A receptacle for disposing of drilling waste includes a frame, a body coupled to and rotatable relative to the frame, a flap movable relative to the body between closed position in which the opening is covered and an open position for receiving waste and releasing the waste, and an actuator. The actuator acts between the body and the frame to rotate the body relative to the frame and cause the body to move relative to the flap for releasing the waste at a dump site.
METHOD OF AND APPARATUS FOR DISPOSING OF DRILLING WASTE

INTEGRATION BY REFERENCE TO ANY PRIORITY APPLICATIONS

[0001] Any and all applications for which a foreign or domestic priority claim is identified in the Application Data Sheet as filed with the present application are hereby incorporated by reference under 37 CFR 1.57.

[0002] This application claims priority to U.S. Provisional Application Ser. No. 61/880,703, filed Sep. 20, 2013, the disclosure of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0003] The present invention relates to the disposal of waste generated during the drilling of stratigraphic wells to locate oil reserves in underground deposits.

BACKGROUND

[0004] In order to evaluate undeveloped oil reserves, stratigraphic (strat) wells are drilled and geological data is collected therefrom. During drilling, waste is generated, including solid and liquid waste that is discharged from the top of the wellbore as drilling progresses. The waste is then generally separated into solids and liquid, for example utilizing shaker separation and centrifuge techniques. Typically, the waste containers are transported by land vehicle to a waste treatment facility, dumping area or sump site. Emptying of waste containers is a manual process, requiring dedicated resources.

[0005] Improvements in apparatuses for use with collection and transportation of the waste are desirable.

SUMMARY

[0006] According to an aspect of the embodiment, a receptacle for disposing of drilling waste is provided. The receptacle includes a frame, a body coupled to and rotatable relative to the frame, a flap movable relative to the body between closed position in which the opening is covered and an open position for receiving waste and releasing the waste, and an actuator. The actuator acts between the body and the frame to rotate the body relative to the frame and cause the body to move relative to the flap for releasing the waste at a dump site.

[0007] According to another aspect, a method of disposing of drilling waste utilizing a waste receptacle is provided. The waste receptacle includes a frame, a body coupled to and rotatable relative to the frame, the body including an opening to receive and release waste. The method includes receiving the waste in the opening of the receptacle, coupling the frame of the receptacle to a helicopter, transporting, by the helicopter, the receptacle to a dump site, and rotating the receptacle relative to the frame to cause the body to rotate relative to the frame to release the waste at a dump site.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Embodiments of the present invention will be described, by way of example, with reference to the drawings and to the following description, in which:

[0009] FIG. 1 is a perspective view of a waste receptacle according to one embodiment;

[0010] FIG. 2 is an alternative perspective view of the waste receptacle of FIG. 1, with a top removed to show detail inside the waste receptacle; and

[0011] FIG. 3 is a schematic view of an aircraft transporting the waste receptacle of FIG. 1.

DETAILED DESCRIPTION

[0012] For simplicity and clarity of illustration, reference numerals may be repeated among the figures to indicate corresponding or analogous elements. Numerous details are set forth to provide an understanding of the examples described herein. The examples may be practiced without these details. In other instances, well-known methods, procedures, and components are not described in detail to avoid obscuring the examples described. The description is not to be considered as limited to the scope of the examples described herein.

[0013] The disclosure generally relates to a receptacle, also referred to as a dump bucket, for disposing of drilling waste and to a method of disposing of the drilling waste, utilizing the receptacle. The receptacle includes a frame, a body coupled to and rotatable relative to the frame, a flap movable relative to the body between closed position in which the opening is covered and an open position for receiving waste and releasing the waste, and an actuator. The actuator acts between the body and the frame to rotate the body relative to the frame and cause the body to move relative to the flap for releasing the waste at a dump site.

[0014] Referring to FIG. 1 and FIG. 2, the receptacle 100 generally includes a frame 102, also referred to as a fly box, and a body 104. The frame 102 and the body 104 may be made of any suitable material. For example, the frame 102 and the body 104 may be steel. The frame 102 may be a tubular frame, such as a square cross-section metal tubular frame. The frame 102 may be any suitable shape to provide support for body 104.

[0015] In this example, the frame 102 includes a generally square base 106, opposing sides 108, 110, and a top cross-member 112 that extends between the opposing sides 108, 110.

[0016] The base 106 includes a front tube 114, a back tube 116, and opposing side tubes 118, 120, that are welded together to form the square base 106.

[0017] The opposing sides 108, 110 of the frame 102 extend generally upwardly from the opposing side tubes 118, 120 of the base 106. The side 108 includes a first member 122 and a second member 124 that extend upwardly, at an acute angle from the side tube 118. The first member 122 extends upwardly from a location along the side tube 118 that is spaced from the front tube 114 by a distance of about one quarter of the length of the side tube 118. The second member 124 extends upwardly from the corner at which the side tube 118 is joined to the back tube 116. With part of the side tube 118, the first member 122 and the second member 124 form a generally equilateral triangle. The upper ends of the first member 122 and the second member 124 are joined to an upright member 126 that extends from near a top of the body 104, generally vertically, to a location spaced from the top of the body 104.

[0018] The side 108 also includes a third member 128 and a fourth member 130 that extend upwardly at an acute angle from the side tube 118. The third member 128 is not as long as the first member 122, is spaced from the first member 122 such that the third member is closer to the back tube 116 than the first member 122, and extends generally parallel to the
first member 122. The fourth member 130 is not as long as the second member 124, is spaced from the second member 124 such that the fourth member 130 is farther from the back tube 116 than the second member 124, and extends generally parallel to the second member 124. The third member 128 and the fourth member 130 terminate at a generally horizontal beam 132 that extends from the top of the fourth member 130, across the top of the third member 128, to a location along the first member 122. The generally horizontal beam 132 is welded to the first member 122 at a location that is near the center along the length of the first member 122.

[0019] A collar 134 is disposed on the generally horizontal beam 132, for example, by bolting or welding flanges of the collar 134 to the generally horizontal beam 132. The collar 134 includes bearings disposed therein to facilitate rotation of a shaft within the collar 134, the shaft extending through the body 104.

[0020] The side 110 is generally a mirror image of the side 108 and is not described again in detail herein.

[0021] The top crossmember 112 extends from the upright member 126 on the side 108 of the frame 102 to an upright member 126 on the side 110 of the frame 102. A respective lug 136 extends from each end of the top crossmember 112. Each of the lugs 136 may be coupled to the top crossmember 112 and to the respective upright member 126 by brackets and by welding. The lugs provide coupling points for coupling cables to the waste receptacle 100 for transportation of the waste receptacle 100 by air.

[0022] The body 104 of the waste receptacle 100 includes a generally upright back 140 that extends between two generally upright sides 142, 144. A front 146 of the body 104 extends between the two generally upright sides 142, 144. The body also includes a bottom 148 that extends between the upright sides 142, 144 and extends from the front 146 to the back 140. The front 146 of the body 104 includes a curved portion 150 and a lip 152 angled outwardly therefrom. The curved portion 150 and the bottom 148 may be formed of a single sheet of metal that is curved to form a radius from the bottom 148 to the front 146. Thus, the bottom 148 and the curved portion 150 form a generally smooth surface, without any corners or small radius corners, to facilitate rotation of the body 104 relative to the frame 102 and to facilitate sliding of materials within the body 104 to release or expel the waste when the body 104 is rotated relative to the frame 102.

[0023] The body 104 also includes a top 154 that includes a fixed portion 156 that covers a majority of the opening formed by the back 140, the sides 142, 144, and the front 146. The waste receptacle 100 also includes a flap 158. The fixed portion 156 may cover about two-thirds of the opening. The fixed portion 156 extends from the back 140, along the sides 142, 144, toward the front 146. The flap 158 is coupled to the fixed portion 156 of the top 154 of the body 104 by hinges 160 such that the flap 158 is movable between an open position in which the flap 158 is moved away from the lip 152, to expose an opening in the body 104, and a closed position in which the flap 158 covers the opening and rests on the sides 142, 144 and the edge of the lip 152.

[0024] The flap 158 is coupled to the top crossmember 112 by a cable 164 that is generally fully extended or generally taut when the flap 158 is in the closed position and the body 104 is in an upright position as shown in FIG. 1 and FIG. 2. The cable 164 may be coupled to the flap 158 by any suitable coupling. For example, the cable may be coupled to the end of the flap 158, near a center thereof, and nearest the lip 152, by a clevis. Similarly, the cable may be coupled to the top crossmember 112 by any suitable coupling. For example, the cable may be coupled to the top crossmember 112, near a center thereof, by a clevis.

[0025] Thus, the flap 158 may be moved to an open position in which the cable 164 is loose, or not fully extended and the flap 158 abuts the top crossmember 112 in order for the body 104 to receive waste. The flap 158 may also be moved relative to the body 104, to an open position in which the cable 164 is generally extended or generally taut, by rotating the body 104 within the frame 102 such that the body 104 is moved relative to the flap 158 to release waste.

[0026] The shaft 162 extends through the side 142, through the body 104, and through the side 144. The shaft 162 is coupled to the sides 142, 144, for example, by welding to the sides 142, 144. The shaft 162 extends into the collars 134, from the collar 134 on the first side 108 of the frame 102 to the collar 134 on the second side 110 of the frame 102. The shaft 162 is rotatable within the collars 134, and thus, the body 104 is rotatable relative to the frame 102.

[0027] An actuator, such as a hydraulic mechanism (not shown) acts between the body 104 and the frame 102 to cause the body 104 to rotate relative to the frame 102 to release the contents of the body 104. The hydraulic mechanism may be any suitable hydraulic mechanism to cause rotation of the body 104 relative to the frame 102. For example, the hydraulic mechanism may be a hydraulic cam that is actuable to cause the shaft 162 to rotate relative to the frame 102. Other hydraulic mechanisms may also be utilized, such as a ram that is utilized to act against the shaft 162 or against a face disposed along the shaft 162, to cause the body 104 to rotate by rotation of the shaft 162 in the collars 134. As the body 104 rotates, the flap 158 is held in position relative to the frame 102 by the cable 164 such that the lip 152 rotates away from the flap 158. Thus, an opening is provided in the body 104 and the body 104 is rotated to release the contents within the body 104.

[0028] In use, the waste receptacle 100 may be filled by moving the flap 158 to the open position in which the flap 158 abuts the top crossmember 112. Cuttings from the drilling operation are deposited into the waste receptacle 100. The waste receptacle 100 may be any suitable size. In one example, the body 104 is sized to receive about 1.7 cubic meters of waste. Multiple waste receptacles may be disposed, for example, along a skid, and may be moved laterally such that a first waste receptacle 100 is positioned to receive waste. When filled, a first, second, and third waste receptacle 100 slide laterally to move the second waste receptacle 100 into position to receive waste. When filled, the waste receptacles slide to move the third waste receptacle 100 into position to receive waste. The waste receptacles may be moved manually. One, two, three or more waste receptacles may be positioned on a skid at a given time.

[0029] As shown in the schematic view of FIG. 3, an aircraft 300 is utilized to lift and transport each waste receptacle 100, after filling, to a suitable dump site. A heavy cargo helicopter having relatively little downwash compared to other helicopters may be utilized. In one embodiment, a Kaman K-MAX® helicopter is utilized. The aircraft 300 is releasably coupled to the frame 102 by cables that are releasably coupled to the lugs 136, for example, by clevises. The aircraft 300 is in communication with the actuator, which in
this example is a hydraulic mechanism, for example, by a cable that extends from a control in the aircraft 300, to the hydraulic mechanism.

After coupling the aircraft 300 to the waste receptacle 100, the aircraft 300 lifts and transports the receptacle 100 to a suitable dump site. The hydraulic mechanism is then actuated to cause the body 104 to rotate relative to the frame 102. As the body 104 rotates, the flap 158 is held in position relative to the frame 102 by the cable 164 such that the lip 152 rotates away from the flap 158 to provide an opening in the body 104. The cuttings are released, by the force of gravity, from the body 104.

Advantageously, the method and apparatus described herein facilitates transportation of drilling waste, away from the drilling site, without the use of temporary roads. Transporting the equipment and waste by helicopter means that temporary roads are not constructed, which may reduce the environmental footprint of the operation by up to 50% compared to a traditional stratigraphic well drilling operation.

The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the claims should not be limited by the preferred embodiments set forth in the examples, but should be given the broadest interpretation consistent with the description as a whole. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A method of disposing of drilling waste utilizing a waste receptacle, the waste receptacle including a frame, a body coupled to and rotatable relative to the frame, the body including an opening to receive and release waste, the method comprising:
   - receiving the waste in the opening of the receptacle;
   - coupling the frame of the receptacle to a helicopter;
   - transporting, by the helicopter, the receptacle to a dump site; and
   - rotating the receptacle relative to the frame to cause the body to rotate relative to the frame to release the waste at a dump site.

2. The method according to claim 1, wherein the waste receptacle includes a flap to cover the opening, wherein the flap is in an open position during receiving the waste.

3. The method according to claim 2, wherein the flap is moved to a closed position to cover the opening for transporting the receptacle.

4. The method according to claim 3, wherein the body moves relative to the flap when rotating the receptacle relative to the frame.

5. The method according to claim 1, wherein rotating the receptacle comprises controlling an actuator from the helicopter to rotate the receptacle to release the waste.

6. A receptacle for disposing of drilling waste, the receptacle comprising:
   - a frame;
   - a body coupled to and rotatable relative to the frame, the body including an opening therein to receive and release waste;
   - a flap movable relative to the body between closed position in which the opening is covered and an open position for receiving waste and releasing the waste;
   - an actuator acting between the body and the frame to rotate the body relative to the frame and cause the body to move relative to the flap for releasing the waste at a dump site.

7. The receptacle according to claim 6, wherein the flap is movable relative to the frame to move the flap between the open position and the closed position without rotating the body relative to the frame.

8. The receptacle according to claim 7, wherein the body is movable relative to the frame without moving the flap relative to the frame, thereby moving the flap relative to the body.

9. The receptacle according to claim 6, wherein the flap is coupled to the frame by a cable to facilitate movement of the flap relative to the frame and to facilitate movement of the body relative to the flap when the body is moved relative to the frame.

10. The receptacle according to claim 6, wherein the actuator comprises a hydraulic mechanism that is controlled remotely.

11. The receptacle according to claim 10, wherein the actuator is controllable from a helicopter that is utilized to transport the receptacle.

12. The receptacle according to claim 6, wherein the body includes a bottom and front that curves from the bottom to form a generally smooth, curved surface to facilitate sliding of waste within the body when releasing the waste.

13. The receptacle according to claim 6, wherein the body rotates relative to the frame, about a shaft that is coupled to the frame.

14. The receptacle according to claim 6, wherein the frame includes a crossmember that includes connectors for coupling cables thereto for transporting the receptacle by helicopter.

15. The receptacle according to claim 14, wherein the flap is coupled to the crossmember by a cable to facilitate movement of the flap relative to the frame and to facilitate movement of the body relative to the flap when the body is moved relative to the frame.