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## **Establishing a Safety Performance System for Pipeline Integrity**

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Pipeline incidents recorded by Pipeline and Hazardous Materials Safety Administration (PHMSA), from 1994 through 2013, the U.S. had 745 serious incidents with gas distribution, causing 278 fatalities and 1059 injuries, with \$110,658,083 in property damage with additional 41 fatalities from gas transmission incidents and 363 fatalities from incidents with gas all system type. Similar pipeline incidents have occurred around the world. This has brought the importance of establishing a good monitoring and evaluation program for maintaining the integrity of the gas and liquid pipelines. Establishment of a safety performance evaluation system is important for understanding the current state of the process safety management system, identifying gaps and striving for continuous improvement based on the plan, do, check and act approach. In this paper, the authors discuss various meaningful performance metrics vital to integrity management based on relevant API, ANSI, ASME, Canadian, and U.K. HSE standards. It discusses how to select of key indicators including both leading and lagging indicators and the characteristics of mature indicator program. The leading or lagging indicator (whether process safety or personal safety) should relate directly to a particular engineering control that is in place to prevent a hazardous event from occurring or to mitigate the consequences of a hazardous event. Some indicators may be a requirement by regulator, however, for continuous and holistic improvement, indicators related to pertinent challenges to integrity of pipelines such as corrosion, third party damage, under/over pressure, integrity inspections, transportation and construction damage and human error should be structured into the performance evaluation program.