An arrangement of an unmanned and remotely operated production facility

The present invention relates to an arrangement of an unmanned or normally unmanned and remotely operated production facility comprising a wellhead platform including a wellhead assembly having a X-mas tree, a flowline starting from an outlet point from the X-mas tree and transporting hydrocarbon fluids produced from a well via the wellhead assembly to one or more consecutive process equipment(s), and further on to a destination via a transport pipeline starting at a point located at a level lower than the outlet point.

According to one aspect, said arrangement is characterized in that any process equipment and/or pipeline section located at a higher level than said outlet point from said wellhead assembly, is arranged to either drain back to the x-mas tree, or drain downstream to said transport pipeline by assistance of respective valves arranged along said flowline.

In one embodiment, the present disclosure contemplates an arrangement of an unmanned and remotely operated production facility. The arrangement can include a wellhead platform including a wellhead assembly having an X-mas tree and a wellhead-assembly outlet point; a flowline starting from the wellhead assembly outlet point from the X-mas tree and transporting hydrocarbon fluids produced from a well via the wellhead assembly to consecutive process equipment, and further on to a destination via a transport pipeline, wherein said transport pipeline starts at a transport pipeline starting point B located at a level lower than the outlet point A, wherein at least one of the process equipment and a pipeline section is located at a higher level than the wellhead-assembly outlet point A or the transport pipeline starting point B so that the hydrocarbon fluids drain back to the x-mas tree or drain downstream to the transport pipeline at least in part via valves and associated piping arranged with the respective process equipment along the flowline; and wherein the associated piping is not in the flowline.

The invention is also related to evacuation of liquids in a process system and more specifically evacuation of liquids from segments in a process system to other sections of the same process system and final pressure relief of the system.

The present concept which describes the system, the arrangement and a method for evacuating liquids in parts of a process system is typically applicable for use in situations where a shutdown of the process system is necessary, or that shut down of parts or components in the process system is necessary due to intrusive activities as maintenance and replacement of components.

For manned facilities, a dedicated closed drain system is well known technology for drainage of liquids from segments. This type of systems is in daily use in several locations. For such facilities, systems are manually drained prior to any intervention or during extended duration shutdowns. Liquids are typically routed to a closed drain system, which collects and disposes of any liquids remaining in the segment.

From patent application PCT/NO2015/050135 a concept for drainage of liquids from a wellhead assembly is described. The concept describes a continuously sloping pipe arrangement from wing valve to riser for drainage of liquids under

Patent claims

1. An arrangement of an unmanned and remotely operated production facility, the arrangement comprising:

a wellhead platform including a wellhead assembly (1) having an X-mas tree and a wellhead-assembly outlet point (A);

a flowline (2) starting from the wellhead assembly outlet point (A) from the X-mas tree and transporting hydrocarbon fluids produced from a well via the wellhead assembly (1) to consecutive process equipment (3-6), and further on to a destination via a transport pipeline (8),

wherein said transport pipeline starts at a transport pipeline starting point B located at a level lower than the outlet point A,

wherein at least one of the process equipment and a pipeline section is located at a higher level than the wellhead-assembly outlet point A or the transport pipeline starting point B so that the hydrocarbon fluids drain back to the x-mas tree or drain downstream to the transport pipeline at least in part via valves and associated piping arranged with the respective process equipment along the flowline (2); and

wherein the associated piping is not in the flowline.

2. The arrangement of an unmanned and remotely operated production facility according to claim 1, **wherein** the process equipment comprises at least one of meters, valves, sensors, manifolds, vessels, mechanical equipment, and process assemblies (3 – 6).

3. The arrangement of an unmanned and remotely operated production facility according to any of the claims 1-2, **wherein** a pipeline section between or within process equipment (3 – 6) is arranged at a level lower that the process equipment and is connected to a lower pipeline section by use of respective actuatable short circuit valve (7) and the associated piping (12) conducting fluids to a lower level.

4. The arrangement of an unmanned and remotely operated production facility according to claim 3, **wherein** the lower pipeline section is arranged upstream.

5. The arrangement of an unmanned and remotely operated production facility according to claim 3, **wherein** the lower pipeline section is arranged downstream.

6. The arrangement of an unmanned and remotely operated production facility according to any of the claims 1-4, wherein the production facility comprises a manifold receiving fluid from one or more additional wells and route to transport pipeline for transport to destination.

7. The arrangement of an unmanned and remotely operated production facility according to any of the claims 1-5, wherein the destination is a processing facility.

8. The arrangement of an unmanned and remotely operated production facility according to any one of the claims 1-6, wherein said arrangement further comprising a service line (9) connected to the flowline (2) for depressurizing the flowline (2) and the process equipment (3-5) after shutdown of the assembly.

9. The arrangement of an unmanned and remotely operated production facility according to claim 8**, wherein** the service line (9) is connected to the flowline (2) at the proximity of the outlet point from said wellhead assembly (A).