

APPENDIX D

STATISTICAL ANALYSIS OF DATA

In the early part of the research project, the numbers of people to be surveyed in a company or company unit were chosen from practical considerations and from the author's experience in using the questionnaire in consulting. Ideally this would have been determined by prior statistical analysis. Partway through the project, some statistical analysis was conducted to guide the rest of the research.

The survey at S&C Electric was used as an example. The calculations were designed to determine whether the differences in answers between groups (e.g., between managers and supervisors or between managers and workers) were significant and whether the S&C answers differed from the best result for that question. Some examples of the statistical analyses are presented below.

The numbers of people sampled at S&C Electric are shown in Fig. AppD-1.

The S&C responses for Question 1 are summarized in Fig. AppD-2.

The statistical analysis of the internal S&C results indicated almost 95% confidence that there is a real difference between the average response of managers (82%) and that of workers (91%), more than 95% confidence that there is a difference between the response of managers (82%) and supervisors (62%), and more than 99% confidence that there is a difference between the response of supervisors (62%) and that of workers (91%).

We can be more than 99% confident that there is a real difference in results between the combined answer for all S&C respondents

Responses to Questionnaires S&C Electric		
Group	People in Company	Number of Questionnaires
Managers	11	11
Supervisors	30	13
Professionals	35	11
Workers	145	30
Other	--	--
Total	~250-300	65

Figure AppD-1 Responses to questionnaires, S&C.

The Priority Individuals Give to Safety				
	% Who Ranked Safety First			
	Manag.	Super.	Work.	All
S&C Electric	82	62	91	75
Best Result	97	90	92	94

Figure AppD-2 The priority individuals give to safety at S&C Electric (Q1).

Line Management Accountability, S&C Electric				
	% Who Said Line Management Is Held <i>Fully</i> Accountable ...			
	Managers	Supervisors	Workers	All
S&C Electric	27	47	43	37
Best Result	83	76	44	61
Safe Co. Avg.	58	55	34	44
Unsafe Co. Avg.	23	9	7	10
Worst Result	14	0	65	4

Figure AppD-3 The extent line management at S&C Electric is held *fully* responsible for safety (Q8).

(75%) and the combined answer for the company with the best result (94%).

In question 8 about the extent to which management is held accountable for safety, the S&C results had a different pattern than from that of the other very safe companies (Fig. AppD-3). The combined result for all S&C respondents was somewhat lower than the average of the very safe companies; the low result for managers pulled it down.

For the internal S&C responses, we can be more than 95% certain that there is a difference between the perception of managers (27%) and supervisors (47%) and about 95% certain that there is a difference between managers and workers (27% vs. 43%). However, the difference between the responses of supervisors and workers is not significant (47% vs. 43%).

We can be confident at more than the 99% level that the S&C answers for "all" (37%) are different from those of the company with the best result (61%). Without analysis it is obvious that the S&C result for "all" respondents combined (37%) is at about the safe company average (44%) and very different from the results of the companies with poor safety or the worst result.

The statistical calculations confirmed that the sample sizes had generally been sufficient to yield satisfactory results, although larger samples would have been appropriate in some cases.