

# **MAINE ASSOCIATION FOR SEARCH AND RESCUE**

## **Search Team Member Certification Standard**

### **Appendix A**

#### **Aerobic Fitness Evaluation**

##### **I. Introduction**

- A. General good health and physical fitness is necessary for a participant in ground search in the State of Maine. Although there are several factors which determine an individual's overall physical condition, MASAR considers the measurement of aerobic fitness the most important indicator of an individual's suitability for involvement in Search Team Member.
- B. As part of an individual's certification as a Search Team Member, therefore, MASAR requires proof that the individual has achieved a minimum level of aerobic conditioning.
- C. The indicator of this minimum level is a predicted  $VO_2$  of 35 (35 ml  $O_2$ /kg/min) or its equivalent. This level may be predicted using one of the tests outlined below or by an equivalent test provided by the unit or its designated representative. As with all other tests for certification for a Search Team Member, it is the unit's responsibility to both ensure that a test is administered properly and that individuals to be tested are physically prepared for the test.

##### **II. Tests for Measurement of Aerobic Fitness**

- A. Three tests are included for use by units for evaluating their members' aerobic fitness:
  - 1. 1-1/2 Mile Run
  - 2. 1 Mile Speed Walk
  - 3. U.S. Forest Service "Field Test"
- B. The Field Test is the test most applicable for evaluating the aerobic fitness of searchers. For individuals with knee problems, the 1 Mile Speed Walk may be substituted.
- C. People over the age of 59 should use the 1 Mile Walk or Field Test to determine their aerobic fitness. Times for people in this age range are not available for the 1-1/2 Mile Run.
- D. Any one of these tests may be used for evaluating a person's aerobic fitness. The test used should be noted on the test form along with the individual's  $VO_2$  level (if calculated) and whether that person passed or failed the test.
- E. A unit may use alternative tests as long as they provide an equivalent measurement of an individual's predicted  $VO_2$  level.

### III. **Recommended Minimum Aerobic Fitness Test Conditions**

- A. The subject should have a medical examination and/or a doctor's approval before testing.
- B. In order to assure accuracy and standardization, specific individuals should be trained to conduct all tests. When possible, an emergency medical technician (EMT) should be present during testing. If an EMT is not available, the tester must be trained in the administration of oxygen and be currently certified in CPR.
- C. Each subject should be screened before testing and should be questioned to determine his or her work capacity and general state of health, including any history of chest pain, shortness of breath and/or drug usage. No individual should be tested who reports circulatory, heart or respiratory problems, hypertension, acute infectious disease, fever, or other problems that require medical attention.
- D. Testing may be deferred if an individual is under medical attention which would influence such testing. Neuromuscular or skeletal disorders, such as bad knees, do not automatically preclude testing, however. A case-by-case evaluation may be done by the unit's representative.

### IV. **Aerobic Fitness Tests**

- A. 1.5 Mile Run\*
  - 1. Inactive individuals should precede the test with at least six to eight weeks of regular moderate aerobic exercise, such as swimming, jogging, biking, or aerobic dancing.
  - 2. Environment
    - a. This test should be administered in reasonable weather. The test is intended to get an accurate picture of a subject's health and fitness, not to jeopardize him or her by testing in excessive heat, cold, wind or humidity.
    - b. Running/walking tests should not be conducted if the actual course temperature is below 32 degrees or above 90 degrees Fahrenheit.
  - 3. Procedures
    - a. The course should be smooth, level and accurately measured.
    - b. The subject should be well rested. Encourage a warm-up, including flexibility and stretching exercises.
    - c. During the run, advise the subject of the distance covered and time remaining, if possible.
    - d. Count laps for each runner if on a lap course.
    - e. Call out the time as the subject finishes.

4. The minimum sex and age adjusted times (indicating a minimum VO<sub>2</sub> of 35) are:

<u>AGE</u>	<u>WOMEN'S TIMES</u>	<u>MEN'S TIMES</u>
20-29	14:55	12:18
30-39	15:26	12:51
40-49	16:27	13:53
50-59	17:24	14:55

B. 1 Mile Walk\*

1. Inactive individuals should precede the test with at least six to eight weeks of regular moderate aerobic exercise, such as swimming, walking, biking, or aerobic dancing.
2. Environment
  - a. This test should be administered in reasonable weather. The test is intended to get an accurate picture of a subject's health and fitness, not to jeopardize him or her by testing in excessive heat, cold, wind or humidity.
  - b. Walking tests should not be conducted if the actual course temperature is below 32 degrees or above 90 degrees Fahrenheit.
3. Procedures
  - a. The course should be smooth, level and accurately measured.
  - b. Before beginning, prepare an "Aerobic Fitness Evaluation Form" for the subject. The subject's sex, age, and weight are required.
  - c. The subject should be well rested. Encourage a warm-up, including flexibility and stretching exercises.
  - d. The subject should walk the course as fast as possible, but at a steady pace.
  - e. During the walk, the test administrator should advise the subject of the distance covered.
  - f. The test administrator should call out the time as the subject finishes.
  - g. The subject should measure his or her heart rate immediately upon completion of the course.
4. Use the accompanying tables to calculate the subject's VO<sub>2</sub>. As for the previous tests, the minimum acceptable score is 35.

C. U.S. Forest Service Field Test

1. Applicability
  - a. The Field Test is a work capacity test used to qualify an individual for moderate firefighting duty.
  - b. A moderate level of duty for firefighting requires "complete control of physical faculties and may include considerable walking, standing, and lifting 25-50 pounds."\*\* This roughly corresponds to the anticipated work load for a Search Team Member in Maine.

2. Environment
  - a. This test should be administered in reasonable weather. The test is intended to get an accurate picture of a subject's health and fitness, not to jeopardize him or her by testing in excessive heat, cold, wind or humidity.
  - b. Walking tests should not be conducted if the actual course temperature is below 32 degrees or above 90 degrees Fahrenheit.
  - c. The test shall take place on a level 2 mile course.
3. Preparation
  - a. Inactive individuals should begin training for the test at least four to six weeks beforehand.
  - b. The individual taking the test shall wear shoes or boots "that will cover and protect feet and ankles while testing."
  - c. The individual taking the test should wear comfortable clothing.
4. Procedures
  - a. The subject should be well rested. A warm-up, including flexibility and stretching exercises, is suggested before beginning the test.
  - b. The subject shall bring his or her own pack. "Packs will be weighed before and after testing."
  - c. "No jogging or running is permitted."
  - d. The test administrator shall call out the time as the subject finishes.
  - e. "The test is Pass/Fail only."
5. To pass the Field Test the individual must walk the course in 30 minutes or less while wearing a 25-pound pack.

\* These evaluation techniques and the rationale for their use are taken from the National Park Service document NPS-57, Release No. 1, November 1992: Chapter 6, page 1, Part A, Sections 1 & 2; Chapter 7, pages 1-4; page 1 of Exhibits 2-4.

\*\* The words in quotes are from the U.S. Forest Service brochure "The Pack Test", stock number FS-617, printed February 1998.

Predicted Maximum Oxygen Consumption - 1 Mile Walk Test

A	Heart Rate										
Time	90	100	110	120	130	140	150	160	170	180	190
9:00	3.0	2.9	2.8	2.7	2.6	2.5	2.3	2.2	2.1	2.0	1.9
9:20	3.0	2.8	2.7	2.6	2.5	2.4	2.3	2.1	2.0	1.9	1.8
9:40	2.9	2.8	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.8	1.7
10:00	2.8	2.7	2.6	2.5	2.3	2.2	2.1	2.0	1.9	1.8	1.7
10:20	2.7	2.6	2.5	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6
10:40	2.7	2.5	2.4	2.3	2.2	2.1	2.0	1.8	1.7	1.6	1.5
11:00	2.6	2.5	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.5	1.4
11:20	2.5	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4
11:40	2.4	2.3	2.2	2.1	2.0	1.9	1.7	1.6	1.5	1.4	1.3
12:00	2.4	2.2	2.1	2.0	1.9	1.8	1.7	1.5	1.4	1.3	1.2
12:20	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.2	1.1
12:40	2.2	2.1	2.0	1.9	1.7	1.6	1.5	1.4	1.3	1.2	1.1
13:00	2.1	2.0	1.9	1.8	1.7	1.6	1.4	1.3	1.2	1.1	1.0
13:20	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.2	1.1	1.0	0.9
13:40	2.0	1.9	1.7	1.6	1.5	1.4	1.3	1.2	1.1	0.9	0.8
14:00	1.9	1.8	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.9	0.8
14:20	1.8	1.7	1.6	1.5	1.4	1.3	1.1	1.0	0.9	0.8	0.7
14:40	1.8	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.8	0.7	0.6
15:00	1.7	1.6	1.5	1.3	1.2	1.1	1.0	0.9	0.8	0.6	0.5
15:20	1.6	1.5	1.4	1.3	1.1	1.0	0.9	0.8	0.7	0.6	0.5
15:40	1.5	1.4	1.3	1.2	1.1	1.0	0.8	0.7	0.6	0.5	0.4
16:00	1.5	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.5	0.4	0.3
16:20	1.4	1.3	1.2	1.0	0.9	0.8	0.7	0.6	0.5	0.3	0.2
16:40	1.3	1.2	1.1	1.0	0.8	0.7	0.6	0.5	0.4	0.3	0.2
17:00	1.2	1.1	1.0	0.9	0.8	0.7	0.5	0.4	0.3	0.2	0.1
17:20	1.2	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.2	0.1	0.0
17:40	1.1	1.0	0.9	0.7	0.6	0.5	0.4	0.3	0.2	0.0	
18:00	1.0	0.9	0.8	0.7	0.5	0.4	0.3	0.2	0.1	0.0	
18:20	0.9	0.8	0.7	0.6	0.5	0.4	0.2	0.1	0.0		
18:40	0.9	0.7	0.6	0.5	0.4	0.3	0.2	0.1			
19:00	0.8	0.7	0.6	0.4	0.3	0.2	0.1	0.0			
19:20	0.7	0.6	0.5	0.4	0.3	0.1	0.0				
19:40	0.6	0.5	0.4	0.3	0.2	0.1					

**Instructions:**

- Step 1: Find the intercept of your time and heart rate from chart A and enter the value in box "A" below.
- Step 2: Find the adjustment value closest to your weight (row B) and enter in box "B".
- Step 3: Find the adjustment value closest to your age (row C) and enter in box "C".
- Step 4: Add the adjustment of 0.6 liters if you are a male and enter in box "D".
- Step 5: The total of boxes "A", "B", "C", and "D" is your Max VO<sub>2</sub>, in liters/minute.

Box A: From Chart	
Box B: Weight Adj.	
Box C: Age Adj.	
Box D: Sex Adj.	
Box E: Max VO <sub>2</sub> Liters/Min.	

To calculate your VO<sub>2</sub>MAX score in milliliters of oxygen per kilogram of body weight, you must multiply the answers in Box "E" by 1000, (to change it from liters to milliliters) and divide that value by your weight in kilograms.

See Table 40 to change pounds into kilograms. (1 kilogram = 2.2046 pounds).

Adjustments: Add Weight + Age + Sex for your score in Liters/minute

Row B	Weight:	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250
B	Adjustment:	0.0	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4

Row C	Age:	20	25	30	35	40	45	50	55	60	65	70
C	Adjustment:	1.3	1.2	1.0	0.9	0.8	0.6	0.5	0.4	0.3	0.1	0.0

Row D	Sex:	Male	Female
D	Adjustment:	0.6	0.0

**KILOGRAMS / POUNDS CONVERSION**

<b>KG</b>	<b>LBS</b>	<b>KG</b>	<b>LBS</b>	<b>KG</b>	<b>LBS</b>	<b>KG</b>	<b>LBS</b>	<b>KG</b>	<b>LBS</b>	<b>KG</b>	<b>LBS</b>
50	110	63	138	75	166	88	194	101	222	113	250
50	111	63	139	76	167	88	195	101	223	114	251
51	112	64	140	76	168	89	196	102	224	114	252
51	113	64	141	77	169	89	197	102	225	115	253
52	114	64	142	77	170	90	198	103	226	115	254
52	115	65	143	78	171	90	199	103	227	116	255
53	116	65	144	78	172	91	200	103	228	116	256
53	117	66	145	78	173	91	201	104	229	117	257
54	118	66	146	79	174	92	202	104	230	117	258
54	119	67	147	79	175	92	203	105	231	117	259
54	120	67	148	80	176	93	204	105	232	118	260
55	121	68	149	80	177	93	205	106	233	118	261
55	122	68	150	81	178	93	206	106	234	119	262
56	123	68	151	81	179	94	207	107	235	119	263
56	124	69	152	82	180	94	208	107	236	120	264
57	125	69	153	82	181	95	209	108	237	120	265
57	126	70	154	83	182	95	210	108	238	121	266
58	127	70	155	83	183	96	211	108	239	121	267
58	128	71	156	83	184	96	212	109	240	122	268
59	129	71	157	84	185	97	213	109	241	122	269
59	130	72	158	84	186	97	214	110	242	122	270
59	131	72	159	85	187	98	215	110	243	123	271
60	132	73	160	85	188	98	216	111	244	123	272
60	133	73	161	86	189	98	217	111	245	124	273
61	134	73	162	86	190	99	218	112	246	124	274