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**Flushable body waste collection pouches, pouch-in-pouch appliances using the same, and methods of making the same**

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(54) Title: IMPROVEMENTS IN FLUSHABLE BODY WASTE COLLECTION POUCHES, POUCH-IN-POUCH APPLIANCES USING THE SAME, AND METHODS PERTAINING THERETO

(57) Abstract: A flushable biodegradable pouch having water-dispersible fibers along at least a portion of the outer surface of the pouch's cover layer provided with a water-soluble hydrophilic coating. The pouch's cover layer is water-disintegratable, and the water-soluble hydrophilic coating is a lubricating agent capable of becoming slippery when exposed to water and, upon subsequent drying, again becoming water-soluble upon re-exposure to water. As such, the hydrophilic coating serves as a rewettable, redesolving-lubricating agent.

A2

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**IMPROVEMENTS IN FLUSHABLE BODY WASTE COLLECTION  
POUCHES, POUCH-IN-POUCH APPLIANCE USING THE  
SAME, AND METHODS PERTAINING THERETO**

**5 Related Application**

This application is a patent-of-addition to Australian Patent Application Number AU 2004284922.

**Background of the Invention**

10 Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

This invention relates to flushable body waste collection pouches, and  
15 particularly to a biodegradable pouch suitable for use as the toilet-disposable inner pouch of a pouch-within-a-pouch ostomy appliance of the type generally disclosed in Patent 5,865,819. The disposable pouch has a pair of walls secured together along their peripheral edges to define a waste-receiving chamber, and one of the side walls has a body waste  
20 receiving opening which communicates with that chamber. External attachment means are provided about the opening for attachment of the pouch (or pouch assembly) to a wearer.

The only inner pouch currently on the market is a pouch available from  
25 Welland Medical covered by U.S. patent 5,938,647. This pouch is made of hot water soluble polyvinylalcohol. The problem with polyvinylalcohol is that it becomes brittle and noisy upon aging and has limited biodegradability. Thus, there is a need for an inner pouch file that is flexible, water impermeable, has low noise (an important requirement for  
30 ostomy and fecal incontinence pouches) and good biodegradability.

Published Patent Application US 2005/0084634 (also published as WO 2005/041827) discloses a biodegradable and toilet-flushable body waste collection pouch, and an appliance and method in which such a pouch constitutes the inner pouch of a peelably separable pouch-in-pouch system. The walls of the inner pouch are composed of an ultra-thin, heat-sealable film impermeable to body wastes comprising a plasticized biodegradable polyester or copolyester externally covered by a soft and water-disintegratable cover layer of biodegradable and water-dispersible fibers. The cover layer and film are weakly bonded together in such a way as to avoid pinholes in the film that might otherwise be caused by the fibers. When used as the inner pouch of a pouch-in-pouch system, the film of the outer pouch is selected to have a melting temperature higher than that of the inner pouch film, with the result that a peripheral heat seal joining the walls of the two pouches together will allow the walls of the outer pouch to be peeled away without delaminating the film and cover layers of the inner pouch.

Pedersen et al Published Patent Application US 2005/0113770 (also published as WO 2005/041828) discloses an ostomy appliance having a face plate assembly and inner and outer pouches joined thereto. The outer pouch is provided with one or more peripherally-extending sealing seams that allow the walls of the outer pouch to be separated by peeling forces applied in directions transverse to such seam or seams. In preferred embodiments, the sealing seams also preferably join the peripheral edges of the outer pouch to those of the inner pouch. A method of disposing of the pouch assembly of such an ostomy appliance is also disclosed.

It is an object of the present invention to overcome or ameliorate at least one of the disadvantages of the prior art, or to provide a useful alternative.

Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise", "comprising", and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

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Although the invention will be described with reference to specific examples it will be appreciated by those skilled in the art that the invention may be embodied in many other forms.

10 **Summary of the Invention**

According to a first aspect of the present invention there is provided a biodegradable body waste collection pouch particularly suitable for flush toilet disposability; said pouch having a pair of walls secured together along their peripheral edges to define a waste-receiving chamber therebetween; one of said side walls having a waste-receiving opening therethrough communicating with said chamber; and external attachment means provided about said opening for attachment of said pouch to a wearer; said walls of said pouch being cut from a laminate composed of (a) a layer of thin heat-sealable film impermeable to liquid and solid body wastes and of a composition comprising a biodegradable aliphatic polyester, or a biodegradable aliphatic-aromatic copolyester, or blends thereof, plasticized by one or more biodegradable plasticizers and (b) a water-disintegratable biodegradable cover layer of water-dispersible fibers having one of its surfaces uninterruptedly bonded thereto; said fibers along at least a portion of the outer surface of said pouch being coated with a water-soluble hydrophilic lubricating agent capable of becoming slippery when exposed to water and, upon subsequent drying, again becoming water-soluble upon re-exposure to water.

30 According to a second aspect of the present invention there is provided a method of promoting the flushability of a waste collection pouch in a flush toilet, said method comprising the steps of providing a pouch with a pair of

walls secured together along their peripheral edges to define a waste-receiving chamber therebetween; one of said walls having a waste-receiving opening therethrough communicating with said chamber; said walls being formed from a laminate composed of (a) a layer of thin heat-sealable film impermeable to liquid and solid body wastes and of a composition comprising a biodegradable aliphatic polyester, or a biodegradable aliphatic-aromatic copolyester, or blends thereof, plasticized by one or more biodegradable plasticizers, and (b) a water-disintegratable biodegradable cover layer of water-dispersible fibers having one of its surfaces uninterruptedly bonded thereto, comprising the step of coating 5 said fibers along at least a portion of the outer surface of said laminate, either before or after assembly of said pouch, with a water-soluble hydrophilic lubricating agent capable of becoming slippery when the outer surfaces of said pouch are exposed to water and, upon subsequent drying, again become water-soluble upon re-exposure to water.

10

According to a third aspect of the present invention there is provided a pouch-in-pouch body waste collection appliance comprising an outer pouch formed of liquid, gas and odor impermeable heat-sealable polymeric film having proximal and distal side walls defining a chamber; a toilet-disposable inner body waste collection pouch according to the first aspect having proximal and distal side walls and being disposed in said chamber; said proximal walls of said inner and outer pouches having aligned body waste receiving openings therethrough; and attachment means for attaching said proximal walls of said inner and outer pouches in areas surrounding said openings to skin surfaces of a patient about 20 a body waste discharge orifice; said disposable inner pouch having walls formed from sheet material composed of (a) a layer of thin heat-sealable film impermeable to body wastes of a composition comprising a biodegradable aliphatic polyester, or a biodegradable aliphatic-aromatic copolyester, or blends thereof, plasticized by one or more biodegradable plasticizers and (b) a water-disintegratable, porous, biodegradable cover layer of water-dispersible fibers bonded thereto; said heat-sealable film of said inner pouch having a melting 25 temperature lower than that of the heat-sealable film of said outer pouch; said walls of said outer and inner pouches having peripheral edge portions heat-

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sealed together with the peripheral edge portions of said cover layer being bonded more securely to the film material of said inner pouch than to the film material of said outer pouch; said fibers along at least a portion of the outer surface of the walls of said inner pouch being coated with a water-soluble hydrophilic lubricating agent capable of becoming slippery when exposed to water and, upon subsequent drying, again becoming water-soluble upon re-exposure to water.

According to a fourth aspect of the present invention there is provided a method of making a pouch-in-pouch body waste collection appliance according to the third aspect having an outer pouch formed of odor-impermeable thermoplastic film with proximal and distal walls defining a chamber and a toilet-disposable inner pouch having proximal and distal walls and being disposed in said chamber; said proximal walls of said inner and outer pouches having aligned body waste receiving openings therein; said walls of said inner pouch being formed of a laminate composed of (a) a layer of thin heat-sealable thermoplastic film, and (b) a porous water-disintegratable cover layer of water-dispersible fibers attached to exterior surfaces of said inner pouch film, said cover layer having at least some of said fibers along the exterior surface of said inner pouch coated with a water-soluble hydrophilic lubricating agent capable of becoming slippery when exposed to water and, upon subsequent drying, again becoming water-soluble upon re-exposure to water; wherein said method comprises the steps of selecting a material for the film of an inner pouch having a melting temperature substantially lower than that of the material of said outer pouch; and joining together peripheral portions of said walls of said inner and outer pouches, and portions of said proximal walls of said inner and outer pouches surrounding said body waste receiving openings, by simultaneously applying pressure and heat to said portions so that said proximal and distal walls of said inner pouch are welded together and, simultaneously, said film material of said inner pouch melts and invades the pores of said fibrous cover layer to a greater extent than said film material of said outer pouch, where, upon the subsequent application of peeling forces, said walls of said outer pouch may be peeled away

from said inner pouch without causing separation of said cover and film layers of said inner pouch.

According to a fifth aspect of the present invention there is provided a pouch-in-pouch body waste collection appliance comprising an outer pouch formed of liquid, gas and odor impermeable heat-sealable polymeric film having proximal and distal side walls defining a chamber; a toilet-disposable inner body waste collection pouch according to the first aspect having proximal and distal side walls and being disposed in said chamber; said proximal walls of said inner and outer pouches having aligned body waste receiving openings therethrough; and attachment means for attaching said proximal walls of said inner and outer pouches in areas surrounding said openings to skin surfaces of a patient about a body waste discharge orifice; said disposable inner pouch having walls formed from sheet material composed of (a) a layer of thin heat-sealable polymeric film impermeable to body wastes and (b) a water-disintegratable, porous, biodegradable cover layer of water-dispersible fibers bonded thereto; said fibers along at least outer surface portions of the walls of said inner pouch being coated with a water-soluble hydrophilic lubricating agent capable of becoming slippery when exposed to water and, upon subsequent drying, again becoming water-soluble upon re-exposure to water.

According to a sixth aspect of the present invention there is provided a method for enhancing the toilet flushability of a body waste collection pouch article according to the first aspect comprised of a thin polymeric film covered by a water-disintegratable fibrous cover layer bonded to the outer surface thereof, comprising the step of modifying said cover layer by coating at least some of said fibers along the outer surface \_\_\_\_\_

of said article with a hydrophilic agent that become lubricious upon hydration.

According to a seventh aspect of the present invention there is provided a  
5 pouch-in-pouch body waste collection appliance when made by a method  
according to the fourth aspect of the present invention.

The walls of a pouch embodying this invention are composed of a thin,  
heat sealable (including RF sealable) and liquid-impermeable monolayer  
10 film of a composition comprising a plasticized biodegradable aliphatic  
polyester, or a plasticized biodegradable aliphatic-aromatic copolyester, or  
blends thereof, covered by a water-disintegratable layer of biodegradable  
and water-dispersible fibers, most preferably cellulosic fibers, bonded  
thereto. The polyester or copolyester is blended with an aliphatic ester  
15 plasticizer such as triethylcitrate or vegetable oil. Such a plasticizer  
imparts greater flexibility to the film, reduces film noise upon wrinkling, and  
allows extrusion of the resin into films or coatings as thin as 10 microns  
(0.8 mil) or less. It has also been found that the presence of the  
plasticizer effectively increases the rate of biodegradation of the film.  
20 Starch may also be used advantageously as a biodegradable plasticizer.

The composition of the film may comprise a blend of about 70% to 95% by  
weight of the biodegradable aliphatic polyester or aliphatic-aromatic  
copolyester and 5% to 30% of a biodegradable plasticizer or plasticizers.  
25 More desireably, the blend is within the range of about 75% to 93%  
polyester or copolyester and about 7% to 25% plasticizer(s). A preferred  
composition is believed to be about 90% polyester or copolyester and  
about 10% plasticizer(s).  
30 The aliphatic polyester may comprise a polymer made by ring-opening  
polymerization of a lactone, preferably polycaprolactone. The aliphatic-  
aromatic copolymer may comprise a condensation product of a glycol with

a combination of an aliphatic diacid and aromatic diacid, wherein the aromatic diacid is less than 20% by mole.

To enhance biodegradability, minimize noise, and reduce cost, the film  
5 should be ultra-thin, having a thickness no greater than about 40 microns  
(1.57 mil). A preferred thickness range is believed to be about 6 to 40  
microns (0.24 to 1.57 mil) with a more preferred range being about 10 to  
35 microns (0.39 to 1.38 mil). Particularly effective results are believed to  
occur when the thickness range is about 15 to 30 microns (0.59 to 1.18  
10 mil).

The ultra-thin monolayer film, having the advantages and features  
described above, is reinforced by the water-disintegratable cover layer  
defining the outer surfaces of the pouch. The cover layer is composed of  
15 a random arrangement of water-dispersible fibers, has no non-water-  
soluble binder (and preferably no binder at all) and has significant dry  
strength with virtually no elongation but lacks wet strength. Tissue paper  
having a high cellulosic fiber content, preferably 100%, is believed  
particularly effective. The monolayer film may be secured uninterruptedly  
20 throughout one of its side surfaces to the tissue or other reinforcing  
substrate by any suitable means. While adhesive attachment (as by a  
water-soluble and biodegradable adhesive) is considered feasible, it is  
believed more effective to extrude the polyester or copolyester onto the  
paper substrate to form a thin but uninterrupted coating thereon or to  
25 laminate the two layers together with heat, with the attachment between  
the opposing surfaces of the two layers in either case being produced with  
heat and being mechanical in nature. As long as the external surface of  
the pouch is in a dry state, the tissue paper covering offers mechanical  
strength, softness, and noise reduction but, upon exposure to water, as  
30 when the pouch is discarded into a flush toilet, the tissue disintegrates  
rapidly and is believed to contribute to flushability by rapidly absorbing  
water, wetting the film surface, and reducing pouch buoyancy.

An important aspect of this invention lies in the strength, or lack of strength, of the attachment between substantially one entire surface of the cover layer (excluding its peripheral edge portions) and the film that

5 together form each wall of the flushable pouch. (It is along such peripheral edge portions that the layers are securely heat-sealed together to form a completed pouch.) To avoid the formation of unacceptable pinholes in the film, it is essential that none of the fibers of the cover layer extends through the film or even penetrates the film to any appreciable

10 extent. Since the film may be any of a number of different thicknesses, but is ultra-thin in any event, measuring the maximum extent of penetration, if any, is not considered feasible. However, it has been found that no appreciable penetration is achieved, and no pinholes are formed, if the extent of bonding between the paper and film layers is such that the

15 two layers may be peeled away from each other (when dry), with both layers remaining intact, by the application of 180-degree peel forces in the range of about 2 to 10 g/in (0.02 to 0.1 Newtons/in), preferably about 3 to 6 g/in (0.03 to 0.06 Newtons/in). Under such conditions, the layers are found to be bonded together with sufficient strength to maintain the

20 integrity of the pouch wall during use but without risk of unacceptable fiber penetration.

Since the polyester or copolyester films are heat sealable (including RF sealable), the films may be readily converted into pouches using

25 conventional heat sealing methods. Although the film is covered by a soft, flexible and fibrous backing layer as described above, heat sealing is nevertheless readily achieved because the polymeric layers of the pouch walls face inwardly and may therefore be securely welded to each other. Where the pouch serves as the inner pouch of a two-pouch system, it has

30 been found that where the inner pouch has a fibrous and porous cover layer of tissue paper or other suitable fibrous and porous substrate, heat sealing between the film of the inner pouch, the fibrous and porous cover

layer, and the film of the outer pouch, as along the peripheral edges of the two pouches, may nevertheless occur. In such a case, the seal between the walls of the outer pouch and the fibrous layer of the inner pouch walls is weaker than the seal between the two walls of the inner pouch, thereby

5 allowing the outer pouch to be torn or peeled away from the inner pouch without adversely affecting the integrity of the inner pouch, at which time the still-intact inner pouch and its contents may be discarded into the water of a toilet bowl to commence the disintegration and biodegradation process.

10 In such a pouch-in-pouch appliance, where the walls of the flushable inner pouch are composed of thermoplastic film and tissue paper layers weakly bonded together, it is essential that peeling away of the outer pouch not cause delamination of the paper and film layers of the inner pouch since,

15 as already noted, the paper layer is believed to contribute significantly to the flushability of the inner pouch. Also, retention of the soft paper layer by the inner pouch provides tactile benefits for the user who must handle and remove the inner pouch for toilet disposal, as well as assuring the user that the step of peeling away of the outer pouch walls has not

20 compromised the integrity of the inner pouch. An important aspect of this invention therefore lies in avoiding the risks of such delamination by selecting a thermoplastic material for the outer pouch that has a melting temperature greater than that of the thermoplastic material of the inner pouch. Since the fibers of the non-thermoplastic cover layer penetrate the

25 thermoplastic films of both pouches in the zone of the peripheral heat seal, and since the thermoplastic material of the inner pouch has a lower melting temperature, the fiber penetration into the film of the inner pouch along the peripheral heat seal is greater than into the film of the outer pouch and insures that the paper layer will preferentially remain with the

30 inner pouch as the walls of the outer pouch are peeled away.

The peripheral heat seal therefore simultaneously joins the multiple layers together in different ways to achieve peelability of the outer pouch walls away from the fibrous cover layer of the inner pouch, the retention of the fibrous cover layer by the inner pouch, and the true heat-sealing or 5 welding together of the walls of the inner pouch along their peripheral edges.

The flushability of a biodegradable pouch may be enhanced if the water-dispersible fibers along at least a portion of the outer surface of the 10 pouch's cover layer (which is preferably formed of a nonwoven material, particularly a water- disintegratable paper such as cellulosic toilet tissue) are provided with a hydrophilic coating. The coating does not impair the peelability of the seals of a pouch-in-pouch system or interfere with the water dispersibility of the fibers, and is found to be advantageous because 15 it reduces the friction between the outer surface of the pouch and the walls of a flush toilet and passages of a sanitary sewer system. While the coating would normally be applied and dried during production of such a pouch or pouch assembly, or during the tissue paper-film manufacture, it is contemplated that alternatively such a coating might be applied by a 20 user, as by spraying, just prior to discarding the pouch and its contents into a flush toilet.

When applied in production, the coating in the form of a water- based hydrophilic solution is sprayed, rolled, or otherwise applied to the surface 25 of the pouch's tissue cover layer. It is then dried by any suitable means, as in a convection oven. When the pouch is later discarded into the water of a flush toilet, the coating absorbs water and reactivates a hydrophilic film that makes the surface of the pouch slippery, significantly reducing the friction between the pouch and the walls of the toilet and sewer passages. 30 This reduced surface friction has a positive impact on the flush performance of the pouch.

The biodegradable coating contains one or more lubricating agents. One preferred gelling agent is hydroxyethylcellulose, available under the commercial name "Natrosol" from Aqualon, but other lubricating agents considered suitable are hydroxypropylcellulose, carboxymethylcellulose 5 and their salts, guar gums, gelatin, pectin, polyethylene glycol, polyethyleneoxide, polyacrylamides, acrylic acid polymers and their salts, and water-soluble silicone gelling agents. Of particular importance is that such a lubricating agent, after drying following initial exposure to water, must be capable of again becoming water soluble and slippery when re- 10 exposed to water. Thus, it has been found that polyvinyl alcohol is unsuitable as a gelling agent for use in this invention because although it becomes slippery upon initial hydration, once it has dried it is no longer water-soluble. A lubricating agent for use in this invention must be capable of rewetting/redesolving to avoid the risk that the drying of the coating 15 might cause a pouch to stick to the wall of a sewer pipe and not readily release when water is again flushed through the pipe.

In addition to a lubricating agent or agents, the coating material may include preservatives, surfactants, thickeners, pH buffers, slip agents, 20 odor neutralizers, deodorants and other additives. Examples of thickeners include, but are not limited to, carbomers, gums, poloxamers, gelatin, pectin and nonionic, zwitterionic and ionic gel formers.

By way of example, a coating solution of 2% hydroxyethylcellulose 25 (Natrosol) and 0.3% Phenonip (a commercial mixture of preservatives containing phenoxyethanol, methylparaben, ethylparaben, propylparaben butylparaben and isobutylparaben) may be applied to the paper tissue layer (25g Shawano cellulosic tissue code 3040 from Shawano Specialty Papers) of a waste collection pouch as disclosed in the aforementioned 30 published applications, the disclosures of which are incorporated herein by reference. The coating is then dried by placing the pouch in a convection oven at 75<0>C for approximately one hour. Drying may also be achieved

by using infrared lamps, heating elements or other sources of heat, and may be boosted by negative pressure and air circulation.

5 The desired load of coating may be achieved in single or multiple applications.

It has been found that an inner pouch of the type disclosed the aforementioned published applications, formed of an ultra thin biodegradable film with a tissue covering layer but without the hydrophilic 10 coating described herein, may be safely flushed through a to[upsilon]jet with a pouch load of up to about 110 g, whereas if the tissue layer of a similar pouch is provided with the hydrophilic coating of this invention, the pouch load may be safely and effectively increased to 150 g.

15 Other features and advantages of the invention will become apparent as the specification proceeds.

#### **Brief Description of the Drawings**

20 A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is an elevational view of a flushable body waste collection pouch embodying the invention.

Figure 2 is a somewhat-schematic vertical sectional view taken along line 2-2 of Figure 1.

25 Figure 3 is a sectional view similar to Figure 2 but showing the flushable pouch as the inner pouch of a pouch-in-pouch appliance.

#### **Detailed Description of the Preferred Embodiments**

30 The polyester or copolyester film material of an ostomy pouch or fecal incontinence pouch embodying this invention is obtained by chemical synthesis rather than by a fermentation process. Polyester or copolyester films produced by a fermentation process are considered unsuitable

because they tend to be brittle and cannot be converted into thin flexible films. Examples of synthetic biodegradable polyesters are aliphatic polyesters such as polycaprolactone ("Tone" from Dow Chemical) and aliphatic-aromatic copolyesters with less than 20% by mole of aromatic diacid component ("Estar Bio" from Eastman Chemical, "Ecoflex" from BASF). A synthetic biodegradable polyester precompounded with biodegradable plasticizers and suitable for thin film extrusion is available commercially from Petroplast Vinora under the designation "KF02B".

5 10 Referring to Figures 1 and 2 of the drawings, the numeral 10 generally designates a toilet-flushable body waste collection pouch with proximal (rear or bodyside) and distal (front) walls 11 and 12 having their peripheral edges joined together along a heat seal zone 13. For purposes of illustration, an ostomy pouch is shown, but the invention is applicable to

15 15 other body waste collection pouches such as fecal incontinence pouches. Also, the terms "heat seal" and "heat sealing" should here be understood to include other forms of thermoplastic welding such as RF sealing. As shown, the proximal or bodyside wall is provided with an opening 14 communicating with the chamber 15 of the pouch.

20 The appliance 10 includes a faceplate 17 having a soft, pliant adhesive layer 18 for adhesive attachment to the peristomal skin surfaces of a wearer. A cover film 19 extends over the pouch-facing surfaces of the faceplate's adhesive layer 18, and a stoma-receiving opening 20 is

25 25 provided in the faceplate in alignment with the opening 14 in the pouch. Attachment means 21 is schematically illustrated in Figure 2 for joining the faceplate and pouch together. Such attachment means may take the form of a releasable mechanical coupling or a separable adhesive seal, all as well known in the art. For purposes of this embodiment of the invention,

30 30 which focuses on pouch 10 and the materials from which it is formed (and the combination of that pouch with an outer pouch 10'), the attachment

21 is critical only to the extent that there must be some means around the stoma-receiving opening 14 for securing the pouch to a wearer.

Pouch 10 has its walls 11 and 12 formed of an ultra-thin heat-sealable  
5 (including RF sealable) liquid and gas impermeable film 23 externally  
bonded to a thin water-disintegratable cover layer 24. As previously  
stated, the film 23 is of a composition comprising a biodegradable,  
thermoplastic and heat-sealable, aliphatic polyester, or aliphatic-aromatic  
copolyester, or blends thereof, combined with a biodegradable plasticizer  
10 or combination of such plasticizers. The soft, flexible, water disintegratable  
cover layer 24 is composed of a random arrangement of water-dispersible  
non-thermoplastic fibers, preferably cellulosic fibers, and has significant  
tensile strength when dry but lacks such strength when wet, all as already  
described. The two layers are mechanically bonded together, preferably  
15 by heat, in such a way that despite the ultra-thin character of the film and  
the fibrous nature of the cover layer, there is no significant penetration of  
the fibers into the film and no formation of pinholes through the film. While  
some very limited penetration of the fibers into the film may exist to  
produce the weak mechanical bond between the layers, the penetration is  
20 so slight and the bonding forces so weak that the two layers (when dry)  
may be easily peeled apart with each layer remaining intact during and  
following such a peeling operation. More specifically, the mechanical  
attachment between the film and cover layer must be sufficiently weak to  
allow separation by the application of a 180 degree peeling force of about  
25 2 to 10 g/in (0.02 to 0.1 Newtons/in), preferably about 3 to 6 g/in (0.03 to  
0.06 Newtons/in), when tested in accordance with TAPPI Test Method  
UM502 (1991), all with little or no evidence of fiber retention by the film.  
Under such circumstances, the separated film will be free of pinholes that  
might otherwise cause fluid (liquid) leakage of the laminated two-layer  
30 product in use.

The water-disintegratable cover layer of non-thermoplastic water-dispersible fibers also plays an important role when the pouch serves as the inner pouch of a two-pouch (pouch-in-pouch) appliance as shown in Figure 3. As there shown, pouch 10 is disposed within the chamber 15' of 5 an outer pouch 10'. The peripheral edge portions of the two pouches may be joined together by heat sealing 13' which should be understood here to include RF sealing. The outer pouch 10' is of conventional construction and composed of any of a variety of known thermoplastic film materials that have a sufficiently high heat sealing or melting temperature and that 10 are impermeable to liquids, gases and odors. It includes a proximal (rear or bodyside) wall 11' and a distal (front) wall 12' with the proximal wall having a stoma-receiving opening 14' aligned with the corresponding opening 14 of the inner pouch. The two pouches are sealed together, as by heat seal 30, about their respective openings. Therefore, body waste 15 passing into the appliance can only enter the inner pouch and not the space between the two pouches.

As brought out in the aforementioned copending application, the disclosure of which is incorporated by reference herein, the peripheral seal 20 13' and the seal 30 about stoma openings 14, 14' are peelable seals that allow the proximal and distal walls 11' and 12' of the outer pouch to be peeled away from the inner pouch without disrupting the integrity of the peripheral seal that holds the walls of the inner pouch together. Thus, the walls of the outer pouch may be peeled away to expose the biodegradable 25 inner pouch 10 so that the latter may be discarded along with its contents into a flush toilet. The outer pouch 10', which may or may not be biodegradable, may then be placed into any suitable waste receptacle.

As already noted, the fibrous and porous water-disintegratable layer 24 30 and the film layer 23 that together form the walls of the inner pouch have their major surfaces areas only weakly bonded together, allowing them to be separated intact from each other with the application of only limited

peeling force. However, that does not include the peripheral heat seal zone 13' of the pouch shown in Figure 3, where the film layers 23 of the inner pouch are securely heat sealed or welded to each other and also penetrate the pores of the peripheral zones of the fibrous layers 24 to 5 produce a secure bond with the fibrous layers along the periphery of the inner pouch. The peripheral zones of the fibrous layers are also penetrated to at least some extent by the heat sealable material forming the walls 11' and 12' of the outer pouch 10'. However, the strength of the bond in the peripheral zones between the fibrous layers and the films of 10 the inner pouch is much greater than between the fibrous layers and the thermoplastic films forming the walls of the outer pouch because the melting temperature of the inner pouch film material is substantially lower than the melting temperature of the outer pouch film material. The result is that when a user peels away the walls of the outer pouch to expose the 15 inner pouch, the water-disintegratable, non-heat-sealable tissue paper layers of the inner pouch remain as part of the inner pouch and are not stripped away with the walls of the outer pouch.

Differential scanning calorimetry (DSC) can be used to measure the 20 melting point of candidate film materials and to predict if a certain combination of films might be suitable for the inner and outer pouches. For example, it has been found that a biodegradable plasticized polyester available from Petroplast Vinora under the designation KF02B has a DSC melting peak of 65 degrees C. A known multilayer barrier film currently 25 used commercially for ostomy pouches has a heat-sealable skin layer of poly(ethylene vinylacetate) (EVA) with a DSC melting peak of 88 degrees C. Because of this difference in melting temperatures, it is possible to control heat sealing conditions so that the tissue layer in the peripheral areas of the pouch walls exhibits a stronger bond with the inner pouch film 30 than with the outer pouch film following a heat sealing operation (including RF sealing). As a result, the outer pouch can be peeled away without causing separation of the tissue layer from the inner pouch film. A melting

temperature differential of at least 10 degrees C is believed to be needed to control layer separation.

5 To facilitate the step of manually peeling away the proximal and distal walls of outer pouch 10', such walls may be provided with gripping tabs (not shown) that project outwardly beyond the peripheral edges of inner pouch 10.

10 The walls of the inner pouch must be impermeable to fluid and solid body wastes, and the biodegradable plasticized polyesters or copolyesters described herein perform that function well. Biodegradable polyesters or copolyesters, while generally considered gas impermeable, nevertheless allow diffusion of odors to an extent that renders them, without some protective means, unsuitable for body waste collection pouches intended 15 for more than extremely short durations of use. A plasticized biodegradable polyester or copolyester pouch in the condition shown in Figures 1 and 2 is therefore useful for periods substantially shorter than one hour as, for example, as a pouch to be used with stomal implants where the duration of use may be 30 minutes or less. Despite the odor 20 permeability of such biodegradable polyester materials, however, pouches formed therefrom are well suited for long term body waste collection if they are used for the inner pouches of two pouch systems, as shown in Figure 3, with odor impermeability then provided by the protective outer pouches. Any of a variety of well-known heat-sealable pouch materials that are odor 25 impermeable are suitable for fabrication of outer pouch 10' which is not intended to be toilet flushable.

30 As described above, cover layer 24 of inner pouch 10 is of a porous material that is supportive when dry but has low wet strength. It should also be soft and flexible. Tissue paper that has a high percentage (preferably 100%) of cellulosic fibers is preferred such as, for example, a cellulosic tissue paper of the type available from Shawano Specialty

Papers having a basis weight of 14 lb/ream. Absence of a binder is desirable because a binder may interfere with or retard the rate of disintegration, but a limited amount of a binder that is non-thermoplastic and readily soluble or disintegratable in water, such as starch, may be

5 acceptable. The porous tissue layer for each wall 11 and 12, when such layer is in a dry state, provides reinforcement, softness, and noise reduction for the thin thermoplastic film of the inner pouch and is believed to contribute to the flushability of the film when the inner pouch is separated from the outer pouch and discarded into a flush toilet.

10 As believed evident from the above, A method according to making a pouch-in-pouch waste collection appliance embodying this invention involves the steps of selecting a thermoplastic material for the film of the inner pouch that has a melting temperature substantially lower than that of

15 the thermoplastic material for the film of the outer pouch and then joining together peripheral portions of the walls of the two pouches by simultaneously applying pressure and heat so that the film material of the inner pouch melts and invades the pores of the fibrous cover layer to a greater extent than the film material of the outer pouch. At the same time,

20 the opposing or inwardly-facing film layers of the inner pouch become fused to each other, forming a true heat seal or weld between the walls of the inner pouch. Upon the subsequent application of peeling forces, the walls of the outer pouch may then be peeled away from those of the inner pouch without causing separation of the porous cover layer and film layer

25 of the inner pouch and without disrupting the integrity of the inner pouch. The exposed inner pouch and its contents are then discarded into a flush toilet.

It will be noted from Figure 3 that the proximal wall of the outer pouch may

30 be similarly joined to the porous cover layer of the proximal wall of the inner pouch around the stoma-receiving opening so that as the proximal wall of the outer pouch is peeled away from the proximal wall of the inner

pouch, that is, when the inner pouch is extracted from what remains of the cavity of the outer pouch, a clean separation will occur with the porous cover layer again being retained as part of the flushable inner pouch.

- 5 The biodegradable coating contains one or more lubricating agents. One preferred gelling agent is hydroxyethylcellulose, available under the commercial name "Natrosol" from Aqualon, but other lubricating agents considered suitable are hydroxypropylcellulose, carboxymethylcellulose and their salts, guar gums, gelatin, pectin, polyethylene glycol,
- 10 polyethyleneoxide, polyacrylamides, acrylic acid polymers and their salts, and water-soluble silicone gelling agents. Of particular importance is that such a lubricating agent, after drying following initial exposure to water, must be capable of again becoming water soluble and slippery when re-exposed to water. Thus, it has been found that polyvinyl alcohol is
- 15 unsuitable as a gelling agent for use in this invention because although it becomes slippery upon initial hydration, once it has dried it is no longer water-soluble. A lubricating agent for use in this invention must be capable of rewetting/redesolving to avoid the risk that the drying of the coating might cause a pouch to stick to the wall of a sewer pipe and not readily
- 20 release when water is again flushed through the pipe.

In addition to a lubricating agent or agents, the coating material may include preservatives, surfactants, thickeners, pH buffers, slip agents, odor neutralizers, deodorants and other additives. Examples of thickeners

- 25 include, but are not limited to, carbomers, gums, poloxamers, gelatin, pectin and nonionic, zwitterionic and ionic gel formers.

By way of example, a coating solution of 2% hydroxyethylcellulose (Natrosol) and 0.3% Phenonip (a commercial mixture of preservatives

- 30 containing phenoxyethanol, methylparaben, ethylparaben, propylparaben butylparaben and isobutylparaben) may be applied to the paper tissue layer (25g Shawano cellulosic tissue code 3040 from Shawano Specialty

Papers) of a waste collection pouch as disclosed in the aforementioned published applications, the disclosures of which are incorporated herein by reference. The coating is then dried by placing the pouch in a convection oven at 75<0>C for approximately one hour. Drying may also be achieved  
5 by using infrared lamps, heating elements or other sources of heat, and may be boosted by negative pressure and air circulation.

The desired load of coating may be achieved in single or multiple applications.

10 It has been found that an inner pouch of the type disclosed the aforementioned published applications, formed of an ultra thin biodegradable film with a tissue covering layer but without the hydrophilic coating described herein, may be safely flushed through a to[upsilon]jet  
15 with a pouch load of up to about 110 g, whereas if the tissue layer of a similar pouch is provided with the hydrophilic coating of this invention, the pouch load may be safely and effectively increased to 150 g.

20 Other features and advantages of the invention will become apparent from the following examples:

#### **EXAMPLE 1**

Two methods are particularly suitable for the production of the tissue/film laminate of pouch 10: (1) extrusion coating onto tissue paper (1 step), and  
25 (2) film extrusion followed by lamination of the film to tissue paper (2 steps). Extrusion coating may be accomplished using a Davis Standard extrusion coating line. Tissue paper is used as a substrate and the biodegradable polyester is directly extruded onto the tissue in a single step process. With a two-step process, film may be first extruded using a  
30 blown film extrusion line and then laminated to paper tissue paper using a Faustel laminator. Lamination is ideally accomplished thermally with no adhesive layer between tissue and film. Both processes (1) and (2) give

high quality laminates with no wrinkles or other defects. A two-step process is preferred because it affords better control of the adhesion and interpenetration between tissue and film. A temperature in the 165° to 220°F range and a nip pressure in the 40-50 psi range are typically used 5 for lamination. It is from such a laminate that the walls of the pouch may then be die-cut.

#### **EXAMPLE 2**

Blends of polycaprolactone ("Tone 787" from Dow Chemical) and 10 triethylcitrate ("Citroflex 2" from Morflex Corp.) were compounded and pelletized using a twin-screw compounder extruder. The compounded pellets were converted into film using a cast film line equipped with a 1.25 inch extruder having an L/D ratio of 24:1. Film was extruded at a die temperature of 320°F. The following table illustrates the effect of 15 plasticizer content on tensile modulus and noise at a film thickness of 0.6 mil (15.2 microns):

**Effect of Triethylcitrate Content (TEC) on Tensile Modulus and Noise of Polycaprolactone (PCL)**

	PCL Unplasticized	PCL, 10% TEC	PCL, 20% TEC
Tensile modulus, psi(*)	48200	25600	9950
Noise(**)			
dBA	69	65	55
dB. 8 kHz	56	51	41

(\*) Secant modulus at 2% elongation, ASTM D882 (initial strain rate: 10 in/in min)

(\*\*) Film sample is formed into a cylinder and mounted on a test fixture wherein one end is held fixed and the other is rotated around the cylinder axis (15 degree angle, 70 cycles/min). Noise emissions from film flexing are analyzed with a sound level meter. dBA is a weighted average which takes into account the human perception of noise over the entire frequency range, dB in the 8 kHz octave band is indicative of the noise in the high frequency range and represents the crispness of the noise.

The data in this table shows that increasing triethylcitrate plasticizer content reduces the modulus of the polycaprolactone film (i.e., increases its flexibility) and reduces the noise of the film. At 20% TEC, however, film blocking, (where the surfaces of adjacent films stick together) becomes a 5 problem. A plasticizer level of 10% is preferred because it provides adequate flexibility and quietness without blocking.

**EXAMPLE 3**

As ostomy pouch suitable for use as the inner pouch of a two-pouch 10 appliance was constructed with a thin, plasticized polycaprolactone film of 0.2 to 0.6 mil (5.1 to 15.2 microns) prepared in accordance with Example 2. The pouch was found to flush well even with a low-volume toilet system (1.6 gal).

**EXAMPLE 4**

Another biodegradable film suitable for fabricating flushable ostomy pouches was formed by heat-lamination of a plasticized biodegradable synthetic polyester film having a thickness within the range of 0.4 to 0.8 mil (10.2 to 20.3 microns) identified as "KF02B" from Petroplast Vinora, 20 Switzerland to a 100% cellulosic tissue having a basis weight of 14 lb/ream (product code no. 3040 from Shawano Specialty Papers).

**EXAMPLE 5**

The improved biodegradability of a polyester film blended with a 25 biodegradable plasticizer is illustrated by this example.

Biodegradability was tested on film samples consisting of (1) polycaprolactone ("Tone 787" PCL from Dow Chemical) plasticized with triethylcitrate (PCL/TEC weight ratio of 90/10), (2) unplasticized PCL 30 ("Tone 787" from Dow Chemical) and (3) a control sample of polyvinylalcohol film taken from a commercially available flushable inner pouch product ("Impact" flushable ostomy bag from Welland Medical

Limited, Crawley, England). The films were exposed to aerobic sewage sludge inoculum in accordance with ASTM test method D-5209. The average weight losses were (1) 64.0%, for the plasticized PCL, (2) 26.1% for the unplasticized PCL, and (3) 12.4% for the control sample.

5

The plasticized PCL therefore exhibited higher weight loss due to biodegradation than the unplasticized PCL and much higher loss than the commercial PVOH inner pouch material claimed by the manufacturer to be biodegradable.

10

#### EXAMPLE 6

This example illustrates the conditions required to laminate a tissue paper to a thin biodegradable film without causing pinhole formation in the process.

15

A biodegradable film from Petroplast Vinora (KF02B, 20 microns thick) and a cellulosic tissue from Shawano Specialty Papers (Product Code 3040, basis weight 14 lb/ream) were heat laminated using a Faustel laminator. The nip pressure was 50 psi, the temperature 220 degrees F., 20 and the line speed 35 to 40 feet per minute. The laminate exhibited a 180 degree peel strength in the 3-6 g/in range.

The laminate was tested for pinholes as follows: A sample of the laminate was laid on a flat surface with the film side facing up. A blue dye solution 25 was applied on the surface of the film. After 5 minutes the film was turned over and the tissue side inspected. If pinholes were present, the dye solution would have wicked into the tissue producing visible blue dots. The test showed no evidence of pinholes. As the laminator line speed was decreased or the nip pressure increased, the peel strength became 30 progressively higher with evidence of residual fibers embedded in the film and pinholes appeared in the dye wicking test.

**EXAMPLE 7**

This example illustrates the resistance to deformation imparted by tissue lamination to a thin biodegradable film.

The load at 1% and 2% strain was measured in accordance with ASTM 5 D882-02 for the film-tissue laminate of Example 6 and for the film of Example 6 without tissue. Results are illustrated in the following table:

	Load @ 1% strain, MD (*) lb/in	Load @ 2% strain, MD (*) lb/in	Load @ 1% strain, TD (**) lb/in	Load @ 2% strain, TD (**) lb/in
Laminate of Example 6	0.84	1.48	0.83	1.35
Film of Example 6 (no tissue)	0.35	0.62	0.54	0.90

(\*) MD: machine direction

(\*\*) TD: transverse direction

10

**EXAMPLE 8**

This example illustrates differences in heat sealing properties of films suitable for use in pouch-in-pouch appliances embodying the invention.

Materials suitable for the walls of the inner pouch are heat-sealable 15 biodegradable films of 20 microns thickness of plasticized polyester from Petroplast Vinora (KBF02B). A thermoplastic material suitable for the walls of the outer pouch is a commercial multilayer barrier film for ostomy pouches having a heat-sealable skin layer of EVA. In each test, two layers of the same film material were heat sealed together, or sought to be 20 heat sealed together, for an interval of 1.2 seconds with a sealing element maintained at different selected temperatures and at a sealing pressure of 4 bar. Following cooling the strength of the seal (if any) was tested by manually peeling apart, or attempting to peel apart, the two layers. The results of such tests are given below:

25

	Temperature	Sealing Behavior/Observation
	75 Micron Commercial Barrier Film with EVA Skin Layer	20 Micron KF02B
80°C	-	No Bonding
90°C	-	Peel
100°C	-	Peel
110°C	-	Peel
120°C	No Bonding	Peel
130°C	No Bonding	Peel
135°C	Peel	Full Seal
140°C	Peel	-
150°C	Peel	-
160°C	Peel	-
170°C	Full Seal	-

5 The term "Peel" as used in the chart means that the two layers had limited adherence to each other but could nevertheless be separated or peeled apart with each layer remaining intact. "Full Seal" means that the layers had become welded or fused together and could not be so separated. The chart reveals that the KFO2B film had significantly lower heat sealing temperatures than the control film. This is consistent with the DSC melting temperatures discussed earlier.

10

15 While in the foregoing I have disclosed embodiments of the invention in considerable detail for purposes of illustration, it will be understood by those skilled in the art that many of such details may be varied without departing from the spirit and scope of the invention.

**THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-**

1. A biodegradable body waste collection pouch particularly suitable for flush toilet disposability; said pouch having a pair of walls secured together along their peripheral edges to define a waste-receiving chamber therebetween; one of said side walls having a waste-receiving opening therethrough communicating with said chamber; and external attachment means provided about said opening for attachment of said pouch to a wearer; said walls of said pouch being cut from a laminate composed of (a) a layer of thin heat-sealable film impermeable to liquid and solid body wastes and of a composition comprising a biodegradable aliphatic polyester, or a biodegradable aliphatic-aromatic copolyester, or blends thereof, plasticized by one or more biodegradable plasticizers and (b) a water-disintegratable biodegradable cover layer of water-dispersible fibers having one of its surfaces uninterruptedly bonded thereto; said fibers along at least a portion of the outer surface of said pouch being coated with a water-soluble hydrophilic lubricating agent capable of becoming slippery when exposed to water and, upon subsequent drying, again becoming water-soluble upon re-exposure to water.
2. A collection pouch according to claim 1, in which said hydrophilic lubricating agent is selected from the group consisting of hydroxyethylcellulose, hydroxypropylcellulose, carboxymethylcellulose and their salts, polyethylene glycol, gums, gelatin, pectin, polyethyleneoxide, polyacrylamides, acrylic acid copolymers and their salts, and water-soluble silicone lubricating agents, optionally in combination with one or more thickeners, preservatives odor neutralizers/deodorants, and solublization enhancers.

3. A collection pouch according to claim 1 or claim 2, in which said hydrophilic lubricating agent is dry but, when said pouch is immersed in water in a flush toilet for a period less than 60 seconds, becomes hydrated and slippery, so as to promote flushability of the pouch and facilitate its passage through a sanitary sewer system.  
5
4. A collection pouch according to any one of the preceding claims, in which said hydrophilic lubricating agent is dry but, when said pouch is immersed in water in a flush toilet for a period less than 30 seconds, becomes hydrated and slippery, so as to promote flushability of the pouch and facilitate its passage through a sanitary sewer system.  
10
5. A collection pouch according to any one of the preceding claims, in which said hydrophilic lubricating agent is dry but, when said pouch is immersed in water in a flush toilet for a period less than 15 seconds, becomes hydrated and slippery, so as to promote flushability of the pouch and facilitate its passage through a sanitary sewer system.  
15
6. A collection pouch according to any one of the preceding claims, in which the thickness of said film is no greater than about 40 microns.  
20
7. A collection pouch according to any one of the preceding claims, in which the thickness of said film is within the range of about 10 to 35 microns.  
25
8. A collection pouch according to any one of the preceding claims, in which the thickness of said film is within the range of about 15 to 30 microns.  
30

9. A collection pouch according to any one of the preceding claims, in which said layers of said laminate are weakly bonded together and may be separated from each other with each layer remaining intact by the application of 180-degree peeling forces in the range of about 2 to 10 g/in.  
5
10. A collection pouch according to any one of the preceding claims, in which said layers of said laminate are weakly bonded together and may be separated from each other with each layer remaining intact by the application of 180-degree peeling forces in the range of about 3 to 10 g/in.  
10
11. A collection pouch according to any one of the preceding claims, in which said composition comprises about 70% to 95% by weight of said biodegradable aliphatic polyester or aliphatic-aromatic copolyester, and about 5% to 30% by weight of one or more of said biodegradable plasticizer or plasticizers.  
15
12. A collection pouch according to claim 11, in which said composition comprises 75% to 93% by weight of said biodegradable aliphatic polyester or aliphatic-aromatic copolyester.  
20
13. A collection pouch according to claim 11 or claim 12, in which said composition comprises about 90% by weight of said biodegradable aliphatic polyester or aliphatic-aromatic copolyester.  
25
14. A collection pouch according to any one of claims 11 to 13, in which said composition comprises 7% to 25% by weight of one or more of said biodegradable plasticizer or plasticizers.  
30

15. A collection pouch according to any one of claims 11 to 14, in which said composition comprises about 10% by weight of one or more of said biodegradable plasticizer or plasticizers.
- 5 16. A collection pouch according to any one of the preceding claims, in which said aliphatic polyester or the aliphatic component of said copolyester comprises a polymer formed by ring-opening polymerization of a lactone.
- 10 17. A collection pouch according to any one of the preceding claims, in which said aliphatic-aromatic copolymer comprises a condensation product of a glycol with a combination of an aliphatic diacid and an aromatic diacid, wherein the aromatic diacid is less than 20% by mole.
- 15 18. A collection pouch according to any one of the preceding claims, in which said film of a biodegradable aliphatic polyester or copolyester is a monolayer.
- 20 19. A collection pouch according to any one of the preceding claims, in which said fibers of said water-disintegratable cover layer are cellulosic.
- 25 20. A collection pouch according to claim 19, in which said cover layer comprises tissue paper formed of 100% cellulosic fibers.
21. A collection pouch according to any one of the preceding claims, in which said cover layer is heat-bonded to said film.
- 30 22. A method of promoting the flushability of a waste collection pouch in a flush toilet, said method comprising the steps of providing a pouch with a pair of walls secured together along their peripheral

edges to define a waste-receiving chamber therebetween; one of said walls having a waste-receiving opening therethrough communicating with said chamber; said walls being formed from a laminate composed of (a) a layer of thin heat-sealable film impermeable to liquid and solid body wastes and of a composition comprising a biodegradable aliphatic polyester, or a biodegradable aliphatic-aromatic copolyester, or blends thereof, plasticized by one or more biodegradable plasticizers, and (b) a water-disintegratable biodegradable cover layer of water-dispersible fibers having one of its surfaces uninterruptedly bonded thereto, comprising the step of coating said fibers along at least a portion of the outer surface of said laminate, either before or after assembly of said pouch, with a water-soluble hydrophilic lubricating agent capable of becoming slippery when the outer surfaces of said pouch are exposed to water and, upon subsequent drying, again become water-soluble upon re-exposure to water.

23. A method according to claim 22, in which said hydrophilic lubricating agent is selected from the group consisting of hydroxyethylcellulose, hydroxypropylcellulose, carboxymethylcellulose and their salts, polyethylene glycol, gums, gelatin, pectin, polyethyleneoxide, polyacrylamides, acrylic acid copolymers and their salts, and water-soluble silicone gelling agents, optionally in combination with one or more thickeners, preservatives, odor neutralizers, deodorants, and solubilization enhancers.

24. A method according to claim 22 or claim 23, in which said hydrophilic lubricating agent is in the form of a dry coating but, when said pouch is exposed to water in a flush toilet for a period less than 60 seconds becomes hydrated and slippery, so as to promote flushability of the pouch and facilitate its passage through a sanitary sewer system.

25. A method according to any one of claim s 22 to 24, in which said hydrophilic lubricating agent is in the form of a dry coating but, when said pouch is exposed to water in a flush toilet for a period less than 30 seconds becomes hydrated and slippery, so as to promote flushability of the pouch and facilitate its passage through a sanitary sewer system.

5

26. A method according to any one of claims 22 to 25, in which said hydrophilic lubricating agent is in the form of a dry coating but, when said pouch is exposed to water in a flush toilet for a period less than 15 seconds becomes hydrated and slippery, so as to promote flushability of the pouch and facilitate its passage through a sanitary sewer system.

10

27. A method according to any one of claim s 22 to 26, in which said step of coating said fibers along at least a portion of said outer surface with said water- soluble hydrophilic lubricating agent occurs immediately prior to discarding said pouch and its contents into a flush toilet.

15

28. A method according to claim 27, in which said water-soluble lubricating agent is applied to said pouch in liquid form, such as by spraying.

20

29. A pouch-in-pouch body waste collection appliance comprising an outer pouch formed of liquid, gas and odor impermeable heat-sealable polymeric film having proximal and distal side walls defining a chamber; a toilet-disposable inner body waste collection pouch according to any one of claims 1 to 21 having proximal and distal side walls and being disposed in said chamber; said proximal walls of said inner and outer pouches having aligned body waste receiving openings therethrough; and attachment means for \_\_\_\_\_

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attaching said proximal walls of said inner and outer pouches in areas surrounding said openings to skin surfaces of a patient about a body waste discharge orifice; said disposable inner pouch having walls formed from sheet material composed of (a) a layer of thin heat-sealable film impermeable to body wastes of a composition comprising a biodegradable aliphatic polyester, or a biodegradable aliphatic-aromatic copolyester, or blends thereof, plasticized by one or more biodegradable plasticizers and (b) a water- disintegratable, porous, biodegradable cover layer of water-dispersible fibers bonded thereto; said heat-sealable film of said inner pouch having a melting temperature lower than that of the heat-sealable film of said outer pouch; said walls of said outer and inner pouches having peripheral edge portions heat- sealed together with the peripheral edge portions of said cover layer being bonded more securely to the film material of said inner pouch than to the film material of said outer pouch; said fibers along at least a portion of the outer surface of the walls of said inner pouch being coated with a water-soluble hydrophilic lubricating agent capable of becoming slippery when exposed to water and, upon subsequent drying, again becoming water-soluble upon re- exposure to water.

30. A collection appliance according to claim 29, in which said hydrophilic lubricating agent is selected from the group consisting of hydroxyethylcellulose, hydroxypropylcellulose, carboxymethylcellulose and their salts, polyethylene glycol, gums, gelatin, pectin, polyethyleneoxide, polyacrylamides, acrylic acid copolymers and their salts, and water-soluble silicone gelling agents, optionally in combination with one or more thickeners, preservatives, odor neutralizers, deodorants, and solubilization enhancers.

31. A collection appliance according to claim 29 or claim 30, in which said hydrophilic lubricating agent is in the form of a dry coating on

fibers of said cover layer but, when said inner pouch is immersed in water in a flush toilet for a period less than 60 seconds, becomes hydrated and slippery, so as to promote flushability of said inner pouch and facilitate its passage though a sanitary sewer system.

5

32. A collection appliance according to any one of claims 29 to 31, in which said hydrophilic lubricating agent is in the form of a dry coating on fibers of said cover layer but, when said inner pouch is immersed in water in a flush toilet for a period less than 30 seconds becomes hydrated and slippery, so as to promote flushability of said inner pouch and facilitate its passage though a sanitary sewer system.

10

33. A collection appliance according to any one of claims 29 to 32, in which said hydrophilic lubricating agent is in the form of a dry coating on fibers of said cover layer but, when said inner pouch is immersed in water in a flush toilet for a period less than 15 seconds becomes hydrated and slippery, so as to promote flushability of said inner pouch and facilitate its passage though a sanitary sewer system.

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34. A method of making a pouch-in-pouch body waste collection appliance according to any one of claims 29 to 32 having an outer pouch formed of odor-impermeable thermoplastic film with proximal and distal walls defining a chamber and a toilet-disposable inner pouch having proximal and distal walls and being disposed in said chamber; said proximal walls of said inner and outer pouches having aligned body waste receiving openings therein; said walls of said inner pouch being formed of a laminate composed of (a) a layer of thin heat-sealable thermoplastic film, and (b) a porous water-disintegratable cover layer of water-dispersible fibers attached to exterior surfaces of said inner pouch film, said cover layer having at least some of said \_\_\_\_\_

fibers along the exterior surface of said inner pouch coated with a water-soluble hydrophilic lubricating agent capable of becoming slippery when exposed to water and, upon subsequent drying, again becoming water-soluble upon re-exposure to water; wherein

5 said method comprises the steps of selecting a material for the film of an inner pouch having a melting temperature substantially lower than that of the material of said outer pouch; and joining together peripheral portions of said walls of said inner and outer pouches, and portions of said proximal walls of said inner and outer pouches

10 surrounding said body waste receiving openings, by simultaneously applying pressure and heat to said portions so that said proximal and distal walls of said inner pouch are welded together and, simultaneously, said film material of said inner pouch melts and invades the pores of said fibrous cover layer to a greater extent

15 than said film material of said outer pouch, where, upon the subsequent application of peeling forces, said walls of said outer pouch may be peeled away from said inner pouch without causing separation of said cover and film layers of said inner pouch.

20 35. A method according to claim 34, in which said fibers along the peripheral portion of said inner pouch joined to said peripheral portion of said outer pouch are coated with said water-soluble hydrophilic lubricating agent.

25 36. A method according to claim 34, in which said fibers along the peripheral portion of said inner pouch joined to said peripheral portion of said outer pouch are not coated by said water-soluble hydrophilic lubricating agent.

30 37. A method according to any one of claims 34 to 36, in which said film material of said inner pouch has a melting temperature at least 10 °C below the melting temperature of said outer pouch film.

38. A method according to any one of claims 34 to 37, in which said fibers of said cover layer are cellulosic or other equivalent material.

5 39. A method according to claim 38, in which said cover layer comprises tissue paper of 100% cellulosic fibers.

10 40. A method according to any one of claims 34 to 39, in which said cover layer and said thermoplastic film of said inner pouch, throughout the areas between said peripheral portions and said portions surrounding said openings, are weakly bonded together and may be separated from each other with each layer remaining intact by the application of 180-degree peeling forces in the range of about 2 to 10 g/in.

15 41. A method according to any one of claims 34 to 40, in which said cover layer and said thermoplastic film of said inner pouch, throughout the areas between said peripheral portions and said portions surrounding said openings, are weakly bonded together and may be separated from each other with each layer remaining intact by the application of 180-degree peeling forces in the range of about 3 to 6 g/in.

20 42. A method according to any one of claims 34 to 41, in which said film of said inner pouch has a thickness no greater than about 40 microns.

25 43. A method according to any one of claims 34 to 42, in which said film of said inner pouch has a thickness no greater than about 10 to 30 microns.

44. A method according to any one of claims 34 to 43, in which said film of said inner pouch has a thickness no greater than about 15 to 30 microns.
45. A pouch-in-pouch body waste collection appliance comprising an outer pouch formed of liquid, gas and odor impermeable heat-sealable polymeric film having proximal and distal side walls defining a chamber; a toilet-disposable inner body waste collection pouch according to any one of claims 1 to 21 having proximal and distal side walls and being disposed in said chamber; said proximal walls of said inner and outer pouches having aligned body waste receiving openings therethrough; and attachment means for attaching said proximal walls of said inner and outer pouches in areas surrounding said openings to skin surfaces of a patient about a body waste discharge orifice; said disposable inner pouch having walls formed from sheet material composed of (a) a layer of thin heat-sealable polymeric film impermeable to body wastes and (b) a water-disintegratable, porous, biodegradable cover layer of water-dispersible fibers bonded thereto; said fibers along at least outer surface portions of the walls of said inner pouch being coated with a water-soluble hydrophilic lubricating agent capable of becoming slippery when exposed to water and, upon subsequent drying, again becoming water-soluble upon re-exposure to water.
46. A method for enhancing the toilet flushability of a body waste collection pouch article according to any one of claims 1 to 21 comprised of a thin polymeric film covered by a water-disintegratable fibrous cover layer bonded to the outer surface thereof, comprising the step of modifying said cover layer by coating at least some of said fibers along the outer surface of said article with a hydrophilic agent that become lubricious upon hydration.
47. A method according to claim 46, in which said hydrophilic agent is selected from the group consisting of hydroxyethylcellulose,

hydroxypropylcellulose, carboxymethylcellulose and their salts, polyethylene glycol, gums, gelatin, pectin, polyethyleneoxide, polyacrylamides, acrylic acid copolymers and their salts, and water-soluble silicone lubricating agents, optionally in combination with 5 one or more thickeners, preservatives odor neutralizers/deodorants, and solublization enhancers.

48. A method according to claim 46 or claim 47, in which said polymeric film is heat-sealable and impermeable to liquid and solid 10 body wastes.

49. A method according to claim 48, in which said film comprises a biodegradable aliphatic polyester, or a biodegradable aliphatic-aromatic co- polyester, or blends thereof, plasticized by one or 15 more biodegradable plasticizers.

50. A method according to any one of claims 46 to 49, in which thickness of said film is no greater than about 40 microns.

51. A method according to any one of claims 46 to 50, in which 20 thickness of said film is within the range of about 10 to 35 microns.

52. A method according to any one of claims 46 to 51, in which thickness of said film is within the range of about 15 to 30 microns.

25 53. A method according to any one of claims 46 to 52, in which said cover layer is a nonwoven material formed of water-dispersible fibers.

30 54. A method according to claim 53, in which said fibers of said water-disintegrable cover layer are cellulosic.

55. A method according to claim 54, in which said cover layer comprises tissue paper formed of 100% cellulosic fibers.
- 5 56. A method according to any one of claims 46 to 55, in which said fibers coated by said hydrophilic agent are located along the outer surface of said fibrous layer cover.
- 10 57. A pouch-in-pouch body waste collection appliance when made by a method according to any one of claims 34 to 44.
- 15 58. A biodegradable body waste collection pouch; a method of promoting the flushability of a waste collection pouch in a flush toilet; a pouch-in-pouch body waste collection appliance; a method of making a pouch-in-pouch body waste collection appliance; a method for enhancing the toilet flushability of an article; a pouch-in-pouch body waste collection appliance when made by a method substantially as herein described with reference to any one of the embodiments of the invention illustrated in the accompanying examples.