CLAIMS

1. A portable container including an integral controlled evaporative cooling system, comprising:

a storage container wall sealed to a storage container bottom, the storage container wall and storage container bottom positioned to form a storage container with an access aperture;

an evaporative region wall sealed to an evaporative region bottom, the evaporative region wall positioned adjacent to an exterior of the storage container wall and the evaporative region bottom positioned adjacent to an exterior of the storage container bottom, a top edge of the evaporative region wall sealed to the exterior of the storage container wall at a position below a top edge of the storage container wall to form a vapor-sealed evaporative region between the evaporative region wall and the evaporative region bottom and the storage container wall and the storage container bottom;

an insulation wall positioned adjacent to an exterior surface of the evaporative region wall and the storage container wall, a top of the insulation wall sealed to the exterior surface of the storage container wall at a position above the evaporative region wall to form a vapor-sealed insulation region external to the storage container and to the evaporative region;

a desiccant region wall positioned adjacent to an exterior surface of the insulation wall and sealed to the exterior surface of the insulation wall to form a vapor-sealed desiccant region, the desiccant region wall positioned to form an exterior surface of the portable container;

a vapor conduit with a first end positioned within the vapor-sealed evaporative region and a second end positioned within the vapor-sealed desiccant region; and

a vapor control unit attached to the vapor conduit, the vapor control unit including a valve of a size, shape and position to reversibly inhibit flow of gas through the vapor conduit, and a controller operably attached to the valve.

2. The portable container including the integral controlled evaporative cooling system of claim 1, wherein the evaporative region wall and the evaporative region bottom

are of a size, shape and position to form a gap between a surface of the evaporative region wall and the evaporative region bottom with the storage container wall and the storage container bottom.

3. The portable container including the integral controlled evaporative cooling system of claim 1, wherein the vapor-sealed evaporative region comprises:
an evaporative liquid;
a wick structure for the evaporative liquid; and
a gas pressure less than an ambient gas pressure.

4. The portable container including the integral controlled evaporative cooling system of claim 1, wherein the evaporative region wall is formed as a cylindrical structure.

5. The portable container including the integral controlled evaporative cooling system of claim 1, wherein the desiccant region wall encircles the exterior surface of the insulation wall.

6. The portable container including the integral controlled evaporative cooling system of claim 1, wherein the desiccant region wall is sealed to a desiccant region bottom, and the desiccant region bottom is positioned adjacent to an exterior of an insulation bottom to form a desiccant region adjacent to the insulation wall and insulation bottom.

7. The portable container including the integral controlled evaporative cooling system of claim 1, wherein the vapor-sealed desiccant region comprises:
desiccant material.

8. The portable container including the integral controlled evaporative cooling system of claim 1, wherein the vapor conduit comprises:
a hollow structure.

9. The portable container including the integral controlled evaporative cooling system of claim 1, wherein the desiccant region, the evaporative region and the vapor conduit are sealed together with a continuous vapor-sealed interior region including a gas pressure less than an ambient gas pressure adjacent to an exterior of the portable container.

10. The portable container including the integral controlled evaporative cooling system of claim 1, further comprising:

a shutoff valve of a size, shape and position to reversibly fully inhibit flow of gas through the vapor conduit; and

a switch operably attached to the valve, the switch positioned to cause the valve to fully open and fully close in response to an external action on the switch.

11. The portable container including the integral controlled evaporative cooling system of claim 1, further comprising:

a temperature sensor attached to the storage container;

a heating element positioned adjacent to the storage container wall or the storage container bottom; and

a controller connected to the temperature sensor, the vapor control unit, and the heating element.

12. The portable container including the integral controlled evaporative cooling system of claim 1, further including an internal recharging system, comprising:

a temperature sensor affixed to the portable container;

a heating element positioned within or adjacent to the vapor-sealed desiccant region; and

a controller connected to the temperature sensor and the heating element.

13. A set of portable container sections for assembly, comprising:

a storage container with an integrated controlled evaporative cooler, including

an interior storage container positioned with an access aperture at an upper region of the interior storage container,

an outer storage container positioned with an access aperture at an upper region of the interior storage container, the outer storage container sealed to the interior storage container at a position adjacent to the access aperture to form a vapor-sealed evaporative region between the interior storage container and the outer storage container, and

an evaporative section of a vapor conduit, the evaporative section including a first end positioned within the vapor-sealed evaporative region and a second end positioned at an upper region of the storage container with an aperture external to the storage container;

a desiccant section including

an insulation unit with an interior surface of a size and shape to mate with an exterior surface of the storage container, and of a size and shape to extend beyond the access aperture of the storage container,

a desiccant region wall encircling the insulation unit, the desiccant region wall sealed to an exterior of the insulation unit with a vapor-impermeable seal to form a desiccant region exterior to the insulation unit, and

a desiccant section of a vapor conduit, the desiccant section including a first end positioned within the desiccant region and a second end positioned at an upper region of the desiccant region with an aperture external to the desiccant region; and

a central vapor conduit section, including

a first end of a size and shape to mate and seal with the second end of the evaporative section of the vapor conduit,

a second end of a size and shape to mate and seal with the second end of the desiccant section of the vapor conduit, and

a connector section of the central vapor conduit positioned between the first end of the central vapor conduit and the second end of the central vapor conduit, the connector section of a size and shape to position the first end to mate and seal with the second end of the evaporative section and position the second end to mate and seal with the second end of the desiccant section;

wherein the vapor conduit includes an attached vapor control unit, wherein the vapor control unit includes a valve of a size, shape and position to reversibly inhibit flow of gas through the vapor conduit, and a controller operably attached to the valve, and wherein the evaporative section, the desiccant section and the central vapor conduit section are each of a size and shape to fit together into a continuous vapor-sealed interior region of an integrated portable container including a controlled integral controlled evaporative cooling system.

14. A portable container including an integral controlled evaporative cooling system, comprising:

an insulated storage compartment including

at least one wall forming sides and a bottom of an interior of a storage container with an access aperture,

at least one wall forming sides and a bottom of an exterior of the storage container, wherein the exterior is positioned adjacent to the interior and there is a gap between the exterior and the interior,

a seal between the at least one wall forming the sides and the bottom of the interior and the at least one wall forming the sides and the bottom of the exterior, the seal forming a gas-impermeable gap between the walls; and

a lid of a size and shape to match the insulated storage compartment, including

at least one wall forming sides and a bottom of the lid, the sides and bottom of a size and shape to reversibly mate with the interior of the storage container at a position adjacent to the access aperture,

at least one wall forming a top of the lid, the top of the lid affixed to the sides of the lid,

an evaporative compartment positioned within the lid at a position adjacent to the bottom of the lid, the evaporative compartment including an internal evaporative region, the evaporative compartment including an aperture at a position distal to the bottom of the lid,

a desiccant compartment within the lid at a position adjacent to the top of the lid, the desiccant compartment including an internal desiccant region, the desiccant compartment including an aperture at a position distal to the top of the lid, and

a vapor conduit affixed at a first end to the aperture in the evaporative compartment and affixed at a second end to the aperture in the desiccant compartment, the vapor conduit including a vapor control unit, the combination of the vapor conduit, the evaporative region and the desiccant region with the vapor conduit forming a gas-sealed and liquid-sealed region within the lid, wherein the vapor control unit includes a valve of a size, shape and position to reversibly inhibit flow of gas through the vapor conduit, and a controller operably attached to the valve.

15. A portable container including an integral controlled evaporative cooling system, comprising:

at least one storage container wall configured to form a storage container with an access aperture;

at least one insulation wall positioned adjacent to an exterior surface of the storage container wall, and affixed to the exterior surface to form a vapor-sealed insulation region external to a storage region;

at least one desiccant region wall positioned adjacent to an exterior surface of the at least one insulation wall and sealed to the exterior surface of the at least one insulation wall to form a vapor-sealed desiccant region at least partially surrounding an exterior of the portable container;

a lid for the portable container of a size and shape to reversibly mate with an interior surface of the at least one storage container wall, the lid including an internal vapor-sealed evaporative compartment, the lid including a bendable section positioned and configured to allow reversible access to the storage container;

a vapor conduit with a first end positioned within the internal vapor-sealed evaporative region and a second end positioned within the vapor-sealed desiccant region, the vapor conduit including a bendable section aligned with the bendable section of the lid; and

a vapor control unit attached to the vapor conduit, wherein the vapor control unit includes a valve of a size, shape and position to reversibly inhibit flow of gas through the vapor conduit, and a controller operably attached to the valve.