

Attachment 1

bcc: J. R. Martin - ER - BOD-1442
S. W. Dixon*



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED

HASKELL LABORATORY FOR TOXICOLOGY
AND INDUSTRIAL MEDICINE
ELKTON ROAD, NEWARK, DELAWARE 19711

*Without attachment.

CENTRAL RESEARCH AND DEVELOPMENT DEPARTMENT

September 14, 1982

Mr. R. T. Stringer
Marketing Manager
Robertshaw Controls Company
333 North Euclid Way
Anaheim, CA 92803

Dear Bob:

Thank you so much for your call about the Robertshaw Air Capsule. Enclosed is a copy of Brooks Air Force Base Report SAM-TR-80-43 you requested.

We look forward to receiving a report from you that would contain:

- Your recommendations concerning the degree of strenuous activity that could be safely undertaken while wearing the present models of the Air Capsules.
- The status of new developments for the Air Capsule that would increase their protection during emergency use.

When received, I would like to pass this information on to the management of the many Du Pont sites that have purchased the Air Capsule.

Sincerely yours

L. F. Percival
Consultant -
Industrial Hygiene

LFP/dar
Attachment



CONTROLS COMPANY

Life Support Products Marketing Group

333 N. Euclid Way, Anaheim, CA 92803

Telephone (714) 535-8151

Cable Address—Robertshaw

Attachment II

September 24, 1982

Mr. L. F. Percival, Consultant
E. I. du Pont de Nemours & Company
Haskell Laboratory for Toxicology
and Industrial Medicine
Elkton Road
Newark, DE 19711

Dear Lance:

Received your September 14 letter with copy of Brooks AFB ASM document. It was the document that our Engineering Department had not received from Brooks as of this date, even though we are working on a development program with them.

With regard to your two comments in paragraph two of your letter, it should be pointed out that the NIOSH testing performed on our Air Capsule is based principally on a medium to heavy work load of approximately 40 LPM. This is basically pointed out in Title 30, Paragraph 11.85-10, entitled "Service Time Test, Open Circuit Apparatus," which refers to Para. 11.85-3, para.(b). Man tests were also conducted using the Air Capsule and included: walking at 3 miles per hour; climbing a vertical treadmill; carrying a 45-pound weight; and crawling on hands and knees.

As you will note in the Brooks AFB report, under medium to heavy work load conditions there was very little trouble by the user. Under severe work load conditions, such as gasping for breath when climbing a ladder or running, some troubles were encountered. In other words, the use of the Air Capsule for the application concerned was marginal when used too far from the "safe" tunnel area.

Based on the Air Force evaluation and evaluations run for du Pont, we have had two programs going with regard to an Air Capsule improvement program.

- A. We are in the throes of having a 5-minute Air Capsule configuration evaluated by the Air Force, utilizing a demand valve in the hood in lieu of its present constant flow feature. Because this is a demand system we are using coils with increased volume to get the 5-minute duration. In this specific design it will allow the user to inhale as much air as he demands through the demand valve and still maintain sufficient supply in the coils for a 5-minute duration. Air Force tests and evaluations regarding this unit are slowly progressing.
- B. During the last year we have also been working with your Dr. Olguin with regard to increasing the protection factor to a minimum of 2000 on the Air Capsule design. We are also improving the operation of the Air Capsule so that it will not go negative under heavy working conditions. We are anticipating protection factors well above 2000 and, indeed, approaching protection factors now seen only in positive pressure demand SCBA type units. We have been successful with programs performed at your Antioch facility and are presently in the throes of making additional models for submittal to NIOSH, NASA, and yourself for approval.



Mr. L. F. Percival (du Pont)

- 2 -

September 24, 1982

The fact that we went to a higher positive pressure in our hood on the Air Capsule threw us into a different category of Title 30, which has slowed us down. We believe we have this licked at this time, and should be submitting samples to NIOSH, NASA and yourself by January, 1983.

Within the next two weeks the writer will contact you with regard to comments you may have regarding this letter. Please do not hesitate to contact me prior to that time if additional information is desired immediately.

Yours truly,

R. T. Stringer
Marketing Manager

nd

SAL 000046260

Attachment III

Clarification and Comments on the Robertshaw Company Letter

RE: Second paragraph of Attachment II - Title 30, Paragraph 11.85-10 and 11.84-3 are copied below:

§ 11.85-10 Service time test;
open-circuit apparatus.

(a) Service time will be
measured as described in
§ 11.85-3.

(b) The open-circuit
apparatus will be classified
according to the length of time
it supplies air or oxygen to
the breathing machine.

(c) The service time
obtained on this test will be
used to classify the open-
circuit apparatus in accordance
with § 11.53.

§ 11.85.3 Breathing bag test.

(a) Breathing bags will be
tested in an air atmosphere
saturated with gasoline vapor
at room temperature
(24°-30°C./75°-85°F.) for a
continuous period of twice the
rated time of the apparatus
(except for apparatus for
escape only where the test
period shall be the rated time
of the apparatus).

(b) The bag will be operated
during this test by a breathing
machine with 24 respirations
per minute and a minute-volume
of 40 liters.

(c) A breathing machine cam
with a work rate of 622
kg-m./min. will be used.

(d) The air within the
bag(s) shall not contain more
than 100 parts per million of
gasoline vapor at the end of
the test.

SAL 000046261

These tests do not really address the question of oxygen depletion and carbon dioxide buildup for the wearer during heavy work. Assuming that the vapor pressure of gasoline approximates that of n-octane, the passing of the gasoline test in \$11.85-3 above loosely suggests a protection factor in the 130 range.

The man tests in the last sentence of the 2nd paragraph are also part of Title 30. They are copied below for a 5-minute unit:

Test 1 - walk @ 3 mph for 5 minutes

Test 2 - walk @ 1 ft. per sec. on a 15° slope treadmill for 1 minute
- walk @ 3 mph for 1 minute
- walk 1 ft. per sec. on a 15° slope treadmill for 1 minute
- walk @ 2 mph for 2 minutes

Test 3 - walk @ .3 mph for 1 minute
- pull a 40 lb. wt. 5 feet 15 times in 1 minute
- lie on side for 1 minute
- lie on back for 1 minute
- crawl on hands and knees for 1 minute

Test 4 - walk at 1 ft. per sec. on a 15° slope treadmill for 1 minute
- walk @ 3 mph for 1 minute
- pull a 40 lb. wt. 5 feet 30 times in 2 minutes
- run @ 6 mph for 1 minute

Some aspects of test number 4 would approach some increased exertion typical of a "running escape." However, these tests are run in normal room air, so protection factors are not determined.

RE: 3rd Paragraph of Attachment 2 - This paragraph refers to the Robertshaw Company's assessment of the Brooks Air Force Base study. Enclosed is the actual abstract of the report from which the reader may draw his own conclusions.

SAL 000046262