safety Programs
Office for Analysis and Evaluation
of Operational Data

FROM: Jack E. Rosenthal, Chief
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Division of Safety Programs
Office for Analysis and Evaluation
of Operational Data

SUBJECT: HUMAN FACTORS STUDY REPORT - DIABLO CANYON 1
(5/17/91)

On May 17, 1991, at 6:28 a.m., Diablo Canyon 1 tripped from 100% power because of an error by an instrumentation and controls technician. The technician took a nuclear instrumentation channel out of service with another channel already out of service, and this satisfied the necessary 2-out-of-4 trip logic. Following the reactor trip, multiple steam dump valves failed open causing an excessive cooldown and depressurization of the primary system, which initiated a low pressurizer pressure safety injection.

As part of the AEOD program to study the human factors aspects of operational events, a team was sent to the site May 29. The team leader was George Lanik of AEOD; other team members were Gene Trager of AEOD, and Harold Blackman and Bill Steinke of Idaho National Engineering Laboratory. The team was at the site for two days and gathered data from discussions, plant logs, strip chart recordings, and interviews of plant operators.

Enclosed is the report prepared by INEL of the results of the human factors study. Specific human performance aspects of this event are addressed in this memorandum.

Teamwork

This event provided an example of effective teamwork and factors contributing to effective teamwork. The control room crew worked quickly and effectively in responding to the trip and the safety injection, in spite of the fact that a normal member of the team was missing. The abnormal cooldown was identified and an appropriate response determined considering input from a number of team members. Decision making was not involved in terminating the safety injection, because that action was directed by the emergency operating procedure. The response was aided by team training in the use of the procedures.

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Shift Structure

The shift structure and manning were adequate to respond well to this event, primarily because of good teamwork. The control room crew members quickly assumed their emergency roles and made adjustments to perform the activities normally performed by the utility senior control operator (licensed SRO). The licensed control room operators felt their performance was adversely effected by the limited capabilities of the unlicensed assistant control operator, who does not receive reactor operator training and does not train with the crew on the simulator.

Human Factors of Surveillance Testing

A number of factors contributed to the error by the shift control technician that resulted in the reactor trip. The calibration procedure did not follow guidelines that would have made the error less likely, the technician had not completed training in self-verification, and the goal of completing the surveillance before shift change may have created a time-based stress. In addition, the technician was without direct supervision although still in training. This is another example of how factors such as procedures, training, stress, and supervision can adversely effect on-line surveillance testing.

Man-machine Interface

The control room annunciator system acknowledge circuit causes all blinking annunciator tiles to go to solid illumination and silences the alarm. There is pressure to silence the annunciator, because the sound can be irritating and distracting and can interfere with communications. Since the single acknowledge circuit effects all the alarms, there is an increased possibility that an incoming alarm may not be detected. Alternate annunciator system designs divide the alarms into groups that have separate audible signals and acknowledge circuits. San Onofre is considering a control room annunciator system redesign.

EOPs Complicated by Equipment Problems

Equipment problems can complicate the decision making and actions necessary to carry out an effective emergency response. However, equipment problems should be anticipated and provided for in emergency operating procedures and in training. This can help ensure effective operator performance.



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Thomas M. Novak

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Post Trip Event Review Process

At the conclusion of the event, the operators and other involved personnel were required to give written individual statements on what they recalled. However, the statements were sometimes quite terse, perhaps because they were written following shift turnover at 0800 am. The statements contained notes on observations, but did not comment on how the event might have been avoided or how the response might have been improved.

This report is being sent to Region V for appropriate distribution within the region.

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Enclosure: As stated

cc: John Townsend, Station Manager
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