Abstract: The present disclosure relates to novel and advantageous disposable dispensers. The dispenser may include a dispenser assembly comprising an outlet channel in fluid communication with a terminal apparatus, and a pressure source providing a limited supply of fluid or gas, and also includes a collapsible liner that contains a material to be dispensed, the liner detachably secured to the dispenser assembly with the outlet channel in fluid communication with an interior of the liner, wherein the material in the liner is dispensed out the liner and through the outlet channel to the terminal apparatus.
Liner-Based Dispensing Systems

Field of the Invention

[001] The present disclosure relates generally to dispensers. More particularly, in one embodiment, the present disclosure relates to dispensing systems that comprise or include a flexible liner or a rigid collapsible liner that contains the material to be dispensed, wherein in some embodiments, the entire dispensing system may be disposed of and/or recycled after use.

Background of the Invention

[002] The use of dispensing systems to dispense materials onto a particular surface, area, or location is well known. For example, a dispenser may be used to apply, for example, pesticides, fertilizers, cleaning solutions, paint, or other chemicals to a desired area. A dispenser may also be used to dispense reagents, lubricants, and/or other chemicals or materials that are used in the medical, laboratory research, automotive, military, construction, cosmetic, food and/or many other industries, for example. Dispensers may be used in industries that require the material being dispensed to maintain a high, and in some cases a substantially high degree of purity until the material is dispensed. Some materials used in industries such as, for example, the semi-conductor industry, display panel industry, biomedical industry and/or food and beverage industry cannot be contaminated or degraded if the material is to be useful and/or meet required standards or regulations. Additionally, some materials that may be dispensed via dispensers may be or may also be harmful to people, animals, plants, and/or the environment.

[003] Some known dispensers may not adequately maintain or ensure the purity of the contents of the dispenser. For example, some dispensers are unable to keep gas or other contaminants from getting into the contents stored in the liner. Further, many dispensers require a user to pour the desired material into the dispenser from the container that originally houses the material. This may result in a loss of material, which in some cases could be relatively expensive. Further, the material being transferred to the dispenser may degrade as it comes into contact with the environment. Finally, in cases
where the material being transferred is noxious or harmful, the user must assume the risks of being exposed to the material during transfer.

[004] Further, many traditional dispensers, such as pump dispensers, for example, are relatively expensive. Accordingly, in order for their use to be cost-effective, the dispensing system, or some portion thereof may need to be reused. In order to reuse a dispenser, the entire dispenser, or some portion thereof, must be cleaned to prevent clogging, contamination, corrosion, etc. All of the areas of the dispenser that come into contact with the dispensed material must be cleaned before the dispenser can be properly used again. Cleaning the dispenser after use is time consuming and/or expensive. Further, depending on what material is contained in the dispenser, cleaning the dispenser may expose the user doing the cleaning to harmful chemicals or substances. The more parts of the dispenser that need to be cleaned after use, the greater the risk that the user will come into contact with the substance contained in the dispenser. In addition to the relatively high cost of reusable pump dispensers, pump dispensers may damage the material being pumped as the pumping process may create excessive shear forces on the material.

[005] Accordingly, a need exists for a dispenser that does not require a user to transfer the desired chemical or other material from the container initially holding the material into the dispenser. Additionally, a need exists for a dispenser that limits or substantially eliminates contamination and/or degradation of the contents of the dispenser. Further, the need exists for a dispenser that does not require extensive cleaning of its components prior to reuse, and may accordingly be substantially disposable after use. Further yet, a need exists for isolating the contents of a dispenser from the environment from the point of filling to final dispense of the contents.

**Brief Summary of the Invention**

[006] The present disclosure relates to novel and advantageous disposable dispensers. The dispensers include a dispensing assembly. The dispensing assembly has a connector, an outlet channel that may be integrated with or independent from the connector, a terminal apparatus, and a pressure source. The dispenser also has a collapsible liner that contains a material to be dispensed. The liner operably secures to
the dispense assembly, wherein the material in the liner is dispensed by pressure dispense out the liner and through the terminal apparatus of the dispense assembly.

[007] The present disclosure further relates to novel and advantageous reusable dispensers with disposable outlets. The dispensers include a dispensing assembly. The dispensing assembly has a connector, a disposable and replaceable outlet channel, a terminal apparatus, and a pressure source. The dispenser also has a collapsible liner that contains a material to be dispensed. The liner operably secures to the dispense assembly, wherein the material in the liner is dispensed by pressure dispense out the liner and through the terminal apparatus of the dispense assembly.

[008] The present disclosure, in one embodiment, relates to a dispenser including a dispense assembly having a disposable pressure source and an outlet channel in fluid communication with a terminal apparatus, and a collapsible liner that contains a material to be dispensed, the liner detachably secured to the dispense assembly with the outlet channel in fluid communication with an interior of the liner, wherein the material in the liner is dispensed out the liner and through the outlet channel to the terminal apparatus. The dispense assembly may cause dispense of the material to be dispensed by introducing a fluid or gas from the disposable pressure source into the liner, thereby forcing the material in the liner out of the liner and to the outlet channel. In another embodiment, the dispenser may include an overpack that holds the liner and that detachably secures to the dispense assembly. As such, in some embodiments, the dispense assembly may cause dispense of the material to be dispensed by introducing a fluid or gas form the disposable pressure source into an annular space between the liner and the overpack, thereby causing the liner to collapse and forcing the material in the liner out of the liner and to the outlet channel. The pressure source may be a disposable gas cartridge. The terminal apparatus may be a spout, a spray head, a hose, or the like. The liner may also include a fitment having a closure seal providing secure containment of the materials to be dispensed. The closure seal could be resealable.

[009] The present disclosure, in another embodiment, relates to a dispenser including a dispense assembly comprising an outlet channel in fluid communication with a terminal apparatus, and a pressure source providing a limited supply of fluid or gas, and also includes a collapsible liner that contains a material to be dispensed, the liner
detachably secured to the dispense assembly with the outlet channel in fluid communication with an interior of the liner, wherein the material in the liner is dispensed out the liner and through the outlet channel to the terminal apparatus. As discussed above, the dispense assembly may cause dispense of the material to be dispensed by introducing the fluid or gas from the disposable pressure source into the liner, thereby forcing the material in the liner out of the liner and to the outlet channel. In another embodiment, the dispenser may include an overpack that holds the liner and that detachably secures to the dispense assembly. As such, in some embodiments, the dispense assembly may cause dispense of the material to be dispensed by introducing the fluid or gas form the disposable pressure source into an annular space between the liner and the overpack, thereby causing the liner to collapse and forcing the material in the liner out of the liner and to the outlet channel. In some embodiments, the dispenser is configured for limited use ending at least by depletion of the limited supply of the pressure source.

[010] The present disclosure, in yet another embodiment, relates to a method for portable dispense of contents of a liner. The method may include detachably connecting a dispense assembly, comprising an outlet channel in fluid communication with a terminal apparatus, and a pressure source providing a limited supply of fluid or gas, with a collapsible liner with the outlet channel in fluid communication with an interior of the liner, the liner containing a material to be dispensed. The method may also include activating the pressure source, causing the fluid or gas to be introduced into the liner, thereby forcing the material in the liner out of the liner and to the outlet channel.

[011] The present disclosure, in still another embodiment, relates to a method for portable dispense of contents of a liner. The method may include detachably connecting a dispense assembly, comprising an outlet channel in fluid communication with a terminal apparatus, and a pressure source providing a limited supply of fluid or gas, with an overpack and collapsible liner assembly, with the outlet channel in fluid communication with an interior of the liner, the liner containing a material to be dispensed. The method may also include activating the pressure source, causing the fluid or gas to be introduced into an annular space between the liner and the overpack, thereby causing the liner to collapse and forcing the material in the liner out of the liner and to the
outlet channel. In some embodiments, the pressure source may be controllable activated and deactivated until the limited supply of fluid or gas from the pressure source is depleted. The dispense could be controlled by a timer-controlled valve or triggered by sensing an external event. In other embodiments, the material to be dispensed from the liner may be continuously dispensed until the limited supply of fluid or gas from the pressure source is depleted.

[012] While multiple embodiments are disclosed, still other embodiments of the present disclosure will become apparent to those skilled in the art from the following detailed description, which shows and describes illustrative embodiments of the disclosure. As will be realized, the various embodiments of the present disclosure are capable of modifications in various obvious aspects, all without departing from the spirit and scope of the present disclosure. Accordingly, the drawings and detailed description are to be regarded as illustrative in nature and not restrictive.

**Brief Description of the Drawings**

[013] While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter that is regarded as forming the various embodiments of the present disclosure, it is believed that the disclosure will be better understood from the following description taken in conjunction with the accompanying Figures, in which:

[014] Figure 1 shows a cut-away view of a dispensing system, according to one embodiment of the present disclosure.

[015] Figure 2 shows a liner, according to one embodiment of the present disclosure.

[016] Figure 3 shows a broken cut-away view of a pressure dispense of one embodiment of a dispensing system of the present disclosure.

[017] Figure 4A shows the terminal apparatus, according to one embodiment of the present disclosure.

[018] Figure 4B shows the terminal apparatus, according to another embodiment of the present disclosure.
Figure 4C shows the terminal apparatus, according to yet another embodiment of the present disclosure.

Figure 5A shows a dispenser with the pressure source connected thereto, according to one embodiment of the present disclosure.

Figure 5B shows a dispenser with the pressure source connected to the connector of the dispenser, according to one embodiment of the present disclosure.

Figure 6 shows a dispenser, according to one embodiment of the present disclosure.

Figure 7 shows a liner and overpack, according to one embodiment of the present disclosure.

Detailed Description

The present disclosure relates to novel and advantageous dispensing systems. More particularly, in one embodiment, the present disclosure relates to dispensing systems that comprise or include a flexible liner or a rigid collapsible liner that contains the material to be dispensed, wherein in some embodiments, the dispensing system may be disposed of and/or recycled after use, thereby eliminating the need to clean the dispenser after use. Additionally, the material would not need to be transferred from an original package to the dispenser, as the material may be originally packaged in the dispenser. Further, because the entire system could come ready-to-use, the material would not need to ever be exposed to the environment or the user until dispense.

Embodiments of the present disclosure may be used with a variety of materials in a variety of different industries. Dispensers of the present disclosure may contain, for example, but are not limited to: pesticides/fertilizers; paints/glosses/solvents/coating-materials etc.; power washing fluids; lubricants for use in the automobile or aviation industry, for example; food products, such as condiments, for example; reagents or other materials for use in the biomedical or research industry; hazardous materials used by the military, for example; or any other material that may be dispensed by pressure dispense, for example. Materials that may be used with embodiments of the present disclosure may have any viscosity, including high viscosity and low viscosity fluids.
As may be seen in Figure 1, in one embodiment of the present disclosure a dispenser 100 may comprise a liner 102, an overpack 110, and a dispense assembly 130 that may be detachably secured to the liner 102 and/or the overpack 110. The liner 102 may be filled with the material M that is to be dispensed. In some embodiments, the material M may be sold in the liner 102, which may or may not already be positioned in the overpack 110. Accordingly, the user need only connect the liner 102 and/or the overpack 110 to the dispense assembly 130, thereby avoiding the problems and risks associated with transferring the material from its original container to the fluid reservoir. In other embodiments, the dispenser 100 may be purchased as a complete system, wherein the liner 102 is filled with material M and positioned in the overpack 110 with the dispense assembly 130 already connected to the liner 102 and/or overpack 110. The users of such embodiments generally need only to activate a dispense actuator in order to dispense the contents of the dispenser.

The liner 102 may be a collapsible liner that is substantially flexible, while in other embodiments the liner may be somewhat rigid but still collapsible, e.g., a rigid collapsible liner. The liner 102 may be manufactured using any suitable material or combination of materials, for example but not limited to, one or more polymers, including plastics, nylons, EVOH, polyolefins, or other natural or synthetic polymers. In further embodiments, the overpack 102 may be manufactured using polyethylene terephthalate (PET), polyethylene naphthalate (PEN), poly(butylene 2,6-naphthalate) (PBN), polyethylene (PE), linear low-density polyethylene (LLDPE), low-density polyethylene (LDPE), medium-density polyethylene (MDPE), high-density polyethylene (HDPE), polypropylene (PP), and/or a fluoropolymer, such as but not limited to, polychlorotrifluoroethylene (PCTFE), polytetrafluoroethylene (PTFE), fluorinated ethylene propylene (FEP), and perfluoroalkoxy (PFA). In some embodiments, the material or materials selected and the thickness of that material or those materials may determine the rigidity of the liner 102. The liner 102 may have one or more layers and may have any desirable thickness. A liner 102 may have a thickness of, for example, from about 0.05 mm to about 3 mm, or any other suitable thickness. As used here and throughout the present disclosure, ranges are used as a short hand for describing each and
every value that is within the range; any value within the range can be selected as the terminus of the range.

[028] With reference to Figure 1, although not required, an overpack 110 may be used with a liner 102 and dispense assembly 130, in some embodiments. As shown in Figure 1, the liner 102 may be placed inside of the overpack 110. In some embodiments, the overpack 110 may be a known overpack that may already be used in one or more industries, for example, and/or may be of any suitable shape or configuration, such as, but not limited to, a bottle, a can, a drum, etc. In other embodiments, the overpack 110 may be manufactured specifically for use with embodiments of the present disclosure. The overpack 110 may take any desired shape and may be comprised of any suitable relatively rigid material. For example, the overpack 110 may be comprised of plastic, metal, wood, corrugated cardboard, composites, glass, or any other suitable material, or combination of materials, including any of the materials or combination of materials listed above with respect to the liner 102. The overpack 110 and liner 102 need not be manufactured from the same materials.

[029] The liner 102 may be configured to comprise any desirable shape that is appealing to the user, and/or assists in the collapse of the liner. The liner 102, in some embodiments, may be dimensioned and shaped to substantially conform to the interior of the overpack 110. As such, the liner 102 may have a relatively simplistic design with a generally smooth outer surface, or the liner may have a relatively complicated design including, for example but not limited to, indentations and/or protrusions. In some embodiments, the liner wall may include a generally textured surface in order to minimize adhesion. For example, in some embodiments, the surface may include a plurality of bumps, scales, or projections, which may each have any appropriate size, for example, but not limited to, from about 0.5 - 100 μm. Texturizing features may be spaced any suitable distance from one another. In some embodiments, the texturizing may comprise a framework, such as a lattice or scaffold, for example. Examples of some suitable texturizing features are described in greater detail in U.S. Provisional Patent Appln. No. 61/334,005, titled, "Fluid Processing Components with Textured Surface for Decreased Adhesion and Related Methods," filed May 12, 2010, which is hereby incorporated by reference herein in its entirety. The liner 102 may have a relatively thin
liner wall, as compared to the thickness of the overpack wall. In some embodiments, the liner 102 may be flexible such that the liner wall may be readily collapsed, such as by vacuum through the mouth or by pressure between the liner 102 and overpack 110, referred to herein as the annular space therebetween.

[030] The liner 102, in a further embodiment, may have a shape, when inflated or filled, that is different from, but complimentary with, the shape of the overpack 110 such that it may be disposed therein. In some embodiments, the liner 102 may be removably attached to the interior of the overpack wall. The liner 102 may provide a barrier, such as a gas barrier, against drive gas migration from the annular space between the liner 102 and the overpack 110. Accordingly, the liner 102 may generally ensure and/or maintain the purity of the contents within the liner.

[031] In some embodiments, particularly where sterility of the contents of the liner must be substantially maintained, the liner 102 may be comprised of a material that may help ensure or maintain a sterile environment for the contents disposed in the liner. For example, in some embodiments the liner may be comprised of TK8 manufactured by ATMI of Danbury, Connecticut, or any other suitable material. As noted above, in some embodiments, the liner 102 may comprise multiple layers. The multiple layers may comprise one or more different polymers or other suitable materials. In some embodiments, the thickness, ply, and/or the composition of the liner and/or the layers of the liner may allow for the secure and substantially uncontaminated shipment of the contents of the liner-based system of the present disclosure by limiting or eliminating typical weaknesses or problems associated with traditional liners or packages, such as, for example weld tears, pin holes, gas entrainment, and/or any other means of contamination. Similarly, or in addition, the liner 102 may also contribute to the secure and substantially uncontaminated shipment of the contents of the dispense system of the present disclosure by configuring the liner to substantially conform to the shape of the overpack when the liner is filled, thereby reducing the amount of movement of the contents during shipping. Further, in embodiments where the liner substantially conforms to the shape of the overpack, the amount of movement of the liner during shipment may be reduced or substantially reduced, advantageously reducing or eliminating the occurrence of pin holes.
The overpack 110 and liner 102 may each be manufactured using any suitable manufacturing process, for example but not limited to, welding or blow molding, including extrusion blow molding, injection blow molding, stretch blow molding and/or reheating and blow molding, or any other suitable process, and may each be manufactured as a single component or may be a combination of multiple components. In some embodiments, the overpack 110 and liner 102 may be blow molded in a nested fashion, also referred to herein as co-blow molded. Examples of liner-based systems and methods utilizing co-blow molding techniques have been described in greater detail in International PCT Appl. No. PCT/US11/55560, titled, "Nested Blow Molded Liner and Overpack and Methods of Making Same," filed October 10, 2011, which is hereby incorporated herein by reference in its entirety.

In one particular embodiment, as illustrated in Figure 7, a dispenser may include a liner-based system 700 having a liner positioned within an overpack 706. The liner and overpack may each be formed by blow molding, such as but not limited to nested co-blow molding, as indicated above. The liner and/or overpack may include surface features, and in some embodiments, such as where nested co-blow molding is used to manufacture the liner and overpack, co-extensive surface features. Particularly, in one embodiment, the liner and overpack may contain surface features, such as but not limited to, one or more indented or protruding panels that may be positioned around the circumference of the liner and overpack. More particularly, in one embodiment, the liner and overpack may contain surface features, such as but not limited to, one or more surface features or panels having a generally rectangular-shaped design. For example, as may be seen in Figure 7, six generally rectangular-shaped panels 702 may be vertically disposed along the circumference of the liner and/or overpack walls; however, any other number of panels may be suitably used. The panels 702 may have a height generally equal to the non-sloping height of the liner and overpack; that is to say, for example, that the panels 702 may not cover the top portion of a liner and overpack that may begin to slope or curve toward the mouth of the liner and overpack. In some embodiments, the panels 702 may each have substantially the same size and shape as the other panels, or in other embodiments, one or more panels may be differently sized and shaped than one or more other panels. Also, the boundary edge that defines a panel 702 may have any
suitable thickness and/or definition, including a shallow depth or a more defined and/or greater depth. In some embodiments, the edging depth may be generally the same for each panel and/or for the entire perimeter of a single panel, while in other embodiments the depth may vary from panel to panel or from one position along the perimeter to another position along the perimeter of the same panel. While the six-panel design is described and shown as generally rectangularly-shaped panels 702, it will be understood that any suitable or desirable geometry is contemplated and within the spirit and scope of the present disclosure. Further, it will be understood that any suitable number of panels, spaced any suitable distance from one another is contemplated and within the spirit and scope of the present disclosure. Generally, surface features such as one or more panels may add strength and/or rigidity to the liner and/or overpack. However, in some embodiments, more shallow edging may also keep the liner from sticking to the overpack.

[034] As may also be seen in Figure 7, the liner-based system 700 may, in some embodiments, include a chime 704, which may be used, for example, to provide a smooth generally rigid exterior surface for the liner-based system, which can hide any dimpling effects of the liner and/or overpack created by temperature changes and/or may create a surface for labels and the like. In some embodiments, the chime 704 may extend a sufficient height to generally cover the rectangular panel surface features, while in other embodiments, the modified chime may extend any suitable lesser height, including a substantially shorter height as compared to the liner or overpack, which may add free-standing support to the liner-based system. The chime 704 may be comprised of any suitable material, including plastic, for example high density polyethylene (HDPE), PET or any other suitable polyester, or any other suitable material or plastic, or combination thereof. The chime 704 may be relatively rigid as compared to the liner and/or overpack in some embodiments, and because the chime may generally fit over a substantial portion of the liner/overpack, if the liner/overpack collapses, dimples, or otherwise distorts, the chime may generally maintain a smooth and rigid shape. As such, any distortion of the liner/overpack may be generally unobservable from the exterior of the liner-based system. Further, the smooth exterior surface of the chime 704 may provide a generally undistorted surface for adhering a label. The chime 704 may also include a colorant or
other additives to protect the liner and overpack from UV light. In some embodiments, the overpack 706 may include connecting features 708 for connecting to the chime, including snap-fit, friction-fit, bayonet, adhesive, or other features that allow the chime to be detachably coupled to the overpack.

Further examples and embodiments of the type of liners and overpacks that may be used are disclosed in more detail in: International PCT Appl. No. PCT/US1/55558, titled, "Substantially Rigid Collapsible Liner, Container and/or Liner for Replacing Glass Bottles, and Enhanced Flexible Liners," filed October 10, 2011; International PCT Appl. No. PCT/US1/55560, titled, "Nested Blow Molded Liner and Overpack and Methods of Making Same," filed October 10, 2011; U.S. Prov. Appl. No. 61/556,943, titled "Generally Cylindrically-Shaped Liner for Use in Pressure Dispense Systems and Methods of Manufacturing the Same," filed November 8, 2011; U.S. Prov. Appl. No. 61/468,832, titled "Liner-Based Dispenser," filed March 29, 2011; U.S. Prov. Appl. No. 61/525,540, titled "Liner-Based Dispensing Systems," filed August 19, 2011; U.S. Pat. Appl. No. 11/915,996, titled "Fluid Storage and Dispensing Systems and Processes," filed June 5, 2006; International PCT Appl. No. PCT/US0/51786, titled "Material Storage and Dispensing System and Method With Degassing Assembly," filed October 7, 2010, International PCT Appl. No. PCT/US1/41629, U.S. Pat. No. 7,335,721, U.S. Pat. Appl. No. 11/912,629, U.S. Pat. Appl. No. 12/302,287, and International PCT Appl. No. PCT/US08/85264, each of which is hereby incorporated by reference herein in its entirety. The overpack 102 and liner 104 for use with the shipping and dispense system 100 of the present disclosure may include any of the embodiments, features, and/or enhancements disclosed in any of the above noted applications, including, but not limited to, flexible, rigid collapsible, 2-dimensional, 3-dimensional, welded, molded, gusseted, and/or non-gusseted liners, and/or liners that contain folds and/or liners that comprise methods for limiting or eliminating choke-off and liners sold under the brand name NOWpak® by ATMI, Inc. for example. Various features of dispensing systems disclosed in embodiments described herein may be used in combination with one or more other features described with regard to other embodiments.

As may be seen in Figures 1 and 2, the liner 102 may also have a fitment 116 that may be integral with the liner 102. The fitment 116 may be comprised of a
thicker material than the rest of the liner 102. The fitment 116 may contain a closure seal 120 in some embodiments, such that the material M in the liner 102 may be securely contained until dispense. The closure seal 120, in some embodiments, may be removed prior to connecting the liner 102 to the overpack and/or dispense assembly. In such embodiments, any suitable method of removing all or a portion of the closure seal 120 may be used. For example, a pull tab may be used to remove the closure seal 120, in one embodiment. In another embodiment, the closure seal 120 may be pierced, punctured, or pushed through prior to or during attachment of the dispense assembly to the dispenser for dispense. In yet another embodiment, the seal 120 may be a reclosable seal that may automatically close if or when the liner 102 is removed from the dispense assembly. A reclosable seal may advantageously limit or substantially eliminate the exposure of any remaining material to the environment if/when the dispense assembly may be removed from the liner 102.

[037] In one embodiment, the liner 102, and overpack in some embodiments, may be configured or adapted for connection with existing or traditional dispense assemblies. In other embodiments of the system, which for example may be purchased as a complete system, may be provided with the dispense assembly, and in some cases with the dispense assembly already attached to the liner and/or overpack.

[038] In some embodiments, the closure seal 120 on the liner 102 may be punctured or otherwise removed, for example, the first time a user attaches or actuates the dispense assembly (discussed further below). In some embodiments, the closure seal may reseal or close, such as but not limited to, via a self-sealing closure, each time a user deactivates the dispense assembly, while in other embodiments, the closure seal may not reseal or close once the seal has been opened. In some embodiments, the closure seal may be a valve, such as a piston with a spring, or any other suitable valve, that may permit the closure seal to automatically open when the liquid is dispensed, for example, and/or automatically close when dispense is halted.

[039] In some embodiments, the dispense assembly 130 may comprise: a connector 134; a cover 140; an outlet channel 164; and a pressure source 180. As described above, the connector 134 may be detachably secured to the liner 102 via connecting features, for example threads on the connector 134 that mate with
complimentary threads on the fitment 116 of the liner 102. In other embodiments, however, the connector 134 of the dispense assembly 130 may connect to the liner 102 by any suitable means, such as, for example, snap fit, locking hinges, or any other suitable method or combination of methods. The connector 134 may also comprise a dispense opening 136 for the material M in the liner 102 to flow from the liner 102 through the outlet channel 164 to a desired location via a terminal apparatus (discussed further below). In one embodiment, the connector 134 may include connecting features that couple with connecting features on the overpack 110, for example on the neck 112 of the overpack 110.

In some embodiments, the connector 134 of the dispense assembly 130 may also include a dip tube 168 that may be integral with the connector 134 and may extend into the liner 102 through the liner fitment 116 any suitable distance, for example. In other embodiments, the connector 134 of the dispense assembly 130 may have features for detachably securing a dip tube 168 to it (such as complimentary threading, snap-fit, friction-fit, or any other suitable mechanism for connecting to the dip tube). In some embodiments, the dispensing assembly may include a tube or hose that extends only a relatively short distance into the interior of the liner 102, in order to direct the material out of the liner, which may be referred to as a "stubby probe." In some embodiments, the use of a stubby probe may advantageously allow for the removal of any excess gas at the top of the liner, sometimes referred to as head space gas, prior to dispense in order to substantially reduce the amount of gas that may dissolve in the contents of the liner. Examples of "stubby probes" that may be used with the present disclosure may be those of ATMI of Danbury, Connecticut, or those disclosed in PCT Application No. PCT/US07/70911, entitled "Liquid Dispensing Systems Encompassing Gas," with an international filing date of June 11, 2007, which is hereby incorporated by reference herein in its entirety. In other embodiments, however, the dip tube may extend generally the entire vertical distance of the liner, for example, or any other suitable distance into the liner.

In some embodiments, the dispense assembly 130 may also include a cover 140. The cover 140 may fit over the connector 134 and may remain in place during dispense. In other embodiments, the cover 140 may be removed prior to attaching other
portions of the dispense assembly 130. The cover 140 may detachably or fixedly secure to the connector 134 and/or the fitment 116 of the liner 102 and/or the neck 112 of the overpack 110, for example.

[042] In some embodiments of dispensers, some or all of the separate components may be integral with one another. For example, in one embodiment, while not required, the outlet channel 164 may be integral with the connector 134 and/or dip tube 168. In some embodiments, some or all of the components of the dispense assembly 130 may be disposable and separable from the overpack 110 such that the overpack may be reusable, for example, by replacing an exhausted liner 102 from within the overpack with a new or refilled liner. Once a new or refilled liner is positioned within the overpack 110, the same dispense assembly 130 or a new or cleaned dispense assembly may be reattached with the liner 102 and/or overpack and the dispenser reused. In some embodiments, some components of the initial dispense assembly 130 may be reused while others are replaced prior to reconnection with the liner 102 and/or overpack 110. For example, but not limited by, the outlet channel 164 and/or dip tube 168 may be replaced with a new outlet channel or dip tube and the used one(s) disposed off. Such replacement can decrease contamination of any new contents within the liner 102. In these embodiments, waste may be reduced, since the overpack and certain other components need not be replaced after every use.

[043] The overpack 110, and in some embodiments the overpack 110 and the liner 102, may be detachably connected to the connector 134 and/or cover 140 of the dispense assembly 130. In still other embodiments, the liner 102 may be attached to the connector 134 and/or the cover 140 of the dispense assembly 130, while the overpack 110 may not be. The overpack 110 may have a neck 112 comprising features for connecting the overpack 110 to the dispense assembly 130. In some embodiments, for example, the neck 112 may comprise threads that may mate with complimentary threads on the connector 134 of the dispense assembly 130. In other embodiments, the connecting features may comprise any suitable method for securing the dispense assembly 130 to the overpack 110, for example.

[044] Embodiments of dispensers that include an overpack 110 may be configured to dispense material by any suitable mechanism. In one embodiment, the
contents M of the liner 102 may be dispensed by pressure dispense, for example, whereby a substance S such as a fluid, gas, or any other suitable substance may be directed into the annular space 160 between the exterior walls of the liner 102 and the interior walls of the overpack 110. As may be seen in Figure 3, the substance S that is introduced into the annular space 360 puts pressure on the exterior walls of the liner 302, thereby collapsing the liner 302 inward, forcing the material M of the liner into the outlet channel 364 and out of the dispenser. With reference back to Figure 1, in embodiments of dispensers 100 using pressure dispense, the connector 134 and/or cover 140 of the dispense assembly 130 may have an inlet 182 such that the fluid, gas, or any other suitable material S may be directed into the annular space 160 between the exterior walls of the liner 102 and the interior walls of the overpack 110. Embodiments of the present disclosure utilizing pressure dispense may or may not include a dip tube. With any type of dispense, the packaging systems of the present disclosure may be configured to dispense at any orientation, including inverted dispensing orientations.

In other embodiments, the dispense mechanism of the dispense assembly may comprise a direct pressure dispense mechanism, whereby a substance, for example, a fluid, gas, or any other suitable substance, may be introduced directly into the liner, thereby forcing the material M out of the liner. In such embodiments, the connector and/or cover of the dispense assembly may include an inlet channel that permits the fluid, gas, or other substance to be pumped directly into the liner. Embodiments of dispensers using this type of pressure dispense, may or may not use an overpack. Such embodiments may be suitable for use, for example, when the substance to be dispensed may not be adversely affected by the introduction of a fluid, gas, or other substance directly into the substance.

Because the use of pressure dispense can eliminate the need for a pump, issues associated with pump dispense, such as, for example, the damage the shear forces may cause to the material, pump clogging, pump clean-up, and/or pump replacement/rebuilds may be reduced or eliminated. The pressure dispense mechanism may provide for variable rates of dispense, including continuous flow, continuous spray, and/or controlled periodic bursts, or any other suitable dispense method and/or rate of dispense.
[047] The outlet channel 164 of the dispensing assembly may operably connect to and/or be integral with a terminal apparatus, through which the dispenser may ultimately deliver the material. The terminal apparatus may take any suitable form that may be appropriate for the intended use of the dispenser. In some embodiments, the terminal apparatus may be attached, connected, or integrally coupled to the dispenser. In some embodiments, for example, as may be seen in Figures 4A - 4C, the terminal apparatus 402 may be attached to the dispenser. As may be seen in Figure 4A, in one embodiment, the terminal apparatus may be generally configured as a spout for dispensing materials such as condiments and/or beverages, for example. In other embodiments, the terminal apparatus 412 may be generally configured as a spray head, as shown in Figure 4B. In some embodiments, the terminal apparatus may be configured to provide a wide dispersal pattern, so as to provide wide coverage of the material being sprayed, which may be useful in applications of, but not limited to, pesticides, odor neutralizers, fertilizers, cleaning formulations, irritants, sterilizing preparations, crowd control agents, perfumes, wetting agents, preservatives, pest repellents, aromatherapy, paint strippers, adhesives, lubricants, materials for providing textured surfaces, etc. In one embodiment, an atomizing nozzle may be used, but other means for creating wide dispersal spray patterns are considered within the spirit and scope of the present disclosure. In still other embodiments, the terminal apparatus 422 may generally be configured as a tube or hose, for example, as may be seen in Figure 4C. Materials such as cleaning materials, beverages, and/or any other suitable material may be delivered through such a terminal apparatus. While the foregoing embodiments have been described in some detail, it will be recognized that any suitable terminal apparatus may be used to deliver the dispensed material and is within the spirit and scope of the present disclosure. Further, while the embodiments shown and described above are depicted with the fitment positioned on the top of the liner, it will be recognized that the fitment, and therefore the connector and/or in some cases the terminal apparatus, may be positioned at any suitable place on the liner.

[048] In other embodiments, the terminal apparatus may be remote, that is it may not be directly attached to the dispenser, but rather may be operably coupled to the dispenser. For example, in one embodiment the terminal apparatus that is configured as a
tube as shown in Figure 4C, may connect or otherwise attach to a terminal apparatus of any suitable type, such as a spray nozzle, a spout, or any other type of terminal apparatus. In such embodiments, the terminal apparatus may connect to a hose, tube, or other suitable apparatus by any suitable means, such as by screwing the terminal apparatus to the hose, snapping the terminal apparatus to the hose, or by any other suitable means. The use of a remote terminal apparatus may be beneficial with dispensers that may be too large and/or heavy to easily pick-up or move, for example.

[049] In some embodiments a pressure source 180 may be included as part of the dispense assembly 130. The pressure source 180 may be used to pressure dispense the contents of the dispenser 100, by forcing a gas, for example, into the annular space 160 of the dispense assembly 100. The pressure source, in some embodiments, may be connected directly to, or be integral with the dispenser, while in other embodiments, the pressure source may be remotely connected to the dispenser via any suitable means, for example tubing or hosing. In some embodiments, the pressure source 180 may comprise a carbon dioxide (CO₂) or nitrogen (N₂), or other disposable compressed gas cartridge, for example. In some embodiments, the pressure source 180 may be generally free-standing, or generally detached from the dispenser, as shown in Figure 1. In such embodiments, the pressure source 180 may be operably connected to the liner 102 and/or overpack 110 and/or other features of the dispense assembly 130 via hosing, tubing or any other suitable means, or combination of means. In other embodiments, the pressure source may be fixedly or detachably secured to any portion of the dispenser, in any suitable manner. As shown in Figure 5A, for example, the pressure source 506 may be detachably or fixedly secured to the overpack 508 in any suitable manner, such as but not limited to, straps, holders, fixatives, or any other suitable method or combination of methods.

[050] In other embodiments, as shown in Figure 5B, the pressure source 520 may be detachably or fixedly secured to the connector and/or the cover 524, for example, in any suitable manner, such as, but not limited to straps, holders, fixatives, or any other suitable method or combination of methods. In still other embodiments, the pressure source may be generally directly detachably connected or integrally connected to the dispense assembly. While particular embodiments have been described herein, it will be
understood that the pressure source may be positioned at any suitable place on and/or near the dispenser by any suitable means. While the pressure source has been discussed as a disposable cartridge for use with a disposable system, in other embodiments the pressure source may be any suitable or known pressure source to which the dispenser may be operably connected.

[051] Figure 6 shows yet another embodiment of a dispensing system 600 of the present disclosure. As may be seen, the pressure source 680 may be a gas cartridge, which in some embodiments may be refillable or disposable, that may be detachably or integrally coupled to the dispense assembly 630. In some embodiments, as shown in Figure 6, the pressure source may be directly coupled with a cover 640 of the dispense assembly. However, those skilled in the art will recognize that this is not required and/or the pressure source may be directly coupled with any other suitable element of the dispense system 600. The pressure source 680 may be in fluid communication with the interior of the dispensing system overpack or liner, depending on the pressure dispense application. In some embodiments, the fluid communication may be permitted via a direct connection with a pressure inlet (e.g., inlet 182 as shown in Figure 1) or via a tubing 694 as shown in Figure 6. In the embodiment of Figure 6, the terminal apparatus 690 may be operably coupled to the dispenser 600 via tubing 664, for example. Furthermore, terminal apparatus 690 may include a dispense actuator, discussed in further detail below.

[052] In one embodiment, the dispensing system 600 may be, or may be similar to, the portable pressure source and dispense systems sold under the brand name Tap-A-Draft by Sturman BG, LLC of Woodland Park, CO, which have traditionally been used to maintain and dispense carbonated beverages. Generally, as the liquid stored in the container to which the Tap-A-Draft system is attached is poured through the Tap-A-Draft dispense connector, gas, such as CO₂, Nitrous, or Argon, is allowed to enter the container to maintain the pressure within the container. Such portable pressure source and dispense systems, like the pressure dispense assemblies sold under the brand name Tap-A-Draft by Sturman BG, LLC, are further described in detail in: U.S. Pat. No. 5,395,012; U.S. Pat. No. 5,443,186; U.S. Pat. No. 5,979,713; U.S. Pat. No. 6,036,054; U.S. Pat. No.
In use, the dispensing system may be operated by a user with relatively little, if any, preparatory work. For example, as discussed above, in some embodiments, a user may need only connect the dispensing assembly to the liner and/or overpack prior to use, while in other embodiments, the dispensing system may be purchased completely assembled, e.g., the dispensing assembly may already be connected to the liner and/or overpack.

In some embodiments, a user may activate the dispensing system by activating the pressure source. The pressure source may be activated, or turned "on," in a variety of suitable ways, for example but not limited to, via a button, flip-switch, sliding switch, or any other suitable actuator or combination of actuators. In some embodiments, such as in a fully disposable and/or recyclable embodiment, wherein the pressure source may comprise, for example, a CO₂, N₂, or other disposable compressed gas cartridge, the pressure source may be activated by activating the compressed gas cartridge as would be understood by those skilled in the art. In some embodiments, activating the pressure source may cause the contents of the liner or dispensing system to be dispensed. In still further embodiments, the contents of the liner or dispensing system may be dispensed continuously until the pressure source is deactivated or, in the case of a compressed gas cartridge, for example, until the contents of the pressure source are entirely or substantially depleted, and/or until the contents of the liner are substantially depleted or are otherwise down to a desired level.

In further embodiments, a user may control dispense of the contents of the system by actuating a dispense actuator, which in some embodiments, may be operably coupled or directly integrated with a component of the dispense system or the terminal apparatus. As may be seen in Figure 5A, for example, in some embodiments, the dispense actuator 510 may comprise a button located on the dispenser, while in other embodiments, as shown in Figure 6, the dispense actuator may be part of the terminal apparatus 690. However, it will be understood that the dispense actuator may be any other suitable actuating device, including but not limited to, a button, plug, flip-switch, sliding switch, clip, locking mechanism, or any other suitable actuating device or
combination of actuating devices. In some embodiments, the dispense actuator may simply be a device that blocks and/or unblocks the flow of contents from the dispense system. At any rate, with a dispense actuator, a user may control the dispense of the material in the dispenser by turning the actuator to an "on," activated, or unblocking position, which may then allow the pressure source to dispense the contents of the dispense system. In still other embodiments, a single actuator may be used to both activate the pressure source and the terminal apparatus. While particular embodiments of dispense actuators have been described herein, it will be understood that any suitable configuration for allowing the material of the liner to be dispensed is within the spirit and scope of the present disclosure.

[056] In some embodiments, a dispenser may include more than one liner that may contain different materials. By way of example, one liner may contain a dark blue colored paint and another liner may contain a light purple colored paint. The dispense assembly may include a connector/cover that may connect to or align with the fitments of each of the liners. Alternatively, one liner may comprise two or more compartments that may contain different materials. When the dispense actuator is activated, the dispense assembly may draw the material from both of the liners and may mix the material prior to being dispensed out of the dispenser may be a mixture of the contents of all or some of the liners. In addition to saving time, such a feature is advantageous because it does not require a user to be subjected to potentially noxious fumes or odors during mixing. This embodiment may also be advantageously used with applications of coatings that may be unstable and require a catalyst to cure where one liner may contain the coating and another liner may contain the catalyst, thereby allowing a mixture of both to be applied. In multiple liner embodiments, the ratio of the material of each liner that is included in the mixture may be controlled by a variety of means, for example, by varying the pressure applied, by varying the size of a terminal apparatus configured as a nozzle, by varying the size of the channels through the connector/cover, by varying the size of any dip tube(s) used, or any other suitable method or combination of methods.

[057] In some embodiments, the terminal apparatus may include a mechanism that may help partially cure the material as it is being dispensed. This may be achieved
by any suitable means, or combination of means, for example, but not limited to, an ultraviolet light, an infrared light, and/or a small heater that may be included in the nozzle of a dispense assembly.

[058] In another embodiment, a dispenser of the present disclosure may include a timer-controlled valve, which in some embodiments may be provided with or integrated with the dispensing assembly, that permits the use of the dispenser remotely or on a scheduled basis. In one embodiment, the timer-controlled valve may be controlled by a microchip integrated with the dispensing assembly or may be controlled remotely, such as by radio, infrared, WiFi, Bluetooth, etc. which may be connected to a controller. The timer-controlled valve could be configured for a one-time dispense event, such as for use with a fogger or pesticide or may be configured for repeating dispense events, such as for introducing an odor neutralizer or aroma into an enclosed space. A dispenser with a timer-controlled valve may be used for any suitable time-controlled dispense application.

[059] In further embodiments, the control valve may be triggered by an external event or external sensing, such as but not limited to spraying a fragrance when a person is near, dispensing a repellent after detection of a pest or a change in ambient lighting, etc. Such external sensing may be provided by one or more ultrasonic proximity detectors, photodetectors, or any other suitable sensors or sensing means or combinations thereof, supplied with the dispenser.

[060] In some dispenser embodiments, the liner, overpack, and/or dispensing assembly may be configured for high flow dispense or dispense of contents of relatively higher viscosity. In one embodiment, such high flow or high viscous dispense can be achieved by providing larger orifice sizes in the liner, overpack, and/or dispensing assembly, which would allow for higher flow rates or the larger flow paths for materials with relatively higher viscosity.

[061] In some embodiments, a dispenser of the present disclosure can include features permitting integrated mixing. Such integrated mixing may be useful, for example, when storing and dispensing two phase or emulsive products or contents. Mixing may be provided, for example, via a magnetically coupled stirring rod or stirring plate; however, other stirring mechanisms can be used, such as but not limited to a Tesla turbine, in order to circulate or mix the contents. In some embodiments, the dispenser or
one or more components thereof may need to be modified to provide a more wear
resistant, or a substantially wear resistant, location for the mixing device. Such wear
resistant area may include, but is not limited to, a dimple or a thickened area in the wall
of the liner. In still other embodiments, the dispenser could be configured to mate or be
used with a shaker or roller in order to mix the contents stored therein.

[062] In further embodiments, the dispenser could be modified to deliver the
contents to a mixing system for use in process. Alternatively, two or more dispensers
could be configured to be connected to one another, or their dispense ports or lines,
connected to one another, so that the contents thereof may be mixed upon dispense. In
yet other embodiments, as discussed above, a single dispenser may include a plurality of
liners (optionally within a single overpack) and may be configured to mix the contents of
two or more of the plurality of liners upon dispense. Such embodiments may be used, for
example, with reactive materials dispensing, which may require isolation of components
prior to dispense and may require flow control to deliver the right ratio of isolated
components. One example would be systems that polymerize or cross-link on dispense
like epoxies, casting compounds such as dental fillers or molds, cleaning agents requiring
an oxidizer as a bleach that does not have long term stability when mixed in the full
preparation, etc. Generally any scenario where short-lived material would desirably be
generated as needed upon mixing could be used with such an embodiment of the present
disclosure. In some embodiments, a mixing head or connector may be provided. The
mixing head may control the ratio of materials as they are dispensed/mixed. In some
embodiments, the mixing head may be able to be cleaned, purged, and/or sterilized. A
simplistic embodiment of a mixing head may include orifice plates or constrained volume
dip tubes so that the ratio of materials is controlled. However, more complicated mixing
heads are suitable for the embodiments of the present disclosure. In other embodiments,
a pump, including a portable pump, may be used with, or connected with one
embodiment of a dispenser disclosed herein, so as to permit the end user to combine a
material or ingredient with the contents of the dispenser upon dispense, or to add a
material or ingredient to the packaging system prior to dispense. In still further
embodiments, co-blow molded or nested preforms and liners, such as those described in
International PCT Appln. No. PCT/US 11/55560, titled, "Nested Blow Molded Liner and
Overpack and Methods of Making Same," filed October 10, 2011; and U.S. Prov. Appl.
No. 61/448,172, titled "Nested Blow Molded Liner and Overpack," filed March 1, 2011, which were previously incorporated herein, may be used to manufacture a dispenser having greater than two layers. Two or more separate materials may be filled into the spaces between the layers. The dispenser may be configured to mix the separate materials upon dispense.

[063] In other embodiments, the dispensers of the present disclosure may include baffles, baffling features, or other discontinuities in the interior surface(s) thereof to retard settling of the suspended solids contained therein during storage and/or transportation.

[064] The dispensers described herein may be configured as any suitable shape, including but not limited to square, rectangular, triangular or pyramidal, cylindrical, or any other suitable polygon or other shape. Differently shaped dispensers can improve packing density during storage and/or transportation, and may reduce overall transportation costs. Additionally, differently shaped dispensers can be used to differentiate dispensers from one another, such as to provide an indicator of the contents provided within the dispensers or to identify for which application or applications the contents are to be used, etc. In still further embodiments, the dispensers described herein may be configured as any suitable shape in order to "retrofit" the dispensers with existing dispense assemblies or dispense systems.

[065] In some embodiments, the dispensers described herein may include symbols and/or writing that is molded into the dispensers or one or more components thereof. Such symbols and/or writing may include, but is not limited to names, logos, instructions, warnings, etc. Such molding may be done during or after the manufacturing process of the dispensers or one or more components thereof. In one embodiment, such molding may be readily accomplished during the fabrication process by, for example, embossing the mold for the dispensers or one or more components thereof. The molded symbols and/or writing may be used, for example, to differentiate products.

[066] In some embodiments, one or more colors and/or absorbant materials may be added to the materials of the dispensers or one or more components thereof during or after the manufacturing process to help protect the contents of the dispensers from the
external environment, to decorate the dispensers, or to use as an indicator or identifier of the contents within the dispensers or otherwise to differentiate multiple dispensers, etc. Colors may be added using, for example, dyes, pigments, nanoparticles, or any other suitable mechanism. Absorbant materials may include materials that absorb ultraviolet light, infrared light, and/or radio frequency signals, etc.

[067] Similarly, in some embodiments, the dispensers or one or more components thereof may be provided with different textures or finishes. As with color and molded symbols and/or writing, the different textures or finishes may be used to differentiate products, to provide an indicator of the contents provided within the dispensers, or to identify for which application or applications the contents are to be used, etc. In one embodiment, the texture or finish may be designed to be a substantially non-slip texture or finish or the like, and including or adding such a texture or finish to the dispensers or one or more components thereof may help improve graspability or handling of the packaging system, and thereby reduce or minimize the risk of dropping of the dispensers. The texture or finish may be readily accomplished during the fabrication process by, for example, providing a mold for the dispensers or one or more components thereof with the appropriate surface features. In other embodiments, the molded dispensers may be coated with the texture or finish. In some embodiments, the texture or finish may be provided on substantially the entire dispenser or substantially the entirety of one or more components thereof. However, in other embodiments, the texture or finish may be provided on only a portion of the dispenser or a portion of one or more components thereof.

[068] Similarly, in some embodiments, the exterior and/or interior walls of the dispensers or one or more components thereof may have any suitable coating provided thereon. The coating may increase material compatibility, decrease permeability, increase strength, increase pinhole resistance, increase stability, provide anti-static capabilities or otherwise reduce static, etc. Such coatings can include coatings of polymers or plastic, metal, glass, adhesives, etc. and may be applied during the manufacturing process by, for example coating a preform used in blow-molding, or may be applied post manufacturing, such as by spraying, dipping, filling, etc.
In some embodiments, the dispensers may include one or more handles. The one or more handles can be of any shape or size, and may be located at any suitable position of the dispensers. Types of handles can include, but are not limited to, handles that are located at the top and/or sides; are ergonomic; are removable or detachable; are molded into the dispensers or are provided after fabrication of the dispensers (such as by, for example, snap fit, adhesive, riveting, screwed on, bayonet-fit, etc.); etc. Different handles and/or handling options can be provided and may depend on, for example but not limited to, the anticipated contents of the dispensers, the application for the dispensers, the size and shape of the dispensers, the anticipated dispensing system for the dispensers, etc.

In order to assist in making the dispensers described herein more sustainable, the dispensers or one or more components thereof, including any overpack, liner(s), handles, etc., may be manufactured from biodegradable materials or biodegradable polymers, including but not limited to: polyhydroxyalkanoates (PHAs), like poly-3-hydroxybutyrate (PHB), polyhydroxyvalerate (PHV), and polyhydroxyhexanoate (PHH); polylactic acid (PLA); polybutylene succinate (PBS); polycaprolactone (PCL); polyanhydrides; polyvinyl alcohol; starch derivatives; cellulose esters, like cellulose acetate and nitrocellulose and their derivatives (celluloid); etc.

In some embodiments, the dispensers may include two or more layers, such as an overpack and a liner, multiple overpacks, or multiple liners. In further embodiments, a dispenser may include at least three layers, which may help ensure enhanced containment of the contents therein, increase structural strength, and/or decrease permeability, etc. Any of the layers may be made from the same or different materials, such as but not limited to, the materials previously discussed herein.

In some embodiments, the dispensers or one or more components thereof may be manufactured from materials that can be recycled or recovered, and in some embodiments, used in another process by the same or a different end user, thereby allowing such end user(s) to lessen their impact on the environment or lower their overall emissions. For example, in one embodiment, the dispensers or one or more components thereof may be manufactured from materials that may be incinerated, such that the heat generated therefrom may be captured and incorporated or used in another process by the
same or different end user. In general the dispensers or one or more components thereof may be manufactured from materials that can be recycled, or that may be converted into raw materials that may be used again.

[073] In some embodiments, one or more components of the dispensers, such as but not limited to the overpack, may be configured or designed for reuse or reusability, while other components of the dispensers, such as but not limited to some components of the dispense assembly, may be configured or designed for one-time use or disposability. Accordingly, such embodiments may have a reduced number of components that are disposed of after use, thereby reducing overall waste. In such embodiments, decreased contamination risk can be maintained by configuring a dispenser such that several or all of the components that have contact with the contents of the liner during dispense may be disposable or replaceable.

[074] In some embodiments, structural features may be designed into the dispensers that add strength and integrity to the dispensers or one or more components thereof. For example, the base (or chime in some embodiments), top, and sides of the dispensers may all be areas that experiences increased shake and external forces during filling, transportation, installation, and use (e.g., dispensing). Accordingly, in one embodiment, added thickness or structural edifices (e.g., bridge tressel design) may be added to support stressed regions of the dispensers, which can add strength and integrity to the dispensers. Furthermore, any connection region in the dispensers may also experience increased stress during use. Accordingly, any of these such regions may include structural features that add strength through, for example, increased thickness and/or specifically tailored designs. In further embodiments, the use of triangular shapes could be used to add increased strength to any of the above described structures; however, other designs or mechanical support features may be used.

[075] In some embodiments, the dispensers or one or more components thereof, including any overpack or liner(s), may include reinforcement features, such as but not limited to, a mesh, fiber(s), epoxy, or resin, etc. that may be integrated or added to the dispensers or one or more components thereof, or portions thereof, in order to add reinforcement or strength. Such reinforcement may assist in high pressure dispense
applications, or in applications for dispensing high viscosity contents or corrosive
contents.

[076] In some embodiments, the dispensers may include level sensing features
or sensors. Such level sensing features or sensors may use visual, electronic, ultrasonic,
or other suitable mechanisms for identifying, indicating, or determining the level of the
contents stored in the dispensers. For example, in one embodiment, the dispensers or a
portion thereof may be made from a substantially translucent or transparent material that
may be used to view the level of the contents stored therein.

[077] In further embodiments, flow metering technology may be integrated into
the dispense assembly for a direct measurement of material being delivered from the
packaging system to a downstream process. A direct measurement of the material being
delivered could provide the end user with data which may help ensure process
repeatability or reproducibility. In one embodiment, the integrated flow meter may
provide an analog or digital readout of the material flow. The flow meter, or other
component of the system, can take the characteristics of the material (including but not
limited to viscosity and concentration) and other flow parameters into consideration to
provide an accurate flow measurement. Additionally, or alternatively, the integrated flow
meter can be configured to work with, and accurately measure, a specific material stored
and dispensed from the dispenser. In one embodiment, the inlet pressure can be cycled,
or adjusted, to maintain a substantially constant outlet pressure or flow rate.

[078] In alternative embodiments, the systems of the present disclosure may be
used for assisting in emergency situations, such as but not limited to use by Hazardous
Materials (HazMat) and Emergency Response Teams. HazMat and Emergency Response
Teams often have to deal with unknown emergency situations in the field. After a quick
assessment of the emergency situation, the identity of the hazard can be categorized as
chemical, biological, physical, nuclear, or other hazards. In each situation, the use of
portable dispense systems as disclosed herein, used in reverse such as with a vacuum,
could be used to locally vacuum up spilled materials and isolate those hazards within a
liner-based package for isolation, containment, and/or destruction. Utilization of such
portable technology can alleviate concerns from the hazardous material spill or
emergency threat situation, regardless of the hazard category being addressed. Isolation
of the spilled material, within a liner, for neutralization, destruction, and/or disposal can be achieved on site or at a remote location depending upon the type and severity of the hazard being addressed.

For example, in a chemical spill, an acid or base being transported might leak into the local surroundings. By using a portable vacuum or portable vacuum technology, such as using an embodiment of the systems disclosed herein with a vacuum being applied instead of pressure (e.g., dispense system used in reverse), the acids or bases could be "sucked" into the liner of a portable liner-based package. In some embodiments, a specific neutralization agent may be provided within the package or liner to neutralize the acid or base, or other chemical. Alternatively, the acid or base or other chemical could be isolated and contained within the liner, and transported to another location for later neutralization away from the emergency situation.

As another example, in a biological emergency scenario, a portable vacuum system as disclosed herein, could be used to isolate a biological agent through suction into a liner-based repository. The liner might contain an anti-biological agent to kill the biological material and reduce the immediate threat situation. Alternatively, the isolated biological agent can be isolated and contained within the liner, and transported to another location for later handling, away from the emergency situation, thereby alleviating the potential for widespread destruction and the loss of life.

As yet another example, in a nuclear accident scenario, such as in a nuclear reactor, a radioactive spill could be isolated and contained in a liner-based, portable vacuum system for isolation in another location. The radioactive material, once isolated, can be removed and treated at a remote, non-emergency location. This approach allows increased survival rates and the ability to quickly contain radioactive material in emergency conditions.

Accordingly, the use of a portable pump technology, modified to provide vacuum or suction, can have significant value for these emergency response scenarios. In one embodiment, the systems described above may be modified for suction by replacing the pressure source, in any of the embodiments described above, with a vacuum source. The vacuum source may be a portable vacuum source, and may be separate from the other components of the system or may be an integrated component of the system.
In the foregoing description, various embodiments have been presented for the purpose of illustration and description. They are not intended to be exhaustive or to limit the disclosure to the precise forms disclosed. Obvious modifications or variations are possible in light of the above teachings. The embodiments were chosen and described to provide the best illustration of the principals of the present disclosure and its practical application, and to enable one of ordinary skill in the art to utilize the various embodiments with various modifications as are suited to the particular use contemplated. All such modifications and variations are within the scope of the present disclosure as determined by the appended claims when interpreted in accordance with the breadth they are fairly, legally, and equitably entitled.
Claims

We claim:

1. A dispenser comprising:
   a dispense assembly comprising a disposable pressure source and an outlet channel in fluid communication with a terminal apparatus; and
   a collapsible liner that contains a material to be dispensed, the liner detachably secured to the dispense assembly with the outlet channel in fluid communication with an interior of the liner, wherein the material in the liner is dispensed out the liner and through the outlet channel to the terminal apparatus.

2. The dispenser of claim 1, wherein the dispense assembly causes dispense of the material to be dispensed by introducing a fluid or gas from the disposable pressure source into the liner, thereby forcing the material in the liner out of the liner and to the outlet channel.

3. The dispenser of claim 1, further comprising an overpack that holds the liner and that detachably secures to the dispense assembly.

4. The dispenser of claim 3, wherein the dispense assembly causes dispense of the material to be dispensed by introducing a fluid or gas form the disposable pressure source into an annular space between the liner and the overpack, thereby causing the liner to collapse and forcing the material in the liner out of the liner and to the outlet channel.

5. The dispenser of claim 1, wherein the pressure source is a disposable gas cartridge.

6. The dispenser of claim 5, wherein the terminal apparatus is a spout.

7. The dispenser of claim 5, wherein the terminal apparatus is a spray head.

8. The dispenser of claim 5, wherein the terminal apparatus is a hose.
9. The dispenser of claim 5, wherein the liner comprises a fitment having a closure seal providing secure containment of the materials to be dispensed.

10. The dispenser of claim 9, wherein the closure seal is resealable.

11. A dispenser comprising:

   a dispense assembly comprising an outlet channel in fluid communication with a terminal apparatus, and a pressure source providing a limited supply of fluid or gas; and

   a collapsible liner that contains a material to be dispensed, the liner detachably secured to the dispense assembly with the outlet channel in fluid communication with an interior of the liner, wherein the material in the liner is dispensed out the liner and through the outlet channel to the terminal apparatus.

12. The dispenser of claim 11, wherein the dispense assembly causes dispense of the material to be dispensed by introducing the fluid or gas from the disposable pressure source into the liner, thereby forcing the material in the liner out of the liner and to the outlet channel.

13. The dispenser of claim 11, further comprising an overpack that holds the liner and that detachably secures to the dispense assembly.

14. The dispenser of claim 13, wherein the dispense assembly causes dispense of the material to be dispensed by introducing the fluid or gas from the disposable pressure source into an annular space between the liner and the overpack, thereby causing the liner to collapse and forcing the material in the liner out of the liner and to the outlet channel.

15. The dispenser of claim 11, wherein the dispenser is configured for limited use ending at least by depletion of the limited supply of the pressure source.

16. A method for portable dispense of contents of a liner, the method comprising:
detachably connecting a dispense assembly, comprising an outlet channel in fluid communication with a terminal apparatus, and a pressure source providing a limited supply of fluid or gas, with a collapsible liner with the outlet channel in fluid communication with an interior of the liner, the liner containing a material to be dispensed; and

activating the pressure source, causing the fluid or gas to be introduced into the liner, thereby forcing the material in the liner out of the liner and to the outlet channel.

17. A method for portable dispense of contents of a liner, the method comprising:

detachably connecting a dispense assembly, comprising an outlet channel in fluid communication with a terminal apparatus, and a pressure source providing a limited supply of fluid or gas, with an overpack and collapsible liner assembly, with the outlet channel in fluid communication with an interior of the liner, the liner containing a material to be dispensed; and

activating the pressure source, causing the fluid or gas to be introduced into an annular space between the liner and the overpack, thereby causing the liner to collapse and forcing the material in the liner out of the liner and to the outlet channel.

18. The method of claim 17, wherein pressure source may be controllably activated and deactivated until the limited supply of fluid or gas from the pressure source is depleted.

19. The method of claim 18, wherein dispense is controlled by a timer-controlled valve.

20. The method of claim 18, wherein dispense is triggered by sensing an external event.

21. The method of claim 17, wherein the material to be dispensed from the liner is continuously dispensed until the limited supply of fluid or gas from the pressure source is depleted.
Fig. 3