

8 - New horizons, emerging technologies, converging safety cultures? Learning from the challenges of nanotechnology

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"Nanotechnology" research is very active, and it will continue to grow in the near future. Nanotechnology has created a convergence of many traditional scientific disciplines, such as chemistry, biochemistry, biology, physics, and multiple areas of engineering. All are dealing with advanced applications of new materials being created by nanotechnology. It is not unusual for today's nanomaterial project team to be composed of a chemist, biologist, material scientists, electrical or chemical, physicist, and manufacturing technology specialist. This project team is focusing on the development of new material applications that are made possible by the new or unique activities of nanomaterials. Working with these new, and sometimes uncharacterized materials creates a safety challenge in the laboratory and pilot plant. A good chemical or biological safety program should be able to accommodate new or novel entities, and this should be true for engineered nanomaterials. There is a growing challenge to accommodate the interfaces that are being created between the safety cultures that have evolved around these disciplines that are now being merged. Developing a nanomaterial based biomechanical device may require the movement through the following safety cultures: Basic chemical laboratory safety during initial material synthesis and characterization; Biosafety practices during the use of biologically active or derived materials used as templates or substrates; and Mechanical Systems Safety, including electrical, thermal, and pressure, for developing scale-up and manufacturing processes. All of these safety cultures need to be incorporated into a successful nanomaterials program. Developing these interfaces between the programs, and ensuring good knowledge across the entire project team and project life cycle will facilitate nanotechnology efforts today and serve as a template for success for future emerging technologies. Examples of the challenge, as experienced by NIOSH and other safety and health practitioners will be summarized and a potential path forward will be discussed.

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