Rail Cargo Screening Simulation Modeling and Analysis

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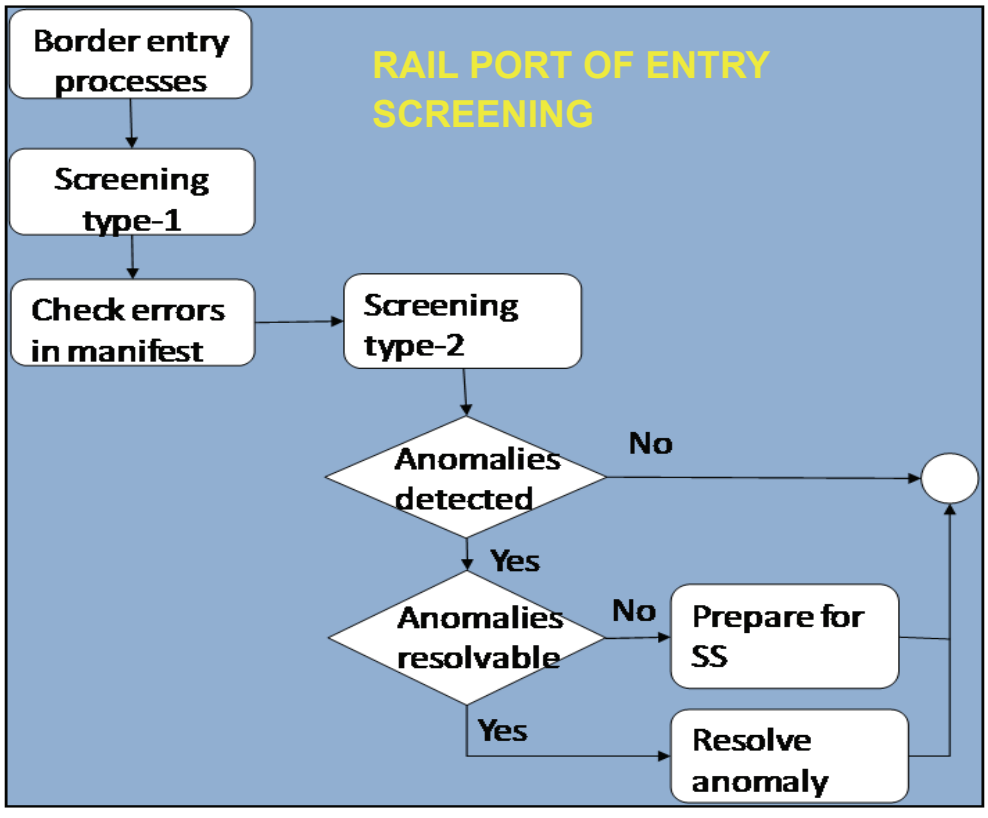
Rail is one of the major modes of freight transportation in the United States, and plays an important part in the U.S. economy. In 2005, the U.S. railroad system accounted for more than 38% of domestic freight movement, measured in ton-miles. This use of railroads to move freight is increasing, as this mode of transportation becomes even more attractive when energy prices sky rocket, like in the summer of 2008.

Freight rail companies carry many commodities on U.S. rail lines, to include coal, chemicals, ethanol, plastic resins, fertilizers, grain and other agriculture products, non-metallic minerals, food and food products, steel and other primary metal products, forest products, motor vehicles and waste. Many of these commodities come from international sources in Canada and Mexico, presenting a security risk carrying cargo across our nation's northern and southern borders. Given the potential threat, the Domestic Nuclear Detection Office (DNDO) tasked Oak Ridge National Laboratory to develop simulation software that models the screening of rail cargo at U.S. rail ports of entry.



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The simulation system architecture developed for the project contains three distinct but important components that are essential to meeting the needs of the DNDO:

- A secure web-based user interface, providing an interactive modeling experience.
- A relational database structure for storing the vast quantities of system and model level data.
- The simulation software itself, developed in Arena, to model the system and perform applicable analysis.

Benefits of Using ORNL's Rail Simulation Model

Using the rail model developed by ORNL allows DNDO to better:

- Develop a system to detect hazardous (nuclear, radiological, and narcotics) material entering US by freight railroads
- Minimize the adverse effects on the supply chain due to rail cargo screening processes
  - Dwell times created by cargo screening.
  - Reduce the number of cars impacted by the screening.
  - Increase speed of commodity movement through the ports of entry.
- Investigate the impacts of given screening technologies with respect to performance and reliability characteristics.
- Investigate rail screening resource utilization, e.g. staff and equipment.

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