CLAIMS

1. A method of plugging a wellbore, comprising:

providing a set-delayed cement composition comprising pumice, hydrated lime, a phosphonic acid derivative cement set retarder, a polycarboxylated ether dispersant, and water;

activating the set-delayed cement composition to produce an activated set-delayed cement composition;

introducing the activated set-delayed cement composition into the wellbore; and

allowing the activated set-delayed cement composition to form a plug in the wellbore, wherein the plug has a permeability of less than 0.1 millidarcy.

2. The method of claim 1 wherein the pumice has a mean particle size in a range of about 10 micron to about 25 microns.

3. The method of claim 1 wherein the pumice and the hydrated lime are present in a weight ratio of pumice to hydrated lime of about 10:1 to about 1:1.

4. The method of claim 1 wherein the set-delayed cement composition has a pumice-to-hydrated-lime weight ratio of about 3:1 to about 5:1, wherein the cement set retarder is present in an amount of about 0.01% to about 2% by weight of the pumice, and wherein the polycarboxylated ether dispersant is present in an amount of about 0.01% to about 2% by weight of the pumice.

5. The method of claim 1 wherein the set-delayed cement composition further comprises at least one additive selected from the group consisting of a viscosifier, a weighting agent, a lightweight additive, a gas-generating additive, a mechanical-property-enhancing additive, a lost-circulation material, a filtration-control additive, a fluid-loss-control additive, a defoaming agent, a foaming agent, a thixotropic additive, and any combination thereof.

6. The method of claim 1 wherein the set-delayed cement composition remains in a pumpable fluid state for a time period of about 7 days or longer prior to the activating.

7. The method of claim 1 wherein the set-delayed cement composition remains in a pumpable fluid state for a time period of about 30 days or longer prior to the activating.

8. The method of claim 1 wherein the step of activating the set-delayed cement composition comprises adding a cement set activator to the set-delayed cement composition.

9. The method of claim 8, wherein the cement set activator comprises a liquid additive comprising sodium sulfate, sodium hexametaphosphate, a dispersant, and water.

10. A method of plugging a wellbore, comprising:

providing a cement composition comprising water, pumice, hydrated lime, a polycarboxylated ether dispersant, a viscosifier, a weighting agent, and a phosphonic acid derivative cement set retarder;

storing the cement composition for a period of about 1 day or longer;

activating the cement composition to produce an activated cement composition;

introducing the activated cement composition into the wellbore; and

allowing the activated cement composition to form a plug in the wellbore, wherein the plug has a permeability of less than 0.1 millidarcy.

11. The method of claim 10 wherein the pumice and the hydrated lime are present in a weight ratio of pumice to hydrated lime of about 10:1 to about 1:1.

12. The method of claim 10 wherein the viscosifier comprises a biopolymer, and wherein the cement set activator comprises a liquid additive comprising sodium sulfate, sodium hexametaphosphate, a dispersant, and water.

13. The method of claim 10 wherein the cement composition is stored for a time period of about 30 days or longer.

14. A set-delayed cementing system for plugging a wellbore comprising:

a set-delayed cement composition comprising:

water,

pumice,

hydrated lime,

a polycarboxylated ether dispersant, and

a phosphonic acid derivative cement set retarder;

a cement set activator for activating the set-delayed cement composition,

mixing equipment for mixing the set-delayed cement composition and the cement set activator to produce an activated set-delayed cement composition, and

equipment for delivering the activated set-delayed cement composition to a wellbore.

15. The system of claim 14, wherein the set-delayed cement composition further comprises a viscosifier.

16. The system of claim 15 wherein the equipment for delivering the activated set-delayed cement composition comprises pumping equipment or a dump bailer.

17. The method of claim 1 wherein the set-delayed cement composition further comprises a biopolymer viscosifier.

18. The method of claim 1 wherein the wellbore is disposed within a subterranean formation having a bottom hole static temperature between about 100° F to about 450° F.

19. The method of claim 1 wherein the water is present in an amount of about 33% to about 200% by weight of the pumice.

20. The method of claim 1 wherein the set-delayed cement composition has a density in the range of from about 4 lb/gal to about 20 lb/gal.