

Title	Urban Gamma Spectrometry: Report 2
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Abstract	<p>Urban gamma spectrometry has been given only minor attention with the focus being on rural gamma spectrometry. However, in recent years the Nordic emergency management authorities have turned focus towards border control and lost or stolen sources. Gamma spectra measured in urban areas are characterized by a wide variety of spectrum shapes and very fast changes in environmental background.</p> <p>In 2004 a Danish CGS survey took place in Copenhagen. It was found that gamma spectrometry in urban areas is far more complicated to interpret than had previously been thought and a new method "Fitting with Spectral Components", FSC, based on NASVD, was tested with some success. In Finland, a database "LINSSI" has been developed for spectral data management. In CGS search mode a "peak hypothesis test" is applied to the measured spectra. This system was tested during the Helsinki 2005 Athletics World Championship and it provides fast and reliable automated alarms for intermediate and high level signals. In Sweden mobile detector systems are used for border controls and problems are encountered when making measurement in harbour, container areas.</p> <p>The methods for handling data and for interpretation of urban gamma spectrometry measurements were compared and tested on the same data sets from Copenhagen and Helsinki. Software tools were developed for converting data between the Finnish LINSSI database and the binary file formats used in Denmark and Sweden. The Processing methods used at DTU and STUK have different goals. The ASSS and FSC methods are designed to optimize the overall detection capability of the system, while sacrificing speed, usability and to a certain level robustness. These methods cannot always be used for real time analysis. The Peak Significance method is designed to give robust alarms in real time, while sacrificing some of the detection capability. Thus these methods are not interchangeable, but rather complementary. An ideal system based on these methods would use the Peak Significance method simultaneously with the data collection and the ASSS and FSC methods in post processing to achieve both an optimal detection capability and a fast response. Ideally, the three systems would run simultaneously in a user-friendly environment, such as the LINSSI database.</p>
Key words	Urban Carborne Gamma Spectrometry, Spectrum Stripping, Peak hypothesis, LINSSI, FSC, ASSS, NASVD, Harbour, source search