

## **CDC'S RADIATION BIOASSAY LABORATORY PARTICIPATION IN THE INTEGRATED CONSORTIUM OF LABORATORY NETWORK'S FULL SCALE RADIOLOGICAL LABORATORY EXERCISE**

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The 2014 Integrated Consortium of Laboratory Networks (ICLN) exercise targeted radioanalytical laboratories' emergency response capabilities during early and recovery phases of a radiological incident. CDC's participation in this exercise was intended to assess the ability of its Radiation Laboratory to respond to a radiological incident in support of the overall Population Monitoring effort at CDC. The exercise tested the CDC's ability to receive, login, process, analyze (screen, identify and quantify), perform quality control and report radionuclides in 200 "spot" urine samples. It also tested the Radiation Laboratory's ability to upload their data to the ICLN Portal Data Exchange Utility using the ICLN Minimum Data Element (MDE) format.

A 3.6 liter base urine pool was created and spiked with two relevant activity levels of Strontium-90 (Sr-90) or Plutonium-239 (Pu-239), producing four sets of 15 samples each for a total of 60 spiked samples. The spike levels were based on Limit of Detection (LOD) and/or Clinical Decision Guide (CDG) based activity levels for these radionuclides. CDC determined CDG levels for threat radionuclides in urine, based on NCRP Report #161, to determine Method Quality Objectives. These target MQO detection capabilities are five or ten day post contamination levels of concern for a Child or Pregnant Woman (C/P). Pu-239 spike levels were about 4 and 20 times its LOD and CDG, which are about the same for this method. Sr-90 spike levels were about 6 and 30 times the method LOD, since the C/P CDG level is well above the LOD. There were a total of 140 unspiked samples - 50 single, 30 duplicate and 10 triplicates.

Two hundred samples were aliquoted by our Emergency Response Sample Logistics Team, and given to our Pu-239, Sr-90 and Creatinine analysts. Pu-239 analyses used our Pu-239 method, which consists of column separation and subsequent introduction through a desolvating inlet system to a Sector Field (SF) Inductively Coupled Plasma Mass Spectrometer (ICP-MS). Gross Alpha/Beta (GAB) screening used our GAB method on a Liquid Scintillation Counter (LSC). Sr-90 analyses used our Sr-90 method, which includes column separation, LSC analysis and Quadrupole ICP-MS recovery determination. Creatinine analyses used our creatinine method on our Roche Integra 400 analyzer. All methods were CLIA compliant.

Analysts imported and analyzed data, using CDC developed Visual Basic macros, to a Microsoft Excel spreadsheet and uploaded results to our LIMS database. They used SAS QA/QC analysis to compare batch/run QC sample results to QC characterization and historical run data to allow review by our branch QC personnel so that analytical results were ready for reporting.

GAB analyses screened and properly identified the Sr-90 spiked samples with 100% accuracy. Identified elevated beta emitting samples were accurately analyzed for Sr-90. Since Pu-239 activities were well below the GAB LOD, all samples were accurately analyzed, identified and quantified using the Pu-239 ICP-MS method. This presentation covers all phases of CDC's involvement in the exercise, from creation of the exercise Test Plan, preparation for and participation in the exercise itself, to evaluation of the whole exercise process.