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**Moore**

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(54) **SITU FORMATION OF APATITE FOR SEQUESTERING RADIONUCLIDES AND HEAVY METALS**

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(73) Assignee: **Sandia Corporation**, Albuquerque, NM (US)

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 84 days.

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**Related U.S. Application Data**

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(51) **Int. Cl.**<sup>7</sup> ..... **E02D 3/12**; B09B 1/00

(52) **U.S. Cl.** ..... **405/129.25**; 405/128.75; 588/250; 435/262.5

(58) **Field of Search** ..... 588/17, 250; 405/128.1, 405/128.15, 128.45, 128.5, 128.7, 128.8, 129.27, 128.75, 129.1, 129.25, 129.45; 435/262.5

**ABSTRACT**

Methods for in situ formation in soil of a permeable reactive barrier or zone comprising a phosphate precipitate, such as apatite or hydroxyapatite, which is capable of selectively trapping and removing radionuclides and heavy metal contaminants from the soil, while allowing water or other compounds to pass through. A preparation of a phosphate reagent and a chelated calcium reagent is mixed above-ground and injected into the soil. Subsequently, the chelated calcium reagent biodegrades and slowly releases free calcium. The free calcium reacts with the phosphate reagent to form a phosphate precipitate. Under the proper chemical conditions, apatite or hydroxyapatite can form. Radionuclide and heavy metal contaminants, including lead, strontium, lanthanides, and uranium are then selectively sequestered by sorbing them onto the phosphate precipitate. A reducing agent can be added for reduction and selective sequestration of technetium or selenium contaminants.

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**41 Claims, 4 Drawing Sheets**

