It is a related object of the invention to provide a novel drilling method and apparatus where the distributed well centres can be utilized to reduce the time consequence of equipment breakdown as progress can still be made with a functional secondary drilling unit or pod or the main drilling unit, and thus enhancing the reliability of the operation.

It is a further object of the invention to provide a novel drilling method and apparatus for shallow water drilling from a jack-up where the distributed well centres can be used to reduce the need to wait for a weather window for reposition the jack-up as the secondary drilling units or pods may be skidded beyond the reach of the jack-up and be used to continue well operations as well as tubular operations on such wells.

It is also an object of the invention to provide a novel drilling method and apparatus for drilling from a fixed offshore installation or land rig where the distributed well centres can be used to reduce time and cost for field development and well decommissioning (Plug & Abandonment).

BRIEF SUMMARY OF THE INVENTION

The system according to the invention is characterised in that a plurality of secondary drilling units, each comprising its own drilling equipment for performing drilling operations, are positioned on the wellhead cluster below the main drilling unit for performing well operations in the plurality of hydrocarbon wells, wherein the main drilling unit and at least one of the plurality of secondary drilling units are arranged for performing alternating well operations in at least one of the plurality of hydrocarbon wells.

The main drilling rig comprises a skiddable cantilever comprising a drilling mast and drilling machinery, wherein said main drilling unit is placed on the skiddable cantilever, wherein the wellhead spread is placed adjacent and below the cantilever of the main drilling unit, the secondary drilling unit is being arranged for simultaneously well operations in separate wells while being supported by the main drilling unit.

The main drilling unit may have a well operations capacity in at least one of said well operations which is higher than the well operations capacity of said at least one of the plurality of secondary drilling units.

The system may comprise at least one umbilical running from the main drilling unit to the wellhead cluster for providing drilling support to said plurality of secondary drilling units and/or for allowing control and operation of the plurality of secondary drilling units from the main drilling unit.

The main drilling unit may provide at least one of mud control, power supply and hydraulics supply to the wellhead cluster.

The main drilling unit may be movable in a plane above the wellhead cluster.

The main drilling rig may be any one of a jack-up rig, a drilling module, a drillship, a tension leg platform, a jacket, a land rig or a semi-submersible platform.

The system may be used for distributed well activities in said plurality of hydrocarbon wells.

the second secondary drilling unit and the iron roughneck breaks the connection releasing the drill string from the elevated main drilling unit. The second secondary drilling unit can then start drilling using its own local drill pipe storage. The elevated main drilling unit will prepare the casing section for the first secondary drilling unit, move over and when ready pull out the drill string from the first secondary drilling unit and then run in the casing section through the secondary drilling unit's rotary bushing and BOP. When the run is close to completed, the casing landing string is transferred to the secondary drilling unit, which can land out the casing.

By using this principle two or more wells can be drilled simultaneously from one main drilling unit by use of two or more distributed well centres keeping the well control for the well at all times. The size of the distributed well centres can be kept small as the main drilling unit is supplying services including mud, power, hydraulics and so on. Furthermore, the main drilling unit can be utilized to time optimize operations or operations requiring increased capabilities such as tripping in and out of the hole and running or pulling casings.

Claims

1. A system for performing well operations in a plurality of hydrocarbon wells (120a, 120b, 120c) of a wellhead cluster (104), which system comprises a main drilling rig (106) comprising a main drilling unit (107) displaying a drill floor (108) and comprising a drilling and hoisting system (109) arranged to operate on the drill floor (108) about a well centre (110), a plurality of secondary drilling units (105a, 105b), each comprising its own drilling equipment for performing drilling operations, are positioned on the wellhead cluster (104) below the main drilling unit (107) for performing well operations in the plurality of hydrocarbon wells (120a, 120b, 120c), wherein the main drilling unit (107) and at least one of the plurality of secondary drilling units (105a, 105b) are arranged for performing alternating well operations in at least one of the plurality of hydrocarbon wells (120a, 120b, 120c),

characterised in that said main drilling rig (10) comprises a skiddable cantilever (20) comprising a drilling mast (24) and drilling machinery (26), wherein said main drilling unit (22) is placed on the skiddable cantilever (20), wherein the wellhead spread (50) is placed adjacent and below the cantilever (20) of the main drilling unit (10), the secondary drilling unit (30) is being arranged for simultaneously well operations in separate wells while being supported by the main drilling unit (30).

2. The system according to claim 1, **characterised in that** the main drilling unit (107) has a well operations capacity in at least one of said well operations which is higher than the well operations capacity of said at least one of the plurality of secondary drilling units (105a, 105b).

3. The system according to any one of the preceding claims, **characterised in that** it comprises at least one umbilical (124) running from the main drilling unit (107) to the wellhead cluster (104) for providing drilling support to said plurality of secondary drilling units (105a, 105b) and/or for allowing control and operation of the plurality of secondary drilling units (105a, 105b) from the main drilling unit (107).

4. The system according to claim 3, **characterised in that** the main drilling unit (107) provides at least one of mud control, power supply, hydraulics supply to the wellhead cluster (104).

5. The system according to any one of the preceding claims, **characterised in that** the main drilling unit (107) is movable in a plane above the wellhead cluster (104).

6. The system according to any one of the preceding claims, **characterised in that** the main drilling rig (106) is any one of a jack-up rig, a drilling module, a drillship, a tension leg platform, a jacket, a land rig or a semi-submersible platform.

7. The system according to any one of the preceding claims, **characterised in that** it is used for distributed well activities in said plurality of hydrocarbon wells (120a, 120b, 120c).

8. The system according to claim 1-7, wherein the wellhead spread (50) comprises distributed well centres comprising said secondary drilling units (30).

9. The system according to claim 1-8, wherein the main drilling rig (10) is a jack-up rig standing on support legs (14) and comprising a barge (12) that can be raised or lowered, the jack-up rig (10) being further equipped with the cantilever (20) supporting the main drilling unit (22), where the cantilever (20) can be driven or skidded out over water, such that the main drilling unit (22) is above an operational area to perform desired drilling operations.

10. The system according to claim 1-8, wherein the secondary drilling units (30) each comprises a mast (32), drill floor (34) and BOP (36), which mast (32) comprises a rotary drilling machine (38) which is adapted to drive a tubular (40) through the BOP (36) and into a desired wellhead (42).

11. The system according to claim 3-10, wherein the main drilling unit (22) comprises a driller's cabin/control station (60) connected by the at least one umbilical (58) to the equipment on the wellhead spread (50) for control and operations of the secondary drilling units (30) and equipment on the wellhead spread (50).

12. A method of performing well operations in a plurality of hydrocarbon wells (120a, 120b, 120c) of a wellhead cluster (104) of a system according to claims 1-11, comprising the steps of:

- positioning a main drilling unit (107) displaying a drill floor (108) and comprising a drilling and hoisting system (109) operating on the drill floor (28) above the wellhead cluster (104),
- positioning a plurality of secondary drilling units (105a, 105b) at wellheads (101a, 101b) on the wellhead cluster (104), and
- alternatingly or simultaneously performing well operations in the hydrocarbon wells (120a, 120b, 120c) using the main drilling unit (107) and at least one of said secondary drilling units (105a, 105b).

13. The method according to claim 12, comprising the steps of:

- positioning the main drilling unit (107) above the wellhead cluster (104) such that a well centre (110) of the drilling unit (107) becomes positioned vertically above a first wellhead (101a) of a first hydrocarbon well (120a) of the wellhead cluster (104),
- performing a well operation in the first hydrocarbon well (120a) using the main drilling unit (107),
- repositioning the main drilling unit (107) such that the well centre (110) of the drilling unit (107) becomes positioned vertically above a second wellhead (101b) of a

second hydrocarbon well (120a) of the wellhead cluster (104),

- performing a well operation in the second hydrocarbon well (120b) using the main drilling unit (107) and simultaneously performing a well operation in the first hydrocarbon well (120a) using a first secondary drilling unit (105a) positioned on the wellhead spread (104) at the first wellhead (101a).

14. The method according to any one of claims 12 and 13, wherein the step of positioning a plurality of secondary drilling units (105a, 105b) at wellheads (101a, 101b) on the wellhead cluster (104) comprises deploying the plurality of secondary drilling units (105a, 105b) from a main drilling rig (106) carrying the main drilling unit (107).

15. The method according to any one of claims 12 to 14, wherein the method is realised using a system comprising a main drilling rig (10) comprising an elevated main drilling unit (22) comprising a drill floor (28) positioned on a skiddable cantilever (20), equipped with at least one main well centre (68,70), and a wellhead spread (50) placed adjacent and below the cantilever (20) of the main drilling rig (10), wherein the method comprises the steps of:

(a) deploying, from the main drilling rig (10), several secondary drilling units (30) onto a well deck of the wellhead spread (50),

(b) running well operations in a first well from the main well centre (68) through a first secondary drilling unit (30) on the wellhead spread (50),

(c) breaking the connection between the main well centre (68) and the first secondary drilling unit (30),

(d) proceeding with drilling operations in the first well using the first secondary drilling unit (30),

(e) moving the main drilling rig (22) to a position above a second secondary drilling unit (30) on the wellhead spread (50),

(f) running well operations in a second well from the main well centre (68) through the second secondary drilling unit (30) on the wellhead spread (50),

(g) breaking the connection between the main well centre (68) and the second secondary drilling unit (30), and

(h) proceeding with well operations in the second well using the second secondary drilling unit (30).

16. The method according to claim 15, wherein the main drilling unit (22) performs preparations for the next activity, such as making up bottom hole assembly or rack up or down casing, while not supporting one of the secondary drilling units (30).

17. The method according to claim 15, wherein the main drilling unit (22) in step (b) is tripping in with bottom-hole assembly through the first secondary drilling unit's (30) rotary bushing and BOP, and when reaching TD the drill string is landed in said secondary drilling unit's (30) rotary bushing and an iron roughneck machine on the

secondary drilling unit (30) breaks the connection freeing the main drilling unit (22) for other operations.

18. The method according to claim 15, wherein the main drilling unit (22) moves over immediately to the second secondary drilling unit (30), after breaking the connection between the main well centre (68) and the first secondary drilling unit (30), to assist the second secondary drilling unit (30) while the first secondary drilling unit is drilling ahead using local pipe storage.

19. The method according to claim 15, wherein the main drilling unit (22) in step (f) is tripping in with a bottom hole assembly to TD through the second secondary drilling unit (30), and when reaching TD a string is landed out in a rotary bushing on the second secondary drilling unit (30) and an iron roughneck breaks the connection releasing the drill string from the main well centre (68), while the second secondary drilling unit (30) starts drilling using its own local drill pipe storage.

20. The method according to claim 15, wherein the main drilling rig (22) prepares a casing section for the first secondary drilling unit (30), moves over and when ready pulls out a drill string from the first secondary drilling unit (30) and then run in the casing section through the secondary drilling unit's rotary bushing and BOP.

21. The method according to claim 20, wherein when the run is close to be completed, a casing landing string is transferred to the secondary drilling unit (30) which is landing out the casing.