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INCINERATOR APPARATUS

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The present invention relates to a method and apparatus for incinerating drilling mud or other particulate material.

In using drilling mud in oil exploration, the drilling mud becomes contaminated with oil. Spent drilling mud must be
5 decontaminated, to remove the oil, before it can be disposed of in land-fill sites.

Hitherto, spent drilling mud has been decontaminated using an incinerator in the form of a large, rotary kiln: this burns off the oil from the drilling mud. The smoke and gases
10 which are generated in this process are passed to a secondary combustion chamber to produce a final emission which is sufficiently clean that it can be passed into the atmosphere.

Such incinerators are very large structures which must therefore occupy a fixed site, to which the contaminated
15 drilling mud must be taken. Current-day regulations place severe limitations on the transport of contaminated drilling mud, so it is often required to go to the heavy expense of building an incinerator installation at a convenient site, local to the oil exploration site or (for offshore exploration)
20 at a local port.

We have now devised an incinerator apparatus which is sufficiently compact that it can be transported to locations where it is desired to decontaminate the drilling mud.

In accordance with the present invention, there is
25 provided an incinerator apparatus for incinerating drilling mud or other contaminated particulate material, the apparatus comprising an upper treatment conveyor and a lower treatment conveyor arranged so that the material to be incinerated is advanced along the upper treatment conveyor, then falls onto
30 the lower treatment conveyor and is returned along the lower treatment conveyor, and burner means for directing one or more flames to heat the air circulating around the material being advanced along each treatment conveyor to a temperature which exceeds the flash point of oil with which the material is

contaminated, to effect combustion of the oil.

Preferably a feed conveyor is provided to feed the contaminated material onto one end of the upper treatment conveyor. Preferably an outlet conveyor is provided to take out
5 the decontaminated material from the corresponding end of the lower treatment conveyor.

Preferably each of the treatment conveyors comprises an open trough provided with a longitudinal screw or auger to advance the material along the trough.

10 Preferably the treatment conveyors are mounted within an enclosed chamber, one end of which is formed with an inlet opening for the contaminated material and an outlet opening for the decontaminated material.

Preferably the chamber, or main chamber, in which the
15 treatment conveyors are mounted, has an outlet to take the smoke and gases, generated by the incineration process, to a secondary combustion chamber. Preferably the outlet of the secondary combustion chamber is provided with an extraction fan, so that both main and secondary chambers run under
20 negative pressure.

We have found that the above-described apparatus is effective in burning off the oil with which the drilling mud is contaminated. The augers of the treatment conveyors continually turn the material over and so bring fresh portions
25 of the material to the burner flames, thus ensuring that the entire body of material is subjected to the required heat. Moreover, the apparatus may be of a relatively compact size, such that it can be transported e.g. on a low-loader trailer of a road vehicle.

30 Also, in accordance with the present invention, there is provided method of incinerating drilling mud or other particulate material which is contaminated with oil, comprising advancing the material to be incinerated along a an upper treatment conveyor of an incinerator apparatus having burner
35 means, returning the material falling from the upper conveyor

along a lower conveyor of the apparatus and directing one or more flames from said burner means to heat the air circulating around the material being advanced along the treatment conveyors to a temperature which exceeds the flash point of oil with which the material is contaminated, to effect combustion of the oil.

An embodiment of the present invention will now be described by way of example only and with reference to the accompanying drawings, in which:

10 FIGURE 1 is a diagrammatic longitudinal section through an incinerator apparatus in accordance with this invention; and

FIGURE 2 is a diagrammatic cross-section through the apparatus of Figure 1.

Referring to the drawings, there is shown an
15 incinerator apparatus in accordance with this invention, comprising a main chamber 10 which is closed at both ends. The

chamber 10 may be formed of mild steel and is lined on its inner surface with a ceramic fibre thermally insulating material (not shown). Within the chamber 10, upper and lower troughs 12,14 of stainless steel are supported on framework 5 (not shown) to extend lengthwise of the chamber 10. An elongate screw or auger 13,15 is disposed lengthwise within each of the troughs 12,14 and coupled to a motorised drive 16 mounted outside one end of the chamber.

The troughs 12,14 and their screws 13,15 thus form 10 upper and lower treatment conveyors, arranged for conveying drilling mud firstly along the upper conveyor and then back along the lower conveyor. The end of chamber 10, opposite the motorised drive 16, is formed with an inlet opening 17 for drilling mud to be decontaminated and a feed conveyor 18, in 15 the form of a screw conveyor, is provided to feed the drilling mud into the chamber 10 and onto the adjacent end of the upper trough 12. The opposite end of the upper trough 12 is arranged for the drilling mud to drop onto the lower trough 14, to be conveyed in the return direction: when the drilling mud reaches 20 the end of the lower trough 14, it is deposited onto another screw conveyor 19 which carries the drilling mud out through the end of the chamber 10, via an opening 20 below the inlet opening.

Each of the troughs 12,14 is provided with a series of 25 oil-fired burners indicated at 22, the flames of which are directed across the tops of the respective troughs 12,14. These flames serve to ignite the oil which contaminates the drilling mud. A circulation of air is produced, across each trough and then back underneath it. The oil has a relatively low flash 30 point, of approximately 114°C: the temperature of the air circulating within the chamber 10 is typically of the order of 250°C.

The chamber 10 has a port 24 at its top, for the gases and smoke produced by the combustion process to pass into a 35 secondary chamber 30, extending lengthwise of the main chamber

10. The secondary chamber 30 incorporates a thermal oxidiser and an extraction fan 32 is provided at the outlet end of this chamber. The secondary chamber runs at a temperature typically of 850°C and provides a residence time of approximately 1
5 second for the gases passing through it. It will be appreciated that the extraction fan creates a negative pressure within both the main and secondary chambers 10,30.

The main chamber 10 may have a length typically of the order of 5 metres and a diameter typically of 2.5 metres, with
10 the troughs 12,14 of the treatment conveyors being typically 1 metre in width. The entire apparatus is accordingly relatively compact and can be transported with reasonable ease, e.g. on a low-loader road trailer.

Claims

- 1) A method of incinerating drilling mud or other particulate material which is contaminated with oil, comprising advancing the material to be incinerated along an upper treatment conveyor of an incinerator apparatus having burner means, returning the material falling from the upper conveyor along a lower conveyor of the apparatus and directing one or more flames from said burner means to heat the air circulating around the material being advanced along the treatment conveyors to a temperature which exceeds the flash point of oil with which the material is contaminated, to effect combustion of the oil.
- 2) A method as claimed in claim 1, in which the treatment conveyors comprise an open trough provided with a longitudinally-extending, rotary auger to advance the material being incinerated.
- 3) A method as claimed in claim 2, in which the material to be incinerated is fed by a feed conveyor onto one end of the upper treatment conveyor.
- 4) A method as claimed in claim 3, in which the decontaminated material is taken out by an outlet conveyor from the corresponding end of the lower treatment conveyor.
- 5) A method as claimed in any preceding claim, in which the air is heated by directing said one or more flames across the top of the trough of a said conveyor on which the burner means is provided.
- 6) A method as claimed in any preceding claim, in which the treatment conveyors are mounted in an enclosed chamber which has an inlet opening through which the contaminated

material is fed and an outlet opening through which the decontaminated material issues.

7) A method as claimed in claim 6, in which smoke and gases generated in said chamber are passed to a secondary combustion chamber.

8) A method as claimed in claim 7, in which an extraction fan is provided in the secondary combustion chamber so that the main and secondary chambers run under negative pressure.

9) An apparatus for carrying out the method of claim 1, comprising an upper treatment conveyor and a lower treatment conveyor, arranged so that the material to be contaminated is advanced along the upper treatment conveyor, then falls onto the lower treatment conveyor and is returned along the lower treatment conveyor, and burner means for directing one or more flames to heat the air circulating around the material passing along each treatment conveyor to a temperature which exceeds the flash point of oil with which the material is contaminated, to effect combustion of the oil.

10) An incinerator apparatus as claimed in claim 9, comprising a feed conveyor arranged to feed the contaminated material onto one end of the upper treatment conveyor.

11) An incinerator apparatus as claimed in claim 10, comprising an outlet conveyor arranged to take out decontaminated material from the corresponding end of the lower treatment conveyor.

12) An incinerator apparatus as claimed in any one of claims 9 to 11, in which the or each treatment conveyor comprises an open trough provided with a longitudinally-extending rotary auger to advance the material being

incinerated along the treatment.

13) An incinerator apparatus as claimed in any one of claims 9 to 12, comprising an enclosed chamber in which the treatment conveyor or conveyors are mounted, said chamber
5 having an inlet opening for the contaminated material and an outlet opening for the decontaminated material.

14) An incinerator apparatus as claimed in claim 13, in which said chamber forms a main chamber and is formed with an outlet to take smoke and gases, generated in use of the
10 apparatus, to a secondary combustion chamber.

15) An incinerator apparatus as claimed in claim 14, in which said secondary combustion chamber is provided with an extraction fan such that both the main and secondary chambers run, in use, under negative pressure.