Summary of Responses to DOE's Request for Information from Laboratories Regarding Detection Limits

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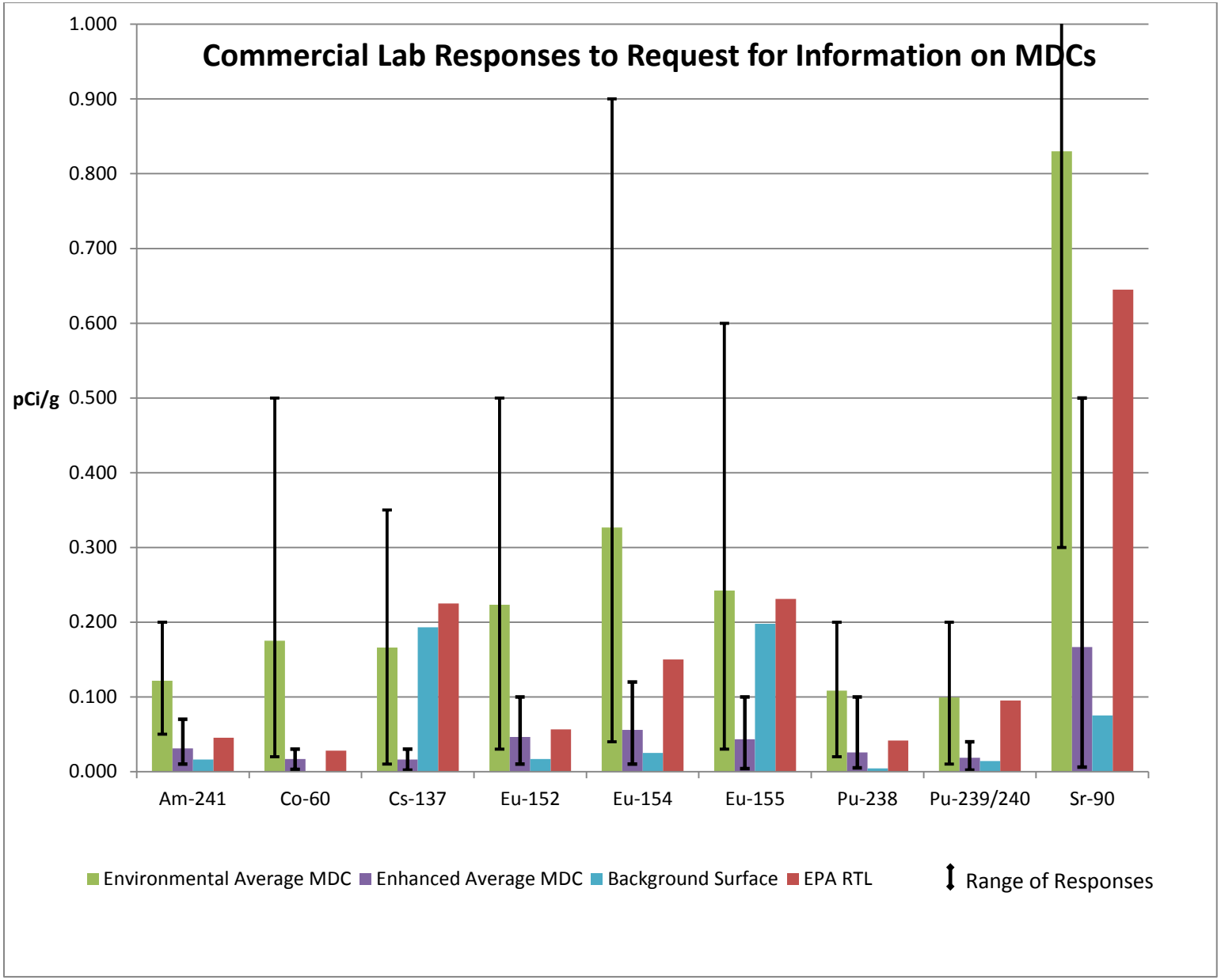
In July of 2012, DOE submitted to 17 radioanalytical laboratories, including 4 DOE contract laboratories, 2 specialized research/support laboratories, and 11 commercial radioanalytical laboratories a request for information regarding normal and enhanced minimum detectable concentrations (MDCs) for 15 radionuclides that have been detected above the EPA trigger levels in Area IV of the Santa Susana Field Laboratory during the recent Radiological Survey conducted by EPA. The radionuclides included americium-241 (^{241}Am), cobalt-60 (^{60}Co), cesium-137 (^{137}Cs), europium-152 (^{152}Eu), europium-154 (^{154}Eu), europium-155 (^{155}Eu), plutonium-238 (^{238}Pu), plutonium-239/240 ($^{239/240}$Pu), strontium-90 (^{90}Sr), thorium-228 (^{228}Th), thorium-230 (^{230}Th), thorium-232 (^{232}Th), uranium-233/234 ($^{233/234}$U), uranium-235/236 ($^{235/236}$U), and uranium-238 (^{238}U). The laboratories were told to assume the analytical and quality control requirements and MDC definition as specified in the DOE's DOECAP "Quality Systems for Analytical Services." In addition to normal and enhanced MDCs, the laboratories were requested to provide the impact of obtaining enhanced MDCs on cost and sample throughput due to increased aliquot size and counting times.

Responses were received from 14 radioanalytical laboratories, including 2 DOE contract laboratories, 2 specialized research/support laboratories, and 10 commercial laboratories. The results were compared to the surface background values and to the EPA trigger levels. The following bullets summarize the evaluation of the responses received from the laboratories:

- Some laboratories, including the laboratories utilized by EPA, were initially reluctant to respond to the RFI and some even declined due to the SSFL project's reputation for low detection limit requirements.
- Some of the laboratories indicated that the MDCs provided were based on blanks with no matrix or other radionuclide interferences and that the reported MDCs may not be achievable on all samples.
- Some of the laboratories explained that they had normal MDCs and environmental MDCs and also reported what could do to enhance the environmental MDCs. Some labs reported all three. Based on the reported MDCs and the listed aliquot sizes and counting times, it was apparent that most labs reported their typical MDCs for environmental samples as normal MDCs and the enhanced MDCs were only obtained through extraordinary effort using aliquot sizes and counting times that impacted their sample throughput capacity.

- In general, enhanced detection limits impacted the cost by a factor of 1.25 to 2.5 and impacted the sample throughput capacity by factor of 2 or more.
- The range of responses in each category is due mostly to the number of detectors that each laboratory has and the corresponding counting time that they can afford to allocate to each sample.
- For the radionuclides that have a significant natural background and for which EPA's trigger level was based on background, including ^{137}Cs, ^{155}Eu, ^{228}Th, ^{230}Th, ^{232}Th, $^{233/234}$U, $^{235/236}$U, and ^{238}U the average obtainable normal environmental detection limits are generally sufficient to detect at the trigger level, although for ^{137}Cs, ^{155}Eu, and , $^{235/236}$U, the MDCs are not sufficiently low enough to allow a reasonable (10-20%) uncertainty in the measurement at the trigger level [there is about 60% measurement uncertainty (2σ) at the MDC].
- For the radionuclides that do not have a significant natural background and for which EPAs trigger level was based on MDCs, including ^{241}Am, ^{60}Co, ^{152}Eu, ^{154}Eu, ^{238}Pu, $^{239/240}$Pu, and ^{90}Sr, the average obtainable normal environmental detection limits are not sufficient to detect at the trigger level, and enhanced detection limits are required to come close to detecting at the trigger level. Again, for these radionuclides the MDCs are not sufficiently low enough to allow a reasonable (10-20%) uncertainty in the measurement at the trigger level.
- The MDCs from DOE and research/support laboratories were generally similar to those from commercial laboratories, although for some analytes that were specifically related to the lab's purpose, higher or lower detection limits may have been provided due to the labs normal process related requirements. (Note: DOE process and research laboratories often have difficulty meeting turn-around times due to their commitment to support their own process related needs).
- The environmental and enhanced MDCs reported by the 10 commercial laboratories are summarized on the attached chart along with the EPA background screening values and trigger levels for all of the above listed radionuclides except for the primordial thorium and uranium radionuclides which typically do not pose a problem with detection at background levels.


Commercial Lab Responses to Request for Information on MDCs
pCi/g
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Am-241
Co-60
Cs-137
Eu-152
Eu-154
Eu-155
Pu-238
Pu-239/240
Sr-90
Environmental Average MDC
Enhanced Average MDC
Background Surface
EPA RTL
Range of Responses