following drilling. Such casing strings are typically made of steel and perform adequately in most applications, in some cases, however, it may be difficult or impossible, or economically infeasible to case extended sections of the well. This is particularly true of off-horizontal sections of a well (e.g., resulting from directional drilling), where forces on the casing string are influenced both by the formations and the resistance to advancement of the casing (e.g., due to its weight and any deviations or tortuosity of the hole that may exist in the wellbore).

[0005] In some cases, reamers, tools, shoes, guides, and other structures have been used or proposed to aid in deploying rigid casing in sections of wells. Some of these may be designed to be drilled through. Others act as guides for the actual casing, but do not, and are not intended to themselves form any permanent part of the well casing. Indeed, given their construction, dimensions, and placement, they may be wholly unsuitable for use as actual casing.

[0006] There is a need, therefore, for improved approaches to casing extended sections of wells, and particularly in extents that cannot be reached by conventional casing running methods.

BRIEF DESCRIPTION

[0007] In accordance with one aspect of the disclosure, a system comprises a tubular casing section comprising a first material and extending through a first section of a subterranean well, and a toe casing section coupled to the lower end of the tubular casing section and extending into the furthest section of open hole of the well, the toe casing section comprising a second material different from the first material, wherein both the tubular casing section and the toe casing section comprise production casing once the well is completed for the production of hydrocarbons from the well.

[0008] The disclosure also provides a system comprising a tubular casing section comprising a first material and extending through a generally vertical section of a subterranean well and into a portion of an off-vertical section of the subterranean well

continuous with the vertical section, and a toe casing section coupled to the distal end of the tubular casing section and extending into the furthest section of open-hole , the toe casing section comprising a second material different from the first material, wherein both the tubular casing section and the toe casing section comprise production casing once the well is completed for the production of hydrocarbons from the well.

[0009] Furthermore, the disclosure provides a method comprising assembling a toe casing section comprising a toe casing material, deploying the toe casing section into a well, assembling a casing section comprising a casing material different from the toe casing material, the toe casing section being secured to an upper section of casing, and deploying the whole casing into the well to set the toe casing section into the end of the open-hole section of the well, wherein both the tubular casing section and the toe casing section comprise production casing once the well is completed for the production of hydrocarbons from the well.

DRAWINGS

[0010] These and other features, aspects, and advantages of the present invention will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

[0011] FIG. 1 is a diagrammatical representation of an example installation for drilling, completing, or servicing a well in accordance with the present techniques;

[0012] FIG. 2 is a diagrammatical representation of a sections of a tubular string extending into a well and including the toe casing section;

[0013] FIG. 3 is a diagrammatical representation of a toe casing section inserted into a section of a well; and

[0014] FIG. 4 is a flow chart illustrating example operations for deploying a toe casing section into a well.

CLAIMS:

1. A system comprising:

a tubular casing section comprising a first material and extending through a first section of a subterranean well; and

a toe casing section coupled to a lower end of the tubular casing section and extending into an open-hole section of the subterranean well, the toe casing section comprising a second material different from the first material,

wherein both the tubular casing section and the toe casing section comprise production casing once the well is completed for the production of hydrocarbons from the well.

2. The system of claim 1, wherein the first material comprises steel, and the second material comprises an aluminum alloy.

3. The system of claim 1, wherein the toe casing section has a nominal length of 20 feet.

4. The system of claim 2, wherein the toe casing section has a length sufficient to assist the whole casing string to reach desired depth.

5. The system of claim 1, wherein the toe casing section comprises a plurality of modular sections having a nominal length of 10 to 45 feet.

6. The system of claim 1, wherein the toe casing section has an outer diameter of at least about 3 inches to 36 inches.

7. The system of claim 5, wherein the toe casing section has a wall thickness of between about 0.25 inches to 1.5 inches.

8. The system of claim 1, wherein the toe casing section comprises a casing shoe.

9. The system of claim 1, wherein the open-hole section is off-vertical and the toe casing section extends at least 5,000 to 20,000 feet into the off-vertical open-hole section.

10. A system comprising:

a tubular casing section comprising a first material and extending through a generally vertical section of a subterranean well and into a portion of an off-vertical section of the subterranean well continuous with the vertical section; and

a toe casing section coupled to a distal end of the tubular casing section and extending into an open-hole section of the off-vertical section beyond a limit of the casing section, the toe casing section comprising a second material different from the first material,

wherein both the tubular casing section and the toe casing section comprise production casing once the well is completed for the production of hydrocarbons from the well.

11. The system of claim 10, wherein the first material comprises steel, and the second material comprises an aluminum alloy.

12. The system of claim 10, wherein the toe casing section has a nominal length of 20 feet.

13. The system of claim 10, wherein the toe casing section has an outer diameter of at least about 3 inches to 36 inches.

14. The system of claim 13, wherein the toe casing section has a wall thickness of between about 0.25 inches to 1.5 inches.

15. The system of claim 10, wherein the toe casing section comprises at least one casing shoe.

16. The system of claim 10, wherein the toe casing section extends at least 5,000 to 20,000 feet into the off-vertical open-hole section.

17. A method comprising:

assembling a toe casing section comprising a toe casing material;

deploying the toe casing section into a well;

assembling a casing section comprising a casing material different from the toe casing material, a lower end of the casing section being secured to an upper end of the toe casing section;

deploying the casing section into the well to set the toe casing section into an open-hole section of the well,

wherein both the tubular casing section and the toe casing section comprise production casing once the well is completed for the production of hydrocarbons from the well.

18. The method of claim 17, wherein the open-hole section is generally off-vertical.

19. The method of claim 17, wherein the toe casing section comprises at least one casing shoe.

20. The method of claim 17, wherein the toe casing material comprises an aluminum alloy and the casing material comprises steel.