



Mary Kay O'Connor Process
Safety Center
2006 International Symposium

<http://process-safety.tamu.edu>

The Evolution of the Cookbook

Michaela Gentile, Ph.D. and Angela E. Summers, Ph.D., P.E

*SIS-TECH Solutions, LP
12621 Featherwood, Suite 120
Houston, Texas 77034*

Safety instrumented systems (SIS) are designed to take the process to the “safe state” when a hazardous condition is detected. The need for an SIS is identified during the Hazard and Risk Analysis (H&RA), which assesses the process risk and defines the safety integrity level (SIL) requirements necessary to achieve the company risk criteria. The SIL serves as a performance benchmark that is used during design, operation, and maintenance to determine the SIS acceptability.

In the past, many owner/operators used prescriptive practices to specify SIS requirements. The use of “cookbooks” was very common in the process industry prior to the issuance of the ISA 84.01-1996. Cookbooks define the minimum requirements to achieve SIL 1, SIL 2, and SIL 3, including architectures, diagnostics, and proof test intervals. Cookbooks were based on historical experience and were generally intended to be sufficiently conservative that a wide range of devices could be used to implement the design. The proof test interval restriction was considered an important part of the cookbook and was applied unless additional analysis was performed.

The modern process industry is under pressure to increase productivity and reduce downtime. As a consequence, the opportunity to proof test is becoming less frequent. The desire to extend the test interval beyond the cookbook requirements is the primary reason why many owner/operators began using calculations to define the SIS design and maintenance requirements. This paper provides examples of these “cookbook” approaches and illustrates how the architectures evolve as successively higher integrity levels and/or process reliability is required.