SAND2012-0627C

The Role of Modern Positioning Systems in In-situ Survey Techniques

Mark L. Miller
Sandia National Laboratories, Albuquerque, NM

SAND No. 2012-0627C

Sandia is a multi-program laboratory managed and operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000

Philosophical Tidbit #1

If you're not taking data, then you're just making <u>conversation!</u>

Philosophical Tidbit #2

If you're not analyzing your data, you're wasting your money!

Current Situation

- MARSSIM (NUREG-1575)
- Current practices “de facto” requirements?
- MARSSIM alludes to “alternative methods”
- MARSAME (new)
- Opportunities for improvement?

Future Options

- GPS-coupled detectors outdoors
- Fan-laser surveyor-coupled detectors indoors
- Automated data acquisition and analyses
- Vastly increased data volume
- Improved Analysis & Presentation Software
- Graphical (Visual) Data Presentation

Considerations

- Fully MARSSIM Compatible
- Fewer fixed-point measurements
- More frequency distribution and statistical analyses
- Continued DCGL assurance
- Easier, yet more powerful

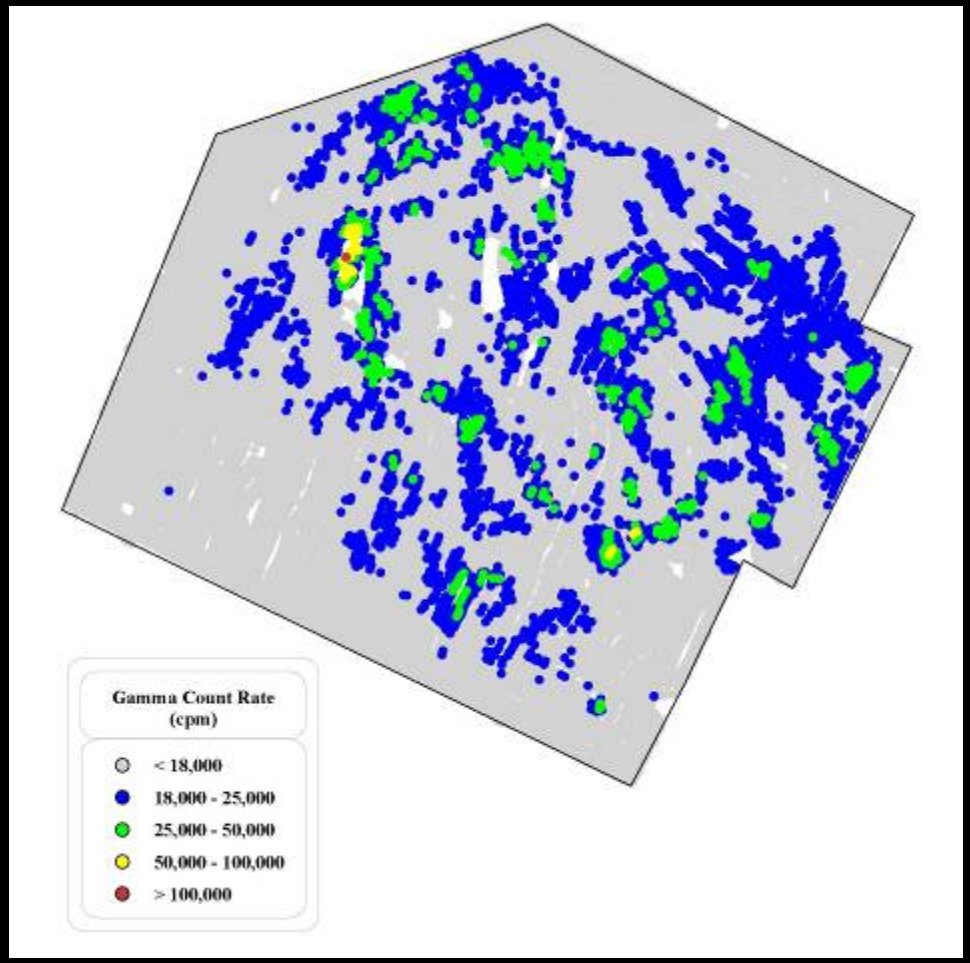
Automated Data Collection Systems

- USRADS
- GPS-Coupled (sub-meter accuracy)
- Infrared Fan Laser-Coupled (sub-centimeter accuracy)
- Ultra-sonic Locator-Coupled
- X, Y, Z data logging

Automated Capabilities

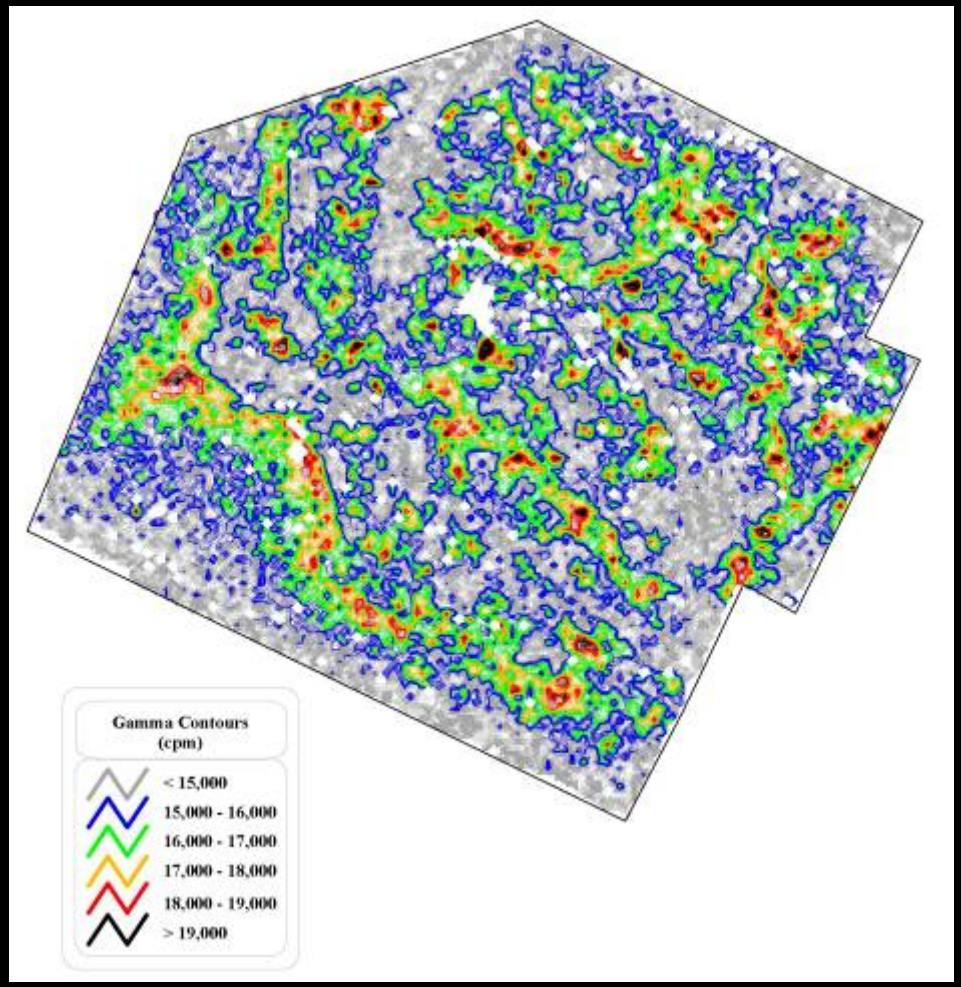
- Determine scanning MDA
- Scan 100% of surfaces with constant scanning speed
- Measure variability for use in the final status survey design
- Make integrated measurements on a defined grid
- Return to a predetermined position (x, y, z) for “surgical remediation” or follow-up surveys
- Download data into ArcView GIS, AutoCAD, or other application

Example Data Output



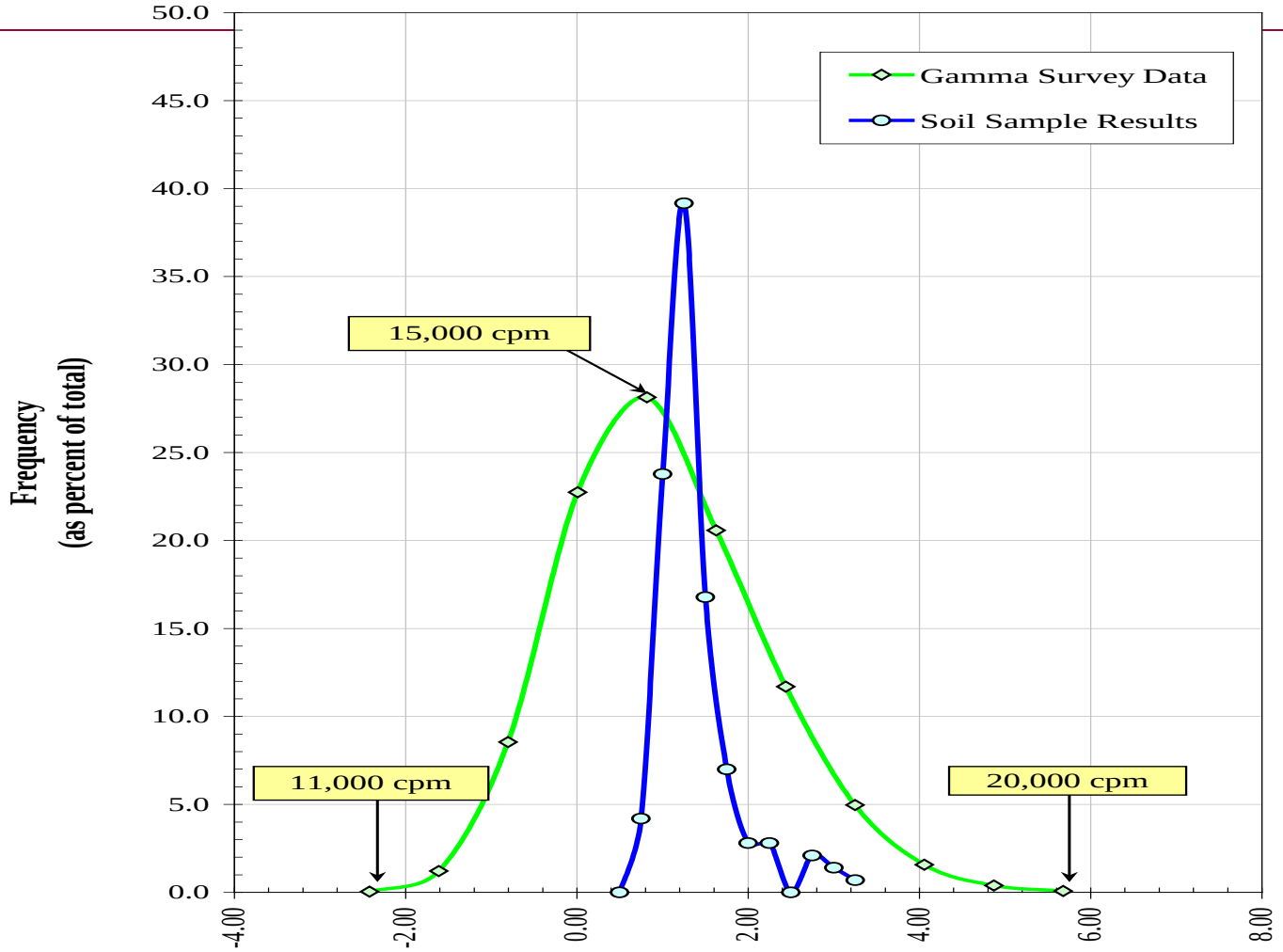
Remedial Action Support Survey

Example Data Output



Final Status Survey

Example Data Output



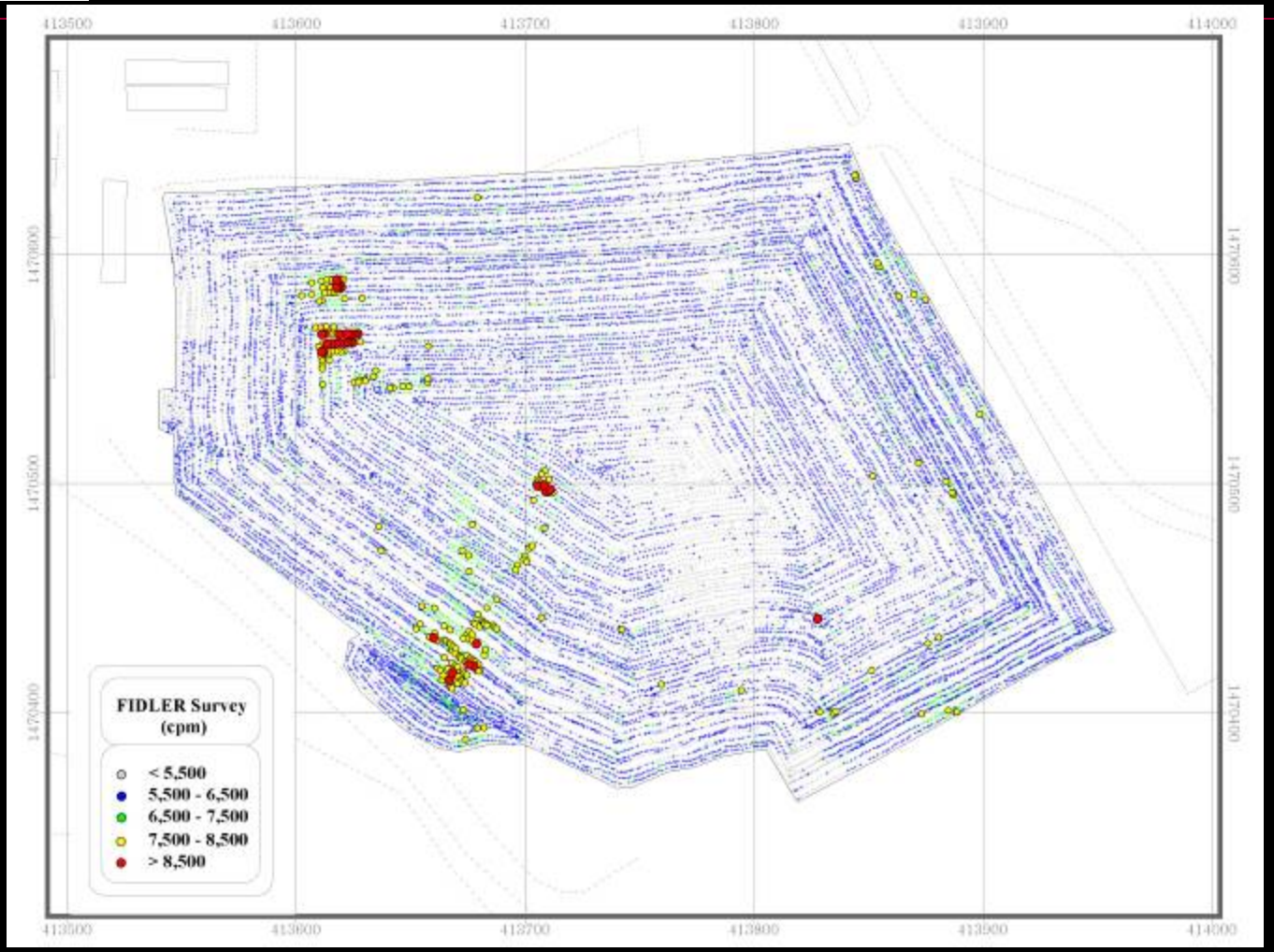
Comparison of Final Status Frequency Distributions

August 2006

National Nuclear Security Administration

Sandia National Laboratories

Example Data Output

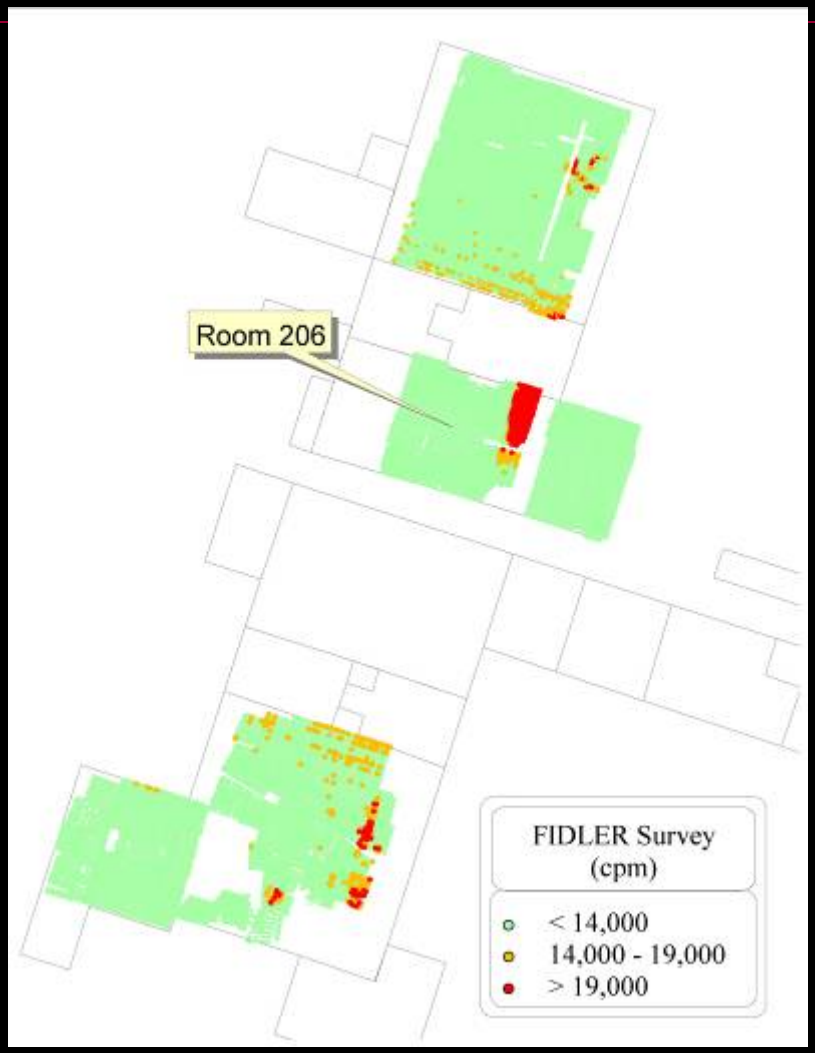


Characterization Survey Raw Data

National Nuclear Security Administration

Sandia National Laboratories

Example Data Output

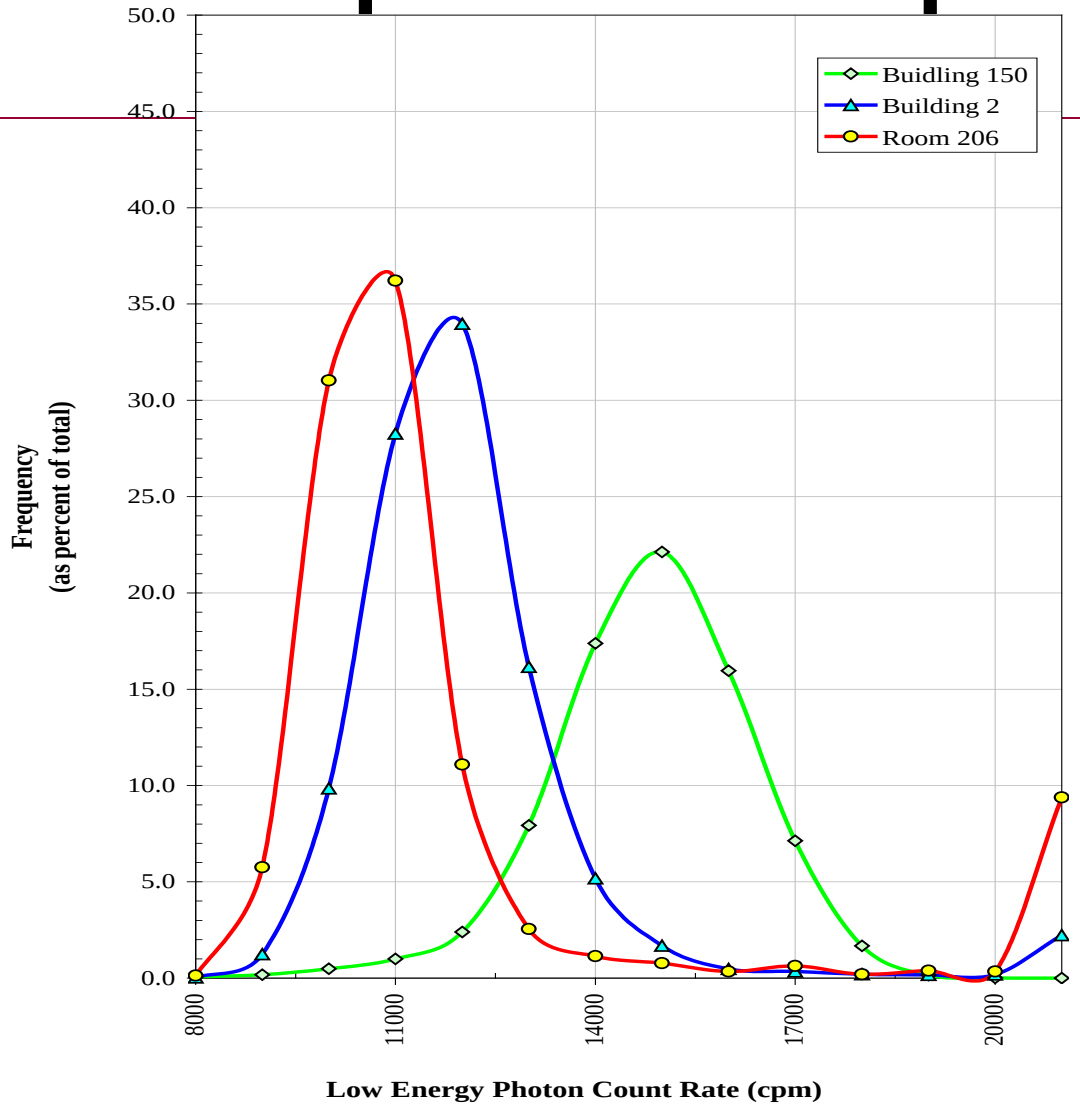


Floor Survey in Building

Example Data Output

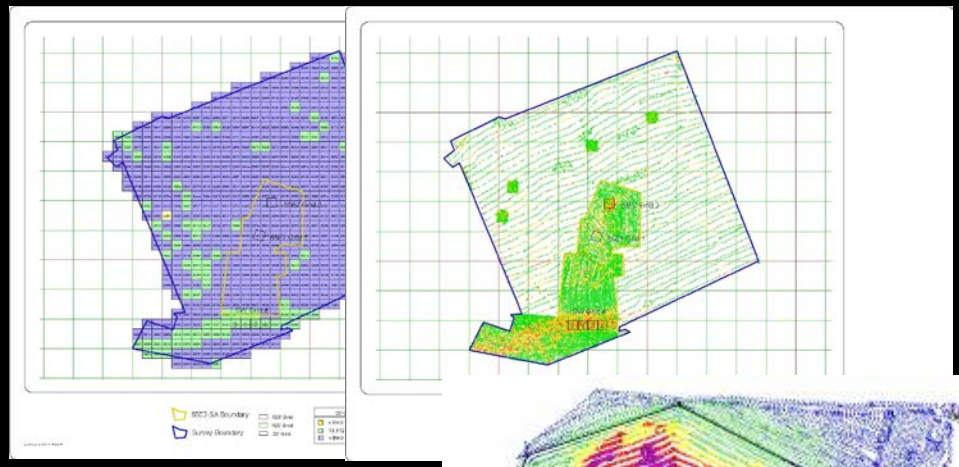
Floor Survey in Building

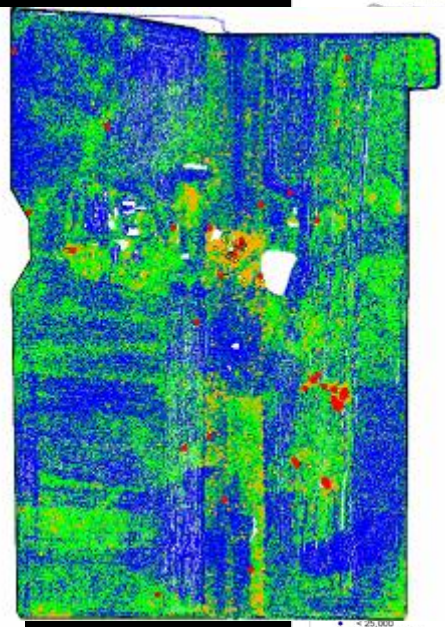
Example Data Output

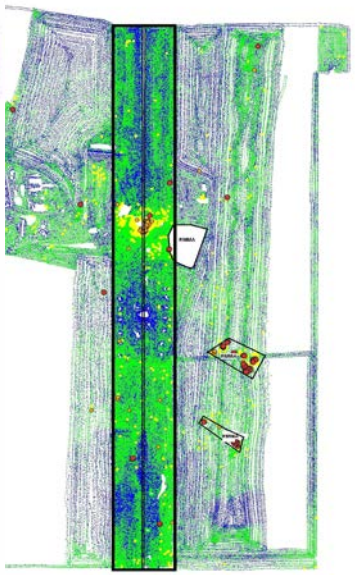


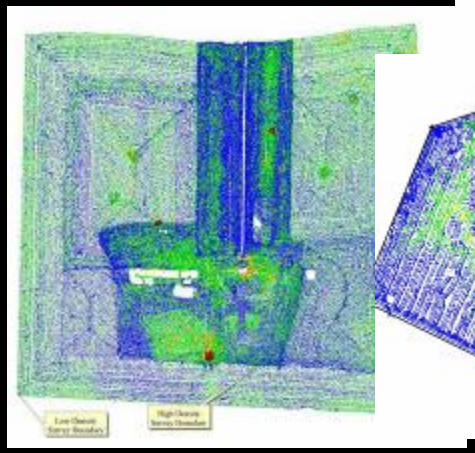
Frequency Distributions of Low Energy Photon Count Rates

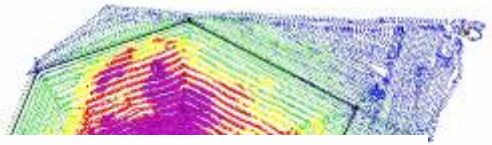
Miscellaneous Outputs

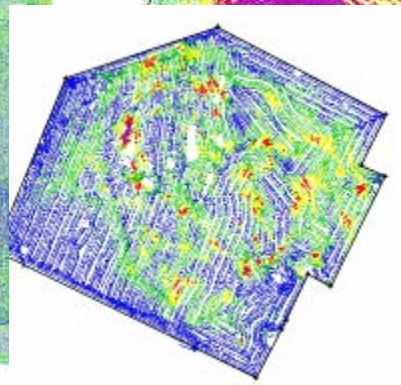


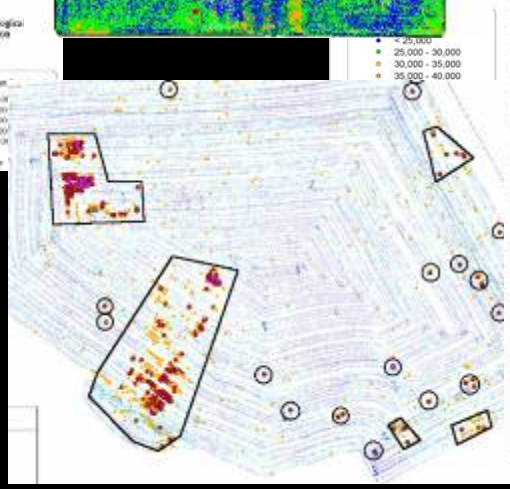


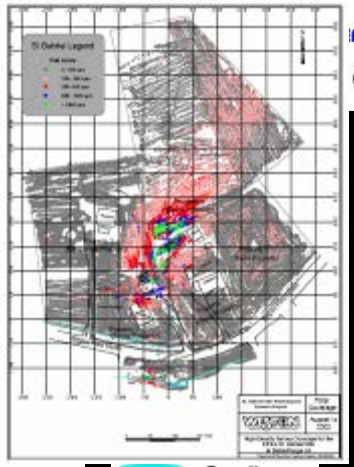






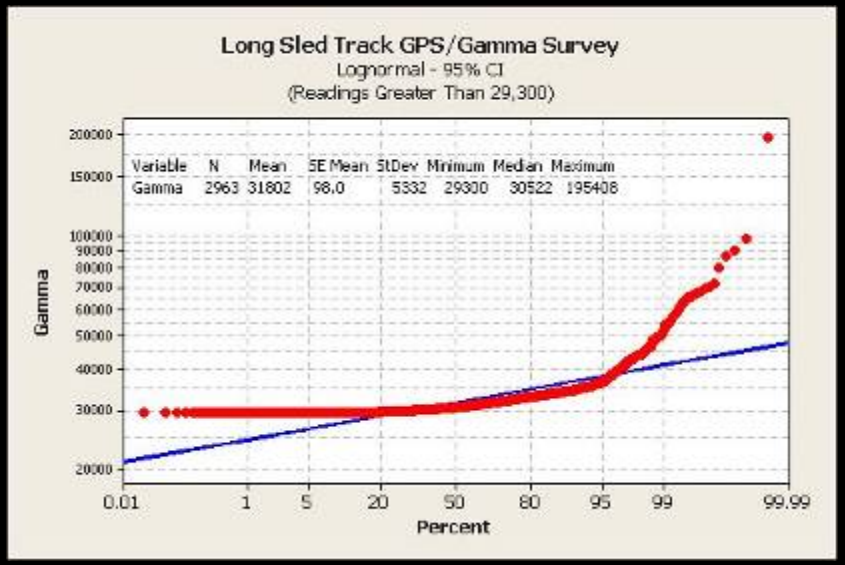


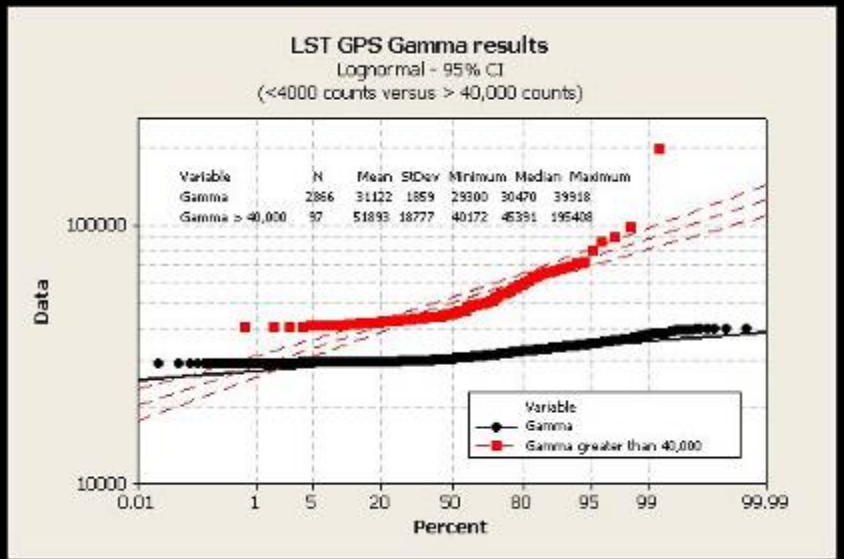


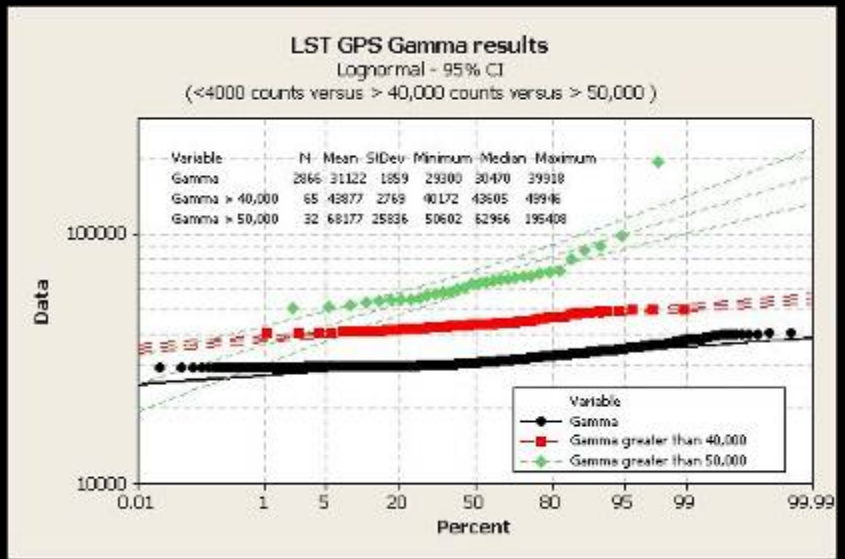


Using Statistical/Graphical Tools

Starting with a “mere” 420,000 readings:







Summary

- Automation may soon become the “industry standard”
- Indoor and outdoor applications “off-the-shelf”
- Computerized data analysis and presentation extremely powerful
- Iterative, on-the-fly surveys, “surgical” remediation