



MEDICAL FITNESS STANDARDS FOR NON-NUCLEAR RESPONSE FORCE PROGRAM SUPPORT PERSONNEL WITH FIREARMS AND AMMUNITION RELATED DUTIES

Ronald A. Davidson, MD
Turning Stone Medical (TSM) Inc.



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SUPPORT PERSONNEL WITH FIREARMS AND
AMMUNITION RELATED DUTIES**

Prepared by:
Ronald A. Davidson, MD
Turning Stone Medical (TSM) Inc.

Prepared for:
The Canadian Nuclear Safety Commission

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EXECUTIVE SUMMARY

Establishing medical, physical, and psychological employment fitness standards is vital to most occupational health and safety programs and is required under legislation in most Canadian jurisdictions. In October 2008, the Canadian Nuclear Safety Commission (CNSC) approved *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness*, which applied to all Nuclear Security Officers, including Nuclear Response Force personnel. However, RD-363 did not include non-Nuclear Response Force program support groups – such as armourers, instructor/trainers, and controlling authorities – who also perform firearms and ammunition related duties.

The primary objective of this report is to establish minimum medical fitness standards for non-Nuclear Response Force program support groups that will ensure job safety while at the same time preserve optimum productivity. Secondary objectives of the report are to recommend improvements to the current medical evaluation and selection process (if warranted), to make recommendations regarding the scope and periodicity of medical re-evaluation, and to assess the necessity for establishing specific physical and psychological fitness standards for non-Nuclear Response Force program support groups.

Representatives of several non-Nuclear Response Force program support groups at Ontario Power Generation, Bruce Power, and Atomic Energy of Canada Laboratories were interviewed and preliminary workplace analyses were completed to identify essential tasks likely to be impacted by decrements in medical fitness. A comprehensive literature review was then conducted to compare these findings to published medical standards from other national and international organizations having workers employed in similar roles. Once completed, a consensus list of recommended minimum medical standards for non-Nuclear Response Force program support groups was compiled.

A template for a Medical Examination Report for examining physicians was created to help improve the comprehensiveness, quality, and transfer of medical information between examining physicians and Company medical support teams. The Medical Examination Report included three sections: Part A – Past Medical Issues, with two sub-sections, Personal Medical History and Family Medical History; Part B – Current Medical Issues, with three sub-sections, Functional Review, Immunizations and Supplements, and Lifestyle Review; and Part C – Physician Contact, with three sub-sections, Personal Metrics, Physical Examination, and Ancillary Testing. Once completed, the Medical Examination Report will be used to standardize the medical information provided to Company medical support teams who will then render a final decision on medical fitness to Company management. Medical documentation will be retained at the medical clinic and accessed only by medical staff on an as required basis.

Finally, the requirement for specific physical and psychological fitness testing for non-Nuclear Response Force support groups, similar to that outlined in *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness*, was assessed and recommendations were provided.

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INTRODUCTION

Establishing medical, physical, and psychological employment fitness standards is vital to most occupational health and safety programs and is required under legislation in most Canadian jurisdictions. The primary objective of this report is to determine the minimum medical fitness standards for non-Nuclear Response Force program support groups that will ensure job safety while at the same time preserving optimum productivity. Failure to realize this goal could lead to excessive manpower, productivity, and litigation costs. The Canadian Charter of Rights and Freedoms (1982), the Canadian Human Rights Act (1985), the Employment Equity Act (1995), and other provincial and territorial regulations all compel employers to find that nexus where job safety and productivity intersect.

Medical standards are usually implemented by way of physical examination and ancillary testing, but unless there is a standardized approach to the examination, the utility of this process may be undermined. If the examination process is unfocussed and arbitrary, the results may fall short of the goal of matching the 'right' employee to the 'right' job. For this reason, it is important that any medical evaluation process be comprehensive, standardized and consistent with the intent of the exercise.

BACKGROUND

In December 2006, the Governor in Council amended Nuclear Security Regulations (2000), pursuant to the Nuclear Safety and Control Act (1997). These regulations provided direction to licensees with respect to medical, physical, and psychological fitness of Nuclear Security personnel. The cited regulations specify that a licensee shall obtain from the person:

- A certificate, signed by a duly qualified medical practitioner, certifying that the person does not have a medical condition that would prevent them from performing the tasks that are likely to be assigned by the licensee.
- A certificate, signed by a fitness consultant recognized by the Canadian Society of Exercise Physiology, or a person with equivalent, certifying that the person is physically able to perform tasks that are likely to be assigned by the licensee.
- A certificate, signed by a duly qualified psychologist, certifying that the person is psychologically able to perform tasks likely to be assigned by the licensee.

In October 2008, the Canadian Nuclear Safety Commission (CNSC) approved *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness (2008)*, which applied to all Nuclear Security Officers, including Nuclear Response Force (NRF) personnel. However, RD-363 did not include support groups – such as armourers, instructor/trainers, and controlling authorities – who also perform firearms and ammunition related duties.

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STUDY OBJECTIVES

The objectives of this study were as follows:

- To establish the minimum medical fitness standards for non-Nuclear Response Force (non-NRF) program support groups that will ensure job safety while at the same time preserving optimum productivity.
- To recommend improvements to the current medical evaluation and selection process to improve the comprehensiveness, quality, and transfer of medical information to Company medical support teams (if warranted).
- To make recommendations regarding the scope and periodicity for medical re-evaluation for non-NRF program support groups.
- To assess the requirement for mandated physical and psychological fitness testing for non-NRF support personnel, similar to that outlined in *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness*.

STUDY METHODOLOGY

The study methodology was as follows:

- Conduct on-site visits to Ontario Power Generation, Bruce Power, and Atomic Energy of Canada Laboratories to interview representatives of three non-NRF program support groups – armourers, instructor/trainers, and controlling authorities – and perform workplace analyses on all groups to help identify essential tasks that are likely to be impacted by decrements in medical fitness.
- Conduct interviews with Company medical support teams from all three facilities to gather information on the medical evaluation and selection process currently used to evaluate and monitor medical fitness of non-NRF program support groups and suggest options for improving the process.
- Review *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness*, Job Identification Data Sheets for non-NRF program support groups, existing CNSC regulations, documents and standards, to help identify essential tasks likely to be impacted by decrements in medical fitness.
- Conduct a comprehensive literature review to compare the findings identified through interviews and workplace analyses with published medical standards from other national and international organizations having workers employed in similar roles and then tabulate the results.

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- Review the published literature once again to compare the recommended scope and periodicity of medical re-evaluation for personnel from other national and international organizations employed in similar roles.
- Create a template for a Medical Examination Report (MER) for examining physicians to help improve the comprehensiveness, quality, and transfer of medical information between examining physicians and Company medical support teams. The MER will include three sections: Part A – Past Medical Issues, with two sub-sections, Personal Medical History and Family Medical History; Part B – Current Medical Issues, with three sub-sections, Functional Review, Immunizations and Supplements, and Lifestyle Review; and Part C – Physician Contact, with three sub-sections, Personal Metrics, Physical Examination, and Ancillary Testing. Once completed, the MER will be used to standardize the medical information provided to Company medical support teams who will then render a final decision on medical fitness to Company management. Medical documentation will be retained at the medical clinic and accessed only by medical staff on an as required basis.
- Review the protocols used to assess physical and psychological fitness for NRF personnel as published in *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness* and determine their applicability for non-NRF program support groups.

STUDY RESULTS

The study results were organized into three sections: Job Identification Data Sheets, On-Site Interviews and Workplace Analyses, and Literature Review.

Job Identification Sheets

In addition to NRF personnel, most high-security Canadian nuclear facilities also employ several groups of non-NRF program support personnel who also perform firearms and ammunition related duties. While the risk of intentional or unintentional firearm injuries may be reduced for non-NRF program support groups, the common denominator for all who work in the nuclear security arena is the potentially serious consequences that may result from firearms mishaps. The Job Identification Data Sheets for all non-NRF program support groups include many of the following essential tasks:

- Inspect, repair, overhaul, modify and preserve firearms and related ancillary equipment such as optical devices.
- Demonstrate proficiency in the safe handling, use and maintenance of the primary firearm.
- Research, test, and evaluate new weapon systems, ammunition and related equipment.

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- Provide technical advice on matters pertaining to firearms and ammunition.
- Load, store, and organize ammunition and transport ammunition and ancillary equipment to and from the range.
- Develop range control functions, including design, templates, access control and ammunition control.
- Design, develop, and deliver firearms training to NRF personnel.
- Conduct technical investigations of firearms and ammunition related incidents and report failures with suggestions for remedial action.

A preliminary review of the above listed essential tasks and duties suggest that safe and productive non-NRF program support groups will require strong executive functioning and decision-making abilities, good hand-eye coordination and manual dexterity, good vision and hearing ability (especially near and colour vision), and freedom from any effort-limiting cardiovascular, respiratory or musculoskeletal diseases or injuries.

On-Site Interviews and Workplace Analyses

In total, fifteen non-NRF program support personnel and Company medical support personnel were interviewed and seven workplaces were analyzed. Of the fifteen non-NRF program support interviewees, four were armourers, three were instructor/trainers, three were controlling authorities (managers), four were Company medical support personnel, and one was a security officer.

The results of the interviews and workplace analyses supported the preliminary observations based on the Job Identification Data Sheets and led to the selection of the following five areas or systems where a decrement in medical fitness below a yet-to-be-determined threshold was likely to negatively impact on job safety and productivity:

1. Vision (including distant and near vision, colour vision, depth perception, and peripheral vision)
2. Hearing
3. Cardiovascular
4. Respiratory
5. Musculoskeletal

While there were several differences in the essential tasks mandated for each non-NRF program support group, access to firearms and ammunition was a common thread for each and, for that reason, similar medical standards across all non-NRF program support groups were supported.

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Literature Review

Fifteen national and international organizations published job descriptions similar to the non-NRF program support groups. Medical fitness standards were compared for the five areas or systems identified during the interview and workplace analysis stage of the report. Not surprisingly, most of the organizations were involved with nuclear security, law enforcement, border patrol services, or the military. Of the fifteen organizations studied, only eight published standards or job descriptions that were complete and clear enough to enable valid comparisons. Data for the remaining organizations was discarded. In the end, medical standards for the following organizations were selected for comparison with non-NRF program support groups.

1. Ontario Association Chiefs of Police Constable Selection System (2006)
2. Royal Canadian Mounted Police (2011)
3. Canadian Armed Forces – Military Weapons Technician (2013)
4. Canadian Armed Forces – Military Ammunition Technician (2013)
5. United States Nuclear Regulatory Commission (2013)
6. United States Department of Energy (2006)
7. United States Department of the Interior (1998)
8. United States Department of Homeland Security (2008)

It should be noted that, as mandated in *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness*, all Nuclear Security Officers, including NRF personnel, are obliged to follow the guidance provided in the Ontario Association of Chiefs of Police documents entitled, *Constable Selection System – Guidelines for Examining Physicians, Guidelines for Examining Ophthalmologists/Optometrists, and Hearing Performance Standard*.

Medical fitness standards for each of the selected organizations can be found in Table 1.

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Table 1: Summary of medical standards from national and international security organizations

Organization	Distant Vision	Near Vision	Colour Vision	Depth Perception and Peripheral Vision	Hearing	Cardiovascular	Respiratory	Musculoskeletal
Ontario Association of Chiefs of Police (Law Enforcement)	Uncorrected vision: 6/12 (20/40) both eyes open. Corrected vision: 6/6 (20/20) both eyes open.	No published near vision standard	Ishihara to screen and successful Farnsworth D-15 if fails Ishihara	Depth Perception: Stereo acuity of 80 seconds of arc or better Peripheral Vision: Temporal (0° meridian): 75°	Unaided criteria 1A: ≤ 40 dB HL at 500, 1000, 2000, and 3000 Hz each ear and ≤ 55 dB HL at 4000 Hz each ear	Any heart condition requires consideration for risk of sudden incapacitation. OCSS uses CMA document 'Determining Fitness to Drive' for guidance	'Physical Readiness Evaluation for Police' test used to screen most chronic conditions. Less predictable disease considered after period of satisfactory control.	No specific disqualifying conditions stated. Satisfactory performance on 'Physical Readiness Evaluation for Police' test used to determine musculoskeletal fitness.
Royal Canadian Mounted Police (Law Enforcement)	Uncorrected vision: At least 6/18 (20/60) either eye or 6/12 (20/40) better eye and 6/30 (20/100) worse eye. Corrected vision: 6/6 (20/20) better eye and 6/9 (20/30) worse eye.	No published near vision standard	Ishihara for screening and successful Farnsworth D-15 if fails Ishihara plates	Depth Perception: Stereo acuity of 100 seconds of arc or better Peripheral Vision: No published peripheral vision standard	HL no greater than 30 dB in better ear at 500, 1000, 2000, and 3000 Hz and HL no greater than 30 dB in worst ear at 500 to 2900 Hz range and no greater than 50 dB in worst ear at 3000 Hz.	No specific disqualifying cardiovascular conditions stated. Functionality rather than disease is used to determine fitness. Some conditions do need review such as angina, post-op CAD, valvular disease, cardiomyopathy, etc.	No specific disqualifying respiratory conditions stated. Functionality rather than disease used to determine fitness. Some conditions do need review such as COPD, asthma, bronchitis, emphysema, chest wall disease, etc.	No specific disqualifying musculoskeletal conditions stated. Functionality rather than disease used to determine fitness. Some conditions do need review such as arthritis, RA, AIDS, chronic low back or knee pain, etc.
Canadian Armed Forces – Weapons Technician (Army Expeditionary Function)	Uncorrected vision: No worse than 6/60 (20/200) better eye; no worse than 6/60 (20/200) other eye. Corrected vision: 6/9 (20/30) better eye and 6/60 (20/200) other eye.	Uncorrected near vision: No standard either eye. Corrected near vision: N6 at 30-50 cm better eye, N36 at 30-50 cm other eye.	Ishihara for screening and successful Farnsworth D-15 if fails Ishihara plates	Depth Perception: No published depth perception standard Peripheral Vision: No published peripheral vision standard	Member requires necessary auditory acuity to hear sounds of less than or equal to 50 dB in either ear in the 500 to 3000 Hz frequency range.	No specific disqualifying cardiovascular conditions stated. Functionality rather than disease is used to determine fitness. Some conditions do need review such as angina, post-op CAD, valvular disease, cardiomyopathy, etc.	No specific disqualifying respiratory conditions stated. Functionality rather than disease used to determine fitness. Some conditions do need review such as COPD, asthma, bronchitis, emphysema, chest wall disease, etc.	No specific disqualifying musculoskeletal conditions stated. Functionality rather than disease used to determine fitness. Some conditions do need review such as arthritis, RA, AIDS, chronic low back or knee pain, etc.
Canadian Armed Forces – Ammunition Technician (Army Expeditionary Function)	Uncorrected vision: No worse than 6/60 (20/200) better eye; no worse than 6/60 (20/200) other eye. Corrected vision: 6/9 (20/30) better eye and 6/60 (20/200) other eye.	Uncorrected near vision: No standard either eye. Corrected near vision: N6 at 30-50 cm better eye, N36 at 30-50 cm other eye.	Must pass Ishihara plates	Depth Perception: No published depth perception standard Peripheral Vision: No published peripheral vision standard	Member requires necessary auditory acuity to hear sounds of less than or equal to 50 dB in either ear in the 500 to 3000 Hz frequency range.	No specific disqualifying cardiovascular conditions stated. Functionality rather than disease is used to determine fitness. Some conditions do need review such as angina, post-op CAD, valvular disease, cardiomyopathy, etc.	No specific disqualifying respiratory conditions stated. Functionality rather than disease used to determine fitness. Some conditions do need review such as COPD, asthma, bronchitis, emphysema, chest wall disease, etc.	No specific disqualifying musculoskeletal conditions stated. Functionality rather than disease used to determine fitness. Some conditions do need review such as arthritis, RA, AIDS, chronic low back or knee pain, etc.

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Table 1: Summary of medical standards from national and international security organizations (cont.)

Organization	Distant Vision	Near Vision	Colour Vision	Depth Perception and Peripheral Vision	Hearing	Cardiovascular	Respiratory	Musculoskeletal
United States Nuclear Regulatory Commission (Nuclear Security)	Uncorrected vision: At least 6/12 (20/40) better eye or must carry extra pair of corrective lenses. Corrected vision: At least 6/9 (20/30) better eye and 6/12 (20/40) worst eye with eyeglasses or contact lenses.	Uncorrected or corrected near vision acuity shall be at least 20/40 in the better eye.	Able to distinguish red, green, and yellow colors.	Depth Perception: Peripheral Vision: Temporal (0° meridian): 70° both eyes.	Hearing loss no greater than 30 dB average at 500 to 2000 Hz with no single frequency greater than 40 Hz.	Individuals shall have no medical history of cardiovascular disease or, where a condition exists, the individual shall provide medical evidence that the condition can be controlled with proper medication.	Individuals shall have no medical history of respiratory disease or, where such a condition exists, the individual shall provide medical evidence that the condition can be controlled with proper medication.	Individuals shall have no medical history of musculoskeletal disease or, where such a condition exists, the individual shall provide medical evidence that the condition can be controlled with proper medication.
United States Department of Energy (Nuclear Security)	Uncorrected vision: At least 6/60 (20/200) in better eye. Corrected vision: 6/9 (20/30) in better eye and 6/12 (20/40) in other eye.	Correctable to 6/12 (20/40) in better eye.	Able to distinguish red, green, and yellow colors.	Depth Perception: Peripheral Vision: Temporal (0° meridian): 70° both eyes	Hearing loss no greater than 30 dB in better ear at 500, 1000, 2000, and 3000 Hz.	Must have capacity for exertion during emergencies. If examination reveals arrhythmias, high blood pressure, enlargement, etc., specialist evaluation is warranted.	Capacity to perform physical exertion in emergencies, and ability to utilize respiratory protective filters and air supply masks when emergency equipment required.	Normal symmetrical structure, range of motion, and power.
United States Department of the Interior (Law Enforcement)	Uncorrected vision: Equal or better than 6/30 (20/100) in each eye	Must be correctable to 6/9 (20/30) with both eyes.	Ishihara for screening and successful Farnsworth D-15 if fails Ishihara plates	Depth Perception: Peripheral Vision: Temporal (0° meridian): 70-85° both eyes.	Hearing no greater than 30 dB at 500, 1000, and 2000 Hz in either ear, and no greater than 40dB at 3000Hz in either ear.	Applicant or incumbent must have a cardiovascular system that is sufficient for the individual to safely and efficiently carry out the requirements of the job.	Applicant or incumbent must have a respiratory system that is sufficient for the individual to safely and efficiently carry out the requirements of the job.	Must have a musculoskeletal system sufficient to safely and efficiently carry out duties. Any condition that affects individual's range of motion, flexibility, strength, dexterity, or coordination requires review.
United States Department of Homeland Security (Law Enforcement)	Uncorrected vision: At least 6/30 (20/100) in each eye. Corrected vision: At least 6/6 (20/20) in each eye.	No published near vision standard.	Must be able to distinguish basic colors by Ishihara plate test missing no more than four plates.	Depth Perception: Peripheral Vision: Normal peripheral vision.	Hearing loss no greater than 30 dB in either ear at 500, 1000, and 2000 Hz and no more than 40 dB at 3000 Hz.	Individual must be free of any impairment and free of any existing health problem that would be aggravated in response to the work duties or that would affect the safe performance of the position's duties.	Individual must be free of any impairment and free of any existing health problem that would be aggravated in response to the work duties or that would affect the safe performance of the position's duties.	Individual must be free of any impairment and free of any existing health problem that would be aggravated in response to the work duties or that would affect the safe performance of the position's duties.

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DISCUSSION

At the most recent International Atomic Energy Agency (IAEA) summit in The Hague, the IAEA Director General Yukiya Amano praised all 162-member states for placing the protection of nuclear and other radioactive material from malicious acts, high on the international agenda. However, he continued, too much nuclear material still goes missing, too many facilities are still inadequately protected, border security remains lax in too many places, and attempts are still being made to acquire nuclear or other radioactive material with malicious intent. The threat of nuclear terrorism remains real (Amano, 2014).

At the same IAEA summit, Prime Minister Stephen Harper renewed Canada's strong commitment to act along with its partners to combat all forms of nuclear terrorism and has pledged an additional \$28M to support the efforts (Do, 2014).

All personnel working in the nuclear security arena, whether they are NRF personnel or non-NRF program support personnel (or others) should have appropriate medical, physical, and psychological employment fitness standards consistent with their job requirements. As stated previously, while essential job requirements within each non-NRF program support group may differ somewhat, the common denominator among the groups is access to firearms and ammunition and, for that reason, like their NRF counterparts, all non-NRF program support groups require reasonable, defensible, and job specific medical fitness standards that ensure job safety and optimize productivity.

Distant Vision

Distant vision is measured using a Snellen chart, a chart containing block characters arranged in rows with the larger characters appearing at the top. The test subject is positioned 6 metres (20 feet) away from the chart and asked to read the characters starting at the top of the chart. When the test subject can no longer correctly identify characters, the test is halted and progress is converted to the 6/6 (20/20) nomenclature.

With 6/6 (20/20) vision, a test subject can see at 6 metres (20 feet) what a person with normal vision can see at 6 metres (20 feet). With 6/12 (20/40) vision, a test subject has to be at 6 metres (20 feet) to see what a person with normal vision can see at 12 metres (40 feet), and so on. For this report all numbers have been converted to the 6/6 metric equivalent and both systems appear side by side.

Whether corrected or uncorrected, good distant vision is important for both NRF and non-NRF program support groups; however, when a non-NRF program support group individual requires corrective lenses to achieve good vision, his uncorrected vision standard can be relaxed. This reduced uncorrected vision standard for non-NRF program support groups is based on the reduced risk of physical altercation where corrective lenses may be dislodged and a member's ability to defend himself, or protect others, may be compromised. For the non-NRF program support group member the loss of corrective lenses is unlikely to result in the same serious consequences as with the NRF member.

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In a landmark study, Goldberg and Spilberg (2004) conducted a meta-analysis on the work of several authors looking at the significance of distant visual acuity on critical task performance. The results for weapon identification revealed that with 6/6 (20/20) vision, in good light conditions, subjects could consistently identify weapons at distances up to 25 yards. But with 6/12 (20/40) vision, in good light, subjects could only consistently identify weapons at 7 yards, with an error rate of 14 percent at 15 yards. At 6/24 (20/80) vision, in good light, subjects could inconsistently identify weapons at 7 yards with an error rate of 8 percent that increased to 22 percent at 15 yards. The study also looked at facial identification and found that with 6/6 (20/20) vision, subjects could identify faces at 14 yards with an accuracy rate of 50 percent. With 6/15 (20/50) vision, the 50 percent accuracy rate was achieved at 4.4 yards. This is a significant study that illustrates the importance of near-normal distant vision for any type of security-related work.

The complete meta-analysis appears in Table 2.

Table 2: Critical task performance versus distant acuity as determined by decorrection studies

VISUAL ACUITY	CRITICAL TASK PERFORMANCE
6/6 (20/20)	<ul style="list-style-type: none"> In good light, can consistently identify weapons at distances of up to 25 yards (Giannoni, 1981) In low light, will identify weapons correctly at 7 yards with an error rate of 5-15% (Good and Augsburger, 1987) Under night conditions, from 5-7 feet can detect whether an individual is holding an object with 100% accuracy and can identify object with 75% accuracy (Johnson and Brintz, 1993) Facial identification with 50% accuracy at 14 yards (Bullimore, et al., 1991) License plate identification at 100 feet or 6 car lengths (Sheedy, 1980)
6/9 (20/30)	<ul style="list-style-type: none"> “Reliable” facial identification at 7 yards; 50% accuracy at 8 yards (Bullimore, et al., 1991)
6/12 (20/40)	<ul style="list-style-type: none"> In good light, can consistently identify weapons at 7 yards, but error rate of 14% at 15 yards (Giannoni, 1981) In low light, can identify weapons at 7 yards with an error rate of 25% (Good and Augsburger, 1987) Legal limit for driving any vehicle License plate identification at 50 feet (3 car lengths) (Sheedy, 1980) Facial identification is “questionable” at 7 yards; 50% accuracy at 6 yards (Bullimore, et al., 1991)
6/15 (20/50)	<ul style="list-style-type: none"> In low light, will misidentify weapons at 7 yards with an average error rate of >25% (Good and Augsburger, 1987) Cannot legally drive Faces are “homogeneous” at 7 yards; 50% accuracy at 4.4 yards (Bullimore, et al., 1991)
6/18 (20/60)	<ul style="list-style-type: none"> Under night conditions, from 5-7 feet can detect whether an individual is holding an object with 80% accuracy and can identify object with 40% accuracy (Johnson and Brintz, 1993)
6/24 (20/80)	<ul style="list-style-type: none"> In good light, can identify weapons at 7 yards with error rate of 8%; 22% error at 15 yards (Giannoni, 1981) In low light, will misidentify weapons at 7 yards with an average error rate of >30% (Good and Augsburger, 1987) Facial identification possible with 50% accuracy only at 2.5 yards (Bullimore, et al., 1991) License plate identification at 25 feet (Sheedy, 1980)
6/30 (20/100)	<ul style="list-style-type: none"> Under night conditions, from 5-7 feet, can detect whether an individual is holding an object with 80% accuracy and can identify object with 25% accuracy (Johnson and Brintz, 1993)
6/60 (20/200)	<ul style="list-style-type: none"> In good light, can identify weapons at 7 yards with error rate of 17%; 39% error at 15 yards (Giannoni, 1981) In low light, identifying weapons at 7 yards will be no better than guessing (Good and Augsburger, 1987) Under night conditions, from 5-7 feet, can detect whether an individual is holding an object with 60% accuracy and can identify object with less than 10% accuracy (Johnson and Brintz, 1993) Facial identification is impossible beyond an arm’s length (Bullimore, et al., 1991) License plate identification impossible at >10 feet (Sheedy, 1980) Legal blindness as defined by the Social Security Administration and the IRS

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As discussed previously, the Ontario Association of Chiefs of Police documents entitled, *Constable Selection System – Guidelines for Examining Physicians, Guidelines for Examining Ophthalmologists/Optometrists, and Hearing Performance Standard* are used by the NRF group and for contextual reasons it may be useful to compare NRF medical standards with the proposed non-NRF program support group standards. Therefore, NRF standards will appear in parenthesis after each recommended non-NRF program support group standard. It should be remembered, however, that all standards recommended for the non-NRF program support groups are based on a consensus of the eight organizations studied along with consideration for any differences among essential task requirements for each organization.

After due consideration for the critical task requirements of the non-NRF program support groups, and after comparison with the other organizations studied, the recommended minimal distant vision standard for the non-NRF program support groups is:

- Uncorrected distant vision equal or better than 6/60 (20/200) in each eye (NRF: uncorrected distant vision of at least 6/12 (20/40) with both eyes open)
- Corrected distant vision equal or better than 6/9 (20/30) in the better eye and no worse than 6/12 (20/40) in the other eye (NRF: corrected distant vision of at least 6/6 (20/20) with both eyes open)

Near Vision

Near vision is defined as the ability to see objects and fine detail clearly at a distance of 36 inches or less. Near vision presents a critical challenge for non-NRF program support groups – at least for armourers – since many of their essential tasks involve close-up work with small pieces of firearms equipment. For these groups, good near vision pays a premium in terms of productivity and safety. However, since near vision can easily be corrected using presbyopic lenses, either as an ‘add’ to regular lenses or as a separate pair of lenses (reading glasses) for those with good distant vision, near vision shouldn’t be a disqualifying medical issue for non-NRF program support groups. This may be the reason that several of the organizations studied in this report didn’t publish near vision standards.

After due consideration for the critical task requirements of the non-NRF program support groups, and after comparison with the other organizations studied, the recommended minimal near vision standard for the non-NRF program support groups is:

- Near vision correctable to 6/12 (20/40) with both eyes (NRF: no published near vision standard)

Colour Vision

Colour discrimination is the ability to differentiate between shades of one color or between two or more different colours. Many tasks performed by non-NRF program support groups rely on normal colour vision to complete essential tasks safely and effectively. The armourer group, for example, relies heavily on colour-coded indicator lights, safety switches, and related equipment

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during the inspection, cleaning, repair, and modification of firearms. The instructor/trainer group relies on good colour vision to differentiate training OC canisters with green markings from the real canisters with red markings.

The most common form of colour deficiency is a recessive sex-linked hereditary defect that normally affects only males. About 8-10% of males and 0.4-0.8% of females are colour deficient (Steward, J.M. and Cole, B.L., 1989). Color deficiency is initially tested using pseudoisochromic plates (sometimes referred to as Ishihara plates) where the subject is asked to identify a number consisting of colored dots embedded in a background of different colored dots. If a subject passes the plate test they are considered to be normal colour vision – safe. If they fail the plate test, then further testing using the Farnsworth D-15 colour vision test is required. If a member then passes the Farnsworth D-15, they are said to be abnormal colour vision – safe, meaning that they should be able to complete all required tasks safely. If the member fails the plate test and the Farnsworth D-15, he is said to be abnormal colour vision – unsafe and should be disqualified.

While there were slight discrepancies in colour vision standards across the organizations studied, there was clear consensus by all that mild deficits in colour vision could be tolerated for those not possessing normal colour vision.

After due consideration for the critical task requirements of the non-NRF program support groups, and after comparison with the other organizations studied, the recommended minimal colour vision standard for the non-NRF program support groups is:

- Abnormal colour vision – safe (NRF: abnormal colour vision – safe)

Depth Perception

Depth perception is the ability of the human eye to see in three dimensions (3D) and judge the distance of an object. It takes both eyes working in sync to look at an object and develop an informed idea about the object, such as its size or how far away it is. The two eyes view an object from different angles and that information is processed in the brain to form a single image. Over time, individuals with monocular vision can also learn to perceive depth, however, it must be achieved using monocular cues, such as relative size, interposition, linear perspective, aerial perspective, light and shade, or monocular movement parallax.

Depth perception is important for all activities of daily living. It allows us to move through life without bumping into objects or falling over them. Without some degree of depth perception, a person may have difficulty judging the distance to a flight of stairs.

Depth perception also allows a person to determine how fast an object is moving towards him. This skill is important if he is crossing the street and there are cars coming or if he is driving and wants to pass a slow car and has to go into the oncoming traffic lane to do so. Good depth perception keeps a person safe in these types of situations.

From the perspective of the non-NRF program support groups and their essential tasks, good depth perception is a necessary requirement that supports safety and productivity. There was

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broad consensus among the various organizations that depth perception is an important criterion of visual fitness and their published standards were very similar.

After due consideration for the critical task requirements of the non-NRF program support groups, and after comparison with the other organizations studied, the recommended minimal depth perception standard for the non-NRF program support groups is:

- Stereo acuity of 80 seconds of arc or better (NRF: stereo acuity of 80 seconds of arc or better)

Peripheral Vision

Peripheral vision is the ability to perceive objects, movement or sharp contrasts towards the edges of the visual field (MED-TOX, 1999). Good peripheral vision is an important visual ability for all security personnel.

Johnson, et al. (1992) tested the impact of glasses that restrict peripheral vision on the ability of corrections officers to detect suspicious behaviour by inmates gathered in a day room. Restricting the binocular horizontal field to 120 degrees in each eye had no impact, but further restriction to 60 degrees significantly impaired performance. The literature would appear to support a total horizontal binocular field standard that is not less than 120 degrees in each eye and a total vertical field standard of between 90 and 100 degrees.

Most of the selected organizations identify a specific standard for peripheral vision although our workplace analyses and literature review did not identify it as a critical limiting factor for non-NRF program support groups. The United States organizations had the most stringent peripheral vision standards while the Ontario Association of Chiefs of Police and the Royal Canadian Mounted Police had the least stringent standards. In fact, the Royal Canadian Mounted Police did not even publish a standard for peripheral vision.

After due consideration for the critical task requirements of the non-NRF program support groups, and after comparison with the other organizations studied, the recommended minimal peripheral vision standard for the non-NRF program support groups is:

- Each eye 75 degrees laterally from the 0 degree meridian (NRF: each eye 75 degrees laterally from the 0 degree meridian)

Hearing

Hearing loss is one of the commonest disabilities in Canada today and its incidence is increasing. According to Statistics Canada (2002), more than one million adults across the country reported having a hearing-related disability.

Goldberg (2004) conducted a study involving 131 officers who were asked to rate 13 hearing-related tasks for importance and frequency of occurrence in various background noise situations. The tasks were grouped into four categories: speech comprehension, sound localization, sound

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detection, and sound recognition. Tasks requiring speech comprehension, such as monitoring radio transmissions and conversing face-to-face were rated very important or important.

The complete study results can be found at Table 3.

The ability to hear, discriminate, localize and respond appropriately to a variety of speech and environmental sounds is critical to most occupations, especially when firearms are involved. It is understandable, then, that all our selected organizations adopted fairly uniform standards for hearing. Most will accept a mild degree of hearing loss, if speech comprehension, sound localization, sound detection, and sound recognition are adequate.

After due consideration for the critical task requirements of the non-NRF program support groups, and after comparison with the other organizations studied, the recommended minimal hearing standard for the non-NRF program support groups is:

- Each ear: ≤ 40 dB at each of 500, 1000, 2000, 3000 Hz and ≤ 55 dB at 4000 Hz (NRF: each ear ≤ 40 dB at each of 500, 1000, 2000, 3000 Hz and ≤ 55 dB at 4000 Hz)

Table 3: Hearing related tasks

Task	Importance of Overall Job Satisfaction	Frequency of Performance Under Specific Background Noise Conditions					
		Silence	Moderate	Loud	Very Loud		
Speech Comprehension							
Radio transmission	5.6	5.1	7.0	6.5	4.0		
Face-to-face conversations	5.2	4.9	6.5	5.5	3.1		
Conversation when speaker is not visible	4.5	2.8	3.5	3.1	2.0		
Telephone use	4.3	4.7	5.1	4.2	2.4		
Sound Localization							
While on foot	5.4	4.1	5.6	5.1	3.4		
While in patrol vehicle	5.4	4.1	5.9	5.3	3.6		
Sound Detection							
While on foot	5.4	4.4	5.8	5.2	3.3		
While in patrol vehicle	5.4	4.1	5.9	5.4	3.5		
Sound Recognition							
Identify various types of alarms	4.4	3.3	4.4	3.9	2.3		
Notice changes in sound of patrol car	4.1	3.7	5.0	4.1	2.6		
Recognize beeps signaling message from device	4.1	3.8	4.8	4.3	3.0		
Identify by sound an approaching vehicle	4.0	3.8	5.2	4.3	2.6		
Importance Scale							
Critically Important	Very Important	Important	Of Some Importance	Of Little Importance	Task Not Important		
6	5	4	3	2	1		
Frequency Scale							
More than once per day	Daily	Several times a week	Weekly	Several times a month	Monthly	Less than once a month	Task never performed
8	7	6	5	4	3	2	1

- Silence: virtually no background noise
- Moderate: muffled street sounds, running car engine, quiet conversation, etc.
- Loud: honking horns, motorcycle engines, noisy restaurant, etc.
- Very Loud: wailing sirens, large burning building, screaming mob, etc.

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Cardiovascular

Occupational duties cover the extremes from relatively quiet and routine administrative work to the high stress and extremely physical demands experienced during response to a firearms or use of force incident. While non-NRF program support personnel do not routinely engage in strenuous activities like these, there is a requirement for each individual to maintain a level of cardiovascular fitness consistent with job safety and optimum productivity.

Cardiac fitness, or aerobic capacity, refers to the maximum amount of oxygen an individual can consume within a given period of time (VO_2 max). According to Weyers (2004), the aerobic capacity needed to perform tasks such as wrestling can easily exceed 40-41 ml O_2 /kg/min. Extremely rigorous activities, such as running up an embankment or up several flights of stairs, may require an even higher degree of aerobic fitness.

Weyers (2004) further states that the amount of time a person can continuously perform work at a given oxygen requirement depends on the percentage of the person's VO_2 max needed to do the job and his or her state of conditioning. The average person can work at his or her VO_2 max for about 1-3 minutes and at 80% of his or her VO_2 max for 15-20 minutes.

Individuals with cardiovascular disease have varying degrees of aerobic capacity and must, therefore, be considered individually. Most organizations shy away from identifying specific disqualifying cardiovascular diseases, preferring instead to acknowledge that most diseases exist on a continuum from mild and controllable to severe and debilitating. Rather than list a series of disqualifying cardiovascular diseases, it is more prudent and defensible to promulgate a standard that focuses on medical employment limitations – what can and can't the member do? This is clearly the area where the physician approving the medical must have knowledge of both the member's medical problems and his physical work environment.

The Ontario Association of Chiefs of Police medical standards, in the section on cardiac diseases and disorders, acknowledges this approach and simply refers examining physicians to the Canadian Medical Association's booklet on *Determining Medical Fitness to Drive: A Guide for Physicians* (2012). This guide makes very few definitive statements about disqualifying diseases but presents itself as a guide that the physician can use along with clinical judgment to determine medical fitness.

After due consideration for the critical task requirements of the non-NRF program support groups, and after comparison with the other organizations studied, the recommended minimal cardiovascular standard for the non-NRF program support groups is:

- Must have no established cardiovascular condition that, in the opinion of the Company medical support physician, may compromise the safe and effective performance of all essential tasks and duties (NRF: similar to proposed standard for non-NRF program support groups)

For borderline cases, the option exists to conduct a physician-supervised practical trial to determine if the mandated duties can be performed safely and effectively.

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Respiratory

Respiratory fitness and cardiovascular fitness go hand in hand, but there are several specific obstructive and restrictive respiratory diseases – asthma and emphysema, for example – that can have a profound affect on exercise capacity and the ability to perform the job safely and effectively. Hyper-reactivity to the inhalation of volatile substances is always an issue for armourers and those in contact with cleaning and de-greasing solutions.

As described above, oxygen consumption at a level of approximately 42 ml O₂/kg/min. is necessary to perform activities such as wrestling, running, and extensive lifting at a level of moderate to heavy intensity. Since oxygen consumption in a life or death struggle certainly could be greater than 42 ml O₂/kg/min., this value represents a valid minimal level of fitness. Once again, low functional ability is the criteria for disqualification, not the disease process per se.

After due consideration for the critical task requirements of the non-NRF program support groups, and after comparison with the other organizations studied, the recommended minimal respiratory standard for the non-NRF program support groups is:

- Must have no established respiratory condition that, in the opinion of the Company medical support physician, may compromise the safe and effective performance of all essential tasks and duties (NRF: similar to proposed standard for non-NRF program support groups)

As described above, borderline cases may be subjected to a physician-supervised practical trial to determine if the mandated duties can be performed safely and effectively.

Musculoskeletal

Review of the Job Identification Data Sheet for armourers states that 60% of an armourers work is physical with tasks that include, but are not limited to,

- Lifting and/or carrying 10-20 kg weight 34-66% of the time;
- Pushing and/or pulling more than 20 kg weight 34-66% of the time;
- Standing at one time for more than 90 minutes;
- Bending back 34-66% of the time;
- Twisting back 30-66% of the time;
- Crouching back 30-66% of the time;
- Bending neck 34-66% of the time;

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- Reaching overhead, above shoulder, at shoulder, and below shoulder 6-33% of the time; and
- Pinch grip and power grip 34-66%.

This is but a partial list of the physical tasks assigned to the armourer group. A cursory review of the list reveals the degree of significant stress and strain placed on the musculoskeletal system during the performance of job-related duties. Members of this group should be free of disabling musculoskeletal diseases or injuries, but as described above, each case must be assessed on its own merits.

After due consideration for the critical task requirements of the non-NRF program support groups, and after comparison with the other organizations studied, the recommended minimal respiratory standard for the non-NRF program support groups is:

- Must have no established musculoskeletal condition that, in the opinion of the Company medical support physician, may compromise the safe and effective performance of all essential tasks and duties

Also, borderline cases may be subjected to a physician-supervised practical trial to determine if the mandated duties can be performed safely and effectively.

Medical standards for areas or systems not directly covered in this report are contained in Appendix A.

IMPROVING THE MEDICAL EVALUATION PROCESS

At present, prospective candidates for employment at any Canadian nuclear facility must first pass a medical examination performed by an examining physician (usually a family doctor). The physician conducts a physical examination that, in the experience of the medical support personnel interviewed, is not occupationally focused but strictly clinical in nature. There is little or no attempt to consider the health of the candidate in the context of his employment. This is not surprising since very few family physicians have training in occupational medicine. In many cases, not only is the physician unfamiliar with the candidate's work environment and mandated essential tasks, but often the candidate himself is naïve to the extremes of his prospective job.

Once the examination has been completed, the examining physician provides the candidate with an administrative medical certificate marked as either fit or unfit. The candidate then passes the certificate to Company management who will make a decision on his or her employability. Throughout this process, Company medical support staff receives little or no medical documentation. This is significant for two reasons: first, the medical process has bypassed the occupational medicine team who are in a position to offer a more accurate assessment of whether the candidate is truly fit for the job, and second, the absence of medical information makes it difficult for the Company medical support team to build a health care file for the candidate that can be used for ongoing health support. For example, a well-controlled non-insulin diabetic could conceivably have a long and healthy career, but the medical support team needs

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information about his ongoing diabetic status if they are going to optimally monitor his diabetic condition at work. This sharing of medical information between the examining physician, the Company medical support team, and the candidate is a critical part of the medical puzzle and assures that the candidate will receive optimum workplace medical support.

To help standardize the medical information and improve the transfer of valuable documentation between the examining physician and the Company medical support team, a template for a Medical Evaluation Report has been created and included as Appendix B. When the member goes for his initial or periodic medical evaluation, he completes Parts A and B and presents the MER to the examining physician. The physician then completes Part C and includes his fitness recommendation in the space provided. The completed MER is then forwarded to the Company medical support team for review. If there are issues in the MER that are unsettling, then the Company medical support team can request clarification, consultation, or evaluation before the Company physician gives a final fitness recommendation. A prime example might be a candidate with known cardiovascular disease. Many mild cardiac conditions, well controlled and appropriately monitored, can be acceptable for unrestricted duty, but unless the Company physician has access to this information, the inclination may be to declare the trained and productive worker unfit for permanent employment.

One of the most serious physician-patient issues concerns the medical confidentiality of the worker. There is legislation in Canada that prohibits the release or conveyance of confidential medical information to a third party without the written permission of the patient. Under this proposal, all completed MERs would be kept in a secure locked cabinet accessible only to medical personnel with a need to know.

SCOPE AND PERIODICITY OF MEDICAL EVALUATION

The successful implementation of the above medical evaluation process with its improved communication and data collection could pave the way for the introduction of a four-year medical examination cycle for non-NRF program support groups. To ensure safety, the two intervening years would need to be replaced by a self-administered functional review, similar to Parts A and B of Appendix B. Affirmative answers to any of the questions on the functional review could lead to further evaluation, including a complete medical examination by the examining physician.

Discussions with several medical and non-NRF program support personnel at each of the nuclear establishments, and a critical review of the available literature, support the recommendation to transition to a four-year examination cycle.

PHYSICAL AND PSYCHOLOGICAL TESTING

Physical Testing

Should the physical and psychological fitness tests prescribed for Nuclear Security Officers under *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness* become the standard for non-NRF program support personnel?

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The Canadian Nuclear Security Officer's Fitness Test (CNSFT) is a standardized physical fitness abilities assessment tool developed by Dr. Alfred Reed, at The Peak Centre for Human Performance under contract with the Canadian Nuclear Safety Commission. It is contained as an appendix to *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness*.

The test is designed to assess overall physical fitness and targets the following areas:

- Static balance in three planes of motion, proprioception, and flexibility;
- Base aerobic fitness and agility; middle aerobic fitness; and
- Core strength, grip strength, and force discrimination.

An individual rotates through a series of stations, each designed to address a target area. In order to pass the physical fitness test, the individual must obtain a pass mark at each station. The individual must complete each station in a set order. If the individual fails to pass any station, the entire test must be repeated.

This test was specifically designed to address the fitness requirements of unarmed Nuclear Security Officers and a group of armed officers responsible for patrolling the perimeter and protecting all nuclear facilities from intruders. This work requires exceptional physical fitness, especially in emergency situations.

The non-NRF program support groups, while certainly active, are not subjected to the same extreme physical demands experienced by their NRF colleagues and therefore do not require the same level of demonstrated physical fitness.

While sound in concept and delivery, the CNSFT does not satisfy the unique physical fitness challenges for non-NRF program support groups as expressed in the cardiovascular, respiratory, and musculoskeletal sections of this document. There is strong rationale for a new physical fitness test specifically tailored to the challenges of non-NRF program support groups.

Psychological Testing

The Public Health Agency of Canada (2006) revealed that one in 7 adults (13.4%) identified symptoms that met the criteria for a mood disorder at some point during their lifetime, including 12.2% for depression and 2.4% for bipolar disorder.

Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness directs that all Nuclear Security Officers undertake a psychological assessment, which includes an interview and test conducted by a qualified psychologist, but it does not specify or recommend re-testing. Unfortunately, mental health issues are not always florid and apparent and diagnosing and treating them can be fraught with difficulty. In most cases, sufferers float under the radar for lengthy periods of time until an emergency develops and the member decompensates. Hindsight is great in diagnosing what happened, but it has guarded utility in

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diagnosing future events. We must be more effective at recognizing the smoldering course of mental illness long before it strikes – loss of interest in activities or hobbies, impairment of executive functioning and decision-making, difficulty concentrating and remembering details, lassitude, insomnia, irritability, etc. – all of these symptoms can and do impair job safety and productivity. One of the occupational medicine physicians interviewed during the course of this study was very forthcoming in admitting knowledge of several individuals with past and present issues related to operational stress injuries (OSI) or post traumatic stress syndrome (PTSD). This is perhaps not surprising given that many nuclear security personnel are recruited from military or law enforcement organizations where the risks for OSI and PTSD are greater.

For these reasons, and in consideration of the firearms and ammunition related duties, it is recommended that non-NRF program support personnel receive a psychological fitness evaluation on recruitment and that the CNSC explore, with a qualified mental health professional, the requirement and periodicity for re-testing.

CONCLUSIONS

This project started with a challenge to establish the minimum medical fitness standards for non-Nuclear Response Force program support groups that will ensure job safety while at the same time preserving optimum productivity.

In the process we:

- Conducted on-site visits to three nuclear power generation sites and interviewed representatives of three non-NRF program support groups and perform workplace analyses on all groups to help identify essential tasks likely to be impacted by decrements in medical fitness.
- Conducted interviews with Company medical support personnel from all three facilities to gather information on the medical evaluation and selection process currently used to evaluate and monitor medical fitness of non-NRF program support groups and to discuss options for improving the process.
- Reviewed *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness*, Job Identification Data Sheets for non-NRF program support groups, existing CNSC regulations, documents and standards, to assist in identifying essential tasks likely to be impacted by decrements in medical fitness.
- Conducted a comprehensive literature review to compare the findings identified through interviews and workplace analyses to published medical standards from other national and international organizations having workers employed in similar roles.
- Reviewed the published literature once again to compare the recommended scope and periodicity of medical re-evaluation for personnel from other national and international organizations employed in similar roles.

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- Created a template for a Medical Examination Report for examining physicians to help improve the comprehensiveness, quality, and transfer of medical information between examining physicians and Company medical support teams.
- Reviewed protocols for physical and psychological fitness for NRF personnel published in *Regulatory Document RD-363 – Nuclear Security Officer Medical, Physical, and Psychological Fitness* to determine applicability for non-NRF program support groups.

RECOMMENDATIONS

1. The Ontario Association of Chiefs of Police documents, *Constable Selection System – Guidelines for Examining Physicians, Guidelines for Examining Ophthalmologists / Optometrists, and Hearing Performance Standard* are sufficiently comprehensive and authoritative and should be used as the main source for guidance on medical standards for non-NRF program support groups with the exceptions listed on Table 4.

Table 4: Recommended vision, hearing, cardiovascular, respiratory, and musculoskeletal medical standards for non-Nuclear Response Force program support groups

Distant Vision
<ul style="list-style-type: none"> • Uncorrected distant vision equal or better than 6/60 (20/200) in each eye • Corrected distant vision equal or better than 6/9 (20/30) in the better eye and no worse than 6/12 (20/40) in the other eye
Near Vision
<ul style="list-style-type: none"> • Near vision correctable to 6/12 (20/40) with both eyes
Colour Vision
<ul style="list-style-type: none"> • Abnormal Colour Vision – Safe
Depth Perception
<ul style="list-style-type: none"> • Stereo acuity of 80 seconds of arc or better
Peripheral Vision
<ul style="list-style-type: none"> • Each eye 75 degrees laterally from the 0 degree meridian
Hearing
<ul style="list-style-type: none"> • Hearing each ear \leq 40dB at each of 500, 1000, 2000, 3000 Hz and \leq 55dB at 4000 Hz
Cardiovascular
<ul style="list-style-type: none"> • Must have no established cardiovascular condition that, in the opinion of the Company medical support physician, may compromise the safe and effective performance of all essential tasks and duties
Respiratory
<ul style="list-style-type: none"> • Must have no established respiratory condition that, in the opinion of the Company medical support physician, may compromise the safe and effective performance of all essential tasks and duties
Musculoskeletal
<ul style="list-style-type: none"> • Must have no established musculoskeletal condition that, in the opinion of the Company medical support physician, may compromise the safe and effective performance of all essential tasks and duties

2. It is recommended that the concept of a Medical Evaluation Report be accepted and that consideration be given to expanding the functional enquiry section of the Medical Evaluation Report to make it more robust and comprehensive. Furthermore, it is recommended that this expansion be a collaborative effort between the Company medical personnel currently employed at the three nuclear facilities and an external leader.
3. It is recommended that non-NRF program support groups transition to a four-year cycle between complete medical evaluation and testing, with the proviso that the intervening two-years are replaced with a self-administered functional review similar to Parts A & B

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of Appendix B. An improvement to the Medical Evaluation Report would include a significantly improved functional review section.

4. It is recommended that the CNSC consult with a qualified exercise physiologist to create a standardized physical fitness abilities assessment instrument specifically tailored to address the challenges of non-NRF program support groups.
5. Lastly, it is recommended that the CNSC engage the services of a qualified mental health professional to develop a psychological testing tool for non-NRF program support personnel. The engagement should include recommendations for testing frequency and monitoring protocols.

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Appendix A: Physician's Guide to medical standards for non-Nuclear Response Force program support groups

MEDICAL STANDARDS FOR NON-NUCLEAR RESPONSE FORCE PROGRAM SUPPORT GROUPS WITH FIREARMS AND AMMUNITION RELATED DUTIES

1. GENERAL

The goal of the occupational medicine assessment is to identify medical conditions that could adversely affect a person's ability to perform essential tasks in a safe and effective manner. To achieve an optimum outcome, the examining physician not only requires a strong clinical background, but also needs a thorough understanding of the person's work environment and critical tasks. Falling short of this goal can lead to lost productivity for the company and adverse health consequences for the individual.

But predicting medical outcomes is not a simple task. Only a few conditions – such as vision and hearing – have measurable thresholds. For the rest, functional ability lies on a continuum somewhere between mild and controllable to severe and debilitating and sound clinical judgment must be used to determine fitness. When a physician is unable to make a definitive recommendation, he should refer to an appropriate specialist for further evaluation.

In occupational medicine, the physician's role is to communicate employment limitations to management. It's then management's responsibility to make employment decisions. The following list of disease processes or conditions is not exhaustive, nor is it definitive. Each situation must be judged individually and sound clinical judgment is imperative.

2. VISUAL CONDITIONS

The non-NRF program support group applicant or incumbent for must be able to see well enough to safely and effectively carry out the requirements of the job. This requires distant and near vision, colour vision, depth perception, and peripheral vision with the following thresholds.

- Uncorrected distant vision equal or better than 6/60 (20/200) in each eye;
- Corrected far vision equal or better than 6/9 (20/30) in better eye and no worse than 6/12 (20/40) in the other eye;
- Near vision correctable to 6/12 (20/40) with both eyes (Contact lenses and glasses are acceptable for correction of both near and far vision acuity, but the user must be able to demonstrate that the corrective device(s) can be worn safely and for extended periods of time without significant maintenance, as well as being worn with any necessary personal protective equipment;

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- Color vision sufficient to pass the Ishihara plate series color vision test, or the Farnsworth D-15 color vision test and able to identify red, green, and yellow;
- Stereo acuity of 80 seconds of arc or better
- Each eye 75 degrees laterally from the 0 degree meridian; and
- No ophthalmologic condition that would increase ophthalmic sensitivity to bright light, fumes, or airborne particulates.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Ophthalmologic conditions that cause an individual to be particularly susceptible to environmental exposures, such as sunlight, dusts, fumes, and various volatile compounds.
- Refractive surgical procedures may be considered acceptable as long as the individual's vision meets the above standards post-operatively and the operation was performed at least 6 months (for radial keratotomy or photorefractive surgery) or 3 months (for LASIK) before performing prescribed duties. The individual must be free of post-operative complications. The results of an eye examination by an ophthalmologist or optometrist will be required to insure that vision is not impeded due to post-operative complications such as infection, glare, or contrast-sensitivity.
- Chronic conjunctivitis may produce visual impairment and/or increased susceptibility to environmental exposures that could interfere with job performance; this condition may result in a medical disqualification.
- Corneal ulcers are generally disqualifying since essential duties of the position could further exacerbate the condition. This condition must be treated and cleared by an ophthalmologist before any further consideration is given.
- Keratitis or any visual impairment associated with keratitis that is likely to interfere with job performance is generally disqualifying.
- Retinal detachment is generally disqualifying due to the risk of sudden incapacitation.
- Retinitis pigmentosa requires assessment by an ophthalmologist.
- Glaucoma, if confirmed by an ophthalmologist, is generally disqualifying if there is any impairment of peripheral vision.
- Night blindness requires assessment by an ophthalmologist.
- Intraocular lens implantation may be acceptable following an adequate period of recovery and if visual acuity meets the vision standards.

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- Any other vision condition that significantly interferes with normal function and has the potential to render the person suddenly incapacitated is generally disqualifying.

3. HEARING CONDITIONS

The applicant or incumbent must be able to hear well enough to safely and efficiently carry out the requirements of the job (the use of a hearing aid or aids to meet these standards may be approved after a successful practical hearing test). The standards require binaural hearing (to localize sounds) and auditory acuity, which may be demonstrated by:

- A current pure tone, air conduction audiogram, using equipment and a test setting which meet national standards;
- Documentation of hearing thresholds of no greater than 40 dB at 500, 1000, 2000, and 3000 Hz in either ear;
- Documentation of hearing thresholds of no greater than 55 dB at 4000 Hz in either ear; and
- No evidence by physical examination and medical history of ear conditions (external, middle, or internal) likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Meniere's disease
- Vestibular neuronitis
- Vertigo and paroxysmal positional vertigo
- Acoustic neuroma
- Wegener's granulomatosis
- Otosclerosis
- Cochlear implantation
- Chronic otitis externa
- Chronic otitis media

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- Chronic serous otitis media
- Post myringoplasty or tympanoplasty
- Post-mastoid surgery
- Perforated tympanic membrane if recent or unresolved requires assessment and resolution to be considered fit.
- Any other disease or defect of the ear that adversely affects hearing or equilibrium and which may interfere with the safe and efficient job performance is generally disqualifying.

4. HEAD, EARS, NOSE, THROAT AND NECK CONDITIONS

The applicant or incumbent must have structures and functions of the head, ears, nose, throat, and neck that are sufficient for the individual to safely and efficiently carry out the requirements of the job. This may be demonstrated by:

- A physical exam of the head, ears, nose, throat, and neck that is within the range of normal variation, including:
 - Normal flexion, extension, and rotation of the neck;
 - Open nasal and oral airways;
 - Unobstructed Eustachian tubes; and
 - No structural abnormalities that would prevent the normal use of personal protective equipment, including eyewear.
- Normal conversational speech; and
- No evidence by physical examination and medical history of head, ears, nose, throat, or neck conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Anosmia
- Artificial larynx or esophageal speech
- Neck masses, lymphadenopathy, or tracheostomy

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- Atresia or severe stenosis of the ear canal
- Facial palsy with loss of function
- Persistent chronic sinusitis
- Allergic vasomotor rhinitis
- Recurrent nasal polyps
- Tracheostomy
- Any other chronic disease or condition that significantly interferes with speech or breathing and has the potential to render the person suddenly incapacitated is generally disqualifying.

5. SKIN CONDITIONS

The applicant or incumbent must have skin that is sufficient for the individual to safely and efficiently carry out the requirements of the function. This may be demonstrated by:

- A physical exam of the skin that is within the range of normal variation; and
- No evidence by physical examination and medical history of dermatologic conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Albinism
- Skin cancer (including melanoma and severe or poorly controlled basal cell or squamous cell carcinoma)
- Kaposi's sarcoma
- Severe psoriasis
- Severe atopic dermatitis
- Eczematous conditions
- Severe chronic dermatitis

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- Skin disorders associated with environmental or physical factors
- Any other dermatologic condition that significantly interferes with normal function and has the potential to render the person suddenly incapacitated is generally disqualifying.

6. NERVOUS SYSTEM CONDITIONS

The applicant or incumbent must have a nervous system that is sufficient for the individual to safely and efficiently carry out the requirements of the job. This may be demonstrated by:

- A physical exam of the cranial and peripheral nerves and the vestibular and cerebellar system that is within the range of normal variation, including:
 - Intact cranial nerves, I-XII;
 - Normal vibratory sense in the hands and feet;
 - Normal proprioception of the major joints;
 - Normal sensation of hot and cold in the hands and feet;
 - Normal sense of touch in the hands and feet;
 - Normal reflexes of the upper and lower extremities; and
 - Normal balance (e.g., heel-toe walk; Romberg; balance on one foot).
- Normal basic mental status evaluation (e.g., person, place, time, current events, etc.); and
- No evidence by physical examination and medical history of nervous, cerebellar, or vestibular system conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Ataxia
- Choreoathetosis
- Huntington's chorea
- Multiple sclerosis
- Muscular dystrophy

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- Narcolepsy
- Neurofibromatosis
- Parkinson s disease
- Cerebrovascular accident (stroke)
- Transient ischemic attacks
- Sensory dysfunction (smell, touch, taste)
- Migraine cephalgia
- Any other nervous system condition that significantly interferes with normal function and has the potential to render the person suddenly incapacitated is generally disqualifying.
- An individual with a history of one or more seizures must provide the following written information from a physician who is board certified in neurology. This information is to be provided on the physician’s own letterhead, and must include:
 - The physician’s printed or typed name (i.e., legible), signature, and date;
 - Confirmation that the physician has reviewed and is familiar with the requirements of non-NRF duties;
 - A summary of all current medications, along with any known side effects experienced or expected to be experienced by the individual;
 - The known or suspected triggers or factors that may lead to seizure activity for the individual;
 - The results of the most recent diagnostic testing, such as an EEG;
 - The overall medical prognosis, related to his/her seizure disorder; and
 - The estimated risk or likelihood of future seizure activity of any degree.

7. MENTAL HEALTH CONDITIONS

The applicant or incumbent must have judgment, mental functioning, and social interaction and behavior that will provide for the safe and efficient conduct of the requirements of the job. This may be demonstrated by:

- No evidence by physical examination and medical history of psychiatric or psychological conditions (including alcohol or substance dependence) considered likely to interfere with efficient job performance, present a safety risk to the individual or others, or to

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worsen as a result of carrying out the essential functions of the job.

- Disorders that affect safe and efficient job performance may be disqualifying, and consideration must be given to the individual's history of treatment and control of the condition(s). All diagnoses must be consistent with the diagnostic criteria as established by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), or subsequent revisions. Any condition not listed here shall be considered on a case-by-case basis.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER REVIEW OR INVESTIGATION

- Axis I disorders
- Axis II disorders
- Any other psychiatric or psychological condition that significantly or potentially interferes with normal function or has the potential to render the person suddenly incapacitated.

8. CARDIOVASCULAR CONDITIONS

The applicant or incumbent must have a cardiovascular system that is sufficient for the individual to safely and efficiently carry out the requirements of the job. This may be demonstrated by:

- A physical exam of the cardiovascular system that is within the range of normal variation, including:
 - Blood pressure of less than or equal to 140 mmHg systolic and 90 mmHg diastolic;
 - A normal electrocardiogram at each scheduled examination, as required (minor, asymptomatic arrhythmias may be acceptable);
 - No pitting edema in the lower extremities; and
 - Normal cardiac examination.
- No evidence by physical examination and medical history of cardiovascular conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

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- Pacemakers
- Prosthetic valves or any other condition or post-surgical management that requires the use of Coumadin or other anti-coagulants may be disqualifying.
- Coronary artery disease
- Hypertension that requires the use of any medication to stabilize the blood pressure may be disqualifying.
- Left bundle branch block
- Myocarditis/endocarditis/pericarditis (active or recently resolved cases) or a past history of these diseases may require additional testing to determine the current capabilities.
- History of myocardial infarction
- History of cardiac surgery (depending on the procedure and when it was performed)
- Valvular heart disease such as mitral valve stenosis, mitral valve regurgitation, aortic stenosis, mitral valve prolapse, etc.
- Dysrhythmias such as ventricular tachycardia or fibrillation, Wolff-Parkinson-White syndrome, paroxysmal atrial tachycardia with or without block
- Angina pectoris or chest pain of unknown etiology
- Cardiomyopathy from any cause
- Congestive heart failure
- Marfan's syndrome
- Congenital anomalies
- Pacemakers or prosthetic valves are generally disqualifying.
- Any other condition or post-surgical management that requires the use of Coumadin or other anti-coagulants is generally disqualifying.
- Implanted cardiac defibrillators, devices that may, as a result either of their normal operation or a malfunction, render the individual suddenly or subtly incapacitated, are generally disqualifying.
- Any other cardiac disease or condition that significantly interferes with normal cardiac

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function and has the potential to render the person suddenly incapacitated is generally disqualifying.

9. PERIPHERAL VASCULAR CONDITIONS

The peripheral vascular system involves the veins and arteries of the extremities. The applicant or incumbent must have a vascular system that is sufficient for the individual to safely and efficiently carry out the requirements of the job. This may be demonstrated by:

- A physical exam of the vasculature of the upper and lower extremities that is within the range of normal variation, including:
 - No evidence of phlebitis or thrombosis;
 - No evidence of venous stasis or edema; and
 - No evidence of arterial insufficiency.
- No evidence by physical examination or medical history of peripheral vasculature conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Chronic venous insufficiency
- Deep vein thrombosis
- Chronic thrombophlebitis.
- Any other chronic disease or condition that significantly compromises the vascular system and has the potential to render the person suddenly incapacitated is generally disqualifying.
- Raynaud's phenomenon
- Severe varicose veins

10. CHEST AND RESPIRATORY CONDITIONS

The applicant or incumbent must have a respiratory system that is sufficient for the individual to safely and efficiently carry out the requirements of the job. This may be demonstrated by:

- Examination of the respiratory system that is within the range of normal variation;

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- A pulmonary function test (PFT) showing:
 - Forced vital capacity (FVC) of at least 70% of the predicted value;
 - Forced expiratory volume at 1 second (FEV1) of at least 70% of the predicted value; and
 - The ratio FEV1/FVC of at least 70%.
- No evidence by physical examination or medical history of respiratory conditions likely to present a safety risk or to worsen as a result of carrying out the functions of the job

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Significant obstructive or restrictive disorder
- Asthma after the age of 12 years must be considered on a case-by-case basis. A person may be requested to submit documentation of a diagnostic assessment prior to making final recommendations.
- Active pulmonary tuberculosis (TB). A history of confirmed TB that has been treated for longer than 6 months is acceptable provided that documentation supports the treatment history and confirms that the person has been rendered non-communicable.
- History of chronic bronchitis associated with decreased PFT results
- Lung abscess
- Pulmonary embolism (within the past six months or if there is a recurrent history or use of anticoagulants)
- Spontaneous pneumothorax (if recurrent, or recent)
- Emphysema
- Sarcoidosis (if associated with an impaired pulmonary function)
- Pulmonary infarction
- Tumours of the lung
- Pneumonectomy (if FEV1 less than 70%)
- Severe allergies

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- Any other respiratory disease or condition that significantly interferes with normal function and has the potential to render the person suddenly incapacitated is generally disqualifying.
Note: The requirement to use an inhaler (such as for asthma) requires agency review and further information may be required related to the individual's history, the causes of bronchospastic episodes or exacerbations, and the response to medications.

11. GASTROINTESTINAL CONDITIONS

The applicant or incumbent must have a gastrointestinal tract that is sufficient for the individual to safely and efficiently carry out the requirements of the job. The examining physician should consider the gastrointestinal (GI) tract from the mouth to the anus to be normal. The standard may be demonstrated by:

- A physical examination and evaluation of the mouth, abdomen, anus, and rectum that is within the range of normal variation;
- Normal liver function and blood chemistry laboratory tests; and
- No evidence by physical examination (including laboratory testing) and medical history of gastrointestinal conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Acute and chronic active hepatitis
- Crohn's disease, ulcerative colitis, regional enteritis or irritable bowel syndrome (satisfactory control or management of these conditions with surgical and/or medical treatments will be considered on a case-by-case basis.)
- Colostomies
- Ileitis (recurrent or chronic)
- Cholecystitis or cholelithiasis (symptomatic or asymptomatic)
- Diverticulitis (symptomatic)
- Dysphagia from any cause. Severity, treatment, and current status of these conditions will be reviewed on a case-by-case basis.
- Cirrhosis of the liver (depending upon the degree of severity, the etiology, and the prognosis)

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- Intestinal obstruction from any cause, until the condition has fully resolved
- Peptic ulcer disease
- Pancreatitis
- Active gastric or duodenal ulcer
- Anal or perianal conditions
- Gastric or bowel resection, if there is any evidence (historical or physical) of pain, hemorrhages, fainting episodes or dietary restrictions that could interfere with the performance of the job
- An untreated (and clinically-significant) inguinal, incisional or ventral hernia
- Any other gastrointestinal disease or condition that significantly interferes with normal function and has the potential to render the person suddenly incapacitated is generally disqualifying.

12. GENITOURINARY CONDITIONS

In general, any dysfunction of the genitourinary or reproductive system that has the capability of interfering with the required tasks or rendering the person suddenly incapacitated may be considered disqualifying. The applicant or incumbent must have a genitourinary system that is sufficient for the individual to safely and efficiently carry out the requirements of the job. Compliance with the standard may be demonstrated by:

- A normal clean catch urinalysis; and
- No evidence by physical examination and medical history of genitourinary conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Polycystic kidney disease
- Acute or chronic renal failure
- Nephrotic syndrome
- Testicular tumours
- Symptomatic urinary calculi

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- Neurogenic bladder
- Recurrent urinary tract infections
- Urinary incontinence
- History of renal vein thrombosis
- Uncorrected obstructive uropathies
- Renal toxicity
- Renal dialysis
- Renal transplantation may be considered disqualifying unless the applicant is not taking immunosuppressive drugs and is cleared medically by the surgeon who performed the operation (or the successor surgical consultant for the individual) to participate in strenuous activities, and to withstand blunt trauma to his/her flanks without a greater than normal risk of harm.
- Any other genitourinary disease or condition that significantly interferes with normal function and has the potential to render the person suddenly incapacitated is generally disqualifying.

13. MUSCULOSKELETAL CONDITIONS

The applicant or incumbent must have a musculoskeletal system that is sufficient for the individual to safely and efficiently carry out the functional requirements of the job. Any condition that adversely impacts an individual's movement, range of motion, agility, flexibility, strength, dexterity, coordination or the ability to accelerate, decelerate and change directions quickly and easily may be considered disqualifying. A healthy musculoskeletal system may be demonstrated by:

- A physical examination of the upper and lower extremities (including all digits), neck, and back that is within the range of normal variation, including strength, flexibility, range of motion, and joint stability; and
- No evidence by physical examination and medical history of musculoskeletal conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Arthritis (any etiology) if there is limited joint motion and/or pain

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- Amputations of one or more digits if it directly affects the ability to grip and handle weapons or other required equipment and tools efficiently
- Amputations of any extremity
- Ankylosing spondylitis
- Major joint replacement
- Scoliosis, if the lateral curve is 20 degrees or more, or if there is any demonstrable loss of normal and pain-free function
- Muscular dystrophy
- Lumbosacral instability, including pain or limitations of flexibility and strength that limits the individual's ability to stand, bend, stoop, carry heavy objects or sit for long periods of time
- Degenerative disc disease that is symptomatic
- Rheumatoid arthritis
- Gout
- Reiter's disease
- Connective tissue diseases
- Ligamentous injury requiring surgery or causing instability
- Lateral or medial meniscectomy
- Osteoarthritis
- Foot disorders
- Fixed lordosis or kyphosis that limits mobility and skeletal strength
- Fractures: these situations may require orthopedic evaluation to determine whether functional limitations currently exist. A recent fracture that requires immobilization (or for which limb immobilization is indicated, such as casting, bracing, etc.), and that prevents the safe and efficient performance of the full range of non-NRF duties, will require deferment of the clearance until the injury has healed sufficiently for the treating physician to be able to document that immobilization is no longer required, that no physical limitations are present, and no restrictions are required.

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- Sciatica or other neuropathies
- Chronic low back pain (by medical history), with or without demonstrable pathology, may be considered disqualifying. Each case will be reviewed in the context of the etiology, the response to therapeutic regimens, frequency of recurrence, exacerbating factors, and lengths of disability associated with the recurrences, combined with the current clinical presentation.
- A history of a chronic sprain or strain of the neck that limits mobility or causes recurring cephalgia (headaches) may be disqualifying.
- Evidence of a cervical rib, subluxation, torticollis, symptomatic thoracic outlet syndrome or a brachial cleft cyst
- Any evidence of a cervical neuropathy, including any evidence of numbness, tingling or loss of motor strength in the upper extremities, may be disqualifying.
- Any medical condition, congenital or acquired, which interferes with agility, dexterity, the lifting of heavy objects, or the ability to perform the full range of law enforcement duties may be disqualifying.
- A condition may be disqualifying if there is evidence that the general body symmetry may directly interfere with the safe utilization of issued standard and specialty equipment, including but not limited to handguns, shotguns, handcuffs, motor vehicles, personal protective equipment, etc.

14. ENDOCRINE AND METABOLIC DISORDERS

Any excess or deficiency in hormone production can produce metabolic disturbances affecting weight, stress adaptation, energy production, and a variety of symptoms or pathology such as elevated blood pressure, weakness, fatigue and collapse. The applicant or incumbent must have endocrine and metabolic functions that are sufficient for the individual to safely and efficiently carry out the requirements of the job. This may be demonstrated by:

- A physical exam of the skin, thyroid, and eyes that is within the range of normal variation;
- Normal fasting blood sugar level;
- Normal blood chemistry results; and
- No evidence by physical examination (including laboratory testing) and history of endocrine or metabolic conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

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THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Adrenal dysfunction (such as Addison's disease or Cushing's syndrome)
- Thyroid disease that is uncontrolled or associated with complications. hypothyroidism adequately controlled by hormone replacement may be considered acceptable.
- Pituitary dysfunction
- Diabetes mellitus and insipidus
- Hyperglycemia
- Any other endocrine condition that significantly interferes with normal function and has the potential to render the person suddenly incapacitated is generally disqualifying.

15. HEMATOPOETIC CONDITIONS

The applicant or incumbent must have a hematopoietic (blood and blood-producing) system that is sufficient for the individual to safely and efficiently carry out the requirements of the job. This may be demonstrated by:

- A physical exam of the skin that is within the range of normal variation;
- A complete blood count (including at least hemoglobin, hematocrit, platelets, and white blood count, with differential) that is within the normal range; and
- No evidence by physical examination (including laboratory testing) and medical history of hematopoietic conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Anemia
- Leukemias, lymphomas and other proliferative disorders
- Inherited clotting disorders (ex. hemophilia) are generally disqualifying
- Chronic lymphangitis
- Thrombocytopenia or clotting disorder

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- Sickle cell anemia
- Thalassemia major
- Splenomegaly
- Anticoagulation therapy
- Any other hematopoietic condition that significantly interferes with normal function and has the potential to render the person suddenly incapacitated is generally disqualifying.

16. PROSTHETIC, TRANSPLANT AND IMPLANT CONDITIONS

The history of organ transplantation or use of prosthetics or implants is not of themselves disqualifying. However, the applicant or incumbent must be able to safely and efficiently carry out the requirements of the job despite these factors. This may be demonstrated by:

- No evidence by physical examination and medical history that the transplant, the prosthesis, the implant, or the conditions that led to the need for these treatments are likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

Note: For individuals with transplants, prosthetics, or implanted pumps or electrical devices, the examinee will be required to provide for agency review satisfactory documentation from his/her surgeon or physician that the individual (and, if applicable, his or her prosthetic or implanted device) is considered to be fully cleared and compatible with the specified functional requirements of the job.

17. INFECTIOUS DISEASE, IMMUNE SYSTEM OR ALLERGIC DISORDERS

The applicant or incumbent must be free of communicable diseases, have a healthy immune system, and be free of significant allergic conditions in order to safely and efficiently carry out the requirements of the job. This may be demonstrated by:

- A general physical examination of all major body systems that is within the range of normal variation, including:
 - No evidence of current communicable disease that would be expected to interfere with the safe and effective performance of the requirements of the job; and
 - No evidence of current communicable disease that would be expected to pose a threat to the health of any co-workers or the public.
- Normal complete blood count, including white blood count and differential; and

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- No evidence by physical examination and medical history of infectious disease, immune system, or allergy conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.

THE FOLLOWING CONDITIONS MAY RESULT IN DISQUALIFICATION BUT REQUIRES FURTHER EVALUATION.

- Tuberculosis
- HIV infections
- Any hepatitis infection or carrier state
- Hereditary angioedema
- Goodpasture's syndrome
- Autoimmune hemolytic anemia
- Vasculitis
- Hashimoto's thyroiditis
- Myasthenia gravis
- Systemic lupus erythematosus
- Stinging insect allergy
- Any other infectious disease, immune system, or allergic condition that significantly interferes with normal function and has the potential to render the person suddenly incapacitated is generally disqualifying.

18. MEDICATION STANDARD

The need for and use of prescribed or over-the-counter medications are not of themselves disqualifying. However, there must be no evidence by physical examination, laboratory tests, or medical history of any impairment of body function or mental function and attention due to medications that are likely to present a safety risk or to worsen as a result of carrying out the specified functional requirements. Each of the following points should be considered:

- Medication(s) (type and dosage requirements);
- Potential drug side effects;

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- Drug-drug interactions;
- Adverse drug reactions;
- Drug toxicity or medical complications from long term use;
- Drug-environmental interactions;
- Drug-food interactions; and
- History of patient compliance

All medication requirements will be evaluated to ensure that safe and efficient job performance will not be affected adversely by their use. Medications such as narcotics, sedative hypnotics, barbiturates, amphetamines, or any drug with the potential for addiction or a reduction in attentiveness that are taken for extended periods of time (usually beyond 10 days) or are prescribed for a persistent or recurring underlying condition generally would be considered disqualifying. Cases will be reviewed on a case-by-case basis.

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Appendix B: Medical Evaluation Report

MEDICAL EVALUATION REPORT

EXAMINEE IDENTIFICATION

Surname:	Given Names:	
Date of Birth:	Gender: Male <input type="checkbox"/>	Female <input type="checkbox"/>
Full Address:	City:	
Province:	Postal Code:	
Phone:	Mobile:	Fax:
Personal Email:	Date:	

INSTRUCTIONS

The Medical Evaluation Report (MER) is used to standardize the medical examination process and enable examining physicians to transfer medical information more effectively to Company medical support groups in the interest of optimum employee health management. The goal is to identify medical conditions that may adversely affect an employee's ability to perform the essential tasks related to his or her job in a safe and efficient manner. Failure to achieve this goal can lead to lost productivity and expensive litigation costs for the Company and adverse health consequences for the employee.

The Medical Evaluation Report is divided into three sections. The first section (Part A) is titled *Past Medical Issues* and includes two sub-sections, *Personal Medical History* and *Family Medical History*. Personal medical history provides insight into possible future vulnerabilities, while family medical history identifies individuals at greater risk for genetic or familial diseases. The second section (Part B) is titled *Current Medical Issues*. This section deals with issues that may be present today. They are usually signs, symptoms, or behaviours and not necessarily established disease processes. Many of these issues may require investigation before an individual can be cleared to commence or continue employment. Included in this section are three sub-sections titled *Functional Review*, *Immunizations and Supplements*, and *Lifestyle Review*. The last section (Part C) is the *Physician Contact* section. This section includes three sub-sections, *Personal Metrics (e.g. height and weight)*, *the Physical Examination*, and *Ancillary Testing (e.g. vision and hearing)*. The physician should use all previous sections to focus the physical examination on the examinee's ability to perform his or her job in a safe and effective manner.

When the examination is finished, the physician shall indicate his or her recommendations regarding fitness and then submit the completed report in care of the Company health support group where the information is reviewed and an administrative medical certificate categorized as fit, unfit, or fit with stated employment limitations will be forwarded to Company management who will act on the information. All medical information will be kept in secure storage in the medical clinic and accessed only by medical staff on an as required basis.

All non-Nuclear Response Force program support groups with firearms related duties are required to undergo this examination process on initial engagement, every fourth year, and upon release. In the intervening years, only Parts A and B or the MER will be required. A physician visit is not required on intervening years.

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PART A – PAST MEDICAL ISSUES

1. Personal Medical History – Please indicate if you have ever suffered from any of the following disorders?

	Y	N		Y	N
11. Alcoholism/alcohol abuse			29. HIV infection		
12. Arthritis			30. Hospital admissions		
13. Asthma			31. Irritable bowel syndrome		
14. Bladder disease			32. Kidney stones		
15. Bleeding disorder			33. Lactose intolerance		
16. Blood pressure elevation			34. Laser refractive surgery		
17. Blood sugar abnormality			35. Lipid abnormality		
18. Carpal tunnel syndrome			36. Liver disease		
19. Cancer			37. Menstrual problems (females)		
20. Celiac disease			38. Mood disorders		
21. Chronic Pain			39. Motion sickness		
22. Chronic fatigue syndrome			40. Neurologic disease		
23. Colitis			41. Obesity		
24. Colonic polyps			42. Osteoporosis		
25. Crohn's disease			43. Pneumonia		
26. Deep vein thrombosis			44. Post-traumatic stress disorder		
27. Degenerative disc disease			45. Prostatitis (males)		
28. Dental problems			46. Psychiatric disorders		
29. Diabetes			47. Pulmonary disease		
30. Diverticular disease			48. Renal disease		
31. Drug addiction/drug abuse			49. Sexually transmitted disease		
32. Eating disorder			50. Sinus problems		
33. Gastric ulcers			51. Skin problems		
34. Head injury			52. Sleep apnea		
35. Hearing loss			53. Thyroid disease		
36. Heart disease			54. Vision problems		
37. Hemorrhoids			55. Work-related problems		
38. Hepatitis			56. Other medical disorders		

MEDICAL FITNESS STANDARDS

Personal Medical History (cont.) – Please elaborate on any positive answers and indicate the item number, age at onset of the disorder, and the outcome.

2. Family Medical History – Please indicate if any first-degree relatives (parents or siblings) have suffered or currently suffer from any of the following disorders.

	Y	N		Y	N
1. Alcoholism/alcohol abuse			13. Seizure or convulsion		
2. Allergies			14. Genetic disease		
3. Alzheimer’s disease			15. Heart disease before age 60		
4. Pulmonary disease			16. High blood pressure		
5. Autoimmune disorder			17. Inflammatory bowel disease		
6. Blood clotting disorder			18. Obesity		
7. Cancer			19. Osteoporosis		
8. Mood disorder			20. Neurologic disease		
9. Lipid abnormality			21. Stroke		
10. Liver disease			22. Thyroid disease		
11. Diabetes			23. Psychiatric illness		
12. Drug addiction			24. Other medical condition		

Family Medical History (cont.) – Please elaborate on any positive answers and indicate the item number, relationship to you, age at onset of the disorder, and outcome.

MEDICAL FITNESS STANDARDS

PART B – CURRENT MEDICAL ISSUES

1. Functional Review – Please indicate if you are currently experiencing any of the following symptoms or conditions.

	Y	N		Y	N
1. Unexplained weight loss			29. Difficulty swallowing		
2. Weakness, fever, or fatigue			30. Heartburn or indigestion		
3. Easy bruising or bleeding			31. Frequent nausea or vomiting		
4. Worrisome lumps or sores			32. Rectal bleeding or black stools		
5. Poor vision			33. Inc. frequency of bowel motions		
6. Difficulty focusing up close			34. Frequent abdominal pain		
7. Double or blurred vision			35. Frequent or painful urination		
8. Poor hearing or ringing in ears			36. Blood in the urine		
9. Dizziness or loss of balance			37. Investigations for renal stones		
10. Frequent or persistent colds			38. Testicular pain or masses (males)		
11. Chronic nasal obstruction			39. Dribbling after voiding (males)		
12. Frequent nosebleeds			40. Penile discharge (males)		
13. Dental problems			41. Menstrual problems (females)		
14. Bleeding gums			42. Abnormal Pap smear (females)		
15. Frequent sore throats			43. Abn. vaginal discharge (females)		
16. Swollen glands or neck stiffness			44. Pain in muscles or joints		
17. Chest pain or discomfort			45. Persistent neck or back discomfort		
18. Shortness of breath			46. Recent head injury or concussion		
19. Irregular or pounding pulse			47. Recent seizures or convulsions		
20. Unexplained rapid heart beat			48. Weakness, numbness, or paralysis		
21. Swelling of ankles and feet			49. Frequent or severe headaches		
22. Reduced exercise tolerance			50. Heat or cold intolerance		
23. Investigations for heart problems			51. Inc. hunger, thirst, or urination		
24. Pain in chest with inspiration			52. Excessive anxiety or worrying		
25. Chronic or persistent cough			53. Change in mood or temperament		
26. Coughing up blood			54. Concentration problems		
27. Wheezing needing use of inhaler			55. Insomnia or other sleep disorders		
28. Hayfever or allergy symptoms			56. Other medical symptoms		

MEDICAL FITNESS STANDARDS

Functional Review (cont.) – Please elaborate on any positive answers and indicate the item number, date of onset, treatment, and outcome.

2. Medications and Supplements – Please indicate dosage and frequency

Medications and Supplements	Dosage and Frequency

3. Lifestyle Review – Please circle the answer that most closely applies to your situation?

a. General Health

<p>1. In general, how would you assess your overall health?</p> <p>a. Excellent</p> <p>b. Very Good</p> <p>c. Good</p> <p>d. Fair</p> <p>e. Poor</p>	<p>2. Compared to last year, how would you assess your health?</p> <p>a. Much better than last year</p> <p>b. Somewhat better than last year</p> <p>c. About the same as last year</p> <p>d. Somewhat worse than last year</p> <p>e. Much worse than last year</p>
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b. Physical Activity (consider the last three months)

<p>3. How much time do you spend walking at a normal pace in an average week?</p> <p>a. Less than an hour</p> <p>b. 1 hour</p> <p>c. 2 hours</p> <p>d. 3 hours</p> <p>e. More than 3 hours</p>	<p>4. Not including walking, how much time do you spend being physically active in an average week (e.g. running, cycling, etc.)</p> <p>a. Less than an hour</p> <p>b. 1 hour to 2 hours</p> <p>c. 2 hours to 3 hours</p> <p>d. More than 3 hours</p>
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<p>5. How would you describe your current level of fitness?</p> <p>a. Excellent</p> <p>b. Good</p> <p>c. Poor</p>	<p>6. Are you ready to commit to more exercise?</p> <p>a. I already exercise regularly</p> <p>b. I am trying to get more exercise</p> <p>c. I am ready to change</p> <p>d. I have no interest</p>
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MEDICAL FITNESS STANDARDS

c. Nutrition

<p>7. Choose one description that best reflects your eating habits.</p> <ul style="list-style-type: none"> a. 1 meal per day b. 2 meals per day c. 3 meals per day d. Eat constantly whether hungry or not 	<p>8. Do you consider yourself:</p> <ul style="list-style-type: none"> a. Underweight b. Overweight c. Just right
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d. Smoking

<p>9. On average, how many cigarettes do you smoke each day?</p> <ul style="list-style-type: none"> a. I don't smoke b. Less than 5 c. Between 5 and 30 d. More than 30 	<p>10. Do you use alternate forms of tobacco such as a pipe, cigar, chewing tobacco, or snuff?</p> <ul style="list-style-type: none"> a. I don't smoke b. Yes c. No
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e. Alcohol

<p>11. How often do you have a drink containing alcohol?</p> <ul style="list-style-type: none"> a. Never b. Less than once per month c. 1-4 times per month d. 2-4 times per week e. More than 4 times per week 	<p>12. Have you felt you wanted to cut down on your alcohol consumption in the last year?</p> <ul style="list-style-type: none"> a. Yes b. No
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EXAMINEE DECLARATION

<p>I declare that I have carefully considered the statements made above and to the best of my knowledge they are complete and accurate and I have not knowingly withheld any relevant information or made any misleading statements. I recognize that this report and any other medical documentation submitted or authorized to be submitted by me in order to verify medical fitness is the property of the Company and will be safeguarded in accordance with existing Medical Confidentiality legislation.</p>		
Date:	Name:	Witness:
	Signature:	Signature:

MEDICAL FITNESS STANDARDS

3. Ancillary Testing

a. Vision Assessment

Distant Vision ¹	Uncorrected	Corrected	Ocular Muscle Balance ²	
Right Eye	/	/	Orthophoria	Esophoria
Left Eye	/	/	Hyperphoria	Exophoria
Both Eyes	/	/	Cover Test	

Near Vision ³ for N5 @ 30-40 cm	Uncorrected		Corrected		Colour Vision ⁴	
	Pass	Fail	Pass	Fail	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>
Right Eye					Field of Vision ⁵	
Left Eye					Normal <input type="checkbox"/>	Abnormal <input type="checkbox"/>

¹ Distant vision should be tested using Landolt Rings, a chart of Snellen letters or other similar optotypes situated at an optical distance of 6 metres using either an eye lane or an approved vision-testing instrument. Uncorrected vision should be tested first in each eye separately, and then in both eyes. Squinting is not permitted. After the uncorrected vision is tested, the corrected vision should be tested in the same manner.

² Ocular muscle balance can be tested with the cover test, the Maddox rod, or an appropriate vision tester. Record the results of the cover test in the space provided. The Maddox rod results should be noted in the appropriate spaces. Checking the orthophoria space means there are no deviations and all other spaces can be left blank. Any deviations should be noted in the esophoria, exophoria or hyperphoria spaces. The cover test is the most common test used to screen for manifest strabismus or tendencies for the eyes to deviate when the two eyes are dissociated. The examiner stands in front of the examinee that is told to fix his eyes on a small target such as a small examining light. An occluder card is then placed in front of one eye and the other eye is checked for movement. If there is none, the card is removed and the covered eye is examined to see whether it has remained fixed or whether it has moved medially or laterally and has to be re-fixated. The test is then repeated with the other eye covered. If the examinee is orthophoric, no movement of the eyes will take place. If there is esophoria, one eye will move in and then re-fixate when the occluder is removed. In exophoria, the opposite is true.

³ Near vision should be tested with the Faculty of Ophthalmologists Reading Type “N” charts or equivalent, in each eye separately without and then with correction. The standard is N5 at 30-50 centimetres, which equates to a visual acuity of 20/40. Use good illumination of the card and avoid reflections and glare. Place a check in the appropriate boxes on the near vision table.

⁴ Colour vision should be tested at each medical examination as various eye diseases can cause a change or deterioration in colour vision. Colour vision may be tested with any of the standard pseudoisochromatic plate test sets. Appropriate lighting must be provided for the testing. If a special colour balanced light source is not used, daylight is best for screening. An examinee that fails the colour plate testing may have a colour lantern or a Farnsworth D-15 Hue test performed to ensure “safe” colour vision.

⁵ Assessment of field of vision by confrontation is adequate.

MEDICAL FITNESS STANDARDS

b. Hearing Assessment

Whispered Voice ⁶ (>2 m is standard)	Audiogram					
	Hertz	500	1000	2000	3000	4000
Right:	Right					
Left:	Left					

⁶A pure tone audiogram is required with the initial examination and upon release from the Company. For all other examinations, the “whispered voice test” will act as a screening test on subsequent examinations. If the examinee is unable to hear the whispered voice of the medical examiner at a distance greater than 2 metres, then a pure tone audiogram will be required. The whispered voice test is conducted with the examinees back to the examiner.

c. Blood Chemistry

RBC:	WBC:	Hct:	Hgb:	Plts:
FBG:	Chol:	Trig:	HDL:	LDL:

d. Urine Chemistry

Glucose:	Blood:	Protein:
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e. Other Tests or Procedures

f. Electrocardiogram Results

Date:
Interpretation:

⁷A mounted and interpreted 12-lead resting electrocardiogram is required with each medical examination and a legible copy must be submitted with the rest of the completed MER.

SUMMARY COMMENTS AND FITNESS RECOMMENDATIONS

Summary Comments:

MEDICAL EXAMINER IDENTIFICATION

Name:	
Signature:	
Date:	Phone: