

## **“SMART” TRANSPORTATION SYSTEMS THROUGH AUTOMATED DECISION AIDS**

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A smart computer system developed at the Los Alamos National Laboratory can now provide alarm signals when nuclear waste transport drivers waver off course. For waste-carrying trucks bound for the Waste Isolation Pilot Plant (WIPP), this is a timely addition to their shipment-tracking systems. As nuclear material and waste shipments have come under increasing public scrutiny, automated decision aids provide an additional layer of procedural and safety assurance. Automated decision aids facilitate intelligent surveillance of areas where normal human monitoring is unsafe, administratively difficult, or economically impractical to meet the challenges of ever increasing interpretation of large amounts of complex data. When applied to transportation systems, these decision aids have the ability to process information from multiple sources and identify and track patterns of activity that are inconsistent with "normal" shipment operations. Human operators, drivers, and support personnel can be alerted and provided with recommended courses of action when anomalous events or activities are detected.

Research in advanced surveillance and monitoring technologies is producing more fully automated and integrated systems that help manage the information overload, while being flexible enough to address future requirements. Guardian is an intelligent reasoning system component developed under the Department Of Energy (DOE) and National Nuclear Security Administration (NNSA) Nonproliferation Research and Engineering (NN-20) program. Recent successful application of a Guardian reasoning system for automated route assurance of nuclear waste shipments to the WIPP will be presented. The WIPP Route Assurance Program (WippRAP) improves the reliability of monitoring WIPP shipments by monitoring shipment locations in relation to specified routes and providing automated alerts and audible alarms when a shipment requires attention. Automated decision support augments the operator ability to interpret the ever-increasing amounts of data from simultaneous shipments and allows faster, more focused response. Other Guardian applications highlighted will include monitoring nuclear weapons dismantlement and monitoring nuclear materials during transport and storage. Additionally, future application areas for Guardian and other reasoning and automated understanding systems will be discussed.