Duquesne Light

Nuclear Group
P.O. Box 4
Shippingport, PA 15077-0004

Telephone (412) 393-6000

May 2, 1985
ND1MNS:4218

Mr. LeMoine J. Cunningham, Chief
Section 2
Operating Reactor Programs Branch
Division of Inspection Programs
Office of Inspection and Enforcement
Washington, DC 20555

Reference: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
National Draeger Respirator Test Data

Gentlemen:

Beaver Valley Power Station is considering the use of the National Draeger BG-174AP respirator. At this time, NIOSH cannot determine whether any closed circuit breathing apparatus could be approved or recommended as a positive pressure device, due to the lack of an approval schedule. However, NIOSH previously determined that the BioPak 30P and 60P respirators manufactured by BioMarine Industries (now Rexnord) are regarded as positive pressure devices (letter from J. A. Oppold, Director, Division of Safety Research, 6/18/79). In light of this, Ms. L. Hendricks, Office of Inspection and Enforcement, suggested that the National Draeger test data be submitted for NRC evaluation as to whether the BG-714AP may be considered a positive pressure device. The pertinent test data is attached for your review.

NIOSH is currently considering establishment of a new approval category and test criteria for positive pressure closed circuit breathing apparatus. Should the NRC determine that the BG-174AP may be considered a positive pressure device, and Beaver Valley incorporates it into the respiratory program, what would be the consequences should the respirator later fail the NIOSH test criteria?

Your consideration in these matters is requested.

Very truly yours,

J. D. Sieber

J. D. Sieber
Senior Manager
Nuclear Group

Attachment

IE28
1/1

cc: Mr. W. M. Troskoski, Resident Inspector
U. S. Nuclear Regulatory Commission
Beaver Valley Power Station
Shippingport, PA 15077

U. S. Nuclear Regulatory Commission
c/o Document Management Branch
Washington, DC 20555

U. S. Nuclear Regulatory Commission
Attn: Dr. Thomas E. Murley, Regional Administrator
Region 1
631 Park Avenue
King of Prussia, PA 19406

Director, Safety Evaluation & Control
Virginia Electric & Power Company
P.O. Box 26666
One James River Plaza
Richmond, VA 23261

Ms. L. Hendricks
U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Washington, DC 20555

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Our Reference: TN 01801

Centers for Disease Control
National Institute for Occupational
Safety and Health – ALOSH
944 Chestnut Ridge Road
Morgantown, WV 26505–2888

October 29, 1984

Mr. Les Boord
National Draeger, Inc.
101 Technology Drive
P. O. Box 120
Pittsburgh, Pennsylvania 15230

Dear Mr. Boord:

This reply is with reference to your resubmittal letter of August 10, 1984, requesting approval of the BG-174AP (P/N R32200) self-contained breathing apparatus.

Approval TC-13F-176 is granted to cover the 2-hour closed-circuit, compressed oxygen, entry and escape, self-contained breathing apparatus, for respiratory protection during entry into and escape from oxygen deficient atmospheres, gases, and vapors at temperatures above 14° F. Approved only when the compressed oxygen container is fully charged with oxygen meeting the minimum purity requirements for medical or breathing oxygen set forth in the U.S. Pharmacopoeia. The container shall meet applicable DOT specifications.

In making renewals or repairs, parts identical with those furnished by the manufacturer under the pertinent approval shall be maintained.

The approved assembly consists of the following Dragerwerk parts: M174A Mask & Hoses; BG174 AP Harness and Frame Assembly; C174 A-4 Cylinder and Valve; and, 9 x 18-28 CO_2 canister. These parts are to be marked with the indicated numbers in a legible and permanent manner (marking cannot be removed without evidence of its previous presence).

The enclosed approval label designs are to be used in preparing the approval labels. Label TC-13F-176 shall be prepared for use on the harness assembly. Canister label TC-13F-176 shall be prepared for use on the carbon dioxide canister scrubber assembly. Designs of your labels must be submitted to NIOSH for approval before printing, and proofs of the printed labels must be submitted to NIOSH for further approval before their final production.

Your quality control plans for the Model Number BG174AP self-contained breathing apparatus were reviewed by NIOSH. On the basis of that review, your quality control plans are accepted as a part of this approval.

Your drawing lists dated September 1984, apply to this approval.

This Certificate of Approval is not an endorsement of the respirator by the Mine Safety and Health Administration or the National Institute for Occupational Safety and Health, and such endorsement shall not be stated or implied in advertisements or other publicity. However, you may publicize the fact that the product has met the requirements of 30 CFR Part 11.

Any changes you wish to make to this respirator shall be submitted, and a modification of this approval shall be granted before any changes are made. (Reference: Part 11, Section 11.35.)

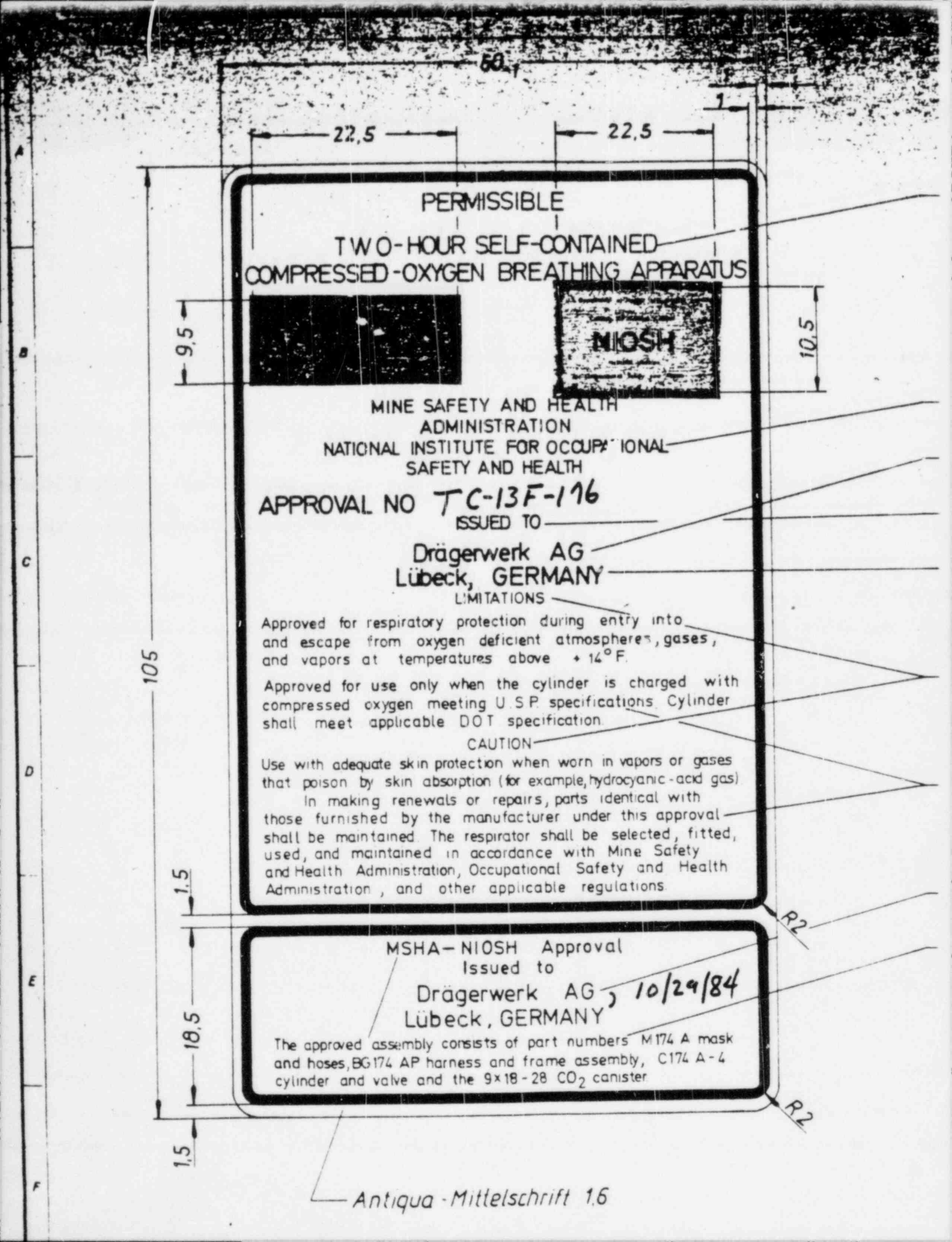
Please submit samples of respirator packaging, bearing all required labels, instructions, and markings, for our approval, before adopting them. Please send us TC-13F-176 approved SCBA to be made a part of the record of this approval. We shall retain several other items as additional record material. All other material will be discarded unless we are otherwise advised by you.

Sincerely yours,

Kenneth P. Klouse, Supervisor,
Office of Quality Assurance
Approval and Certification Center
MSHA

Nancy J. Bollinger, Chief
Certification Branch
Division of Safety Research
NIOSH

Enclosures (3)


50
1
22,5
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105
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PERMISSIBLE
TWO-HOUR SELF-CONTAINED
COMPRESSED-OXYGEN BREATHING APPARATUS
NIOSH
MINE SAFETY AND HEALTH
ADMINISTRATION
NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
APPROVAL NO TC-13F-176
ISSUED TO
Drägerwerk AG
Lübeck, GERMANY
LIMITATIONS
Approved for respiratory protection during entry into and escape from oxygen deficient atmospheres, gases, and vapors at temperatures above + 14° F.
Approved for use only when the cylinder is charged with compressed oxygen meeting U.S.P. specifications. Cylinder shall meet applicable DOT specification.
CAUTION
Use with adequate skin protection when worn in vapors or gases that poison by skin absorption (for example, hydrocyanic-acid gas).
In making renewals or repairs, parts identical with those furnished by the manufacturer under this approval shall be maintained. The respirator shall be selected, fitted, used, and maintained in accordance with Mine Safety and Health Administration, Occupational Safety and Health Administration, and other applicable regulations.
1,5
R2
MSHA-NIOSH Approval
Issued to
Drägerwerk AG, 10/29/84
Lübeck, GERMANY
The approved assembly consists of part numbers M 174 A mask and hoses, BG 174 AP harness and frame assembly, C 174 A-4 cylinder and valve and the 9x18-28 CO_2 canister.
18,5
R2
1,5
Antiqua-Mittelschrift 1,6

PERMISSIBLE

United States Department of Labor
MSHA
Mine Safety and Health Administration

U.S. Department of Health, Education, and Welfare
Center for Disease Control
NIOSH
National Institute
for Occupational Safety and Health

MINE SAFETY AND HEALTH ADMINISTRATION
NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH

APPROVAL NO. TC-

ISSUED TO

LIMITATIONS

CAUTION

MSHA — NIOSH Approval
Issued to

The approved assembly consists of the following part numbers:

TN01801
Draegerwerk
BG174AP - 2 Hour Closed Circuit SCBA
October 24, 1984

I. Background:

In a letter dated July 28, 1983, Draegerwerk AG Luebeck requested NIOSH approval for their BG 174AP. The unit was rated as a 4-hour, closed circuit, SCBA.

During testing (detailed in respirator test report TN 01801, December 6, 1983), the units passed all applicable bench testing. However, the units failed by exceeding the maximum temperature level during man test #1.

In a letter dated February 28, 1984, Draegerwerk resubmitted the same units, this time seeking a 2-hour approval.

During testing (detailed in respirator test report TN01801, May 15, 1984) the units passed the man testing but the alarms failed to activate.

In a letter dated August 10, 1984, Draegerwerk resubmitted the units for testing. In this submittal the O_2 pressure was changed from 3135 psig to 1700 psig and the alarms set to activate between 20 and 25% of the cylinder pressure.

II. Test Outline:

A. Special Test - 11.63(c)

Requirement -

To insure the units would still meet the duration during man testing the O_2 cylinder at the new pressure must have the same amount of O_2 available as the greatest amount used during man testing.

Procedure -

The O_2 cylinder is connected to a regulator and bled down from the old cylinder pressure (3135 psig) to the least amount of pressure recorded during man testing (1500 psig). This procedure is then repeated from the new cylinder pressure (1700 psig) down to 0 psig.

Results -

Pressure Range 1 psig	Liters/O_2
3135 - 1500	235.91
1700 - 0	244.97

The units pass the requirement.

B. Remaining Service Life Indicator - Section 11.82(F)

Requirement -

Each remaining service life indicator or warning device shall give an alarm when the remaining service life of the apparatus is reduced within a range of 20 to 25% of its rated service time or pressure.

Procedure -

To measure the pressure at which the alarm sounds, a calibrated gauge is connected in line between the air supply bottle and the regulator. The unit is then bled down through the regulator by-pass valve. When the alarm sounds, the pressure on the gauge is noted. This procedure is repeated six times. The time at which the alarm sounds is noted during the rated service time test.

Results -

The pressure range for this unit is 340 psig to 425 psig.

	Time (min)	Pressure(psig)	PASS	FAIL
Unit 1		350	X	
		350	X	
		350	X	
		350	X	
		350	X	
		350	X	

	Time (min)	Pressure(psig)	PASS	FAIL
Unit 2		375	X	
		375	X	
		375	X	
		375	X	
		375	X	
		375	X	

The units pass the requirement.

C. Man Test 5 - 11.85-16

Due to the change in the cylinder pressure and based on the average O_2 consumption of the test subjects during man test 5 (respirator test report TN01801, May 5, 1984). The following calculations indicate the possible maximum service life of each unit.

Unit #1 Average 0^2 consumption = 467.50 psig/hr.
1700 psig = 3.64 hours

Unit #2 Average 0^2 consumption = 180 psig/hr.
1700 psig = 9.44 hours

III. Recommendations:

Due to the units meeting the minimum performance requirements of 30 CFR, Part 11, I recommend this request be approved. In support of my recommendations is the QC acceptance memo dated 10-1-84.

IV. References:

December 6, 1983 - Respirator Test Report TN01801
May 15 - 1984 - Respirator Test Report TN01801
August 10, 1984 - Draeger Letter
August 16, 1984 - CB Letter
September 26, 1984 - Draeger Letter
September 28, 1984 - Draeger Letter
October 1, 1984 - QC Memo
October 22, 1984 - Draeger Letter

TN01801
Draegerwerk
BG 174 AP - 4 hour, closed circuit, SCBA
Mike Commodore
December 6, 1983

I. Background:

In a letter dated July 28, 1983, Draegerwerk AG Luebeck requested NIOSH approval for their BG 174 AP. The unit is a four hour, closed circuit, SCBA.

II. Test Outline:

A. Breathing Resistance - 11.85-5 Inhalation

Requirement -

(a) Resistance to inhalation airflow will be measured in the facepiece or mouthpiece while the apparatus is operated by a breathing machine as described in Section 11.85-3.

(c) The inhalation resistance of closed circuit apparatus shall not exceed the difference between exhalation resistance [Section 11.85-6(e)] and 10 cm (4 inches) water-column height.

Section 11.85-6 Exhalation

(e) Resistance to exhalation airflow will be measured in the facepiece or mouthpiece of closed-circuit apparatus with a breathing machine as described in Section 11.85-3, and the exhalation resistance shall not exceed 51mm (2 inches) water-column height.

Procedure -

A breathing machine with a 622 kg-m/min. cam operating at 24 RPM with a 40L-min. vol. is connected to an anthropometric head for cycling. A pressure tap in the head is connected to a transducer which in turn is connected to a strip chart recorder for recording the pressure tracing for calculation and record purposes.

Results -

	Inhalation	Exhalation
Unit #1	0"H_2O	1.66"H_2O
Unit #2	-0.10"H_2O	1.77"H_2O

The units pass the requirement.

B. Gas Flow Test: 11.85-9(c)

Requirement -

All demand-flow devices shall provide at least 30 liters of O_2 per minute when in the fully open position.

Procedure -

The demand valve was tied down in the full open position with the O_2 supply tube connected to a calibrated dry test meter. Flow is averaged from full cylinder pressure to 100 psig.

Results -

	Flow (LPM)
Unit #1	126.47
Unit #2	94.94

The units pass the requirement.

C. Safety Relief Valve Operations: 11.83(i)

Requirement -

The relief valve shall operate automatically when the pressure in the breathing circuit reaches one-half inch above the minimum pressure required to fill the bag.

Procedure -

A transducer is connected to the mouthpiece of the unit in order to obtain a pressure tracing. As pressure builds in the breathing bag, the recorder pen gradually moves until a state of full bag is reached. At this point the slope of pressure over time increases to a sharp linear line until the relief valve opens. Since from the relief valve opening pressure point back toward a state of full bag the line is linear, the difference between full bag and relief valve opening can be determined graphically.

Results -

Unit #1

Bag Full (inches of H_2O)	Release (inches of H_2O)	Difference (inches of H_2O)
1.66	1.87	0.21

Unit #2

Bag Full (inches of H_2O)	Release (inches of H_2O)	Difference (inches of H_2O)
1.77	2.08	0.31

The units pass the requirement.

D. Gas Tightness Test; minimum requirements. Sec. 11.85-19

Requirement/Procedure -

(a) Each apparatus will be tested for tightness by persons wearing it in an atmosphere of 1,000 ppm isoamyl acetate.

(b) Six persons will each wear the apparatus in the test concentrations specified in paragraph (a) of this section for 2-minutes and none shall detect the odor or taste of the test vapor.

Results -

None of the test subjects detected the odor or taste of the test vapor.

The units pass the requirement.

E. 11.85-4 Weight Requirement.

Requirement -

(a) The completely assembled and fully charged apparatus shall not weigh more than 16 kg. (35.28 pounds); however, where the weight decreases by more than 25 percent of its initial charge weight during its rated service life, the maximum allowable weight of a completely assembled and fully charged apparatus shall be 18 kg. (40 pounds).

(b) Where an apparatus employs equipment which contributes materially to the wearer's comfort, e.g., a cooling system, the completely assembled and fully charged apparatus shall not weigh more than 18 kg. (40 pounds) regardless of the decrease in weight during use.

Procedure -

The unit must be fully charged and ready for use before being weighed.

Results -

Unit 1 35 lbs.

Unit 2 35 lbs.

The units pass the requirement.

F. Man tests; testing conditions; general requirements - 11.85-14

General Requirements -

(a) The man tests described in Tables 1, 2, 3, and 4 represent the workload performed in the mining, mineral or allied industries by a person wearing the apparatus tested.

(b) The apparatus tested will be worn by Institute personnel trained in the use of self-contained breathing apparatus and the wearer will, before participating in these tests, pass a physical examination conducted by a qualified physician.

(c) All man tests will be conducted by the Institute.

(d) The apparatus will be examined before each man test to ensure that it is in proper working order.

(e) Breathing resistance will be measured within the facepiece or mouthpiece and the wearer's pulse and respiration rate will be recorded during each 2 minute sample period prescribed in tests 1, 2, 3, and 4.

(f) Man tests 1, 2, 3, and 4 will be conducted in duplicate.

(g) If man tests are not completed through no fault of the apparatus, the test will be repeated.

Man tests 1, 2, 3, and 4 - 11.85-15

Requirements -

(a) Man tests 1, 2, 3, and 4 set forth in Tables 1, 2, 3, and 4 respectively, prescribe the duration and sequence of specific activities. These tests will be conducted to:

(1) Familiarize the wearer with the apparatus during use;

(2) Provide for a gradual increase in activity;

(3) Evaluate the apparatus under different types of work and physical orientation; and

(4) Provide information on the operating and breathing characteristics of the apparatus during actual use.

Man tests; performance - 11.85-18

Requirements -

(a) The apparatus shall satisfy the respiratory requirements of the wearer for the classified service time.

(b) Fogging of the eyepiece shall not obscure the wearer's vision, and the wearer shall not experience undue discomfort because of fit or other characteristics of the apparatus.

(c) When the ambient temperature during testing is $24^{\circ} \pm 6^{\circ}C.$ ($75^{\circ} \pm 10^{\circ}F.$), the maximum temperature of inspired air recorded during man tests shall not exceed the following, after correction for deviation from $24^{\circ}C.$ ($75^{\circ}F.$):

Where service life of of apparatus is--	Where percent relative humidity of inspired air is--	Maximum permissible temperature of inspired air shall not exceed--	
		°F	°C
1/4 hour or less	0-100	135	57
1/2 hour to 3/4 hour	0-50	125	52
	50-100	[1]110	[1]43
1 to 2 hours	0-50	115	46
	50-100	[1]105	[1]41
3 hours	0-50	110	43
	50-100	[1]100	[1]38
4 hours	0-50	105	41
	50-100	[1] 95	[1]35

[1]Where percent relative humidity is 50-100 and apparatus is designed for escape only, these maximum permissible temperatures will be increased by 5°C.(10°F.).

Procedure -

Man tests 1-4 will be run in duplicate.

Results -

Man Test No. 1

Schedule Limit	Unit # 1	Unit #2
O_2 > 19.5%	55.20% to 93.87%	41.81% to 86.01%
CO_2 0.5% max.	0.10% to 0.16%	0.06% to 0.14%
ΔT <95°F	*80.3°F to 95.8°F	82.6°F to 96.0°F
ΔP (in inches of H_2O)	-0.02 to + 0.93	-0.29 to +0.99

Temperature values are corrected.

*Because of the high temperatures Unit 1 failed at 238 minutes and the test on Unit 2 was stopped at 162 minutes. Further testing was discontinued until the manufacturer can find a satisfactory cure for the problem.

The units fail the requirement.

III. Other Problem Areas:

Since there are no test standards for positive pressure closed circuit breathing devices in 30 CFR, Part 11, all references to this unit being positive pressure should be removed from the instruction manual, or a disclaimer should be included in the manual stating that NIOSH did not test or certify this unit as a positive pressure device.

IV. Recommendation:

Due to the BG 174 AP failing to meet the minimum performance requirements of 30 CFR, Part 11, we recommend this request for approval be denied.

V. References:

July 28, 1983 - Draeger Letter
July 25, 1983 - Draeger Letter
October 28, 1983 - Q.C. Memo
October 12, 1983 - Draeger Letter