for distribution to suits **11** through outlets **36** and supply line **37**. Filter(s) **33** may preferably be of the HEPA type, such as the Army M48 filter, effective for removing airborne chemical, biological and radioactive contaminants, such as nerve gas, harassing agents, biological agents and CWA vapor from the conditioned air prior to use by subject **12**. Air flow from plenum **16** to outlets **36** may be regulated by conventional regulator means **38** controlling blower **27** and manifold **35** throughput, and may include a dump valve, airflow adjustment regulator or manually operated vent. Manifold pressure may be displayed on pressure gauge **39**.

The entire system **10** may be housed in appropriate housing **41** (shown by peripheral line) for compactness, portability and ease of transport. It is noted that, depending on the thermal capacity and available flow rate of air conditioning unit **14**, more than one system **10** may be integrated with unit **14** so long as the throughput requirements for each system **10** and temperature, pressure and flow rate for each outlet **36** are maintained.

In a unit built in demonstration of the invention, system **10** was about 30×40×15 inches in size and weighed about 70 pounds. The circulation blower and air conditioner unit **14** comprised a military C39 air conditioner (model A/E 32C-39, American Air Filter Company, 110V, 16A) having a cooling capacity of 54,000 BTUH (4.5 tons) at 1000 cfm and providing 20 cfm to each of ten outlets **36** at 11 inches and 60°–70° F. Each of two filters **33** comprised a standard Army M-48 filter, a gas-particulate NBC, 100 cfm, NSN 4240-01-161-3710, charcoal plus HEPA treated filter.

In the operation of the invention, air conditioning unit **14** is started in order to circulate air through air control plenum **16** at about 1000 cfm and to cool the air to about 60°–70° F. at outlets **36**. System **10** is then started in order to ingest sufficient ambient air to replace any conditioned air which is used for cooling purposes at outlets **36** (viz, 20 cfm per outlet). During a rest break from work for which protective suit **11** is required, subject **12** connects a cooling line **37** to suit **11** to receive cooled air during the break.

In one test series of tests performed in demonstration of the invention, subjects wore the standard military chemical defense ensemble (CDE), which is intended to provide the user with eye, respiratory, and skin protection from chemical and biological agents. The CDE components include a hood, mask, filter, jacket, pants, gloves and overboots, with an air cooling vest. While wearing the CDE, a subject sat at intervals inside an environmental chamber heated at 26.7° C. (10 min), 29.5° C. (15 min), 32.25° C. (15 min), 35.0° C. (15 min), 37.75° C. (15 min), and 40° C. (15 min). The chamber temperature was kept constant and stable for about one hour at each temperature before each test. The cooling vest of each CDE was connected to system **10** integrated with a C39 air conditioner. Operating the air conditioner in five-minute cycles during the tests resulted in cooled air to system **10** at between 8.35° and 20.15° C.; air temperature within manifold **35** ranged between 11.3° and 20.35° C. Outlet temperature of the cooling vest prior to attachment of system **10** indicated temperatures of about 26.60° C. regardless of chamber temperature, but declined about 2° C. within two minutes after attachment of system **10** and remained thereafter between about 22.25° and 24.55° C.

In another test series, four subjects (one female, three males) completed three work/rest cycles while continuously wearing the CDE integrated with a cooling vest. The work portion of the tests comprised walking a 5% grade at 4.8 km/hr inside the chamber under hot conditions (40° C., 25–30% RH) until a core body temperature of 38.5° C. was reached. The subjects then attached system **10** and C39 air conditioner to the cooling vest of the CDE and rested until the core body temperature decreased to 38° C. During the cooling period, the subjects were allowed to take water without removing the CDE. About 510 l/m of 22°–24° C. conditioned air was delivered from system **10** to each CDE during rest periods.

During the work portion, the air vest outlet temperature was between 32.55° and 38.05° C., which was close to the chest skin temperature range, 33.9° to 38.05°. However, chest skin temperature decreased to between 24.0° and 30.3° C. during the rest/cool periods. Initial chest skin temperatures were between 33.8° and 36.5° C.

The work time to reach 38.5° C. core temperature and the cooling time necessary to cool to 38.0° C. varied among subjects. The initial core temperatures of the subjects before the first work cycle ranged from 36.95° to 37.4° C. Work time ranged from 36 to 55 minutes in the first work cycle with subjects working 81 to 109 minutes total test time. Thus the first work cycle accounted for at least 42% of total work time for the three cycles. Percentage of total experiment time spent in cooling ranged from 42–69%.

The invention therefore provides an effective and inexpensive system for supplying intermittant clean, cool and dry air to workers wearing protective garments in hot contaminated environments. It is understood that modifications to the invention may be made as might occur to one with skill in the field of the invention within the scope of the appended claims. All embodiments contemplated hereunder which achieve the objects of the invention have therefore not been shown in complete detail. Other embodiments may be developed without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. A system for providing intermittent cooling to a plurality of persons wearing protective garments for working in a hot contaminated environment, comprising:

(a) an air conditioning unit having an inlet and an outlet and a cooling capacity of at least 1.5 tons at a flow rate of at least 1,000 cubic feet per minute;

(b) an air control plenum having first and second ends, a first inlet at said first end thereof and a first outlet at said second end thereof, and a second inlet near said second end and a second outlet near said first end;

(c) first conduit means operatively interconnecting said first outlet of said plenum and said inlet of said air conditioning unit and second conduit means operatively interconnecting said first inlet of said plenum and said outlet of said air conditioning unit;

(d) blower means having an inlet open to ambient and an outlet operatively connected to said second inlet of said plenum for supplying ambient air to said air conditioning unit;

(e) manifold means comprising a plurality of outlets for supplying conditioned air from said air conditioning unit to a corresponding plurality of protective garments having means for operative connection to said outlets;

(f) filter means operatively interconnecting said second outlet of said plenum and said manifold means