September 2013 Update: EPA has validated and published a rapid method for sodium carbonate fusion of soil matrices for analysis of strontium-90. The method is summarized and accessible through the link provided below, and replaces use of the Department of Energy's "Actinide and Sr-89/90 in Soil Samples" for analysis of strontium-90 in soil using the methods listed in SAM.

Rapid Method for Sodium Carbonate Fusion of Soil and Soil-Related Matrices Prior to Strontium-90 Analyses for Environmental Remediation Following Radiological Incidents

Analyte(s)	CAS RN
Strontium-90	10098-97-2

Analysis Purpose: Qualitative analysis
Technique: Beta counting

Method Developed for: Strontium-90 in soil samples
Method Selected for: SAM lists this method for qualitative analysis of soil/sediment samples

Description of Method: The method is based on the complete fusion of a representative, finely ground 1-g aliquot of dried sample with no insoluble residue remaining after dissolution of the fused melt in acid. For media composed of organic soil, the sample is dry-ashed at 600 ^{o}C in an appropriate vessel prior to fusion. The sample is dissolved in a crucible with hydrofluoric acid and evaporated to dryness on a hotplate at medium to high heat (~300 ^{o}C). Dry flux mix (equal weight of dried sodium carbonate, potassium carbonate and boric acid) is added and the crucible is warmed under a flame until a reaction initiates. The crucible is then heated under full flame until the reaction subsides and the melt is completely liquid and homogeneous. After cooling, the solidified melt is dissolved in nitric acid. A calcium solution and phenolphthalein indicator is added to this mixture and the pH is adjusted to 8.3 with sodium hydroxide. The sample will become pinkish-orange due to the indicator color change and the formation of hydroxide precipitate. Sodium carbonate and heat is added to bring the precipitation to completion. After cooling and allowing the precipitate to settle, the supernatant is decanted and the precipitate is transferred to a centrifuge tube and dissolved in nitric acid. The sample is then processed for Strontium-90 determination using *Rapid Radiochemical Method for Total Radiostrontium (Sr-90) in Water for Environmental Restoration Following Homeland Security Events* (http://www2.epa.gov/radiation/rapid-radiochemical-methods-selected-radionuclides).

Special Considerations: If the sample may contain discrete radioactive particles (DRPs) or particles larger than a nominal size of 150 µm, additional sample preparation may be necessary as described in Sections A4 and A5.2.3 of the method (Interferences and Hot Particles, respectively). Soils with high silica content may require either additional fusing reagent and boric acid or a longer fusion melt. Platinum crucibles must be used in this method, when digesting samples with hydrofluoric acid. If platinum crucibles are not available, an effective, alternate method is available that uses zirconium crucibles [see *Rapid Method for Sodium Hydroxide Fusion of Concrete Matrices prior to Am, Pu, Sr, Ra, and U Analyses* (www2.epa.gov/radiation/incident-guides) and *Rapid Radiochemical Method for Total Radiostrontium (Sr-90) in Building Materials for Environmental Remediation Following Radiological Incidents* (www2.epa.gov/radiation/incident-guides)].

Source: EPA, National Air and Radiation Environmental Laboratory (NAREL). August 2012. Rev 0. "Rapid Method for Sodium Carbonate Fusion of Soil and Soil-Related Matrices Prior to Strontium-90 Analyses for Environmental Remediation Following Radiological Incidents," EPA-600-R-12-640. http://www2.epa.gov/radiation/rapid-radiochemical-methods-selected-radionuclides