

Thank you, Rick, for that kind introduction. I am pleased to be with you all here today to talk about the OHMS Research and Development Program, which is essential to our reason for being here at PHMSA.

One of the problems facing any regulatory agency is the reactive nature of its enterprise. Our primary means of pursuing the goal of zero safety-related incidents lies in making, and then enforcing, standards and rules that will, when followed, eliminate known causes of adverse events. But the goal of perfection, by definition, is *maximum*. Therefore, it will never be reached by conception and enforcement of *minimum* standards.

Rule-making and enforcement are essentially defensive. As a baseball fan, I think of them as our pitching staff, and our inspections and cleanup efforts following incidents as our efforts in the field. Considering the many millions of hazmat shipments and the low incidence of adverse events, I hereby nominate everyone working for PHMSA for Cy Youngs and Golden Gloves all around. This is especially true considering that the thing we play defense against is nothing less than a universal trend toward disorder. One pioneer of Chaos Theory described this attempt to characterize reality as, “When the present determines the future, but the *approximate* present does not determine the *approximate* future.”

Now, when competing with the very nature of reality, one needs both defense *and* offense. Our R&D efforts, designed to reveal substances, methods, processes and procedures that will maximize safety, are where we get to play offense.

PHMSA has a Research and Development Program because safety is a moving target. To fulfill our mandate, it is essential to constantly adapt to advances in automation, imaging, materials science, modes of transport, packaging, and other rapidly evolving technologies. Even the materials that we regulate are a moving target. It is perhaps not surprising that our rules for shipping lithium batteries are still changing, considering that they were invented just 38 years ago.

And so the need for pushing the bounds of knowledge to serve safety is ongoing, and large, and important. And while industry conducts research of its own, it does so focused on several competing goals. Research focused *solely* on safety is an inherently governmental function, and PHMSA R&D efforts comprise one of relatively few programs designed to achieve it.

As we wage this offense, we are mindful that budget constraints mean we get only so many plate appearances. To steward those scarce resources for maximum impact, we must seek ways to identify and exploit leverage: we must generate an outsized impact compared to associated cost. One recent success in this difficult leveraging is the lithium battery safety project that PHMSA executed in concert with the Naval Research Laboratory and the Naval Surface Warfare Center Carderock.

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This one project resulted in better guidance for shippers, development of safer packaging materials, and a system that can be used to test the health of batteries in transport.

I was at a meeting just yesterday doing everything in my power to explain this leverage – seeking to protect the funding for future R&D efforts. It's my job to keep the plate appearances coming, and yours to keep hitting balls out of the park.

Thanks for all you do, and all you're going to *keep* doing, to make PHMSA the most innovative safety transportation agency in the world.