

**ANALYSIS OF CORRECTIVE ACTION DATA FROM TRIAL PROGRAM ON
PROGRAMMATIC PERFORMANCE INDICATORS**

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Introduction

The Nuclear Regulatory Commission (NRC) is considering the use of cause codes as performance indicators (PIs) to monitor licensee performance. In conjunction with the cause codes, corrective action codes are also under consideration to describe licensee corrective actions for problems as represented by the cause codes. The set of cause codes and corrective actions employed in a trial program to assess their usefulness included:

<u>Causes</u>	<u>Corrective Action</u>
Administrative Error	Training
Design/Installation/ Fabrication Error	Procedure Modification
Random Equipment Failure	Discipline
Licensed Operator Error	Management Change
Other Personnel Error	Design Modification
Maintenance Error (2 types)	Equipment Replacement/Adjustment

These causes were selected to represent a broad range of licensee programs, hence the designation of programmatic PIs, that could be monitored in a systematic manner to identify trends in performance. They should establish a basis and focus for further investigation of a particular programmatic area if undesirable trends are evidenced.

The effectiveness of cause and corrective action data for potential inclusion in the PI program will be measured in terms of (1) identifying additional insights not otherwise discerned from other sources, and (2) furthermore determining if the insights are "early" or "leading" indicators. The trial program specifically addressed three questions relative to the use of cause and corrective action codes to follow the operation of commercial nuclear power plants:

Can cause/corrective action coding

- (1) identify weaknesses in licensee programs?
- (2) predict the likelihood of serious events?

(3) monitor the effectiveness of the licensee's corrective actions to identified problems?

The results from the trial program indicated that the cause codes provided additional perspective in identifying adverse trends and in being able to characterize the trends since the cause codes are of a programmatic nature. The cause codes were determined not to provide predictive capability but did appear to provide timely indication of potential improvement or degradation in performance. This paper reviews in more detail the results and observations from item 3 to assess the effectiveness of licensees' corrective actions.

Review of Events and Compilation of Data

In the trial program cause and corrective action codes were assigned to all licensee event reports (LERs) for the first six months of 1988. Each programmatic deficiency was identified through a detailed review of each LER and subsequently was encoded with its attendant corrective action(s) as cited by the licensee. If it was necessary to include more than one cause code to completely identify deficient programmatic areas, multiple cause codes were assigned.

A total of 1226 LERs for the first six months of 1988 was included in this study. Some 1547 cause/corrective action records comprised the database representing these 1226 LERs. The 1547 records breakdown as follows:

- 1226 records, one for each LER
- 181 records affecting a second unit noted in one of the 1226 original LERs
- 140 records which describe a second problem noted in one of the 1226 LERs

The 1547 records describe 1547 distinct problems reported in the 1226 LERs. A total of 2443 cause codes was assigned either individually or in combination to reflect which programmatic areas were involved.

Analysis of Licensee Corrective Action Data

Analyzing corrective actions for cause codes used singly and in various combinations provided meaningful measures of effectiveness of corrective actions. Consideration of the respective cause codes as inclusive causes of all administrative problems or of all licensed operator errors (the collective set of cause code combinations involving administrative control or licensed operator errors) etc., did not yield meaningful results. By analyzing the specific recurring cause code combinations, it became apparent that there are different types of problems occurring at plants based on the nature and type of corrective actions that are employed. When analyzing the corrective actions taken for all plants industry-wide, the corrective actions appear to be reasonable and prudent. When separating the plants into two groups, (1) those with "high" counts in a given cause code category and (2) "all other" plants for the category of interest, a number of differences in approaches to solving similar types of problems were noted between the two groups of plants. Some observations on the corrective actions for particular causes are as follows:

1. Administrative Control Errors. For administrative control errors only (i.e., no other programmatic deficiencies involved), procedures and training were used as corrective actions more frequently for "all other" plants as compared with the plants "high" in administrative errors. The "high" plants used design modifications and equipment replacement/adjustment more frequently than the "all other" plants (Figure 1).

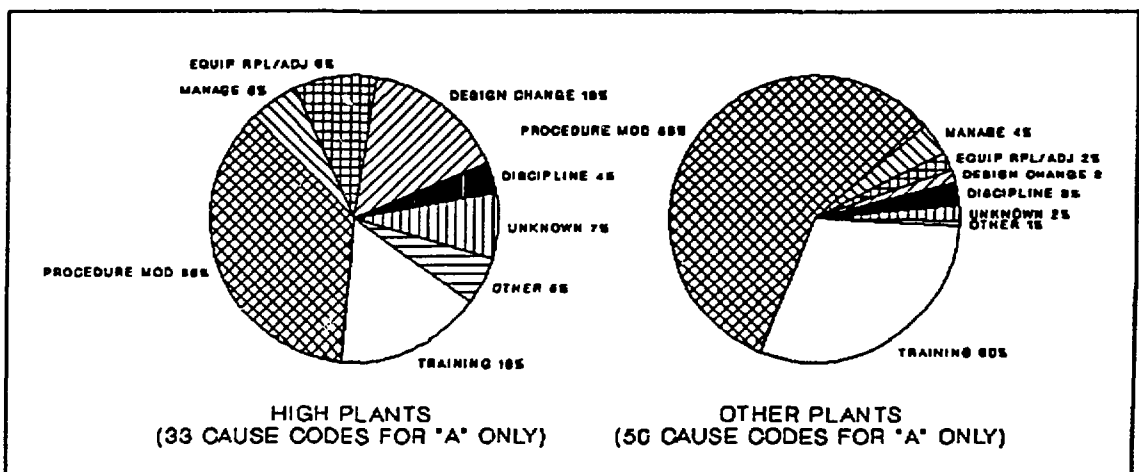


Figure 1 Comparison of Corrective Actions for Administrative Errors Only for "High" and Other Plants

2. Licensed Operator Errors. For events where licensed operator errors were the only programmatic deficiency noted, "all other" plants employed training and revised procedures as corrective actions considerably more often than the plants "high" in licensed operator errors. These "high" plants used corrective discipline at a rate of 15 times more frequently and revised procedures only half as often as the other plants (Figure 2).

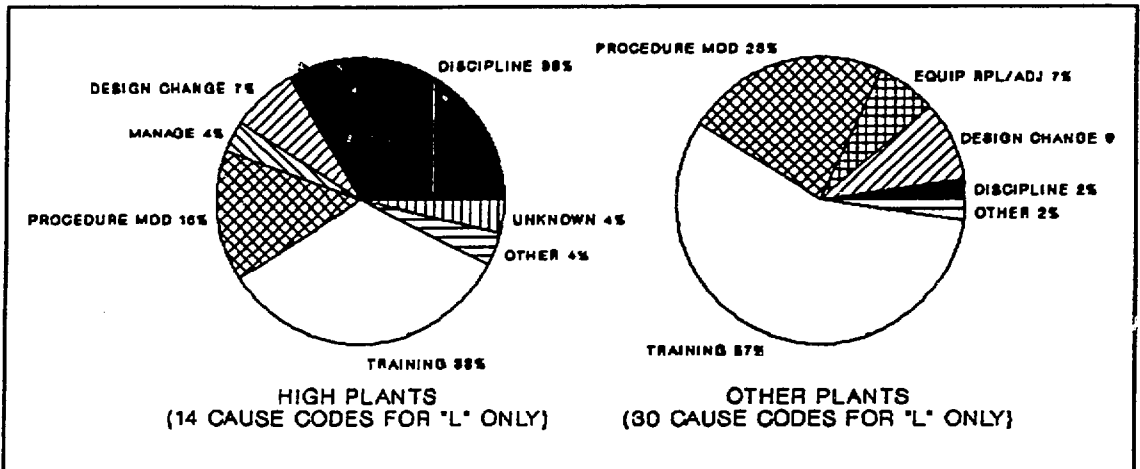


Figure 2 Comparison of Corrective Actions for Licensed Operator Errors Only for "High" and Other Plants

3. Maintenance Errors in Combination. For any cause code combination involving a maintenance cause, the "all other" group of plants employed equipment replacement/adjustment more often than the plants "high" in the cause code combination of interest.

4. Maintenance Errors Alone. For maintenance errors with no other codes used, design changes were implemented as corrective actions more frequently at "all other" plants as compared with the plants "high" in maintenance errors. The "high" plants tended to use procedure modifications more frequently.

5. Other Personnel Errors. For other personnel error cause code combinations, the extent to which discipline was used depended on the cause code combination analyzed. The "all other" group of plants used discipline as a corrective action more frequently than the "high" plants for other personnel errors alone. For the cause code combinations of (1) other personnel and maintenance

errors and (2) for other personnel, maintenance, and administrative errors, the "all other" group of plants used discipline less frequently than the "high" plants.

These observations indicate there is a marked difference in corrective actions taken for similar problems between the two groups of plants. They also suggest that the "all other" plants are taking a more thorough approach in implementing corrective actions as contrasted with the "high" plants. For example, they revise procedures or provide training more frequently and use discipline less often as compared to the "high" plants for personnel errors. For maintenance errors the "all other" plants more frequently replace equipment or modify equipment design as compared to revising procedures as is done at the "high" plants.

The corrective action codes indicate that they could be used to monitor the effectiveness of corrective actions taken at any particular plant and support comparisons among plants.



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Thank you for submitting the summary of your paper "Analysis of Corrective Action Data from Trial Program on Programmatic Performance Indicators". The paper review committee has completed its work and accepted your paper for presentation. It is scheduled to be presented during a session titled Methods and Applications of Root Cause Analysis on August 8, 1989 beginning at 8:30 am. The session chairman is:

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I will be providing you a registration form and additional information concerning the meeting as it comes available during the next several months. Additionally, as the Call for Papers stated, there is a \$165 per page (prorated) charge for preparing each summary for publication. You will be billed for this directly from ANS.

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Again, thank you for your participation, and I look forward to seeing you in Charlotte in August.

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