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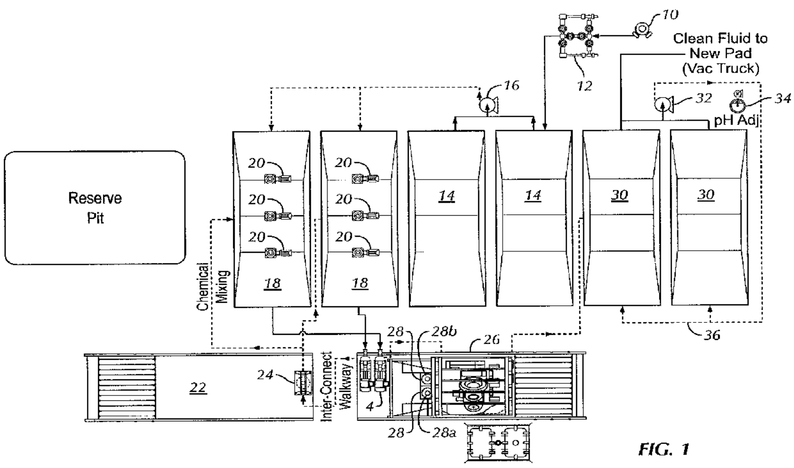

FIG. 1

(57) **Abstract**: A system for reclaiming wellbore fluids, the system including a first pump configured to transfer used wellbore fluid from a used fluid tank and a clarifier in fluid communication with the first pump, wherein the clarifier is configured to receive the used wellbore fluid from the used fluid tank and trap solids entrained in the used wellbore fluid. The system also includes a polishing filter in fluid communication with the clarifier, wherein the polishing filter is configured to receive clarified fluids from the clarifier and produce clean fluid. Also, a method of reclaiming wellbore fluids from a well site, the method including transferring used wellbore fluids from a used fluid tank to a mixing tanks and increasing the pH of the used wellbore fluids in the mixing tank. The method further including removing solids from the used wellbore fluid, transferring the used wellbore fluids to a polishing filter, and filtering the used wellbore fluids into the polishing filter to produce a clean fluid. The method also includes transferring the clean fluid to a clean fluid tank.

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OILFIELD RECLAMATION SYSTEM

BACKGROUND

Field of the Disclosure

[0001] Embodiments disclosed herein relate generally to systems and methods for reclaiming wellbore fluids at a well site. More specifically, embodiments disclosed herein relate to systems and methods for clarifying and polishing wellbore fluids at a well site. More specifically still, embodiments disclosed herein relate to systems and methods for reclaiming wellbore fluids so that the wellbore fluids may be reused in subsequent completion/production operations.

Background Art

[0002] Hydraulic fracturing is a common stimulation technique used to enhance production of fluids from subterranean formations. In a typical hydraulic fracturing treatment, fracturing treatment fluid containing a solid proppant material is injected into the formation at a pressure sufficiently high enough to cause the formation or enlargement of fractures in the reservoir. The proppant material is deposited in a fracture, where it remains after the treatment is completed. After deposition, the proppant material serves to hold the fracture open, thereby enhancing the ability of fluids to migrate from the formation to the well bore through the fracture. Because fractured well productivity depends on the ability of a fracture to conduct fluids from a formation to a wellbore, fracture conductivity is an important parameter in determining the degree of success of a hydraulic fracturing treatment.

[0003] Hydraulic fracturing treatments commonly include proppant materials that are injected downhole with a carrier fluid such as aqueous-based fluid. Many different materials have been used as proppants including sand, glass beads, walnut hulls, metal shot, resin-coated sands, ceramics, sintered bauxite, and deformable materials.

[0004] Typical hydraulic fracturing operations may include the use of 50,000 to 100,000 barrels of fracturing fluid, or more. While a portion of the fluid remains in the formation, typical operations result in the recovery of 30% of the original fluid used. The recovered fluid, however, is not readily reusable because of the increased hydrocarbon, chloride, and metal content of the recovered fluids. These recovered fluids, herein referred to as used wellbore fluids, may thus not be reused in subsequent completion or workover operations, and may not be disposed directly into the environment.

[0005] Traditionally, the used wellbore fluids would be treated with a thermal desorption unit. The thermal desorption unit would thereby increase the volatility of the contaminants so that the contaminants may be separated. However, wellbore fluids treated with thermal desorption are typically not reusable.

[0006] Accordingly, there exists a need for systems and methods for reclaiming used wellbore fluids from well sites.

SUMMARY OF THE DISCLOSURE

[0007] In one aspect, embodiments disclosed herein relate to a system for reclaiming wellbore fluids, the system including a first pump configured to transfer used wellbore fluid from a used fluid tank and a clarifier in fluid communication with the first pump, wherein the clarifier is configured to receive the used wellbore fluid from the used fluid tank and trap solids entrained in the used wellbore fluid. The system also includes a polishing filter in fluid communication with the clarifier, wherein the polishing filter is configured to receive clarified fluids from the clarifier and produce clean fluid.

[0008] In another aspect, embodiments disclosed herein relate to a method of reclaiming wellbore fluids from a well site, the method including transferring used wellbore fluids from a used fluid tank to a mixing tanks and increasing the pH of the used wellbore fluids in the mixing tank. The method further including removing solids from the used wellbore fluid, transferring the used wellbore fluids to a polishing filter, and filtering the used wellbore fluids into the polishing filter to produce a clean fluid. The method also includes transferring the clean fluid to a clean fluid tank.

[0009] Other aspects and advantages of the invention will be apparent from the following description and the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

[0010] Figure 1 is a schematic representation of a drilling site including a reclamation system according to embodiments of the present disclosure.

[0011] Figure 2 is a schematic representation of a reclamation system according to embodiments of the present disclosure.

DETAILED DESCRIPTION

[0012] In one aspect, embodiments disclosed herein relate to systems and methods for reclaiming wellbore fluids at a well site. More specifically, embodiments disclosed herein relate to systems and methods for clarifying and polishing wellbore fluids at a well site. More specifically still, embodiments disclosed herein relate to systems and methods for reclaiming wellbore fluids so that the wellbore fluids may be reused in subsequent completion/production operations.

[0013] The systems and methods disclosed herein may allow fluid engineers the ability to process wellbore fluids that have been used in, for example, completion operations to increase the production of hydrocarbons from a well. After the used fluids are collected at the surface of the well site, the used fluids are typically stored in large containers, where the fluids are kept until they are disposed. Examples of storage containers may include storage tanks, as well as reservoir pits. During completion operations, a number of chemicals and fluid additives may be added to the wellbore fluids to, for example, decrease the friction of the fluid as it flows into the formation. By adding friction-reducing chemical additives to the wellbore fluid, the fluid may be pumped into the formation at a higher velocity. Such fluids with friction-reducing additives are typically referred to as slick water fracturing fluids, and are typically used in low permeability reservoirs.

[0014] In a typical fracturing operation, between 50,000 and 100,000 barrels of fluid may be pumped into the formation, depending on the size and other characteristics of the formation, such as permeability. After the fracturing operation is complete, some of the fluid may be recovered. At the completion of the fracturing operation at a typical well, 30% or more of the original fluid may be recovered. The recovered, used, fluid may then be pumped into storage containers or reservoir pits, where the fluid is stored until it is disposed.

[0015] Aspects of the present disclosure may allow the recovered fluid to be processed and reused, instead of being disposed of, which typically occurs. Embodiments disclosed herein may allow completion engineers to remove contaminants from the used wellbore fluids, such that the cleaned fluids may either be used in subsequent completion operations, or otherwise disposed of in an environmentally sensitive method. Additionally, the cleaned fluids may be used in the process, such that certain aspects of the reclamation process include closed-loop cycles, thereby allowing the processed water to be used/reused.

[0016] Referring initially to Figure 1, a plan view of a cleaning operation at a drilling site according to embodiments of the present disclosure is shown. In this embodiment, fluid is initially pumped from the wellbore 10, using flow back equipment 12 to used fluid tanks 14. Fluid tanks 14 may be any type of fluid storage tanks known in the art, such as 10,000 to 25,000 gallon skid based tanks, in-ground reservoir tanks, or other tanks capable of holding used wellbore fluids. The used wellbore fluids may be stored in used fluid tanks 14 until enough used wellbore fluid is collected to run the cleaning operation, or alternatively, the used fluids may only be kept in fluid tanks 14 until the system is capable of processing an additional volume of fluid. Thus, the system may be operated such that there is continuous cleaning, wherein fluid is substantially constantly injected into the system, or in batch mode, wherein a specified volume is processed. The mode of operation may vary based on aspects of the completion operation, such as the volume of reclaimed fluid and/or the time required to finish the operation.

[0017] The used wellbore fluid may be transferred via pump 16 to mixing tanks 18. Pump 16 may be a centrifugal pump, positive displacement pump, diaphragm pump, or other pump capable of transferring wellbore fluids as known to those of skill in the art. Pump 16 may then transfer fluid from used fluid tanks 14 through a manifold 20, where the fluid may be dispersed into mixing tanks 18. Manifold 20 may include multiple ports, thereby allowing the fluid to be separated into separate mixing tanks 18. The flow rate of the transferred fluid may be controlled by the fluid engineers, and may vary based on the amount of fluid being processed, the amount of fluid recovered from the wellbore, and the speed at which the system is running. Manifold 20 may also include a number of valves that may be used to control the flow of fluid therethrough.

[0018] Similar to used fluid tanks 14, mixing tanks 18 may include any type of vessel capable of holding used wellbore fluids, and may include numerous ports for dispersing the used wellbore fluid. Additionally, mixing tanks 18 may include ports in fluid communication with a chemical additive system 22. The ports in mixing tanks 18 may thereby allow chemicals to flow from a chemical mixer 24 into the mixing tanks 18.

[0019] In addition to chemical mixer 24, chemical additive system 22 may include chemical storage tanks (not shown), dosing hoppers (not shown), pumps (not shown), and/or other components that allow chemicals to be mixed with the used wellbore fluids. In some aspects, the chemicals may be mixed with fluid prior to injection into mixing tanks 18, while in other aspects, the chemicals may be injected directly into mixing tanks 18. In still other aspects, the chemicals may be mixed inline during transfer from chemical additive system 22 to mixing tanks 18.

[0020] The types of chemicals dosed into mixing tank 18 may vary depending on the property of the fluids being treated. Examples of chemicals that may be used include sodium bicarbonate, soda ash, and potassium hydroxide. Generally, the additives may be used to raise the pH of the used wellbore fluid to over 8. In certain aspects, it may be preferable to raise the pH of the used wellbore fluid to 12. By increasing the pH of the used wellbore fluid to 12, iron in the fluid becomes insoluble and precipitates out of the fluid. In other aspects, additional chemicals may be added and/or the pH may be adjusted to other levels depending on the properties of the used wellbore fluids. Additionally, particular chemicals may be added to treat specific impurities. For example, soda ash may be used to treat calcium, wherein approximately 1 pound of soda ash may be used for every 1,650 mg/l of calcium.

[0021] After the pH of the used wellbore fluid is adjusted, the used wellbore fluid may be transferred from mixing tanks 18 to a clarifier 26 via a pump (not shown). Clarifier 26 may include, for example, a filter press capable of processing used wellbore fluids. Examples of filter presses that may be used according to embodiments disclosed herein include canister and/or plate presses. Clarifier 26 may include a number of components and types of media for filtering the used wellbore fluids. In one embodiment, clarifier uses diatomaceous earth as a filter media. In such an embodiment, the system may also include a filter media slurifier (not shown) that pre-wets the diatomaceous earth before injecting the diatomaceous earth into clarifier 26. The slurifier may receive a flow of clean fluid from the system, or alternatively, may receive a flow of clean fluid from outside the system. The clean fluid may be mixed with the diatomaceous earth prior to injection into clarifier 26.

[0022] In one embodiment, clarifier 26 may be a plate press. In such an embodiment, clarifier 26 may include a motor (not shown), a frame (not shown), and a plurality of plates (not shown). Clarifier 26 may also include various types of filter paper that may be placed on the plates. The frame acts as a support for the plates, which are arranged such that as the diatomaceous earth slurry is injected into clarifier 26, the slurry distributes over the plates and/or filter paper, and forms a filter cake thereon. The diatomaceous earth thus forms a complex matrix that traps suspended solids in the used wellbore fluid, and the fluid is pumped therethrough. The size of the diatomaceous earth used may vary based on the properties of the used wellbore fluid, but in certain embodiments, the size of the diatomaceous earth may be coarse to ultra fine.

[0023] As the used wellbore fluid is pumped into clarifier 26, the fluid flows over the diatomaceous earth filter cake, which removes solids suspended therein, and is discharged into a polishing filter 28. Polishing filter 28 may include one or more filter pods 28a and 28b, which may be run in series or parallel. In a series setup, the used wellbore fluid may pass through clarifier 26 and discharge into first filter pod 28a. First filter pod 28a may include a specific size filter, such as a 10 micron filter, and as such, may remove solids greater than 10 micron that remain in the used wellbore fluid after clarification. After removing solids greater than 10 microns, the used wellbore fluid may be injected into second filter pod 28b, which may be a 2 micron filter. Second filter pod 28b may thereby remove remaining solids of greater than 2 microns.

[0024] In other embodiments, filter pods 28a and 28b may be run in parallel, and as such, may have the same filtering potential. For example, in certain embodiments, both filter pod 28a and 28b may be 2 micron filters, and may receive independent flows of used wellbore fluid from clarifier 26. In such an embodiment, polishing filter 28 may include additional components, such as isolation valves, such that one of the pods 28a or 28b may be turned off, and the flow diverted to the other pod 28a or 28b while the first pod is serviced.

[0025] Polishing filter 28 may also include various types of media for polishing the used wellbore fluids. Examples of media that may be used in certain embodiments include hydrocarbon absorption media, hydrogen sulfide stripping media, and coalescing filters. Such media may be used to further remove specific chemicals or solids from the used wellbore fluid.

[0026] After the fluid is processed by polishing filter 26, the cleaned fluids may be transferred to a clean fluid tank 30. Clean fluid tanks 30 may be located at the wellbore site, or at a different wellbore site, and may include various types of tanks capable of holding water for use in completion operations. One or more circulation pumps 32 may be disposed proximate clean fluid tanks 30 and fluidly connected thereto. Circulation pumps 32 may be used to circulate the clean fluid within one or more of the clean fluid tanks 30. Additionally, a pH adjuster 34 may be disposed proximate clean fluid tanks 30 to dose additional chemicals into the cleaned fluid to decrease the pH.

[0027] In one embodiment, pH adjuster 34 is in fluid communication with a process line 36, which fluidly connects mixing tanks 30 to circulation pump 32. In such an embodiment, a pH adjusting chemical may be injected into process line 36; however, in other embodiments, the pH adjusting chemical may be injected directly into clean fluid tanks 30. Those of ordinary skill in the art will appreciate that various pH adjusters may be used, such as, for example, citric acid. Depending on the requirements of the operation, the pH may be adjusted to different levels. In certain aspects, the pH will be adjusted to be within a range between 6.5 and 8.5, and in certain aspects, the pH will be adjusted to be 7.5. The cleaned and pH adjusted fluid may then be pumped to a vacuum truck for use in a subsequent completion operation or may be stored for reuse.

[0028] In certain embodiments, additional components may be used with the water cleaning system. For example, in one embodiment, a reverse osmosis unit may be placed inline before or after the polishing filter 28. The reverse osmosis unit may be used to further process the used wellbore fluid to remove chemicals and/or solids. In certain embodiments, polishing filter 28 may be replaced with the reverse osmosis unit. Such a substitute unit may be possible when the amount of solids remaining in the used wellbore fluid after processing in clarifier 26 is relatively low. In still other embodiments, the used wellbore fluid may bypass clarifier 26 and be injected from mixing tanks 18 into polishing filter 28. In such a system, after being processed in polishing filter 28, the water may be injected into a reverse osmosis unit before being transferred to clean fluid tanks 30.

[0029] The system may also include additional modules, such as a bacteria module (not shown). The bacteria module may be fluidly connected to clean water tank 30, and may include injection ports to introduce bactericidal or bacteriostatic agents into the cleaned fluid. Bactericidal and bacteriostatic agents may be used to kill or slow the reproduction of bacteria that may contaminate the cleaned water. One example of an agent that may be used in the bacteria module includes Myacide GA 25. In applications where bacteria may grow in the cleaned fluid, the fluid may ultimately contain high sulfide levels that may inhibit the use of the cleaned fluids in subsequent completion operations. Thus, the bacteria module may be used to insure the integrity of the cleaned fluid while the fluid is stored.

[0030] Depending on the specific wellbore location, the site setup of the reclamation system may vary. For example, in one embodiment, the used wellbore fluid tanks 14 and clean fluid tanks 30 may be disposed at the wellbore site, while the reclamation system may be a transportable system that is temporarily setup at the drilling site. In other embodiments, used wellbore fluid tanks 14 may be at a first wellbore site while clean fluid tanks 30 may be located at a second wellbore site. In such an embodiment, the transportable reclamation system may be transported between locations to clean used wellbore drilling fluid as required by the completion operation.

[0031] Referring to Figure 2, a transportable wellbore fluid reclamation system according to embodiments of the present disclosure is shown. In this embodiment, reclamation system 200 is a modular system disposed on a trailer 201, such that the system 200 may be transported between multiple wellbore sites. As indicated with respect to Figure 1, reclamation system 200 includes a pump 202, a clarifier 203, and a polishing filter 204. Reclamation system 200 also includes a slurifier 205 and an air compressor 206. Pump 202, clarifier 203, and polishing filter 204 function as described above with respect to Figure 1. Similarly, as explained above slurifier 205 may be used to mix the diatomaceous earth with clean water prior to injection of the diatomaceous earth into clarifier 203.

[0032] During operation, used wellbore fluid may be transferred via pump 202 from a used wellbore tank (not shown) into a mixing tank (not shown) in fluid communication with reclamation system 200. In the mixing tank, the pH of the used wellbore fluid may be increased by injecting chemicals into the mixing tank. The used wellbore fluids with the increased pH may then be transferred to clarifier 203, where solids are removed from the used wellbore fluids. The used wellbore fluids may then be transferred to polishing filter 204, where the used wellbore fluids are reprocessed to produce a clean fluid. The clean fluid is then transferred to a clean fluid tank (not shown). As explained above, in certain embodiments, a reverse osmosis unit (not shown) may also be used in addition to or in place of one or more components of reclamation system 200.

[0033] After the clean fluid is transferred to the clean fluid tank, the pH of the clean fluid is decreased, for example through the addition of an acid. The clean fluid may then be stored until the fluid is used in a subsequent completion operation. In certain embodiments, to decrease the concentration of chlorides in the clean fluid, the clean fluid may be diluted by adding fresh water or clean fluid having a lower chloride concentration. The dilution of the cleaned fluid may typically occur at the second wellbore site. After reclamation, and prior to subsequent use in a second completion operation, the clean fluid may preferably have a chloride content of less than 10,000 parts per million ("ppm"), a calcium content of less than 3,000 ppm, and an iron content of less than 30 ppm.

[0034] In certain embodiments, the fluid, both before and after processing, may be monitored by a remote monitoring facility. Initially, samples of the used wellbore fluid may be provided to a remote lab, not located at the wellbore site. The lab may process the wellbore fluid to determine, for example, the level of sodium, potassium, calcium, magnesium, iron, chlorine, total solids, total suspended solids, and any bacteria content that may be in the used drilling fluid. The lab may also perform a metal analysis to determine the part per million of metals such as mercury, lead, silver, arsenic, barium, cadmium, chromium, and selenium. After running the lab results, the reclamation process may be optimized to remove specific substances. Methods of optimizing the reclamation may include changing the types of filters in polishing filter 204, modifying clarifier 203, changing the pumping rate of fluid through the system, increasing or decreasing the pH, or adding specific chemicals to the used wellbore fluid.

[0035] The rate of sampling may vary according to the specifics of the operation, however, in certain embodiments, the initial fluid may be sampled after the first 500 barrels is collected, and then every 5,000 barrels thereafter. Similarly, the cleaned fluids may be sampled after the initial 500 barrels are processed and then every 5,000 barrels thereafter. In certain embodiments, the cleaned and subsequently diluted fluid may also be sampled and tested after the initial 500 barrels and then every 5,000 barrels thereafter. Consistent sampling may allow the process parameters to be monitored, such that chemicals may be adjusted or the process may be modified as required.

[0036] Examples

[0037] During the development of the present disclosure, several slick water samples from a wellbore completion site were procured, tested, treated following the methodology of the presently disclosed system, and then retested to determine the level of chemicals remaining in the fluid after processing. The testing included determining iron content, chloride levels, pH, turbidity, density, odor, color, appearance, and yield point by performing Fann 35 rheologies. Oil and grease content was also determined by hexane extraction and infra-red absorbance, mineral content was determined by atomic absorption spectroscopy and ion chromatography, and organic compounds were identified by gas chromatography-mass spectrometry.

[0038] After initially testing the sample, the sample was filtered through 6 pounds/barrel of fine diatomaceous earth and retested. After testing, the pH of the sample was lowered to approximately 2.0 using 10% HCl. The sample was agitated for approximately 45 minutes, after which the pH was raised to approximately 10.0 using 25% NaOH. The sample was then agitated for approximately 15 minutes and then refiltered through 6 pound/barrel diatomaceous earth. After filtering, the pH was lowered to between 6-8 using 5% HCl. The sample was subsequently retested. After retesting, the sample was diluted to a ratio of 30:70 with fresh water and the sample was retested a third time. The results of the tests are displayed below in table format:

[0039] Table 1

Fluid Properties	As received	After Filtration	After Acid-Base Treatment	Dilution Treatment	Proposed Parameters
Density lb/gal	8.67	8.71	8.70	8.50	Report
Appearance	Hazy	Clear	Clear	Clear	Clear
Dilution Ratio	N/A	N/A	N/A	30/70	N/A
Odor	None	None	None	None	None
Color	Dark Amber	Amber	Light Amber	Light Amber	Colorless to Light Amber
Clarity NTU	44	21	16	7	≤ 20
pH	7.5	7.6	7.0	8.6 (see note 2)	6 to 8
Iron ppm	39	34	25	5	< 20
Chlorides	3300	3300	4400 (see note 1)	1500	<15000
Oil & Grease ppm	1	1	1	1	N/A
Yield Point	0	0	N/A	N/A	<2

[0040] The proposed parameters for a successful process included a fluid having less than 15,000 ppm chlorides, no active bacteria, less than 20 nephelometric turbidity units ("NTU"), neutral pH, and no traceable polymer residue. As displayed above in Table 1, the fluid as initially tested is out of specification and remains so after filtration through diatomaceous media and treatment with HCl and NaOH, specifically with respect to clarity (NTU), chlorides, and iron content. The fluid is brought into specification by dilution with fresh water for all parameters except pH. The final pH is affected by the acid and alkalinity properties of the dilution water, which was subsequently corrected by neutralizing the treated sample by using either weak caustic or acidic solutions. Additionally, the chloride content is artificially inflated after acid-base treatment due to the addition of the HCl.

[0041] Table 2 illustrates properties of the same sample after only filtration across diatomaceous earth and dilution with fresh water. Additionally, in this test, the pH is affected by the alkalinity of the dilution water. The results are illustrated below in table format:

[0042] Table 2

Fluid Properties	As received	After Filtration	Dilution Treatment	Proposed Parameters
Density lb/gal	8.67	8.71	8.50	Report
Appearance	Hazy	Clear	Clear	Clear
Dilution Ratio	N/A	N/A	30/70	N/A
Odor	None	None	None	None
Color	Dark Amber	Amber	Light Amber	Colorless to Light Amber
Clarity NTU	44	21	7	≤ 20
pH	7.5	7.6	8.8 (note 2)	6 to 8
Iron ppm	39	34	10	< 20
Chlorides	3300	3300	1500	<15000
Oil & Grease ppm	1	1	1	N/A
Yield Point	0	0	0	<2

[0043] Similarly, Table 3 illustrates properties of a second fluid that is initially out of specification, but is brought into specification after HCl/NaOH treatment followed by dilution with fresh water. The results are illustrated below in table format:

[0044] Table 3

Fluid Properties	As received	After Filtration	After Acid-Base Treatment	Dilution Treatment	Proposed Parameters
Density lb/gal	8.64	8.62	8.61	8.44	Report
Appearance	Hazy	Hazy	Clear	Clear	Clear
Dilution Ratio	N/A	N/A	N/A	30/70	N/A
Odor	None	None	None	None	None
Color	Dark Amber	Amber	Light Amber	Light Amber	Colorless to Light Amber
Clarity NTU	210	54	13	5	≤ 20
pH	6.9	7.3	6.0	7.8	6 to 8
Iron ppm	97	97	10	0	< 20
Chlorides	28900	28900	32500 (see note 1)	9600	<15000
Oil & Grease ppm	1	1	1	1	N/A
Yield Point	0	0	0	0	<2

[0045] The results of the tests, as illustrated in Tables 1, 2, and 3 above indicate that slick water used in completions may be treated for reuse in subsequent completion operations. The tests further indicate that the fluid properties may be brought into specification by filtering the fluid through diatomaceous earth followed by an acid/base treatment and dilution. Additionally, the tests indicate that used wellbore fluids may be treated by filtering the fluid through diatomaceous earth followed by dilution or filtering the sample through diatomaceous earth followed by an acid/base treatment and dilution, as described above. In all examples, after processing, the fluids had yield points below 2.0, indicating that there was no active polymer in either fluid. Additionally, the clarity, pH, iron content, chloride content, and oil and grease content are all within specification.

[0046] Advantageously, embodiments of the present disclosure may allow for the recovery and treating of used wellbore fluids, such as fluids used in completion and/or workover operations. By cleaning the used wellbore fluids, the fluids may be reused in subsequent completion and/or workover operations, or may be disposed of in environmentally sensitive areas. Also advantageously, because embodiments disclosed herein may be part of a mobile and transportable system, the system may be used to process used wellbore fluids at multiple well sites.

[0047] Advantageously, embodiments disclosed herein may allow for used wellbore fluids to be processed at a well site so that the fluids may be reused in subsequent completion and workover operations. Because the fluids may be reused, the cost associated with purchasing additional fresh water for use in wellbore fluids may be decreased. Additionally, the costs associated with running thermal desorption units, as would typically be used, may also be decreased.

[0048] While the present disclosure has been described with respect to a limited number of embodiments, those skilled in the art, having benefit of this disclosure, will appreciate that other embodiments may be devised which do not depart from the scope of the disclosure as described herein. Accordingly, the scope of the disclosure should be limited only by the attached claims.

CLAIMS

What is claimed:

1. A system for reclaiming wellbore fluids, the system comprising:
   a first pump configured to transfer used wellbore fluid from a used fluid tank;
   a clarifier in fluid communication with the first pump, wherein the clarifier is configured to receive the used wellbore fluid from the used fluid tank and trap solids entrained in the used wellbore fluid; and
   a polishing filter in fluid communication with the clarifier, wherein the polishing filter is configured to receive clarified fluids from the clarifier and produce clean fluid.

2. The system of claim 1, wherein the clarifier comprises a filter press.

3. The system of claim 2, wherein the system further comprises a filter media slurifier.

4. The system of claim 3 wherein the filter press and slurifier comprise diatomaceous earth filter media.

5. The system of claim 4, wherein the slurifier is in fluid communication with the polishing filter and is configured to mix the clean fluid with the diatomaceous earth.

6. The system of claim 1, further comprising a chemical mixer in fluid communication with the used fluid tank.

7. The system of claim 6, wherein the chemical mixer is configured to increase the pH of the used wellbore fluid in the used fluid tank.

8. The system of claim 1, further comprising a clean fluid tank in fluid communication with the polishing filter.

9. The system of claim 8, further comprising a second pump in fluid communication with the clean fluid tank and configured to circulate fluids therethrough.

10. The system of claim 9, wherein the clean fluid tank comprises a chemical dosing device configured to decrease the pH of the clean fluid in the clean fluid tank.

11. The system of claim 8, further comprising a bacteria module in fluid communication with the clean fluid tank and configured to disperse bactericidal agents in the clean fluid.

12. The system of claim 1, wherein the first pump, clarifier, and polishing filter are disposed on a transportable surface.

13. A method of reclaiming wellbore fluids from a well site, the method comprising:
transferring used wellbore fluids from a used fluid tank to a mixing tank;
increasing the pH of the used wellbore fluids in the mixing tank;
removing solids from the used wellbore fluids;
transferring the used wellbore fluids to a polishing filter;
filtering the used wellbore fluids in the polishing filter to produce clean fluid; and
transferring the clean fluid to a clean fluid tank.

14. The method of claim 13, further comprising testing the used wellbore fluid prior to transferring the used wellbore fluid to the mixing tank.

15. The method of claim 14, further comprising testing the clean fluid.

16. The method of claim 13, further comprising processing the used wellbore fluid in a reverse osmosis unit.

17. The method of claim 13, further comprising decreasing the pH of the clean fluid in the clean fluid tank.

18. The method of claim 17, wherein the clean fluid has a pH of about 6.5 to about 7.5.

19. The method of claim 18, wherein the clean fluid has less than 10,000 ppm chloride content, less than 3,000 ppm calcium content, and less than 30 ppm iron content.

20. The method of claim 13, wherein the removing solids from the used wellbore fluids comprises passing the used wellbore fluids through diatomaceous earth filter media.

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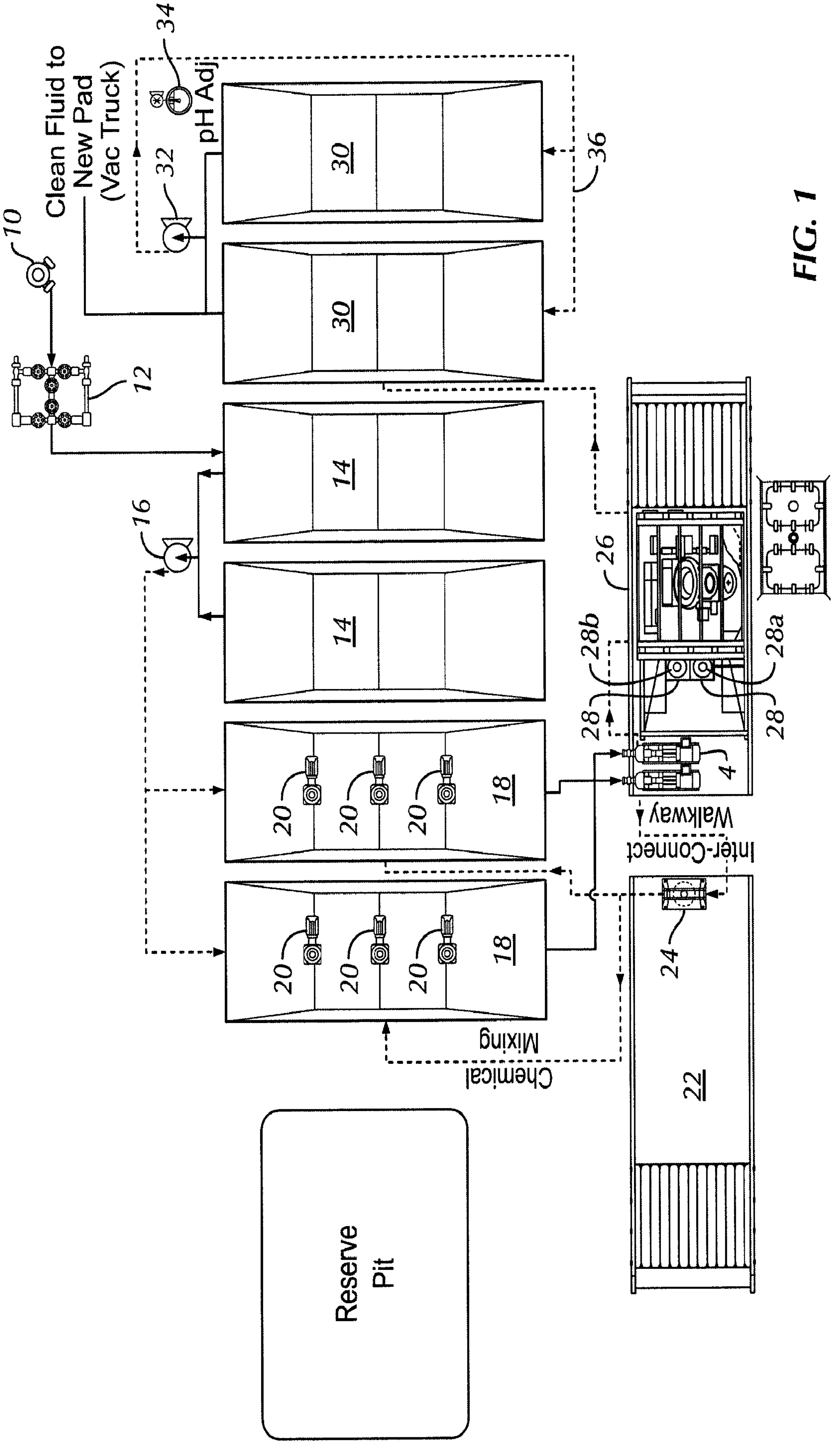

Clean Fluid to New Pad (Vac Truck)
pH Adj
10
12
14
16
18
20
22
24
26
28
28a
28b
30
32
34
36
4
Walkway
Inter-Connect
Chemical Mixing
Reserve Pit

FIG. 1

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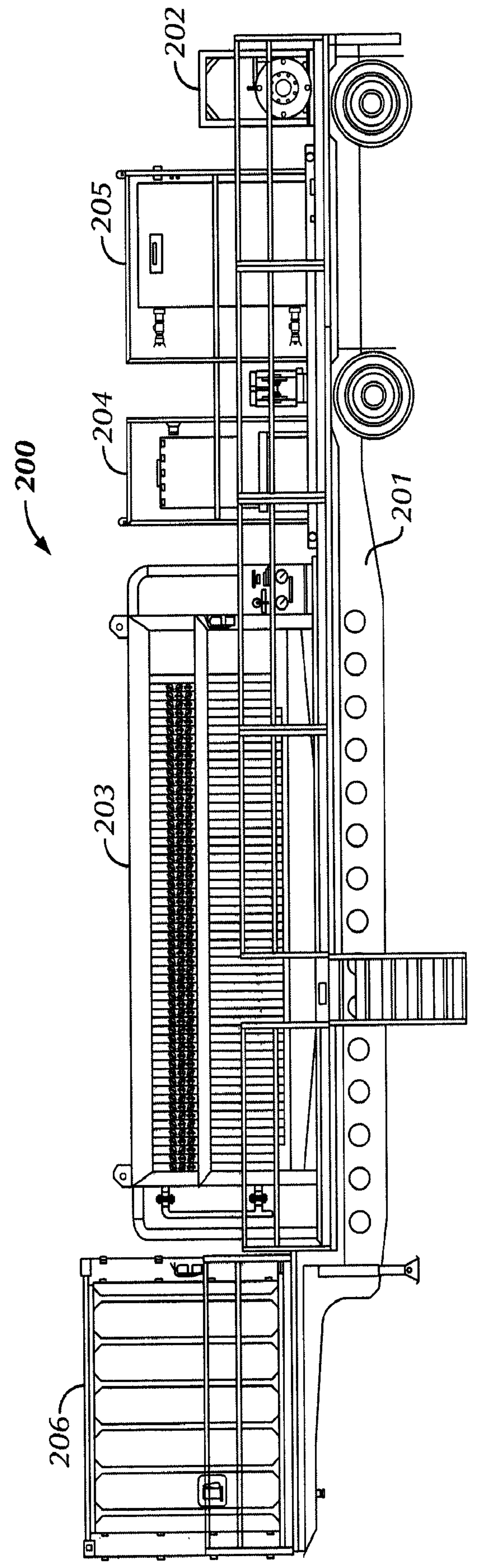

FIG. 2