a need to provide a sampling system that is capable of providing a homogeneous, single phase sample for analysis.

Summary

~~In a first aspect, t~~There is provided a sampling system for obtaining a representative fluid sample from a high pressure multiphase multicomponent fluid, the system comprising: a fluid flow path for transmitting the high pressure multiphase multicomponent fluid therethrough, the pressure of the fluid flow path being substantially the same as the pressure of an environment to be sampled; a sample capture chamber in direct fluid communication with the fluid flow path and having an inlet for receiving the high pressure multiphase, multicomponent fluid therein and an outlet for expelling the high pressure multiphase, multicomponent fluid therefrom; valves means configured to fluidly seal the inlet and outlet of said sample capture chamber and thereby capture the representative fluid sample of the high pressure multiphase multicomponent fluid as it passes therethrough; and control means for controlling the valve means so that the pressure of the representative fluid sample is substantially the same as the high pressure multiphase multicomponent fluid in said fluid flow path.

In a first aspect, there is provided a sampling system for obtaining a representative fluid sample from a high pressure multiphase multicomponent fluid, the system comprising:

a fluid flow path for transmitting the high pressure multiphase multicomponent fluid therethrough, the pressure of the fluid flow path being substantially the same as the pressure of an environment to be sampled;

a sample capture chamber in direct fluid communication with the fluid flow path and having an inlet for receiving the high pressure multiphase multicomponent fluid therein and an outlet for expelling the high pressure multiphase multicomponent fluid therefrom;

valves means configured to fluidly seal the inlet and outlet of said sample capture chamber and thereby capture the representative fluid sample of the high pressure multiphase multicomponent fluid as it passes therethrough; and

control means for controlling the valve means so that the pressure of said representative fluid sample is substantially the same as the high pressure multiphase multicomponent fluid in said fluid flow path; and wherein said control means is configured to actuate the valve means such that the inlet and outlet of the sample capture chamber are synchronously fluidly sealed.

As the representative fluid sample is captured within the sample capture chamber with minimal or no pressure loss, the captured fluid sample does not undergo phase changes during the capturing process. Advantageously, the pressure in the sample capture chamber can be adjusted by controlling the pressure in the fluid flow path. As such, the operator is able to easily control the pressure in the capture sample chamber in accordance with the type and

composition of sample fluid to be captured, in order to acquire a representative sample.

In a preferred embodiment, the pressure in the fluid flow path is above the bubble point pressure of the multiphase multicomponent fluid.

Advantageously, by maintaining the fluid sample above the bubble point pressure at the time the sample is captured, a more accurate representative sample of the fluid may be obtained. For example, if the fluid is a mixture of hydrocarbons from a natural gas field at high pressure, part of the fluid will be in a liquid phase and part of the fluid will be in a gas phase. By capturing the fluid above the bubble point, and more typically at the high pressure that corresponds to the area of the natural gas processing facility being sampled, a more accurate representative sample can be obtained. The multicomponent fluid sample may be captured as a single phase sample, such as a single phase liquid sample. Advantageously, this enables all of the components in the sample to be captured in a single phase, which then allows for an accurate analysis of the sample's composition subsequently. This is particularly important for upstream natural gas and oil extraction facilities as it is important for the operators of these plants to have an accurate sample of what is being processed upstream. In particular, obtaining an accurate upstream sample allows plant operators to adjust their processes downstream or to provide an accurate compositional analysis to their customers who purchase the natural gas or oil.

~~In a second aspect, t~~There is also provided a method of obtaining a representative fluid sample from a high pressure multiphase, multicomponent fluid, the method

comprising the steps of: (a) providing a fluid flow path for transmitting the high pressure multiphase multicomponent fluid therethrough; (b) providing a sample capture chamber in direct fluid communication with the fluid flow path and having an inlet for receiving the high pressure multiphase multicomponent fluid therein and an outlet for expelling the high pressure multiphase multicomponent fluid therefrom; (c) fluidly sealing the inlet and outlet of said sample capture chamber with a valve means and capturing the representative fluid sample from the high pressure multiphase multicomponent fluid as it passes through the sample capture chamber; and (d) controlling the valve means so that the pressure of the representative fluid sample is substantially the same as the high pressure multiphase multicomponent fluid in the fluid flow path.

In a second aspect, there is provided a method of obtaining a representative fluid sample from a high pressure multiphase multicomponent fluid, the method comprising the steps of:

(a) providing a fluid flow path for transmitting the high pressure multiphase multicomponent fluid therethrough;

(b) providing a sample capture chamber in direct fluid communication with the fluid flow path and having an inlet for receiving the high pressure multiphase multicomponent fluid therein and an outlet for expelling the high pressure multiphase multicomponent fluid therefrom;

(c) synchronously sealing the inlet and outlet of said sample capture chamber with a valve means and capturing the representative fluid sample from the high pressure multiphase multicomponent fluid as it passes through the sample capture chamber; and

(d) controlling the valve means so that the pressure of said representative fluid sample is substantially the same as the high pressure multiphase multicomponent fluid in said fluid flow path.

In another aspect, there is provided a sampling device comprising: (a) a housing having an internal conduit that extends through said housing to define a liquid flow path from an inlet for receiving a liquid from a sampling environment to an outlet that discharges said liquid from said housing; (b) a sample capture chamber in fluid communication with said liquid flow path for capture of a liquid sample as said liquid flows along said flow path; and a valve means for transmitting said liquid from said inlet along said flow path to said outlet, and being configured to intermittently direct said liquid to said sample capture chamber to obtain the liquid sample.

The fluid flow path of the above device may be shaped to substantially homogenously mix the liquid sample as it flows therethrough. In one embodiment, the internal conduit may comprise a plurality of bends that are disposed