CLAIMS

We claim:

1. An apparatus for evaluating a parameter of interest of an earth formation, comprising:

   a bottom hole assembly (BHA) having a longitudinal axis; and

   at least one extendable element disposed on the BHA, the at least one extendable element including a drill bit with a nozzle configured to receive a formation fluid, the drill bit being configured to penetrate the earth formation in a direction inclined to the longitudinal axis.

2. The apparatus of claim 1, the at least one extendable element further comprising:

   at least one packer configured to isolate the nozzle from a borehole fluid.

3. The apparatus of claim 1, the at least one extendable element further comprising:

   a sensing element disposed on the at least one extendable element.

4. The apparatus of claim 3, the at least one extendable element further comprising:

   a stimulus source configured to transmit a stimulus into the earth formation.

5. The apparatus of claim 4, wherein the stimulus transmitted includes at least one of: (i) mechanical work, (ii) acoustic energy, (iii) electricity, (iv) magnetism, (v) nuclear radiation, and (vi) electromagnetic radiation.

6. The apparatus of claim 1, further comprising

   a conveyance device configured to convey the BHA into a borehole in the earth formation.

7. The apparatus of claim 1, wherein the at least one extendable element is configured to sense at least one of: (i) electromagnetic radiation, (ii) electric current, (iii) electrostatic potential, (iv) magnetic flux, (v) acoustic wave propagation, (vi) nuclear radiation, (vii) nuclear-resonance properties, (viii) electrical impedance, and (ix) mechanical force.

8. The apparatus of claim 1, wherein the at least one extendable element is configured for detachment from the BHA.

9. The apparatus of claim 8, wherein the at least one extendable element is configured for reattachment to the BHA.

10. The apparatus of claim 9, wherein the at least one extendable element comprises a locator device.

11. The apparatus of claim 1, further comprising:

a locator device disposed on the at least one extendable element.

12. The apparatus of claim 11, wherein the locator device may include at least one of: (i) a radio frequency tag, (ii) an acoustic locator, (iii) a radioactive tag, (iv) a mechanical latch, (v) a tether, and (vi) a locator beacon.

13. The apparatus of claim 1, further comprising:

at least one additional extendable element disposed on the BHA, the at least one additional extendable element including an additional drill bit, the additional drill bit being configured to penetrate the earth formation in a direction inclined to the longitudinal axis.

14. A method of evaluating a parameter of interest of an earth formation, comprising:

conveying a bottom hole assembly (BHA) having a longitudinal axis into a borehole;

using at least one drill bit on at least one extendable element on the BHA for penetrating the earth formation to form a channel in a direction inclined to the longitudinal axis, wherein the earth formation is penetrated beyond a contaminated zone; and

evaluating the parameter of interest.

15. The method of claim 14, further comprising:

receiving a formation fluid using a nozzle on the at least one extendable element.

16. The method of claim 15, further comprising:

dividing the channel into at least two sections using at least one packer disposed on the at least one extendable element.

17. The method of claim 14, further comprising:

transmitting a stimulus into the formation outside the contaminated zone.

18. The method of claim 17, wherein the stimulus includes at least one of: (i) mechanical work, (ii) acoustic energy, (iii) electricity, (iv) magnetism, (v) nuclear radiation, and (vi) electromagnetic radiation.

19. The method of claim 17, wherein the at least one extendable element comprises a first extendable element and a second extendable element, and wherein the stimulus is transmitted using the first extendable element and sensed using the second extendable element.

20. The method of claim 14, wherein evaluating the parameter of interest includes sensing at least one of: (i) electromagnetic radiation, (ii) electric current, (iii) electrostatic potential, (iv) magnetic flux, (v) acoustic wave propagation, (vi) nuclear radiation, (vii) nuclear-resonance properties, (viii) electrical impedance, and (ix) mechanical force.

21. The method of claim 14, further comprising:

detaching the at least one extendable element from the BHA.

22. The method of claim 21, further comprising

reattaching the at least one extendable element to the BHA.

23. The method of claim 21, further comprising:

locating the at least one extendable element in the borehole.

24. The method of claim 14, further comprising:

collapsing the channel.

CLAIMS

We claim:

1. An apparatus for evaluating a parameter of interest of an earth formation, comprising:
a bottom hole assembly (BHA) having a longitudinal axis; and
at least one extendable element disposed on the BHA, the at least one extendable element including a drill bit with a nozzle configured to receive a formation fluid and a sensing element disposed on the at least one extendable element, the drill bit being configured to penetrate the earth formation in a direction inclined to the longitudinal axis.

2. The apparatus of claim 1, the at least one extendable element further comprising:
at least one packer configured to isolate the nozzle from a borehole fluid.

3. The apparatus of claim 1, the at least one extendable element further comprising:
a stimulus source configured to transmit a stimulus into the earth formation.

4. The apparatus of claim 3, wherein the stimulus transmitted includes at least one of: (i) mechanical work, (ii) acoustic energy, (iii) electricity, (iv) magnetism, (v) nuclear radiation, and (vi) electromagnetic radiation.

5. The apparatus of claim 1, further comprising
a conveyance device configured to convey the BHA into a borehole in the earth formation.

6. The apparatus of claim 1, wherein the at least one extendable element is configured to sense at least one of: (i) electromagnetic radiation, (ii) electric current, (iii) electrostatic potential, (iv) magnetic flux, (v) acoustic wave propagation, (vi) nuclear radiation, (vii) nuclear-resonance properties, (viii) electrical impedance, and (ix) mechanical force.

7. The apparatus of claim 1, wherein the at least one extendable element is configured for detachment from the BHA.

8. The apparatus of claim 7, wherein the at least one extendable element is configured for reattachment to the BHA.

9. The apparatus of claim 8, wherein the at least one extendable element comprises a locator device.

10. The apparatus of claim 1, further comprising:
a locator device disposed on the at least one extendable element.

11. The apparatus of claim 10, wherein the locator device may include at least one of: (i) a radio frequency tag, (ii) an acoustic locator, (iii) a radioactive tag, (iv) a mechanical latch, (v) a tether, and (vi) a locator beacon.

12. The apparatus of claim 1, further comprising:
at least one additional extendable element disposed on the BHA, the at least one additional extendable element including an additional drill bit, the additional drill bit being configured to penetrate the earth formation in a direction inclined to the longitudinal axis.

13. A method of evaluating a parameter of interest of an earth formation, comprising:
conveying a bottom hole assembly (BHA) having a longitudinal axis into a borehole;
using at least one drill bit on at least one extendable element on the BHA for penetrating the earth formation to form a channel in a direction inclined to the longitudinal axis, wherein the earth formation is penetrated beyond a contaminated zone; and
evaluating the parameter of interest using a sensing element disposed on the at least one extendable element.

14. The method of claim 13, further comprising:
receiving a formation fluid using a nozzle on the at least one extendable element.

15. The method of claim 14, further comprising:
dividing the channel into at least two sections using at least one packer disposed on the at least one extendable element.

16. The method of claim 13, further comprising:
transmitting a stimulus into the formation outside the contaminated zone.

17. The method of claim 16, wherein the stimulus includes at least one of: (i) mechanical work, (ii) acoustic energy, (iii) electricity, (iv) magnetism, (v) nuclear radiation, and (vi) electromagnetic radiation.

18. The method of claim 16, wherein the at least one extendable element comprises a first extendable element and a second extendable element, and wherein the stimulus is transmitted using the first extendable element and sensed using the second extendable element.

19. The method of claim 13, wherein evaluating the parameter of interest includes sensing at least one of: (i) electromagnetic radiation, (ii) electric current, (iii) electrostatic potential, (iv) magnetic flux, (v) acoustic wave propagation, (vi) nuclear radiation, vii) nuclear-resonance properties, (viii) electrical impedance, and (ix) mechanical force.

20. The method of claim 13, further comprising:
detaching the at least one extendable element from the BHA.

21. The method of claim 20, further comprising
reattaching the at least one extendable element to the BHA.

22. The method of claim 20, further comprising:
locating the at least one extendable element in the borehole.