What is claimed is:

~~1. A drug delivery device or any of the systems, methods, and apparatuses, substantially as shown and described herein.~~

~~2~~1. A cassette for a drug delivery device comprising:

a cassette base portion including a reservoir recess surrounded by an attachment surface, the attachment surface including a reservoir outlet flow path recessed therein; and a reservoir film coupled to the attachment surface and, together with the reservoir recess, defining a flexible reservoir, a portion of the reservoir film having a preformed shape which mimics the contour of the reservoir recess, the preform shape causing the reservoir film to be disposed adjacent the surface of reservoir recess when the reservoir is in an empty state; and

at least one duct recessed into the surface of the reservoir recess, each of the at least one duct defining a flow path which remains in fluid communication with the reservoir outlet flow path when the reservoir is in an empty state.

~~3~~2. The cassette of claim ~~2~~1, wherein the reservoir film comprises an outcrop region that is included in the reservoir film and forms a seal over the reservoir outlet flow path when the reservoir film is coupled to the attachment surface.

~~4~~3. The cassette of claim ~~2~~1, wherein the reservoir film includes at least two layers.

~~5~~4. The cassette of claim ~~2~~1, wherein the reservoir film is heat bonded to the attachment surface.

~~6~~5. The cassette of claim ~~2~~1, wherein the cassette base portion includes a side wall having a fill port leading to an interior volume of the reservoir.

~~7~~6. The cassette of claim ~~6~~5, wherein a basin is recessed into the reservoir recess directly downstream of an inlet leading to the interior volume of the reservoir from the fill port.

~~8~~7. The cassette of claim ~~7~~6, wherein at least one of the at least one duct extends into communication with the basin.

~~9~~8. The cassette of claim ~~2~~1, wherein the at least one duct includes a plurality of ducts which that converge together at a confluence, the confluence disposed intermediate the reservoir outlet flow path and the ducts.

~~10~~9. The cassette of claim ~~2~~1, wherein the at least one duct includes a first duct and a second duct which furcates off of the first duct.

~~11~~10. The cassette of claim ~~2~~1, wherein the reservoir recess includes a wall which extends from a bottom surface of the reservoir recess to the attachment surface and the at least one duct includes a duct which is disposed along a portion of a perimeter of the bottom surface adjacent the wall.

~~12~~11. The cassette of claim ~~11~~10, wherein the duct disposed along a portion of the perimeter is disposed along a majority of the perimeter.

~~13~~12. The cassette of claim ~~2~~1, wherein the reservoir recess includes a wall which extends from a bottom surface of the reservoir recess to the attachment surface and the at least one duct includes a portion recessed into the bottom surface and a second portion recessed into the wall.

~~14~~13. The cassette of claim ~~13~~12, wherein the first portion of the at least one duct has a first width and the second portion of the at least one duct has a variable width.

~~15~~14. The cassette of claim ~~13~~12, wherein the width of the second portion of the at least one duct tapers from a first width to a second width smaller than the first width.

~~16~~15. The cassette of claim ~~13~~12, wherein the first portion of the at least one duct is the second width.

~~17~~16. The cassette of claim ~~2~~1, wherein the at least one duct includes a plurality of ducts which extend from a confluence region at regular angular intervals, the confluence region being disposed intermediate the plurality of ducts and the reservoir outlet flow path.

~~18~~17. The cassette of claim ~~2~~1, wherein the reservoir outlet flow path includes an air trap.

~~19~~18. A cassette for a drug delivery device comprising:

a cassette base portion including a reservoir recess surrounded by an attachment surface, the cassette base portion further including a weld surface along a portion of the periphery of the cassette base portion and a plurality of locating pins;

a reservoir film coupled to the attachment surface and, together with the reservoir recess, defining a flexible reservoir; and

a cassette top portion including a number of locating pin receptacles and a peripheral energy director, the energy director being aligned with the weld surface and a portion of the reservoir film bonded to the attachment surface when the locating pins are disposed within the locating pin receptacles, the energy director being welded to the weld surface and the portion of the reservoir film.

~~20~~19. The cassette of claim ~~19~~18, wherein the energy director comprises a triangular cross section.

~~21~~20. The cassette of claim ~~19~~18, wherein the energy director is sonically welded to the weld surface and the portion of the reservoir film.

~~22~~21. The cassette of claim ~~19~~18, wherein the energy director is ultrasonically welded to the weld surface and the portion of the reservoir film.

~~23~~22. The cassette of claim ~~19~~18, wherein the reservoir film includes at least two layers.

~~24~~23. The cassette of claim ~~19~~18, wherein the cassette top portion includes a bay including a number of retention tabs.

~~25~~24. The cassette of claim ~~24~~23, wherein the cassette further comprises a cover having a number of latch clips, the latch clips configured to cooperatively engage the retention tabs of the bay, the cover being coupled to the cassette top portion when the latch clips cooperatively engage the retention tabs.

~~26. A cassette for a coupling to a reusable housing assembly of a drug delivery device comprising:~~

~~a cassette base portion;~~

~~a reservoir defined by a recess in the cassette base portion and a segment of reservoir film coupled to an attachment surface disposed around the recess;~~

~~a cassette top portion covering the cassette base portion and including an inspection bay which is disposed over the entirety of the reservoir, the inspection bay including a number of coupling elements; and~~

~~a cover including a number of cooperative coupling elements configured to engage with the coupling elements of the inspection bay to couple the cover in place within the inspection bay;~~

~~wherein the reservoir is directly accessible through the inspection bay prior to installation of the cover.~~

~~27. The cassette of claim 26, wherein the cassette base portion is constructed of a transparent material.~~

~~28. The cassette of claim 26, wherein the cassette base portion is constructed of a clear material.~~

~~29. The cassette of claim 26, wherein the cassette base portion is constructed of a light colored material.~~

~~30. The cassette of claim 26, wherein the cover is a solid piece of material.~~

~~31. The cassette of claim 26, wherein the coupling elements are retention tabs and the cooperative coupling elements are latch clips.~~

32. The cassette of claim 31, wherein one of the latch clips is disposed at an unsupported end of a cantilevered member of the cover.

33. The cassette of claim 26, wherein the coupling elements and cooperative coupling elements are configured to engage via a snap fit.

34. The cassette of claim 26, wherein the reservoir is a prefilled reservoir containing a drug.

35. The cassette of claim 26, wherein the cassette includes a flow path extending from the reservoir to delivery tubing attached to the cassette, the cassette further including an occluder assembly disposed at a section of the flow path, the occluder assembly being actuatable between an occluding state and a flow permitting state.

36. A prefilled cassette for a drug delivery device comprising;

a cassette base portion;

a reservoir defined by a recess in the cassette base portion and a piece of reservoir film attached to based portion at an attachment surface surrounding the recess, the reservoir being filled with a medicament;

a flow path extending from the reservoir to an outlet of the cassette, the flow path being defined at least in part by a membrane cover along a segment of the flow path; and

an occluder assembly actuatable between a flow permitting state and an occluding state in which the reservoir and a first portion of the flow path are isolated from a second portion of the flow path downstream of the first, the segment of the flow path defined at least in part by the membrane cover being part of the second portion of the flow path;

wherein the first portion of the flow path is constructed of material having long term compatibility with the medicament and at least the membrane cover is constructed of material having short term compatibility with the medicament.

37. The cassette of claim 36, wherein the reservoir film is a layered film.

38. The cassette of claim 36, wherein the second portion of the flow path includes at least one valve station.

39. The cassette of claim 38, wherein the membrane cover is coupled in place over the valve station so as to form a fluid tight seal.

40. The cassette of claim 36, wherein the second portion of the flow path includes at least one pumping chamber.

41. The cassette of claim 40, wherein the membrane cover is coupled in placed over the valve station so as to form a fluid tight seal.

42. The cassette of claim 36, wherein the occluder assembly includes an occluder diaphragm and an actuator.

43. The cassette of claim 42, wherein the cassette further comprises a threaded port and in the occluding state the actuator is threaded into the flow path and the occluder diaphragm is actuated to occlude the flow path.

44. The cassette of claim 42, wherein the cassette further comprises a threaded port configured to receive the actuator and the occluder assembly is configured to transition from the occluding state to the flow permitting state by extracting the actuator from the threaded port.

45. The cassette of claim 42, wherein the actuator is configured to prevent mating of the cassette with a reusable housing assembly when present in the cassette.

46. The cassette of claim 42, wherein at least a portion of the diaphragm is constructed of material having long term compatibility with the medicament.

47. The cassette of claim 36, wherein the occluder assembly is constructed of material having long term compatibility with the medicament.

48. The cassette of claim 36, wherein at least a portion of the occluder assembly is constructed of material having long term compatibility with the medicament.

49. A prefilled cassette for a drug delivery device comprising;

a housing;

a reservoir containing a medicament;

a flow path extending from the reservoir to an outlet of the cassette, the flow path including a number of valve stations and a pumping chamber; and

an occluder assembly including a diaphragm and an actuator in threaded engagement with a threaded port in the housing, the occluder assembly having an occluding state in which the actuator is in a first position in the threaded port and presses the diaphragm into sealing engagement with an occluder valve station of the valve stations, the occluder assembly having a flow permitting state in which the actuator is unthreaded out of the threaded port from the first position to at least a second position to relieve pressure against the diaphragm.

~~50. The cassette of claim 49, wherein the reservoir is defined by a recess in the cassette base portion and a piece of reservoir film attached to based portion at an attachment surface surrounding the recess.~~

~~51. The cassette of claim 49, wherein the occluder valve station gates flow from a reservoir outlet flow path to a remainder of the flow path including the pumping chamber and the remaining valve stations.~~

~~52. The cassette of claim 49, wherein the diaphragm is captured between a cassette base portion and a cassette top portion of the housing.~~

~~53. The cassette of claim 52, wherein the occluder valve station is included in a depression in a face of the cassette base portion and the diaphragm creates a fluidic seal about a periphery of the depression so as to form a sealed occluder volume.~~

~~54. The cassette of claim 53, wherein the depression includes an occluder outlet.~~

~~55. The cassette of claim 54, wherein the occluder outlet is partially surrounded by a wall, the wall extending from the depression a distance greater than the height of the occluder valve station.~~

~~56. The cassette of claim 49, wherein the occluder valve station is a volcano type valve station.~~

~~57. The cassette of claim 49, wherein the pumping chamber and valve stations, with the exception of the occluder valve station, are covered by a valve membrane cover.~~

~~58. The cassette of claim 57, wherein the housing includes a cassette base portion and a cassette top portion and the valve membrane cover includes an outcrop region which forms a seal over at least one flow channel recessed into a face of the base region when the cassette base portion and cassette top portion are coupled to one another.~~

~~59. The cassette of claim 49, wherein the actuator includes a knob and a rod projection from the rod.~~

~~60. The cassette of claim 59, wherein the rod includes a number of ramp features disposed at a terminal end of the rod opposite the knob, the ramp features having a pitch selected to cooperate with threading in the threaded port.~~

~~61. The cassette of claim 60, wherein the ramp features are disposed at even angular increments.~~

~~62. The cassette of claim 60, wherein the threading in the threaded port includes a shelf section, the ramp features of the actuator being parked on the shelf feature when the actuator is in the first position.~~

~~63. A cassette for a drug delivery device comprising:~~

a cassette base portion including a side wall and a peripheral recess adjacent the side wall;

a cassette top portion coupled to the cassette base portion;

a coupling comprised of a number of tabs projecting from the cassette top portion overhanging the peripheral recess and a number of rotation stops included on the cassette base portion and projecting into the recess, the rotation stops and tabs cooperating to form a number of mating tracks;

a collapsible reservoir;

a fill port extending from the side wall to the reservoir disposed in between two of the mating tracks;

wherein upon introduction and rotation of a mating finger on a reusable housing assembly of the delivery device in each mating track, the cassette is configured to couple with the reusable housing assembly.

64. The cassette of claim 63, wherein the tabs include a detent region.

65. The cassette of claim 63, wherein the tabs include a ramped section.

66. The cassette of claim 63, wherein the cassette top portion includes a sealing ring.

67. The cassette of claim 63, wherein the cassette top portion includes a sealing ring and the tabs include a ramped section, the sealing ring is configured to be compressed by the reusable housing assembly when the coupling fingers of the reusable housing assembly are rotated along the ramped section of the tabs.

68. The cassette of claim 63, wherein the fill port includes a septum.

69. The cassette of claim 63, wherein the fill port includes a guard wall adjacent the reservoir.

70. The cassette of claim 69, wherein the guard wall includes an inlet which places a bore of the fill port into fluid communication with an interior volume of the reservoir.

71. The cassette of claim 63, wherein the rotation stops are disposed perpendicularly to the tabs.

72. The cassette of claim 63, wherein the collapsible reservoir comprises a depression in the cassette base portion and a piece of reservoir film sealing attached to the cassette base portion at an attachment surface surround the depression.

73. The cassette of claim 72, wherein the depression includes a recessed basin directly downstream of the fill port.

74. A cassette for a drug delivery device comprising;

a cassette base portion;

a reservoir formed by a depression in the cassette base portion and a piece of reservoir film attached to the cassette base portion at an attachment surface surrounding the depression;

a valve membrane cover;

a film seal;

a flow path extending from the reservoir to an outlet of the cassette, the flow path including a number of valve stations, at least one pump chamber, at least one channel recessed into each of a first face and opposing second face of the cassette base portion, and a number of conduits extending through the cassette base portion connecting the channels on the first and second face of the cassette base portion, the valve membrane cover forming a seal around the number of valve stations and the at least one pump chamber, the film seal sealing the at least one channel recessed into the second face of the cassette base portion, the at least one channel recessed into the first face of the cassette base portion sealed by at least one of the valve membrane cover and the reservoir film.

75. The cassette of claim 74, wherein the reservoir film and film seal are constructed of the same material.

76. The cassette of claim 74, wherein the reservoir film is a multilayer film.

77. The cassette of claim 74, wherein the film seal is heat bonded to the second face of the cassette.

78. The cassette of claim 74, wherein the reservoir film is heat bonded to the attachment surface.

79. The cassette of claim 74, wherein the at least one channel in the first face of the cassette base portion includes an air trap.

80. The cassette of claim 74, wherein the at least one channel recessed into the first face of the cassette base portion includes a reservoir outlet channel recessed into the attachment surface, the reservoir film forming a seal over the reservoir outlet channel.

81. The cassette of claim 74, wherein the at least one channel recessed into the first face of the cassette base portion includes a channel which is sealed over by an outcrop region included in the valve membrane cover.

82. The cassette of claim 74, wherein the flow path further includes an occluder assembly.

83. The cassette of claim 74, wherein the reservoir is pre-filled by a manufacturer.

84. The cassette of claim 74, wherein the at least one channel recessed into the second face of the cassette base portion as well as the film seal are surrounded by a raised rim wall.

85. The cassette of claim 74, wherein the cassette further comprises a cassette top portion coupled to the cassette base portion, the valve membrane cover being compressed between the cassette base portion and cassette top portion to form a fluid tight seal.

86. The cassette of claim 74, wherein the cassette further comprises a cassette top portion coupled to the cassette base portion by a sonic weld, at least a portion of the sonic weld being formed between the cassette top portion and the reservoir film.

87. A method of filling a reservoir for a cassette of a drug delivery device comprising:

actuating an occluder assembly of the cassette to occlude a flow path leading from the reservoir to an outlet of the set;

loading fluid into the reservoir through a fill port;

imaging the reservoir;

determining whether the reservoir meets acceptability criteria by analyzing at least one image of the reservoir;

installing a cover in an inspection bay which provides visual access to the reservoir.

88. The method of claim 87, wherein imaging the reservoir comprises photographing the reservoir through the inspection bay.

89. The method of claim 87, wherein determining whether the reservoir meets acceptability criteria comprises analyzing the at least one image to determine if particulates are present.

90. The method of claim 87, wherein determining whether the reservoir meets acceptability criteria comprises analyzing the at least one image to determine if an amount of air greater than a predefined threshold is present.

91. The method of claim 87, wherein actuating the occluder assembly comprises installing a removable actuator in a port of the cassette.

92. The method of claim 87, wherein actuating the occluder assembly comprises displacing a membrane against a reservoir outlet valve to close off flow through the reservoir outlet valve.

93. The method of claim 87, wherein installing the cover in the inspection bay includes coupling the cover to the cassette via snap fit.

94. A cassette for a drug delivery device comprising:

a cassette base portion;

a cassette top portion coupled to the cassette base portion;

a collapsible reservoir;

an outlet;

a flow path extending from the collapsible reservoir to the outlet; and

a fill port extending from a side wall of the cassette base portion to the reservoir the fill port including at least one of an access restriction means and a reuse prevention means.

95. A cassette for a drug delivery device comprising;

a cassette base portion;

a reservoir defined by a recess in the cassette base portion and a piece of reservoir film attached to based portion at an attachment surface surrounding the recess, the reservoir being filled with a medicament;

a flow path extending from the reservoir to an outlet of the cassette, the flow path being defined at least in part by a membrane cover along a segment of the flow path; and

an occluder assembly configured for actuation between a flow permitting state and an occluding state in which the reservoir and a first portion of the flow path are isolated from a second portion of the flow path downstream of the first, the segment of the flow path defined at least in part by the membrane cover being part of the second portion of the flow path.

96. The cassette of claim 95, wherein the first portion of the flow path is constructed of material having long term compatibility with the medicament and at least the membrane cover is constructed of material having short term compatibility with the medicament.

97. The cassette of claim 95, wherein the reservoir film is a layered film.

98. The cassette of claim 95, wherein the second portion of the flow path includes at least one valve station.

99. The cassette of claim 98, wherein the membrane cover is coupled in place over the valve station so as to form a fluid tight seal.

100. The cassette of claim 95, wherein the second portion of the flow path includes at least one pumping chamber.

101. The cassette of claim 100, wherein the membrane cover is coupled in placed over the valve station so as to form a fluid tight seal.

102. The cassette of claim 95, wherein the occluder assembly includes an occluder diaphragm and an actuator.

~~103. The cassette of claim 102, wherein the cassette further comprises a threaded port and in the occluding state the actuator is threaded into the flow path and the occluder diaphragm is actuated to occlude the flow path.~~

~~104. The cassette of claim 102, wherein the cassette further comprises a threaded port configured to receive the actuator and the occluder assembly is configured to transition from the occluding state to the flow permitting state by extracting the actuator from the threaded port.~~

~~105. The cassette of claim 102, wherein the actuator is configured to prevent mating of the cassette with a reusable housing assembly when present in the cassette.~~

~~106. The cassette of claim 102, wherein at least a portion of the diaphragm is constructed of material having long term compatibility with the medicament.~~

~~107. The cassette of claim 95, wherein the occluder assembly includes an actuator which is removable from the cassette, the occluder assembly being in a flow permitting state when the actuator is removed from the cassette.~~

~~108. The cassette of claim 95, wherein the occluder assembly includes a rotatable actuator, the occluder assembly configured to transition from the occluding state to the flow permitting state upon rotation of the actuator.~~

~~109. The cassette of claim 95, wherein the occluder assembly includes a displaceable actuator, the occluder assembly configured to transition from the occluding state to the flow permitting state upon translational displacement of the actuator.~~

~~110. The cassette of claim 95, wherein the occluder assembly includes a shuttle disposed in an occluder channel.~~

~~111. The cassette of claim 110, wherein the shuttle comprises at least one sealing interface which generates a fluidic seal against the wall of the occluder channel.~~

~~112. The cassette of claim 111, wherein in the occluding state, the at least one sealing interface is disposed intermediate an opening of the first portion of the flow path to the occluder channel and an opening of the second portion of the flow path to the occluder channel.~~

~~113. The cassette of claim 110, wherein the shuttle is covered by a diaphragm.~~

~~114. The cassette of claim 110, wherein the shuttle is a compressible elastomer.~~

~~115. The cassette of claim 95, wherein the occluder assembly is constructed of material having long term compatibility with the medicament.~~

116. The cassette of claim 95, wherein at least a portion of the occluder assembly is constructed of material having long term compatibility with the medicament.

117. The cassette of claim 95, wherein the medicament is a drug for an endocrine disorder.

118. The cassette of claim 95, wherein the medicament is selected from a group consisting of insulin and an insulin analog.

119. The cassette of claim 95, wherein the medicament is proteinaceous.

120. The cassette of claim 95, wherein the medicament includes a polypeptide having a tertiary structure with at least one hydrophobic region.

121. The cassette of claim 95, wherein the occluder assembly includes a bung and a tapered port, the bung retained in the tapered port via an interference fit.

122. The cassette of claim 121, wherein the occluder assembly includes a diaphragm, the bung compressing and sealing the diaphragm against a reservoir outlet opening when retained in the tapered port.

123. The cassette of claim 121, wherein the bung is constructed of compressible elastomer.

124. A dual valve assembly comprising:

a first valve assembly biased to a close position and having a first mode wherein fluid pressure opens the first valve assembly and a second mode whereby the first valve is movable to an open position by a drive assembly;

a second valve assembly biased to closed position and movable to an open position by a drive assembly; and

a common valve drive assembly for actuating the first valve assembly and the second valve assembly, the valve drive assembly having a first position whereby whereby the first valve assembly is in the first mode and the second valve assembly is in the closed position, a second position whereby the first valve assembly is in the first mode and the second valve assembly is in the open position, and a third position whereby the first valve assembly is in the second mode and in the open position and the second valve assembly is in the open position.

125. The dual valve assembly of claim 124 where in the valve drive assembly comprises a bell crank and the bell crank pivots from the first position to the second position and to the third position.

126. The dual valve assembly of claim 124 wherein the first valve assembly and second valve assembly each have a valve actuator, each valve actuator defining a valve slot and a valve slot stop;

the valve drive assembly having a plurality of pins for slideably engaging the valve slots and contacting the valve slot stops to move the valves to the open position.

127. The dual valve assembly of claim 126 where in the valve drive assembly comprises a bell crank and the bell crank pivots from the first position to the second position and to the third position.

128. A bi-modal valve comprising:

a valve actuator defining a valve face and a valve slot and valve slot stop;

a valve seat;

a valve spring for biasing the valve face against the valve seat to close the valve;

a valve drive assembly having a pin for sliding engagement in the valve stop; whereby in a first mode fluid pressure in the valve greater than a preset threshold moves the valve face away from the valve seat to open the valve and the pin slides in the valve slot, and a second mode where the drive assembly moves the pin to engage the valve slot stop to move the valve face away from the valve seat to open the valve.

129. The bimodal valve of claim 128 further comprising a diaphragm between the valve face and the valve seat.

130. The bi-modal valve of claim 129 further comprising a reusable pump housing and a cassette housing, the pump housing releasably engageable to the cassette housing, and wherein the valve actuator, valve spring and valve drive assembly are in the pump housing and the valve seat and diaphragm are in the cassette assembly.

131. The cassette of claim 2, wherein the at least one duct has a variable width.

132. The cassette of claim 36, wherein the medicament is a drug for an endocrine disorder.

133. The cassette of claim 36, wherein the medicament is selected from a group consisting of insulin and an insulin analog.

134. The cassette of claim 36, wherein the medicament is proteinaceous.

135. The cassette of claim 36, wherein the medicament includes a polypeptide having a tertiary structure with at least one hydrophobic region.

~~136. The cassette of claim 110, wherein the shuttle is compressible and includes an enlarged segment and the occluder channel includes a step between a wide section and narrow section, the enlarged segment of the shuttle being wider than the narrow section in an uncompressed state.~~