- Clearly define and communicate the roles and responsibilities of emergency response personnel to help ensure effective postaccident communications and decision making.
- Communication methods and equipment should support accurate and timely information exchange, consistent and clear communications with the public, and information sharing between the utility and the government.
- Equipment required to respond to a long-term loss of all ac and dc power... should be conveniently staged, protected, and maintained such that it is always ready for use if needed.
- Plant modifications may be needed to ensure critical safety functions can be maintained during a multiunit event that involves extended loss of ac power and dc power.
- Conditions during and following a natural disaster or an internal plant event may significantly impede and delay the ability of plant operators and others to respond and take needed actions. The potential for such delays should be considered when procedures and plans for time-sensitive operator actions are being established.
- Behaviors prior to and during the Fukushima Daiichi event revealed the need to strengthen several aspects of nuclear safety culture. It would be beneficial for all nuclear operating organizations to examine their own practices and behaviors in light of this event and use case studies or other approaches to heighten awareness of safety culture principles and attributes.

2.4 WHAT IS A HAZARD AND OTHER IMPORTANT CONCEPTS

Over the years, there has been considerable confusion with the concepts of safety, risk, and hazard. The major problem is that many people tend to interchange the words as if they mean the same. On top of that, different industries often define the concepts differently.

The most important thing to remember is that *system safety engineering is a combination of management and systems engineering practices applied to the evaluation and reduction of risk in a system and its operation.* The objective of system safety is to identify hazards resulting from the use or operation of a system and to eliminate or reduce the hazards to an acceptable level of risk.

The *system is the combination or interrelation of hardware, software, people, and the operating environment.* In system safety engineering, you must look at the system from cradle to grave. In other words, the *system life cycle is the design, development, test, production, operation, maintenance, expansion, and retirement (or disposal) of the system.* A nuclear power plant is one large system with operators, pressure subsystems, electrical and mechanical subsystems, structural containment, safety systems, etc. A far simpler example is a boy riding his bike. The bike, the boy, the street (with all its traffic conditions), the weather, the time of day, and even other children make up the system of *boy on his bike.*