CLAIMS:

1. A method of providing a tree for a subsea hydrocarbon extraction facility with means for monitoring a plurality of different properties relating to hydrocarbon fluid flow through a pipeline at the tree, the method comprising providing a plurality of sensing means, each for monitoring at least one of said properties, and locating each of the sensing means at or near a position which is optimum for monitoring the at least one of the properties having regard to the configuration of the pipeline.

2. A method according to claim 1, wherein one of said sensing means comprises means for monitoring vibration and/or strain, the method comprising locating it at or near a valve.

3. A method according to claim 1 or 2, wherein one of said sensing means comprises means for monitoring vibration and/or strain, the method comprising locating it at or near a known weak point of the pipeline.

4. A method according to any preceding claim, wherein one of said sensing means comprises means for monitoring bulk density, the method comprising locating it at or near a point of turbulence in the pipeline.

5. A method according to any preceding claim, wherein one of said sensing means comprises means for monitoring particulates in said flow, the method comprising locating it at or near a bend in the pipeline.

6. A method according to any preceding claim, comprising locating one of said sensing means at or near a region of steady state flow in the pipeline.

7. A method according to any preceding claim, wherein one of said sensing means comprises means for monitoring erosion of the pipeline, the method comprising locating it at or near a position of most serious erosion of the pipeline.

8. A method according to any preceding claim, wherein one of said sensing means comprises means for monitoring a pressure drop, the method comprising locating it at or near a restriction or known change in the geometry of the pipeline.

9. A method according to any preceding claim, wherein one of said sensing means comprises means for monitoring temperature, the method comprising locating it at or near a region isolated from an interfering temperature.

10. A tree for a subsea hydrocarbon extraction facility, the tree being provided with means for monitoring a plurality of different properties relating to hydrocarbon fluid flow through a pipeline at the tree, said monitoring means comprising a plurality of sensing means, each for monitoring at least one of said properties, and each of the sensing means being located at or near a position which is optimum for monitoring the at least one of the properties having regard to the configuration of the pipeline.

11. A tree according to claim 10, wherein one of said sensing means comprises means for monitoring vibration and/or strain and is located at or near a valve.

12. A tree according to claim 10 or 11, wherein one of said sensing means comprises means for monitoring vibration and/or strain and is located at or near a known weak point of the pipeline.

13. A tree according to any of claims 10 to 12, wherein one of said sensing means comprises means for monitoring bulk density and is located at or near a point of turbulence in the pipeline.

14. A tree according to any of claims 10 to 13, wherein one of said sensing means comprises means for monitoring particulates in said flow and is located at or near a bend in the pipeline.

15. A tree according to any of claims 10 to 14, wherein one of said sensing means is located at or near a region of steady state flow in the pipeline.

16. A tree according to any of claims 10 to 15, wherein one of said sensing means comprises means for monitoring erosion of the pipeline and is located at or near a position of most serious erosion of the pipeline.

17. A tree according to any of claims 10 to 16, wherein one of said sensing means comprises means for monitoring a pressure drop and is located at or near a restriction or known change in the geometry of the pipeline.

18. A tree according to any of claims 10 to 17, wherein one of said sensing means comprises means for monitoring temperature and is located at or near a region isolated from an interfering temperature.

Claims

1. A method of monitoring hydrocarbon fluid flow of a subsea hydrocarbon extraction facility with means for monitoring a plurality of different properties relating to the hydrocarbon fluid flow through a pipeline (4) at a wellhead tree, the method comprising providing a plurality of sensing means (13, 14, 15, 16, 17, 18, 19), each for monitoring at least one of said properties, and locating each of the sensing means at or near a position which is optimum for monitoring the at least one of the properties having regard to the configuration of the pipeline, characterised in that: one of said sensing means comprises means (13) for monitoring vibration and/or strain, the method comprising locating it at or near a valve (9); and one of said sensing means (14) comprises means for monitoring bulk density, the method comprising locating it at or near a point of turbulence in the pipeline.

2. A method according to claim 1, wherein one of said sensing means comprises means (13) for monitoring vibration and/or strain, the method comprising locating it at or near a known weak point of the pipeline (4).

3. A method according to any preceding claim, wherein one of said sensing means comprises means (15) for monitoring particulates in said flow, the method comprising locating it at or near a bend (7) in the pipeline (4).

4. A method according to any preceding claim, comprising locating one of said sensing means (16) at or near a region of steady state flow in the pipeline (4).

5. A method according to any preceding claim, wherein one of said sensing means comprises means (17) for monitoring erosion of the pipeline (4), the method comprising locating it at or near a position of most serious erosion of the pipeline.

6. A method according to any preceding claim, wherein one of said sensing means comprises means (18) for monitoring a pressure drop, the method comprising locating it at or near a restriction or known change in the geometry of the pipeline (4).

7. A method according to any preceding claim, wherein one of said sensing means comprises means (19) for monitoring temperature, the method comprising locating it at or near a region isolated from an interfering temperature.

8. A wellhead tree (1) for a subsea hydrocarbon extraction facility, the tree being provided with means for monitoring a plurality of different properties relating to hydrocarbon fluid flow through a pipeline (4) at the tree, said monitoring means comprising a plurality of sensing means (13, 14, 15, 16, 17, 18, 19), each for monitoring at least one of said properties, and each of the sensing means being located at or near a position which is optimum for monitoring the at least one of the properties having regard to the configuration of the pipeline, characterised in that: one of said sensing means comprises means (13) for monitoring vibration and/or strain and is located at or near a valve (4); and one of said sensing means comprises means (14) for monitoring bulk density and is located at or near a point of turbulence in the pipeline.

9. A tree (1) according to claim 8, wherein one of said sensing means comprises means (13) for monitoring vibration and/or strain and is located at or near a known weak point of the pipeline (4).

10. A tree (1) according to claim 8 or 9, wherein one of said sensing means comprises means (15) for monitoring particulates in said flow and is located at or near a bend (7) in the pipeline (4).

11. A tree (1) according to any of claims 8 to 10, wherein one of said sensing means (16) is located at or near a region of steady state flow in the pipeline (4).

12. A tree (1) according to any of claims 8 to 11, wherein one of said sensing means comprises means (17) for monitoring erosion of the pipeline (4) and is located at or near a position of most serious erosion of the pipeline.

13. A tree (1) according to any of claims 8 to 12, wherein one of said sensing means comprises means (18) for monitoring a pressure drop and is located at or near a restriction or known change in the geometry of the pipeline (4).

14. A tree (1) according to any of claims 8 to 13, wherein one of said sensing means comprises means (19) for monitoring temperature and is located at or near a region isolated from an interfering temperature.