

WMD Hunting

Piggybacking Sensors on Fleet Vehicles

A Method for the Detection of Clandestine Weapons and Materials



Example: Utilizing Very Large MultiSensor Arrays in Mobile Detection Systems while Hitchhiking on Tractor Trailers Rigs

Note: This approach is intended for all WMDs; however, we will focus on Radiological only.

Preface

The purpose of the web page is to suggest the concept of nationwide use of existing Transportation Infrastructure, i.e., fleet vehicles as unattended sensor platforms for WMD surveillance. My personal goal in writing this page is to communicate this concept to those in position to best evaluate it, and possibly benefit from its use.

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SUMMARY:

- 1)_ Proposed is a nationwide system where by autonomous WMD sensor packages would be installed on various commercial fleet vehicles, such as semi-trailers, trains, taxicabs, police cars, etc. These autonomous sensor packages would essentially be piggybacking on vehicles, requiring little, if any, driver interaction.
- 2)_ Due to the difficulty of detecting clandestine nuclear materials, it is imperative that this system use the latest, and most effective detection devices available, regardless of costs.
- 3)_ The ubiquitous and random nature of the installed systems described in this paper will put powerful Nuclear (CBR*) Detectors in an infinitely greater number of locations than would otherwise be the case, and at almost no recurring operating costs.
- 4)_ The success of such a system depends on the voluntary cooperation of the Transportation Industry. Companies that field vehicles meeting system requirements[1] would be approached confidentially for their cooperation. [See vehicle stats](#)
- 5)_ Collected data would consists of all sensor data, GPS location, and optionally, concurrent CCTV video, and would be transmitted—in realtime—via satellite, and/or cellular modem, to an analysis and dissemination center. For redundancy, the data would also be processed and stored locally. [See system block](#)

[Factors influencing Detection of Nuclear Materials](#)

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* CBR: Chemical, Biological, Radiological, A.K.A., NBC: Nuclear, Biological, Chemical.

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Some of the Vehicles for the Mission



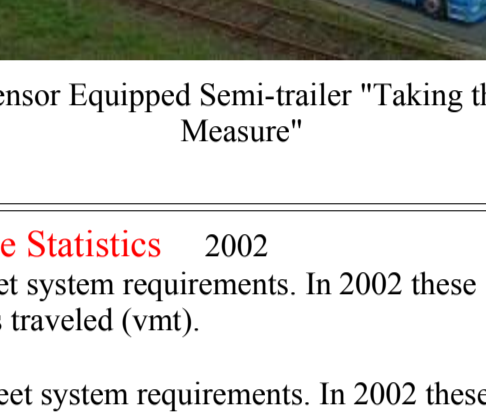
Sensor Equipped Fleet Vehicles:
Police Car, Mail Truck, Taxicab, etc.



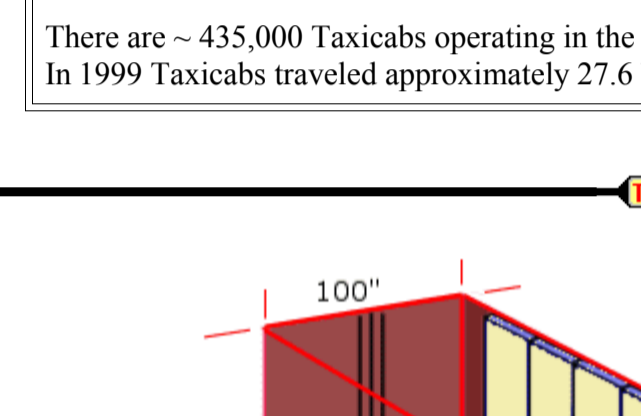
[NucSafe's](#) Car Top Sensor Package



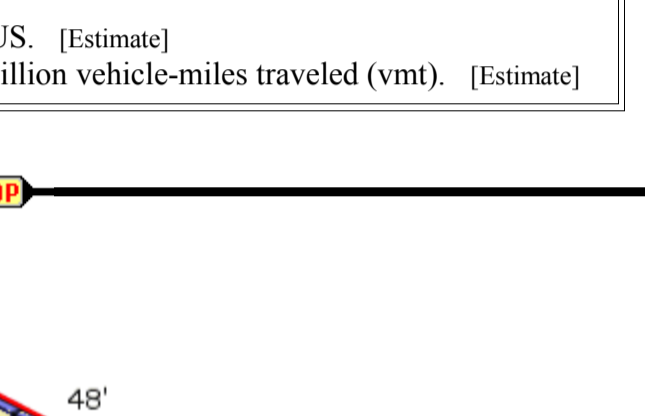
Containers as Sensor Platforms



Rail-borne Sensor Platform



Container Trucks & Terminal



Sensor Equipped Semi-trailer "Taking the Measure"

Some U.S. Fleet Vehicle Statistics 2002

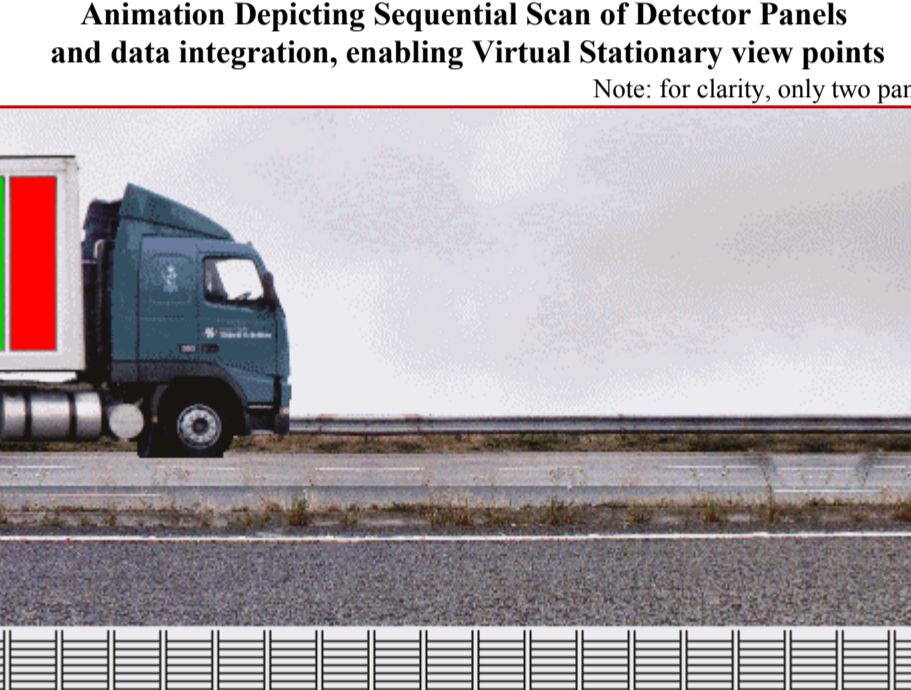
Of ~4.1 million Single Unit Trucks, 690 thousand meet system requirements. In 2002 these trucks traveled approximately 9.9 billion vehicle-miles traveled (vmt).

Of ~1.4 million Semi Trailer Trucks, 730 thousand meet system requirements. In 2002 these trucks traveled approximately 60 billion vehicle-miles traveled (vmt).

There are ~ 435,000 Taxicabs operating in the US. [Estimate]

In 1999 Taxicabs traveled approximately 27.6 billion vehicle-miles traveled (vmt). [Estimate]

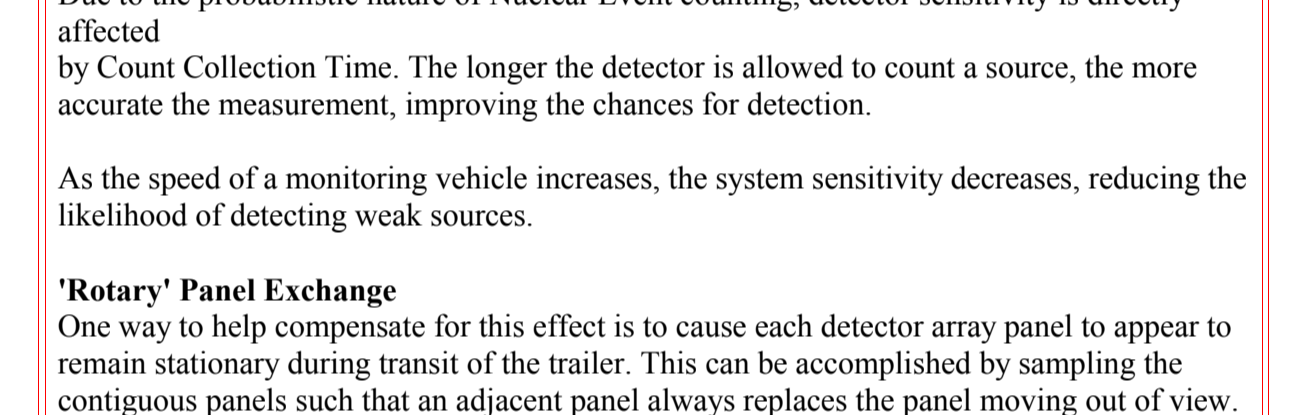
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Semi-Trailer with multiple Large Detector Arrays mounted on inside wall(s)

Animation Depicting Sequential Scan of Detector Panels and data integration, enabling Virtual Stationary view points

Note: for clarity, only two panels are shown.



Mouse-Over image for animation

Example: system of 18 panels, each measuring 9 feet high, 2 feet wide and 4 inches thick.

Animation Explanation

Virtual Exposure Time Extension

Due to the probabilistic nature of Nuclear Event counting, detector sensitivity is directly affected by Count Collection Time. The longer the detector is allowed to count a source, the more accurate the measurement, improving the chances for detection.

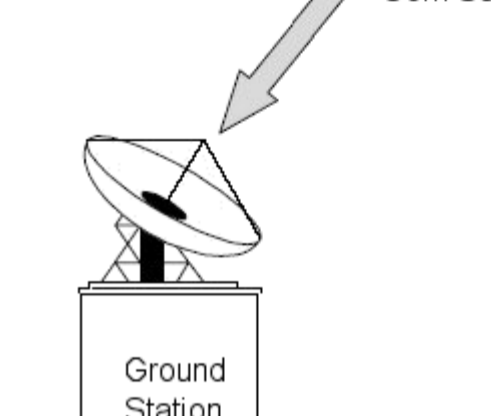
As the speed of a monitoring vehicle increases, the system sensitivity decreases, reducing the likelihood of detecting weak sources.

'Rotary' Panel Exchange

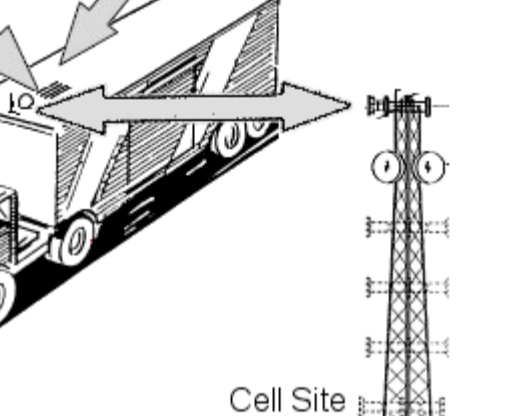
One way to help compensate for this effect is to cause each detector array panel to appear to remain stationary during transit of the trailer. This can be accomplished by sampling the contiguous panels such that an adjacent panel always replaces the panel moving out of view. All this happens at a rate commensurate with the vehicle speed. Said another way, it's a little like panning a camera at a moving object. See the [animation](#)

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Very Large Nuclear Detector Arrays



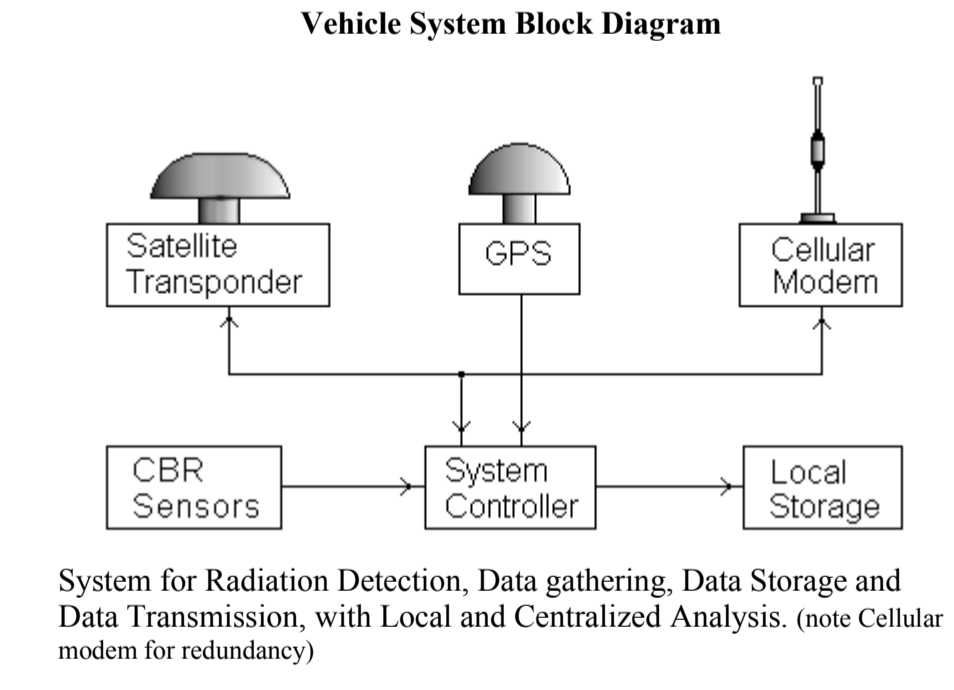
Road Side Detector Array



Large Airborne Detector Array

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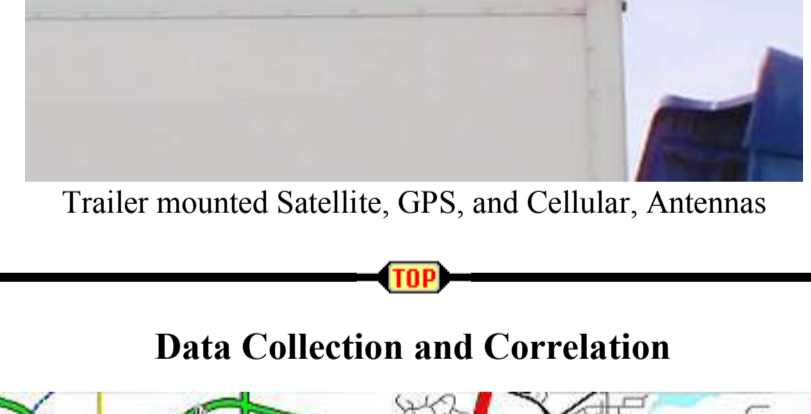
System



Block Diagram of System Command, Control, and Communications (C³)

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Vehicle System Block Diagram



System for Radiation Detection, Data gathering, Data Storage and Data Transmission, with Local and Centralized Analysis. (note Cellular modem for redundancy)

"Antenna Farm"



Trailer mounted Satellite, GPS, and Cellular, Antennas

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Data Collection and Correlation

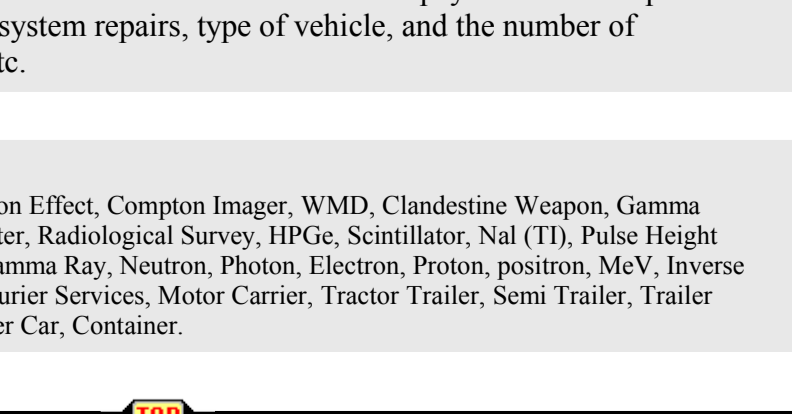


Map overlaid with tracking and sensor data (2 vehicles). Note the green squares are areas of interest.

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Optional Extras

Remote Operation Supervision



Remote Operational Intervention

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[1] System Requirements

The minimum requirements for fleet vehicles to participate have mostly to do with minimum expected mileage, the randomness of routes traveled, the amount of in-vehicle real-estate available for the instrumentation.

As an incentive and to be equitable, there should be a fee structure of payments to the operators based on: mileage, downtime due to system repairs, type of vehicle, and the number of participating vehicles per operator, etc.

Keywords:

CBR, Nuclear, Uranium, Plutonium, Compton Effect, Compton Imager, WMD, Clandestine Weapon, Gamma Camera, Scintillation Counter, Geiger Counter, Radiological Survey, HPGe, Scintillator, NaI (TI), Pulse Height Spectrum, Isotope, Nuclide, Alpha, Beta, Gamma Ray, Neutron, Photon, Electron, Proton, positron, MeV, Inverse Square Law, Fleet Vehicles, Trucking & Courier Services, Motor Carrier, Tractor Trailer, Semi Trailer, Trailer Truck, Freight Motor Carrier, Rail, Container Car, Container.

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