

# SCAPE Protection Factor Test Report

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# SCAPE Protection Factor Test Report

- Aberdeen Proving Ground, Edgewood Area
- US Army Research, Development, and Engineering Command, Protection Factor Test Facility (PFTF)
- January 25-27, 2005
- Testing Conducted on Category I, IV, and VI SCAPE

# SCAPE Protection Factor Test Report

- Normal Facility Test Conditions
  - Corn Oil Aerosol @ 20-40mg/m<sup>3</sup> with mass median aerodynamic diameter of 0.4 to 0.6 microns
  - Sample probe used to measure aerosol penetration at head and chest of each suit
  - Laser Photometer used to measure suit leakage
  - Output is compared to chamber background concentration and converted into a Protection Factor (PF) value
  - The overall PF for each trial is an average of the PF values for each exercise

# SCAPE Protection Factor Test Report

- Facility accommodates simultaneous testing of three subjects
- 24 total tests conducted (3 x 8 tests each)
- Each test consists of a Preoperational (8 - 1 min sequences) and Operational Exercise (8 - 4 minute sequences) with no break

# US Army PFTF Test Protocol

- Preoperational Exercises (1 min each)
  - Normal breathing
  - Bend forward and touch toes (repeat)
  - Jog in Place
  - Raise arms above head and look up
  - Bend knees and squat
  - Crawl on hands and knees
  - Fold arms and twist torso
  - Normal breathing

# US Army PFTF Test Protocol

- Operational Exercises (4 min each)
  - Climb stairs
  - Move boxes from floor to table and back (repeat)
  - Rest (seated)
  - Roll walls and ceiling
  - Bag clothes, dump on floor, rebag (repeat)
  - Rest (seated)
  - Loosen bolts (kneeling position)
  - Move boxes from floor to table and back (repeat)







# SCAPE Protection Factor Test Result Summary

- Both Category I and IV had passing percentages of 100% at a PF of 50000 for both preoperational and operational exercises
- The category VI suit had passing percentage of 100% at 10000 for both preoperational and operational exercises
- Leakage was not detected by the photometer while connecting/disconnecting Cat IV/VI airlines in the test chamber







# SCAPE Protection Factor Data Table

Protection Factor Testing of the SCAPE  
Raw Data Category IV  
Operational Exercises

DATE	TIME	MASK	SUBJECT	CONCEPT	TRIAL	ITEM	Overall	Climb Steps	Move Boxes	Rest	Roll Walls	Bag Clothes	Rest	Loosen Bolts	Move Boxes
1/25/2005	17:0458	5097	4	4	1	OP	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0	100000.0
1/25/2005	18:0645	5097	4	4	2	OP	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0	100000.0
1/26/2005	11:5839	5097	4	4	3	OP	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0	100000.0
1/26/2005	13:0203	5097	4	4	4	OP	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0	100000.0
1/26/2005	14:5512	5097	4	4	5	OP	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0	100000.0
1/26/2005	16:1047	5097	4	4	6	OP	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0	100000.0
1/26/2005	17:5947	5097	4	4	7	OP	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0	100000.0
1/27/2005	10:4209	5097	4	4	8	OP	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0	100000.0

# SCAPE Protection Factor Data Table

Protection Factor Testing of the SCAPE  
Raw Data Category VI  
Preoperational Exercises

DATE	TIME	MASK	SUBJECT	CONCEPT	TRIAL	ITEM	Overall	Normal Breathing	Touch Toes	Jog in Place	Raise Arms	Bend and Squat	Crawl	Twist Torso	Normal Breathing
1/25/2005	16:2534	M04	3	6	1	PREOP	1517.7	100000.0	4784.8	12471.3	100000.0	348.2	484.2	13998.0	100000.0
1/25/2005	17:2713	M04	3	6	2	PREOP	1046.9	100000.0	7202.5	1447.0	100000.0	207.0	422.7	19046.8	100000.0
1/26/2005	11:1913	M01	3	6	1	PREOP	64351.3	100000.0	1000000	100000.0	100000.0	18410.3	100000.0	100000.0	100000.0
1/26/2005	12:2253	M01	3	6	2	PREOP	88785.9	100000.0	57679.7	100000.0	100000.0	78325.4	100000.0	100000.0	100000.0
1/26/2005	14:1615	M01	3	6	3	PREOP	26088.7	100000.0	100000.0	100000.0	100000.0	6372	642.5	100000.0	100000.0
1/26/2005	15:3115	M01	3	6	4	PREOP	28437.1	100000.0	64325.8	100000.0	100000.0	4957.3	11156.4	100000.0	100000.0
1/26/2005	17:2046	M01	3	6	5	PREOP	14826.2	100000.0	71773.9	100000.0	100000.0	2410.6	6443.2	100000.0	100000.0
1/27/2005	10:0215	M01	3	6	6	PREOP	41180.8	100000.0	100000.0	100000.0	100000.0	8047.3	100000.0	100000.0	100000.0

Note: The first Category VI Suit, M04, had leakages during the exercises and was replaced with suit M01. It was later discovered that this particular suit was getting a lower flow rate than M01.

# SCAPE Protection Factor Data Table

Protection Factor Testing of the SCAPE  
Raw Data Category VI  
Operational Exercises

DATE	TIME	MASK	SUBJECT	CONCEPT	TRIAL	TEM	Overall	Climb Steps	Move Boxes	Rest	Roll Walls	Big Clothes	Rest	Loosen Bolts	Move Boxes
1/25/2005	17:0223	M-04	3	6	1	OP	45399.0	100000.0	32352.1	100000.0	11182.0	100000.0	93786.0	12352.3	71028.4
								100000.0	70422.2	00000.0	00000.0	99839.5	100000.0	100000.0	645929
1/25/2005	18:0420	M-04	3	6	2	OP	17009.8	100000.0	100000.0	100000.0	9929.0	100000.0	3347.3	2799.3	55107.0
								100000.0	00000.0	00000.0	00000.0	8988.8	100000.0	100000.0	75187.8
1/26/2005	11:5553	M-01	3	6	1	OP	95049.4	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	4545.0	100000.0	100000.0	100000.0
1/26/2005	12:5941	M-01	3	6	2	OP	93729.6	100000.0	100000.0	100000.0	48300.3	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0
1/26/2005	14:5249	M-01	3	6	3	OP	99658.2	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	4798.6	100000.0	100000.0	100000.0
1/26/2005	16:0816	M-01	3	6	4	OP	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
								100000.0	00000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0
1/26/2005	17:5723	M-01	3	6	5	OP	93489.6	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	47299.0	100000.0
								100000.0	00000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0
1/27/2005	10:3945	M-01	3	6	6	OP	95341.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	56121.2	100000.0
								100000.0	00000.0	00000.0	00000.0	00000.0	100000.0	100000.0	100000.0



Protection Factor  
Testing Facility



Engineering Directorate  
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