BNL-NUREG-32502
Conf-830609--5

Human Error Identification and Analysis Implicitly Determined from LERs

BNL-NUREG--32502
DE83 007392

by

W.J. Luckas, Jr., Brookhaven National Laboratory*
D.M. Speaker (Consultant)

As part of an ongoing effort to quantify human error using modified task analysis on Licensee Event Report (LER) system data, the initial results have been presented[1,2] and documented in NUREG/CR-1880[3] and -2416.[4] These results indicate the relatively important need for indepth analysis of LERs to obtain a more realistic assessment of human error caused events than those explicitly identified in the LERs themselves.

Although nuclear power plant (NPP) licensees do attribute certain reportable events with the appropriate LER Cause Code designation of "Personnel Error", many other events have not been assigned such a similarly appropriate LER event cause designation. By reading the narrative portion of a particular LER, personnel error, although not explicitly stated, can in certain instances be implicitly deduced. As an illustrative, yet quite simplistic, example, the failure of a pump due to lack of associated cooling attributed to a manual valve being closed in the cooling water system should properly be designated a consequence of personnel error (either operational or defective procedure/checklist) and not to component failure of the valve.

During the course of the identification and analysis of LER implied human error as documented in NUREG/CR-2417[5] for pump and valve related events and in NUREG/CR-2987[6] for electrical/electronic component related events, over

*This work was performed under the auspices of the U.S. Nuclear Regulatory Commission.

sixty-one hundred (6100) LERs have been carefully reviewed and analyzed without regard to the cause assigned and an independent determination of the cause of the event has been made in each case. These LERs were reported over a four and a half (4-1/2) year period of time between 1976 and 1981. As a result of this extensive review and analysis, over five hundred and seventy (570) LERs have been independently identified as reflecting human error. These uniquely identifiable LERs are listed and categorized in the Appendix of the appropriate NUREG/CR.[5,6]

Since the primary purpose of the human error data base generated by this study has been to provide a realistic assessment of the real human error population obtainable from the LERs as an important ingredient for the production of detailed human error rates (HERs) (from nuclear data and operational experience[1,2,3,4]) and since quantitative comparisons of various categories of errors can easily be misleading or misintepreted, it is important to keep the findings presented in Tables 1, 2, and 3 in perspective when comparing causative agents and/or reactor type. As the opportunities for the LER implied human error found during this study are analyzed, additional HERs will be generated. In the meantime, this study has generated and documented[5,6] many more human errors than those explicitly stated in the LERs by performing a detailed review and analysis of the LER text.

Table 1

Safety Related Valve* Related Human Errors

Causative Agent	Reactor Type PWR	BWR	Total
Maintenance Personnel	30	53	83
Deficient Procedures	28	21	49
Operating Personnel	58	36	94
Technicians/Other Personnel	24	29	53
Totals	140	139	279

*Emergency Core Cooling Systems
Containment Spray System
Auxiliary/Emergency Feedwater System (PWR only)

Table 2

Safety Related Pump* Related Human Errors

Causative Agent	Reactor Type PWR	BWR	Total
Maintenance Personnel	13	13	26
Deficient Procedures	11	8	19
Operating Personnel	24	18	42
Technicians/Other Personnel	12	6	18
Totals	60	45	105

*Emergency Core Cooling Systems
Containment Spray System
Auxiliary/Emergency Feedwater System (PWR only)

Table 3

Electrical/Electronic Component* Related Human Error

Causative Agent	Reactor Type		
	BWR	PWR	Total
Maintenance Personnel	27	33	60
Deficient Procedures	13	11	24
Operating Personnel	15	22	37
Technicians/Other Personnel	9	3	17
Totals	89	86	175

*Main Steam Isolation Systems
Emergency Core Cooling Systems
AC Onsite Power Systems
Fire Protection Systems

References

1. W.J. LUCKAS, Jr. and R.E. HALL, "Human Error Rates - Quantification Method from Nuclear Experience and Data," Trans. Am. Nucl. Soc., 35, 159 (1980).

2. W.J. LUCKAS, Jr., V. LETTIERI, and R.E. HALL, "Human Error Rates: Initial Quanitification from Instrumentation/Control Data," Trans. Am. Nucl. Soc., 39, 278 (1981).

3. W.J. LUCKAS, Jr. and R.E. HALL, "Initial Quantification of Human Errors Associated with Reactor Safety System Components in Licensed Nuclear Power Plants," NUREG/CR-1880 (1981).

4. W.J. LUCKAS, Jr., V. LETTIERI, and R.E. HALL, "Initial Quantification of Human Errors Associated with Specific Instrumentation and Control System Components in Licensed Nuclear Power Plants," NUREG/CR-2416 (1982).

5. D.M. SPEAKER, S.R. THOMPSON, and W.J. LUCKAS, Jr., "Identification and Analysis of Human Errors Underlying Pump and Valve Related Events Reported by Nuclear Power Plant Licensees," NUREG/CR-2417 (1982).

6. D.M. SPEAKER and W.J. LUCKAS, Jr., "Identification and Analysis of Human Errors Underlying Electrical/Electronic Component Related Events Reported by Nuclear Power Plant Licensees," NUREG/CR-2987 (1983).

DISCLAIMER