IMRicS

Identification and Monitoring of Radiation (in commerce) Shipments

Integrated Safety and Security Enforcement System for the 21st Century with Homeland Security Benefits

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VISION

Identification and Monitoring of Radiation (in commerce) Shipments

- To increase the **safety** and **security** of the domestic transportation system by developing an integrated vehicle monitoring system that will identify vehicles not compliant with Federal and State regulations related to:
  - Transportation Safety,
  - Transportation Security,
  - Law Enforcement
  - Agricultural, and
  - Environmental

Components of Transportaton Systems

Identification and Monitoring of Radiation (in commerce) Shipments

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FOCUS State Enforcement "In Commerce" Issues

Identification and Monitoring of Radiation (in commerce) Shipments

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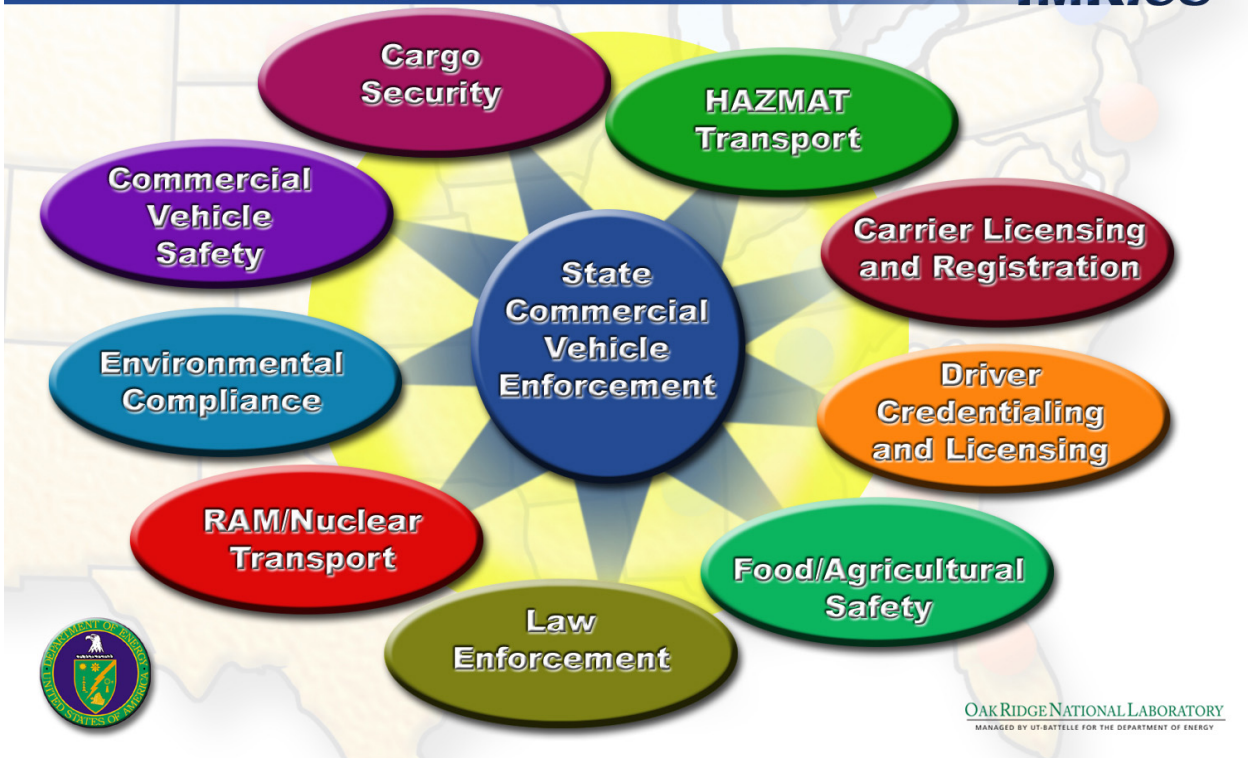

IMRicS Project Chronology

Identification and Monitoring of Radiation (in commerce) Shipments IMRicS

- **2001** - Roots of this program grew from DOE Assets Utilization Program
- **2002** - Tennessee I-40/I-75 Knox County Weigh Station Deployment (TN, DOE & DHS Funds)
- **2003** – RFID program for identification of Radioactive sources in the supply chain (EPA Funds)
- **2004** - Tennessee River Watts Bar Lock Meigs County, Tennessee Deployment (DOE, Army Corps of Engineers & TVA Funds)
- **2004** - South Carolina I-26 Dorchester County Weigh Station Deployment (SC-ODP Funds)
- **2004** - Mississippi Mobile Unit Deployment (DOE Funded)
- **2005** - Kentucky I-75 Laurel County Weigh Station Deployment (KY-DOT Funds)
- **2005** Washington Mobile Deployment (WA-DOT Funds)

Government/Private Sector Teaming Critical for Supply Chain Sustainability & Security

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Key Supply Chain Stakeholders include:

- **DOT – Owners of the Infrastructure (Weigh Stations) & Policy Lead for Transportation Laws**
- **DHS – Homeland Security of our Highways & Policy Lead for Homeland Security Issues on the Highway**
- **States – Law Enforcement on the Infrastructure (Weigh Stations) & Highway Safety & Security**
- **FBI (JTTF) – Coordination of Law Enforcement & Domestic Security**
- **Commercial Carriers – Infrastructure Users, Taxpayers & Critical Stakeholders**
- **Industry Shippers – Products in the Supply Chain**
- **Sensor/Technology Vendors – Integration of technologies for Highway Infrastructure Safety & Security**

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INTEGRATION OF HIGHWAY SAFETY/SECURITY SYSTEMS

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- Sensor Integration for **Dual** Safety and Security Roles
- Identification of Cargos of Interest on the mainline and at illegal bypass points
- Pre-Identification of "Secure" Carriers transporting Cargos of Interest
- Integrating existing infrastructure with detectors to inspect conveyances and cargos of interest with minimal disruption of supply chain
- Encourage the private sector to adapt COTS technologies to expedite deployment and encourage safety & security integration

Domestic Highway Systems Approach

Identification and Monitoring of Radiation (in commerce) Shipments IMRicS

- An integrated Anomaly Detection System that conforms to a Data Framework, and
  - Leverages and Exploits:
    - Ongoing Radiological Detection Equipment Deployments integrated with other sensors
    - The Uniqueness of DOT HAZMAT Regulations
    - Commercial Off the Shelf Technologies allowing shortest time to implementation
  - Utilizes existing and "accepted" ***in commerce*** Infrastructure and Regulations at:
    - State Weigh and Inspection Stations
    - Interstate Mainline Pre-Clearance Systems
    - Illegal Weigh Station Bypass Locations
    - Law Enforcement Patrol Cars and Deployable Mobile Units

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Radiation Detectors Integrated with other Sensors at Weigh Stations Today

Identification and Monitoring of Radiation (in commerce) Shipments IMRicS

- Weigh Stations/Mobile Units Equipped in SC, TN, MS, KY & WA by State Police
- Valuable Data collected for Science & Safety Communities
- Operational integrations for safety and security missions developed
- Training of State Police
- Reachback Procedures Jointly Defined

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Current Concept of Operations

Identification and Monitoring of Radiation (in commerce) Shipments IMRicS

- Sensors include Radiation, OCR, WIM, IR, Laser, Video & Static Scale
- Alarms are set to Pickup cargo emitting radiation above *set* limits
- State Police inspect alarms, use equipment for safety mission and assist in data collection
- ORNL, Sensor Vendors & States are working jointly to define protocols and integrated sensor output applications

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Pilot Program Concept of Operations

Identification and Monitoring of Radiation (in commerce) Shipments IMRicS

- DHS & DOT oversight and funding
- State driven deployments in KY, TN, MS, SC, FL, VA & WV
- Commercialization of sensor integration, sensor deployment, installation and maintenance tasks
- ORNL enables Technical Reachback for State Law Enforcement & performs AdvancedTechnology/Algorithim Development

Partnering and In Discussion States

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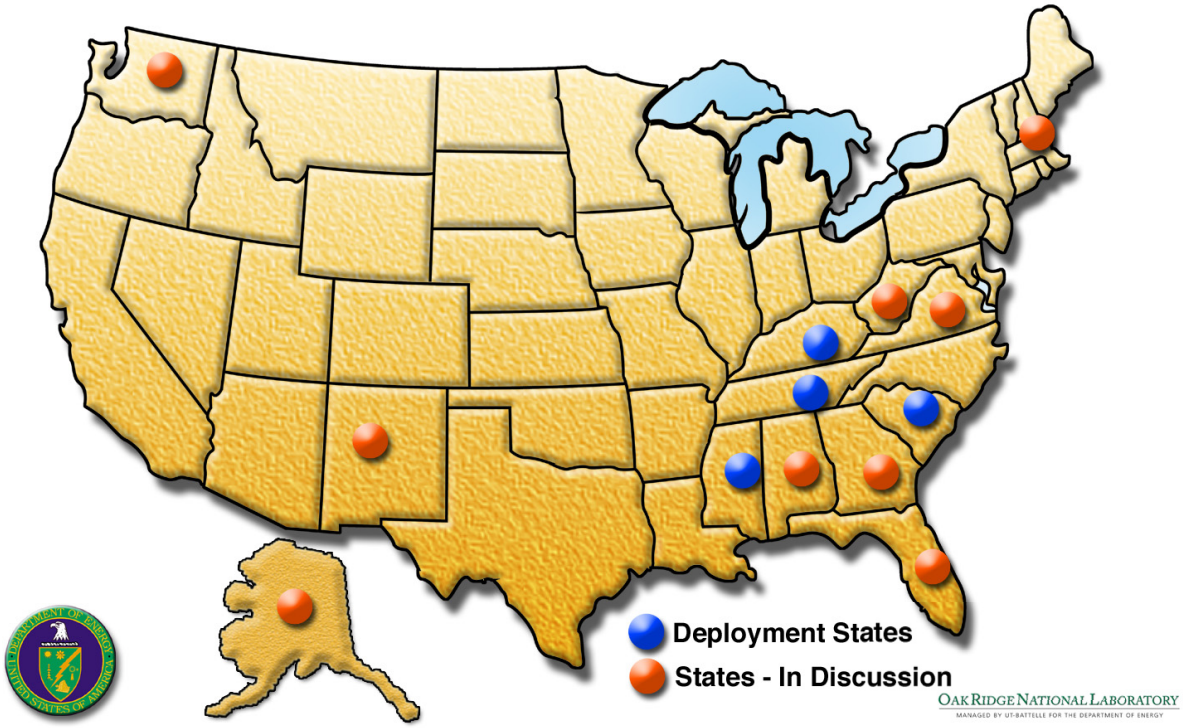

Future Opportunities

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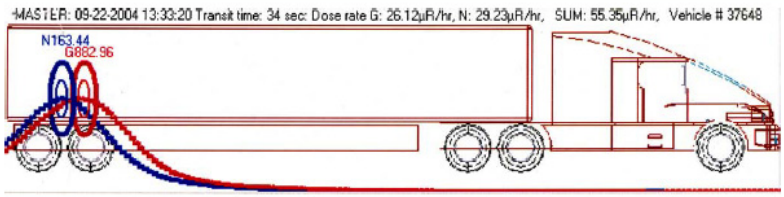
Additional Slides

Identification and Monitoring of Radiation (in commerce) Shipments (IMRicS)

- Other Information Data and Deployments

Example: Point Source



Dose Rate: Gamma 26.12 µR/hr (.026 mR/hr)
Neutron 29.23 µR/hr (.029 mR/hr)
Total .055 mR/hr

Consignee
OAK RIDGE ASSOCIATED UNIVERSITIES

230 WAREHOUSE RD
OAK RIDGE TN 37830-
RANDY DILLON, (865)241-5947

CARRIER: TAG+ / TAG TRANSPORT

* * * T A G + *

CAR OR VEHICLE INITIALS & NO.

SEAL #

Carrier No.

Section 13712
Tender, No.:

Route:

No. PKGS.	HM	Description of Articles (Subject to Correction), Kind of Package, Special Marks and Exceptions (See NMFC Item (Rule) 360)	Weight (Subject to Correction)	Class	Rate	Charges
1 CTN	RQ	Radioactive material, Type A package, special form, 7, UN3332 Cf-252, Cm-248, Cf-250 in special form Activity: 1.74 GBq Label: Radioactive Yellow-III TI: 4.5 Package: DOT 7A Type A Special Form Certification USA/0018/S attached Emergency Response Contact: (865)574-6606 Hazardous Substance Contact: (800)424-8802 ERG # 164 attached	40 LBS			

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

USDOE % UT-B
Signature of Consignor

If freight charges are to be prepaid, write or stamp here "TO BE PREPAID"

PREPAID

Note: Where the rate is

2

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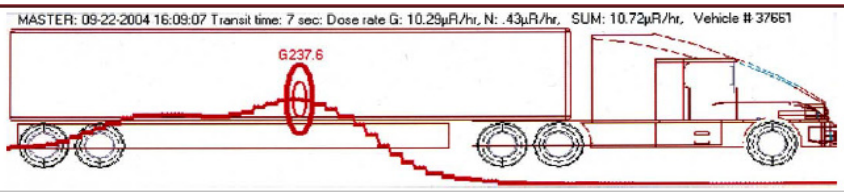
Example: Point Source



Dose Rate: Gamma 10.29 µR/hr (.01 mR/hr)
Neutron .43 µR/hr (.0004 mR/hr)

Consignee
OAK RIDGE ASSOCIATED UNIVERSITIES

230 WAREHOUSE RD
OAK RIDGE TN 37830-
RANDY DILLON, PH: 865-241-5947

CARRIER: RDWY / Roadway Express, Inc.

* * * R D W Y *

CAR OR VEHICLE INITIALS & NO.

SEAL #

Carrier No.

Section 13712
Tender, No.: 2914, Supp.7

Route:

No. PKGS.	HM	Description of Articles (Subject to Correction), Kind of Package, Special Marks and Exceptions (See NMFC Item (Rule) 360)	Weight (Subject to Correction)	Class	Rate	Charges
1 CTN	X	Radioactive material, Type A package, 7, UN2915 Cs-137 as Chloride/Solid Activity: 270.1 MBq Label: Radioactive Yellow-II TI: 0.3 Package: DOT 7A Type A Emergency Response Contact: (865)574-6606 ERG # 163 attached	3 LBS			

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

USDOE % UT-B
Signature of Consignor

If freight charges are to be prepaid, write or stamp here "TO BE PREPAID"

PREPAID

Note: Where the rate is dependent on value, shippers are required to state specifically in writing

1

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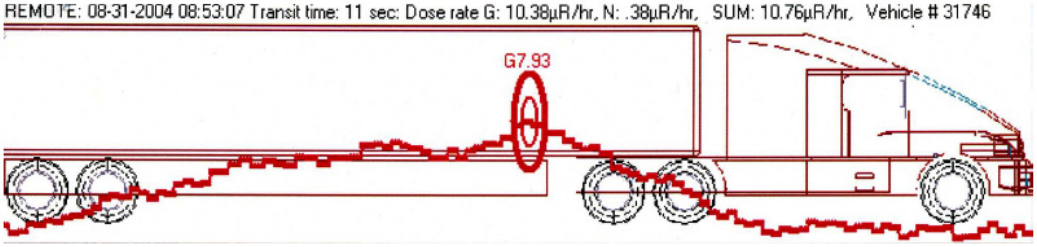
Example: Distributed Load

REMOTE: 08-31-2004 08:53:07 Transit time: 11 sec: Dose rate G: 10.38μR/hr, N: .38μR/hr, SUM: 10.76μR/hr, Vehicle # 31746



☐ Original BOL ☒ Shipping Order ☐ Loading Order

RECEIVED, subject to the contract or common carrier agreement, between the selling party, as noted herein and the carrier, in effect, on the date the shipment is tendered to the carrier. This Bill of Lading is subject only to tariffs and classifications agreed to, in writing, between the carrier and the selling party, as noted herein.

PRICE CLASS	MILES
10	868

FROM Golden Products Div. of Nestle' Purina PetCare Co

CARRIER	SUPPLY POINT	LOADING ORDER NUMBER
PENM PENN'S BEST, INC	BLOOMFIELD MO 63825	3133783

SHIP TO	ROUTING	SCH. SHIP	CRA DATE
GOLDEN CAT - KING WILLIAM 931 DUNLUCE RD RALSTON PURINA COMPANY KING WILLIAM VA 23086	Selling Party: Nestle' Purina PetCare Co.	08/30/04	09/01/04
		COMMENTS	

ORDER NO.	CUSTOMER P.O. NO./DATE	CUBIC FT.	PRODUCT WT.	TOTAL QTY.	UNIT LOADS	CASES PICKED	SEAL NO.
3133783	797-726065	1004	44064	1080	20	0	172755

DATE SHIPPED	QTY. SHIPPED	CAR OR VEHICLE INITIAL & NO.	DATE LOADED	FREIGHT TERMS	SEAL NO.
08/30/04	1080	5446	08/30/04	Prepaid	

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, which govern the transportation of this shipment, and the said terms and conditions are hereby agreed to by shipper and accepted for himself and his assigns.

BILL OF LADING CLASSIFICATION CODES (SEE REVERSE SIDE)

IF CHARGES ARE TO BE PREPAID, WRITE OR STAMP ABOVE "PREPAID"

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Representative Data Acquired to Date:

Commercially Available Products Containing NORM and TENORM Activity Correlation

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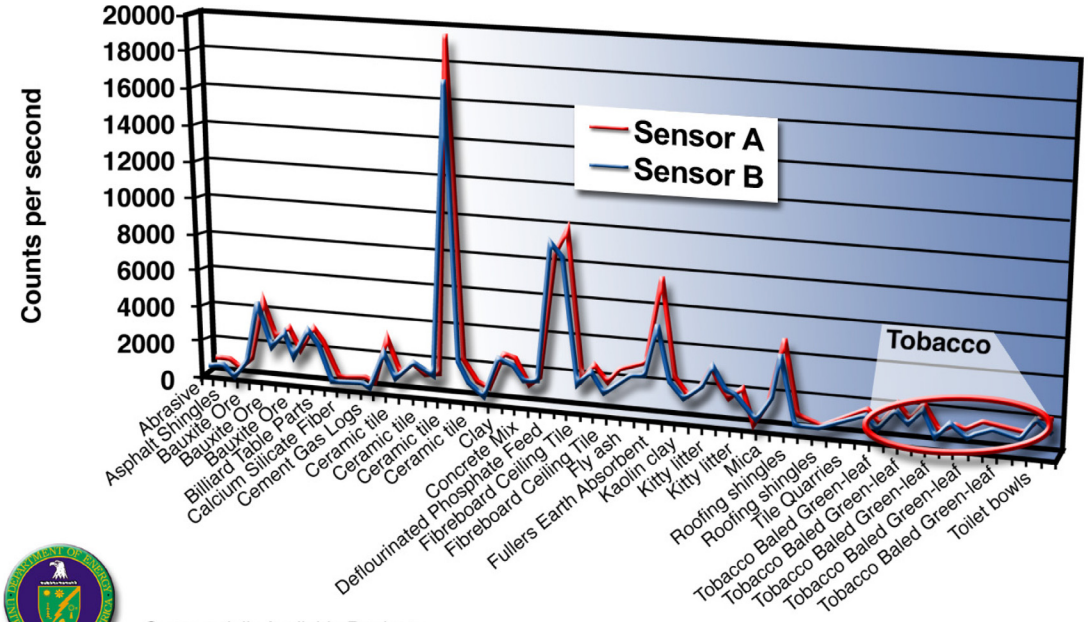

Commercially Available Products

RAM LSA Impact

RAM LSA to Commercially Available Products Correlation

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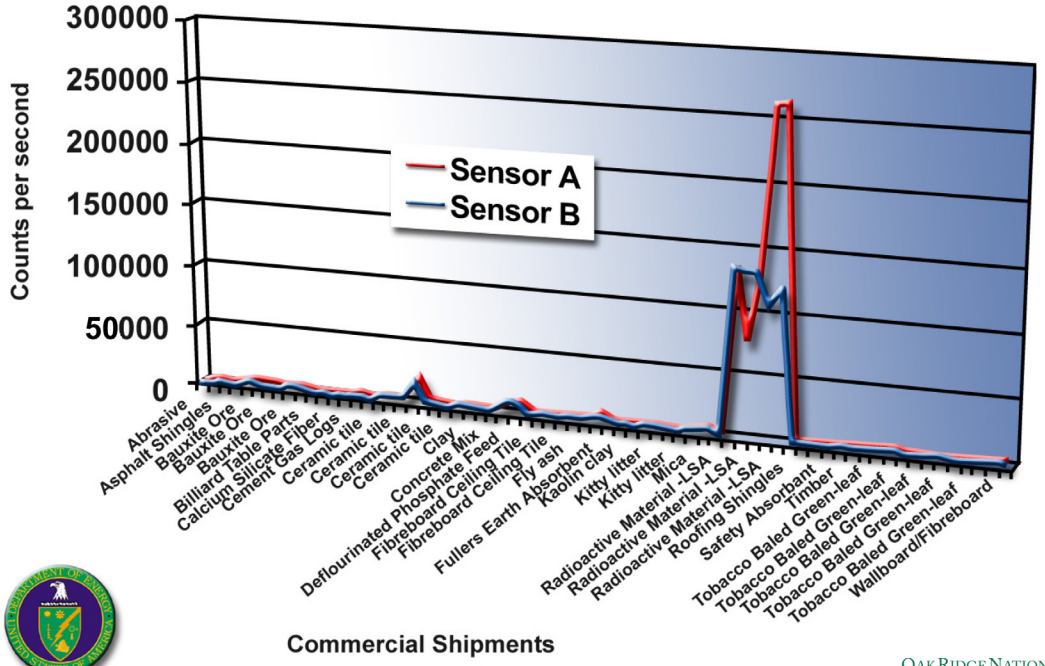

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Mobile Radiation Sensors Deployed in Police Vehicles in Mississippi

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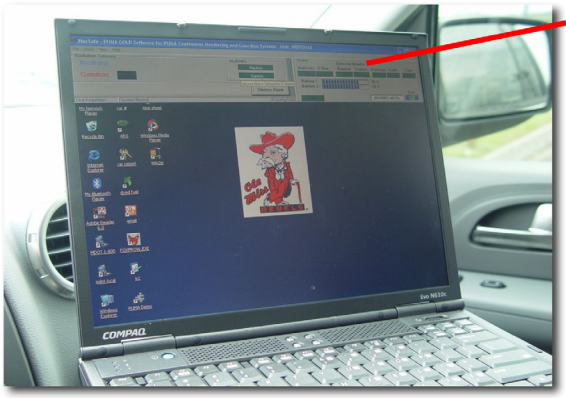
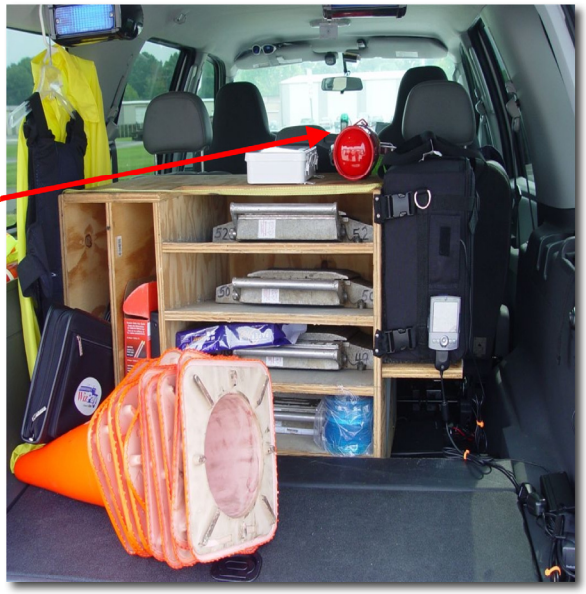
Mobile Detection allows Constant Monitoring & Data Analysis for Police

- Radiation Sensors in MDOT Vehicle
- SensorNet Enabled Connectivity





Expansion to other Modes of Transportation

- Radiation Monitors installed in Inland Waterway Infrastructure

Monitoring of Barges and Personal Watercraft on the Tennessee River

- Radiation Detectors in Watts Bar Dam Lock Doors

High Risk Commodity Packaging can be Identified and Monitored In Transit

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Radioactive Material Package RFID Equipped and Monitored

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Integrating Safety and Security

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- Cargo profiling of Commercial Vehicles
- Inspection results tied to Decision Analysis System
- Safety inspections on commercial vehicles in motion
- Brakes, bearings, and running gear inspection

Vehicle Information From Sensors

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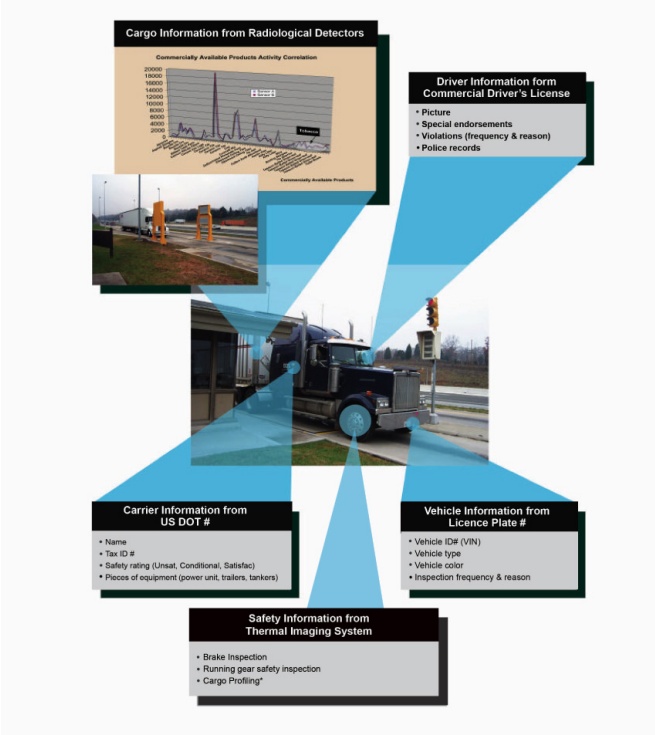

Weigh Stations are "accepted" *Supply Chain* Inspection Infrastructure

Sensors Currently Deployed in supply chain infrastructure:

- Static Scales
- Weigh in Motion
- Weigh Station RFID Pre-Clearance Systems such as NORPASS and PrePass®

Sensors DHS desires to Deploy include:

- Radiation Detection
- Chemical/Explosives Detection
- Video including License Plate Recognition & Infrared
- Mobile/Deployable/Bypass CBRNE Detection

Illegal Weigh Station Bypass Monitoring

- Identify weigh station illegal bypass routes and deploy:
  - Radiation detection (NaI) sensors in traffic signage
  - License Plate Reader Technology
  - Video Imaging Technology
- Utilize accepted Traffic Signage infrastructure to minimize impact and ensure stealth-like deployment
- Wireless communication to weigh station and patrol vehicles for interdiction as necessary

Pre-Clearance Mainline Security Sorting

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- Two primary pre-clearance systems exist (NORPASS & PrePass®)
- Integration of Existing Safety Pre-Clearance Systems with Security Mainline Sorting at existing fixed weigh station deployments
- Opportunities
  - Leveraging proven and industry accepted RFID technologies and infrastructure already deployed
  - Forensic information immediately available to law enforcement

Current SensorNet DHS & DOT Activities

Identification and Monitoring of Radiation (in commerce) Shipments IMRicS

- SensorNet/DHS funded Oak Ridge National Laboratory to deploy and collect data from multiple sensors:
  - At Weigh and Inspection Stations in TN, SC and KY
  - In Patrol Vehicles in MS
- DHS commissioned Sandia National Laboratories, Livermore to study feasibility and costs of national weigh station deployments
- DOT has issued RFP for cost/benefit analysis of radiation detection deployments at weigh stations

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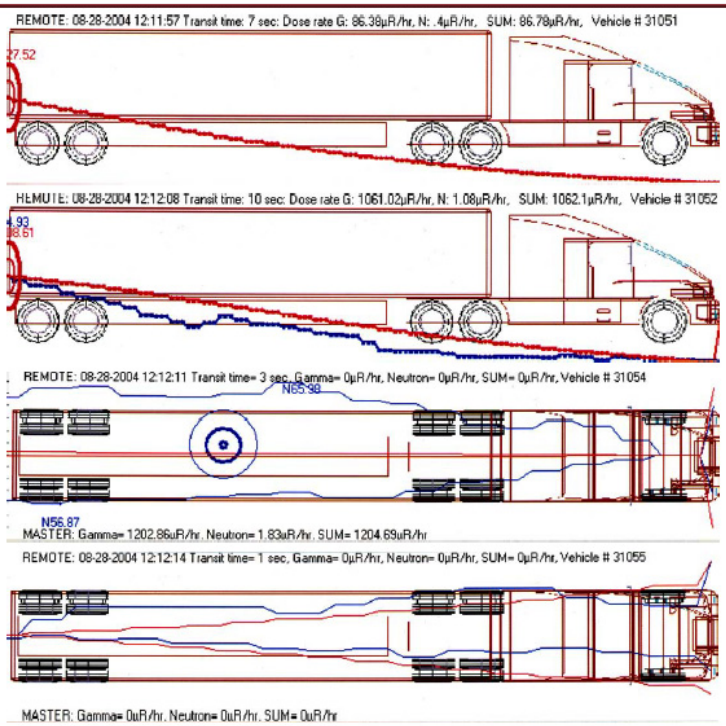
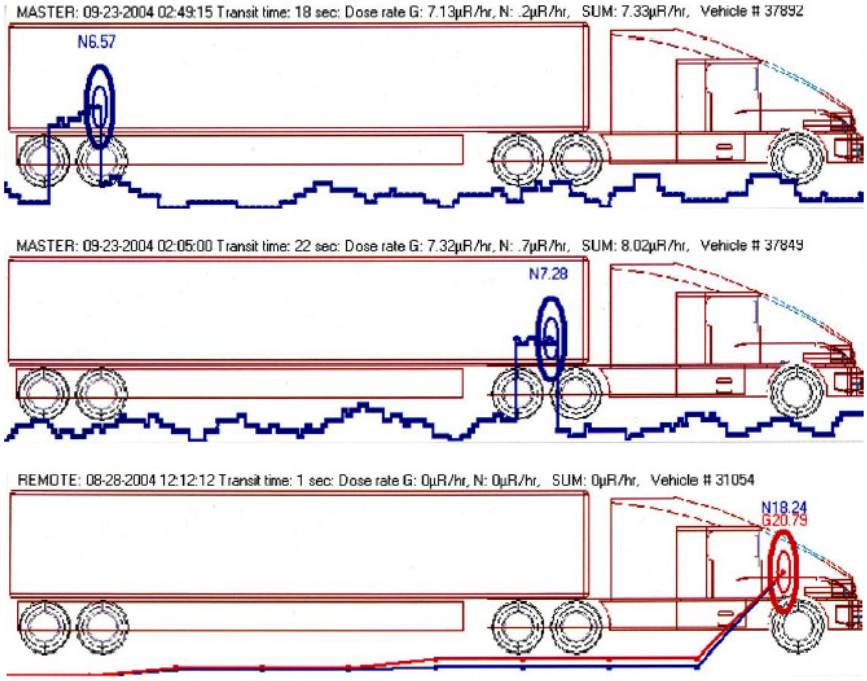
Example: Anomaly



Example: Anomalies