

# ***When an Employee Doesn't Meet the Agency's Vision Standard*** ***-- Color Vision --***

## **An Overview for Federal Supervisors and Medical Standards Program Managers**

July 2009

### **Introduction**

Agency managers frequently are faced with a need to make decisions regarding such things as granting waivers, approving mitigations or accommodations, or taking personnel action when employees are unable to meet medical standards. A medical standard issue that commonly is encountered is related to the lack of normal color vision, such that an individual is unable to meet an established agency standard. There are several types of color vision deficit that may be involved, which will be discussed in this paper. This brief guide is intended to assist supervisors and program managers to evaluate the possible significance of a person's lack of normal color vision, and things to consider when an employee is unable to meet an agency's vision standard.

*Please Note: This guide is intended for general informational purposes only. It reflects the views of the authors, but is not intended to replace or supersede more comprehensive, authoritative, or official agency or professional standards, guidelines, or policies.*

### **Basis for Vision Standards**

A vision standard that requires normal color vision may be established for a group or classification of employees when the ability to identify colors accurately has been identified as pertinent to the safety of employees and the efficient performance of their job duties. The specific standards that relate to all aspects of vision are identified and established through processes that involve making worksite observations and gathering information from employees, supervisors, and medical and safety professionals, then giving careful consideration to the vision factors that are considered to be necessary in order for an individual to carry out the essential functions of the job safely and efficiently, including early visual warning of hazards or threats, vision redundancy (i.e., two functioning eyes, in case one becomes injured while the employee is in a hazardous situation), and accurate assessment of visual cues that relate to the work to be done. In addition, it is recognized that some work tasks that require healthy vision may have to be carried out under particular circumstances and environmental conditions that may not be present when an individual's vision is being tested in the controlled environment of a medical clinic. This includes highly variable lighting conditions, work tasks that require close attention or rapid identification, distractions or hazards in the environment, wind and blown dust, and the presence of irritants or fumes.

### **Legal Requirements**

While this brief guide is not intended as a substitute for the expertise of professional human resources personnel, or the more complete manuals and guidelines available from other agencies, such as the Office of Personnel Management, the manager should be aware of some pertinent

regulations as they consider appropriate actions to take when an employee or applicant does not meet a vision standard. According to Federal law (5 CFR 339.102(c)), “*failure to meet a properly established medical standard or physical requirement ... means that the individual is not qualified for the position unless a waiver or reasonable accommodation is indicated... .*” As a result, if an individual’s vision deficit is so severe that they cannot meet the agency’s established vision standard, some type of response is necessary, either by the employee or by management. This may include such actions as: waiving the standard if the individual can demonstrate that they can perform the essential functions of their job safely and efficiently despite their lack of normal color vision; providing a waiver accompanied by agency-mandated mitigations in order to minimize the risks related to the vision deficit; providing a reasonable accommodation if the employee is found to be a qualified disabled individual; arranging for a transfer to another position where an individual’s vision is less critical; or termination of employment.

### **Waivers**

Federal law (5 CFR 339.204) requires an agency to “*waive a medical standard or physical requirement... when there is sufficient evidence that an applicant or employee... can perform the essential duties of the position without endangering the health and safety of the individual or others.*” As a result, if an individual demonstrates a current and true ability to safely and efficiently perform the requirements of a job, and to do so despite a vision deficit (such as a lack of normal color vision) and under all of the likely conditions and circumstances that may be encountered during the course of carrying out that job, the standard must be waived at that time and for that individual. A waiver may be time limited (e.g., it must be reevaluated every time a clearance examination and/or review is done), and is subject to reevaluation if the individual’s health or the nature of the job changes. In some cases, a waiver may be accompanied by agency-mandated mitigations that are intended to minimize potential risks related to the vision deficit.

### **Accommodations**

Federal law (29 CFR 1614.203, the “Rehabilitation Act”) requires managers to “*make reasonable accommodation to the known physical or mental limitations of an applicant or employee who is a qualified individual with handicaps unless the agency can demonstrate that the accommodation would impose an undue hardship on the operations of its program.*” A qualified individual means “*an individual with handicaps who, with or without reasonable accommodation, can perform the essential functions of the position in question without endangering the health and safety of the individual or others,*” and meets the other requirements for the position.

The granting of waivers, accommodations, and mitigations should never be considered as an automatic response when a lack of normal color vision is encountered. Each case must be considered on a strict case-by-case basis to ensure that the most appropriate course of action is taken, for the safety of the individual and for benefit of the agency.

### **Agency Response to a Finding of Abnormal Color Vision**

How is an employee’s vision recorded, and what do the results mean? How does a manager know if an employee’s vision condition poses a safety risk or may be undermining the efficiency of the program? What are the safety risks associated with a lack of normal color vision? When can (or should) management grant a waiver (with or without mitigations), a step that means, for

that particular employee, management is going to allow the employee to continue to work despite the failure to meet an established standard? What types of accommodations are possible, and reasonable, in response to an employee's lack of normal color vision? This overview will address these questions to help guide the manager to respond in a fair and responsible way when an employee is unable to meet the vision standard.

How vision screening tests may be done

For general medical clearance screening purposes, there are several measures of vision that commonly are conducted. These specific tests are carried out because they provide pertinent information about an individual's functional vision capabilities, and because they can be done in most clinics and physicians' offices, with commonly available equipment. The results of these tests may be recorded on an exam form using one of several formats, such as the following:

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| <p><b><u>Visual Acuity</u></b></p> <p><u>Uncorrected vision (Snellen Units)</u></p> <p>Both Near 20/____ Right Near 20/____ Left Near 20/____</p> <p>Both Far 20/____ Right Far 20/____ Left Far 20/____</p> <p><u>Corrected vision (Snellen Units)</u></p> <p>Both Near 20/____ Right Near 20/____ Left Near 20/____</p> <p>Both Far 20/____ Right Far 20/____ Left Far 20/____</p> | <p><b><u>Color Vision</u></b></p> <p>Type of test</p> <p><input type="checkbox"/> Ishihara plate <input type="checkbox"/> Function test (Yarn, wire, etc.)</p> <p><input type="checkbox"/> Other (specify _____)</p> <p>Normal <input type="checkbox"/> Abnormal <input type="checkbox"/> Number Correct: _____ of _____ tested</p> <p>Can see Red/Green/Blue/Yellow? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> |
| <p><b><u>Peripheral Vision</u></b></p> <p>Right Nasal _____ degrees Temporal _____ degrees</p> <p>Left Nasal _____ degrees Temporal _____ degrees</p>  | <p><b><u>Depth Perception</u></b></p> <p>Type of test: _____</p> <p>Number Correct: _____ of _____ tested</p> <p>_____ Seconds of Arc</p> <p>Interpretation:</p> <p><input type="checkbox"/> Normal <input type="checkbox"/> Abnormal</p>  |

Vision testing may be conducted using one of several types of office-based machines, with standard color plate books or wall-mounted or hand-held charts, or with non-standardized manual assessments carried out by medical services providers. Some vision testing machines may be used to gather information for all of the factors in the above table, while others are more specialized or limited in scope. The wall-mounted and hand-held methods include such standard tools as the Snellen eye chart (for far and, sometimes, near visual acuity) and the Jaeger eye chart or card (for near visual acuity). Books or sets of Ishihara colored plates (which require the identification of numbers or letters made up of specifically-colored circles embedded within a field of other colored circles) are used for standardized color vision testing, and may be used if a vision testing machine does not include the ability to test for color vision or if the patient has difficulty using the machine. The Farnsworth D-15 test assesses the ability of an individual to arrange colored test objects in the correct order based on their hue. Except for the Farnsworth D-15 test, the results of color testing generally are recorded as the number correct out of the number tested, and may be interpreted then as normal or abnormal, depending on the particular scale or scoring method for the test. However, the results for specific plates of the Ishihara test are pertinent regarding the nature

of any color vision deficit that may be found, and the scoring of the Farnsworth D-15 involves a more complicated assessment based on the order of the colored objects as selected by the patient (this is discussed in greater detail below).

All of these simple but standardized tools can be used easily in most clinical settings. In addition, if a vision testing machine is not available, or if the patient has difficulty using the machine, a non-standardized manual assessment of peripheral vision and depth perception can be carried out using what are referred to as “challenge” tests in which the examiner asks the patient to indicate when, for example, a wiggled finger is first seen as it is moved from off to the side and into the patient’s field of vision while the patient looks straight ahead, or the patient is asked to reach out with an index finger and repeatedly touch the examiner’s finger as it is moved about in front of the patient. A non-standardized functional color vision test also may be used when a vision testing machine is not available, or the patient has difficulty using the machine. This alternative test also may be used when the agency needs to confirm an individual’s ability to identify basic colors, such as red/green/blue/yellow, but has not been able to pass a standardized test. For the alternative color vision test, the colors of various non-color-associated objects (e.g., sheets of paper, or short lengths or yarn) are to be identified by the patient for the examiner.

#### What is being tested, and why

**Uncorrected vision** testing is a measure of an individual’s visual acuity without the use of corrective lenses, and is recorded either in Snellen units<sup>1</sup> (e.g., 20/20) or Jaeger units<sup>2</sup> (e.g., Jaeger #1), which may be converted into Snellen units for simplicity. The test results generally are recorded for each eye individually, and then with both eyes open at the same time. Normal vision is considered to be 20/20 or better (e.g., 20/15), though less acuity (e.g., 20/40) may be allowed in some situations, such as for driver licenses in most states. The measurement of uncorrected vision is important for employment situations where corrective lenses may not be permissible or practical, and the ability to see accurately is important for safety or performance reasons. It also may be important in the early detection of harm to the eyes, when potential hazards to the eyes may be present in the environment or as a result of work tasks.

**Corrected vision** testing is a measure of an individual’s visual acuity while using corrective lenses, such as glasses or contacts. As for uncorrected vision testing, the results are recorded either in Snellen or Jaeger units for each eye individually and then with both eyes open at the same time. Vision generally can be correctable to 20/20, unless there are factors that

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<sup>1</sup> Snellen units represent what an individual is able to see at a given distance (i.e., 20 feet) compared to what an individual with normal, healthy eyes would be able to see. A measurement of 20/20 is considered normal, though individuals with very good vision may be found to have results of 20/15 or even better. A measurement of 20/40 means that, at a distance of 20 feet, the individual only is able to see objects clearly that a person with normal vision could see at a distance of 40 feet. Most states consider corrected visual acuity of 20/200 or worse to represent legal blindness, even though such an individual has the ability to identify most large objects and may be able to see movement and colors.

<sup>2</sup> Jaeger units represent the numbered, standardized print sizes used to present sets of text for the patient to attempt to read. Each successive set of text is larger than that which precedes it, and the patient reads to the examiner the set with the smallest text that can be read with the chart held at a distance of 14 inches. A Jaeger #2 corresponds to a Snellen result of 20/25; a Jaeger #1 corresponds to a Snellen of 20/20. Standard tables are available to facilitate the conversion of results from one method to the other.

interfere with this degree of correction. The measurement of corrected far vision is important for employment situations where corrective lenses are permissible and the ability to see objects accurately is important. It also may be important in the early detection of harm, when potential hazards to the eyes may be present in the environment or as a result of work tasks.

**Near vision** testing is a measure of an individual's ability to see objects well at close distances (e.g., an arm's length or less; the test itself usually is conducted with the test card held at 14 inches from the eyes). Near vision may be tested with or without the use of corrective lenses.

**Far vision** testing is a measure of an individual's ability to see objects clearly when they are at a distance, with or without the use of corrective lenses. Such distances may range from many feet away to several miles.

**Color vision** testing is an assessment of an individual's ability to identify colors or hues accurately. Vision depends on two primary types of light receptor cells in the retina of the eye: rods, which contain a single type of photopigment and only respond to light of a limited frequency range; and cones, which have one of three different photopigments which respond to light of three different ranges of wavelengths, which are perceived as blue, green, and red. A total lack of all color vision is extremely rare. Most individuals with other than normal color vision are more accurately described as having a color vision deficiency, and the condition is relatively common, with about 8% of men and 0.5% of women having some degree of color vision deficiency.

A lack of normal color vision may be due to inherited or acquired defects. Inherited defects are congenital: that is, the defect is present at birth as a result of genetic factors, and may be considered permanent. Developmental factors may impact the formation of the eye in utero and cause a congenital (present at birth) deficit. Acquired color vision deficits may occur as a result of factors that are experienced during a person's life time, such as those resulting from certain medications (e.g., chloroquine, indomethacin, oral contraceptives, and digoxin) or diseases (e.g., diabetes, cataracts, or glaucoma), and identification of their cause may allow for the correction of the problem, as well as the avoidance or prevention of the causative factor for the deficit.

Color vision deficits are characterized by the degree of the deficit and the color that is deficient. A person who sees all three color pigments is called a "*trichromat*;" one who sees only two of the color pigments is a "*dichromat*;" and one who sees only one of the pigments is a "*monochromat*." Obviously, dichromats and monochromats both have a color vision deficit, but so may a trichromat if one or more of the pigments is less efficient or effective in responding to certain electromagnetic frequencies (colors) than normal. Such a deficit in a trichromat is referred to as "*anomalous*," or an "*anomalous trichromat*."

Within the three categories (trichromat, dichromat, and monochromat), individuals who lack a fully functioning pigment for blue vision are referred to as "*tritans*," from the Greek for "*tritanopia*" or lacking in vision for blue, and have a "*tritanomaly*." Similarly, those lacking a fully functioning pigment for red vision are "*protans*" and have a "*protanomaly*," and those lacking normal green vision are "*deutans*" and have a "*deutanomaly*." As may be clear,

consideration of color vision is not simply a matter of determining whether or not a person has color vision.

For some agencies, the primary question regarding color vision simply is whether or not the individual can distinguish the colors red, green, blue, and yellow; for other agencies, a more precise color vision capability is necessary. The measurement of color vision may be important for employees whose job requires that they be able to distinguish colors accurately, such as may be the case for electricians (who may need to identify specific wires based on colors and patterns), drivers (who must identify traffic lights, particularly when they are presented or appear in a non-traditional order), law enforcement officers (who must be able to identify colors of clothing, or hair, or automobiles accurately, for example), or inspectors (who must identify and trace the path of color-coded pipes and valves).

**Depth perception**, for purposes of this Guide, incorporates two distinct aspects of vision and the location of objects in a 3-dimensional world. First, there is “distance perception” (or absolute depth perception), which involves an assessment of how far an object is from the viewer or from another object, in measureable units (e.g., inches, feet, football field lengths). Actual “depth perception” (or relative depth perception) involves an assessment of the location of an object relative to another. Being able to estimate with some accuracy how many feet a boat is from the dock is distance perception; recognizing that the boat is closer to you than to the opposite shore is depth perception. Both factors are considered to be important for the safe and efficient performance of many federal jobs.

Normal depth perception involves cues that are both stereoscopic (requiring two eyes) and monocular (possible with only one eye). Depth perception test results generally are reported as the number correct out of the number tested, or in seconds of arc, and are then interpreted by the examiner as demonstrating normal or abnormal findings. Depth perception may be an important factor for purposes of safety (e.g., driving a vehicle and correctly judging safe following and stopping distances; avoiding tripping over objects within the work zone; judging the distance to a platform onto which an employee must step or drop) or performance (e.g., reaching out to place equipment in the bed of a truck or onto a shelf; judging the distance that will be reached by a tree being taken down; or acquiring a target when using a firearm).

**Peripheral vision** is the function of visually detecting light, movement, or the presence of objects at the periphery of our visual field, rather than in front of us where we generally focus our attention. In general, a maximum nasal screening test result is about 60°, and a maximum temporal result is 85° to 90°, or sometimes greater, for a total of approximately 150°. Peripheral vision is important for situational awareness during normal light conditions where the detection and timely and appropriate response to potential physical hazards may be necessary (such as moving machinery or the presence of persons or animals that may be harmful). It also is important simply for the receipt of visual information about an individual's surroundings in low light or near-dark situations.

Does a lack of normal color vision pose a safety risk or undermine the efficiency of the job?

It may. Depending on the workplace hazards and the functional requirements of a particular job, the lack of normal color vision may present important challenges to safe and efficient job

performance. For example, for many federal jobs, the requirement the incumbents be able to identify red, green, and amber (yellow) is consistent with Department of Transportation regulations for commercial driving, as well as for general driving safety. A Forest Service study documented the importance of color vision as it relates to wildland firefighting.<sup>3</sup> The September 2001 Tech Tips article noted:

*“Our field evaluations indicated that hot-pink flagging was the easiest color to see and was visible at the greatest distance. Lime-green flagging showed up poorly to participants with normal color vision, but colorblind participants saw the lime-green flagging best.”*

*“Based on the field evaluations, we recommend that hot-pink flagging marked ESCAPE ROUTE be used to identify escape routes and safety zones. Crews with colorblind members may wish to carry both hot-pink ESCAPE ROUTE and lime-green flagging to identify their escape routes.”*

Individuals who are not able to see colors accurately may mistake the coded information conveyed by special flagging, and special care may be required to assure their safety in certain high-risk situations.

An inability to identify quickly and accurately color-coded wiring or piping may present hazards, based on the particular characteristics of the systems that are so coded. The inaccurate identification of the color characteristics of automobiles, hair color, clothing, or other objects may delay necessary and appropriate action to interrupt criminal activity or direct attention to those who require assistance. Identifying when (or if) brake lights are illuminated may be compromised by a lack of normal color vision, increasing the risk of rear-end collisions.

#### Granting a waiver despite a lack of normal color vision

A waiver despite a lack of normal color vision may be granted when, in the judgment of a deciding official, an individual with such a vision deficit has demonstrated that they have sufficient experience, skills, knowledge, and coping methods to be able to carry out all of the functional requirements of their job, and to do so safely and efficiently, despite that deficit. In this situation, despite the individual's inability to fulfill one or more of the factors described in the agency's medical standards as demonstrating compliance with those standards (e.g., normal color vision), the vision standard related to color vision is waived for that individual for the current evaluation cycle. However, the issue should be re-evaluated every time an examination or clearance evaluation normally would be conducted for that individual, and every time there is a significant change in job duties, the work environment, or the individual's vision or other health factors. This is intended to ensure that the individual continues to be able to perform the duties safely and efficiently. The factors discussed in the preceding sections should be considered when making this sort of decision.

#### Granting a waiver with mitigations for a lack of normal color vision

Similar to a waiver without mitigations, a waiver with mitigations may be granted when, in the judgment of a deciding official, an individual who does not meet a medical standard has

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<sup>3</sup> “Flagging for Firefighting Escape Routes and Safety Zones,” Bob Beckley, Fire Tech Tips, MTDC, September 2001

demonstrated that they have sufficient experience, skills, or knowledge to be able to carry out a job or function safely and efficiently despite their lack of normal color vision if certain steps or actions are taken that are intended to minimize the risks presented by that deficit. As an example, and as developed by the Interagency Wildland Firefighter Medical Standards Program and modified for purposes of this more generic guide, mitigations related to depth perception may involve such measures as:

- 1) Ensuring that both the subject individual and the line supervisor assess the individual's duties for potential hazards that may be encountered during all anticipated work situations to include mitigation steps for color vision deficiency.
- 2) Briefing subordinates, supervisors, and co-workers who work with the individual about the color vision deficiency.
- 3) In addition to specific measures (such as, for firefighters, the use of standard escape flagging), use other methods, such as MTDC approved escape route markers for color blind individuals, and remain constantly aware of the environment to recognize movement and other visual indicators that are less color-dependent.

Specific mitigations should be based on unique aspects of the individual's vision condition, the circumstances of the job, and the environment in which it is to be carried out.

#### Reasonable accommodations for an employee with a lack of normal color vision

As noted on page 1, the Rehabilitation Act requires the accommodation of disabled individuals if the individual is qualified and the accommodation is reasonable. In other words, granting the accommodation would not impose an undue hardship on the operations of the agency. Determining if an accommodation would pose such hardship depends on:

- “(i) The overall size of the agency's program with respect to the number of employees, number and type of facilities and size of budget;*
- (ii) The type of agency operation, including the composition and structure of the agency's work force; and*
- (iii) The nature and the cost of the accommodation.”*

According to the Act, reasonable accommodation “*may include, but shall not be limited to:*

- (i) Making facilities readily accessible to and usable by individuals with handicaps; and*
- (ii) Job restructuring, part-time or modified work schedules, acquisition or modification of equipment or devices, appropriate adjustment or modification of examinations, the provision of readers and interpreters, and other similar actions.”*

These factors, among others that may be applicable to the individual and local circumstances of the job, must be considered when a determination is to be made regarding whether or not an accommodation can or should be granted. Any accommodation that is to be considered for an employee must have an established, direct, risk-avoidance or task-accomplishment value related to the specific medical condition(s). Most medical standards have associated with them some form of narrative or description of the “basis” for the standard, and it may be helpful to review this information when considering whether an accommodation is appropriate.



If a waiver, waiver with mitigations, or accommodation are not considered reasonable

After a careful consideration of the functional requirements of the individual's specific job, and the impact of the vision impairment on their ability to perform the job safely and efficiently, it may be determined that the standard cannot be waived, with or without mitigations, and no accommodation would be both reasonable and effective in overcoming the limitations or risks presented by the condition. In such situations, personnel action may be necessary to separate the individual from their current job, either by reassignment, separation, or retirement.

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Agency managers frequently are faced with a need to make decisions regarding such things as granting waivers, approving mitigations or accommodations, or taking personnel action when employees are unable to meet medical standards. A medical standard issue occasionally encountered is related to the perception of how far away objects are from the viewer, or where the objects are relative to other objects within the field of view, such that an individual is unable to meet an established agency standard. The distinction between distance and depth perception will be discussed in this paper, as well as how these perception functions are measured and what the results mean to employees and to their employing agencies. For simplicity, except where the terms explicitly are made distinct, within this document the term “depth perception” will be used generically to refer both to distance and depth perception. Reported problems with perception of distance and depth may be due to the loss of an eye, poor visual acuity in one or both eyes, difficulty using a vision testing machine, or other factors. This brief guide is intended to assist supervisors and program managers to evaluate the possible significance of a person's lack of normal distance and depth perception, and things to consider when an employee is unable to meet an agency's vision standard.

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Vision testing may be conducted using one of several types of office-based machines, with standard color plate books or wall-mounted or hand-held charts, or with non-standardized manual assessments carried out by medical services providers. Some vision testing machines may be used to gather information for all of the factors in the above table, while others are more specialized or limited in scope. The wall-mounted and hand-held methods include such standard tools as the Snellen eye chart (for far and, sometimes, near visual acuity) and the Jaeger eye chart or card (for near visual acuity). Books or sets of Ishihara colored plates (which require the identification of numbers or letters made up of specifically-colored circles

embedded within a field of other colored circles) are used for standardized color vision testing, and may be used if a vision testing machine does not include the ability to test for color vision or if the patient has difficulty using the machine. The Farnsworth D-15 test assesses the ability of an individual to arrange colored test objects in the correct order based on their hue. Except for the Farnsworth D-15 test, the results of color testing generally are recorded as the number correct out of the number tested, and may be interpreted then as normal or abnormal, depending on the particular scale or scoring method for the test. However, the results for specific plates of the Ishihara test are pertinent regarding the nature of any color vision deficit that may be found, and the scoring of the Farnsworth D-15 involves a more complicated assessment based on the order of the colored objects as selected by the patient (this is discussed in greater detail in a companion guide within this series).

All of these simple but standardized tools can be used easily in most clinical settings. In addition, if a vision testing machine is not available, or if the patient has difficulty using the machine, a non-standardized manual assessment of peripheral vision and depth perception can be carried out using what are referred to as “challenge” tests in which the examiner asks the patient to indicate when, for example, a wiggled finger is first seen as it is moved from off to the side and into the patient’s field of vision while the patient looks straight ahead, or the patient is asked to reach out with an index finger and repeatedly touch the examiner’s finger as it is moved about in front of the patient. A non-standardized functional color vision test also may be used when a vision testing machine is not available, or the patient has difficulty using the machine. This alternative test also may be used when the agency needs to confirm an individual’s ability to identify basic colors, such as red/green/blue/yellow, but has not been able to pass a standardized test. For the alternative color vision test, the colors of various non-color-associated objects (e.g., sheets of paper, or short lengths or yarn) are to be identified by the patient for the examiner.

### What is being tested, and why

**Uncorrected vision** testing is a measure of an individual’s visual acuity without the use of corrective lenses, and is recorded either in Snellen units<sup>1</sup> (e.g., 20/20) or Jaeger units<sup>2</sup> (e.g., Jaeger #1), which may be converted into Snellen units for simplicity. The test results generally are recorded for each eye individually, and then with both eyes open at the same time. Normal vision is considered to be 20/20 or better (e.g., 20/15), though less acuity (e.g., 20/40) may be allowed in some situations, such as for driver licenses in most states. The measurement of uncorrected vision is important for employment situations where corrective lenses may not be permissible or practical, and the ability to see accurately is important for

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<sup>1</sup> Snellen units represent what an individual is able to see at a given distance (i.e., 20 feet) compared to what an individual with normal, healthy eyes would be able to see. A measurement of 20/20 is considered normal, though individuals with very good vision may be found to have results of 20/15 or even better. A measurement of 20/40 means that, at a distance of 20 feet, the individual only is able to see objects clearly that a person with normal vision could see at a distance of 40 feet. Most states consider corrected visual acuity of 20/200 or worse to represent legal blindness, even though such an individual has the ability to identify most large objects and may be able to see movement and colors.

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safety or performance reasons. It also may be important in the early detection of harm to the eyes, when potential hazards to the eyes may be present in the environment or as a result of work tasks.

**Corrected vision** testing is a measure of an individual's visual acuity while using corrective lenses, such as glasses or contacts. As for uncorrected vision testing, the results are recorded either in Snellen or Jaeger units for each eye individually and then with both eyes open at the same time. Vision generally can be correctable to 20/20, unless there are factors that interfere with this degree of correction. The measurement of corrected far vision is important for employment situations where corrective lenses are permissible and the ability to see objects accurately is important. It also may be important in the early detection of harm, when potential hazards to the eyes may be present in the environment or as a result of work tasks.

**Near vision** testing is a measure of an individual's ability to see objects well at close distances (e.g., an arm's length or less; the test itself usually is conducted with the test card held at 14 inches from the eyes). Near vision may be tested with or without the use of corrective lenses.

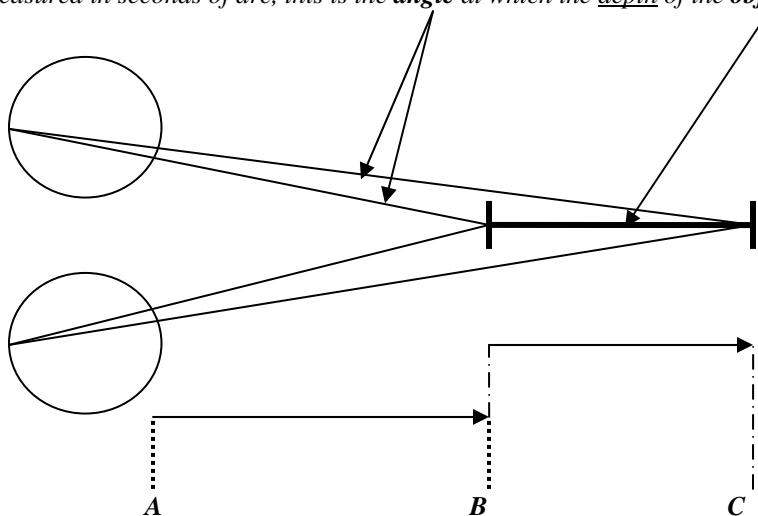
**Far vision** testing is a measure of an individual's ability to see objects clearly when they are at a distance, with or without the use of corrective lenses. Such distances may range from many feet away to several miles.

**Color vision** testing is an assessment of an individual's ability to identify colors or hues accurately. Vision depends on two primary types of light receptor cells in the retina of the eye: rods, which contain a single type of photopigment and only respond to light of a limited frequency range; and cones, which have one of three different photopigments which respond to light of three different wavelengths, which are perceived as blue, green, and red. For some agencies, the primary question regarding color vision simply is whether or not the individual can distinguish the colors red, green, blue, and yellow; for other agencies, a more precise color vision capability is necessary. The measurement of color vision may be important for employees whose job requires that they be able to distinguish colors accurately, such as may be the case for electricians (who may need to identify specific wires based on colors and patterns), drivers (who must identify traffic lights, particularly when they appear in a non-traditional order), law enforcement officers (who must be able to identify colors of clothing, or hair, or automobiles, for example), or inspectors (who must identify and trace the path of color-coded pipes and valves). Testing for color vision also may be important in the detection of the effects of certain metal, chemical, or infectious exposures.

**Depth perception**, for purposes of this Guide, incorporates two distinct aspects of vision and the location of objects in a 3-dimensional world. First, there is "distance perception" (or absolute depth perception), which involves an assessment of how far an object is from the viewer or from another object, in measureable units (e.g., inches, feet, football field lengths). Actual "depth perception" (or relative depth perception) involves an assessment of the location of an object relative to another. Being able to estimate with some accuracy how many feet a boat is from the dock is distance perception; recognizing that boat is closer to you than to the opposite shore is depth perception. Both factors are considered to be important for the safe and efficient performance of many federal jobs.

Depth perception generically may be measured using a vision testing machine, or by a non-standardized challenge test administered by the examiner. The ability to perceive depth or distance depends on several factors. Within several feet of the viewer, stereoscopic vision has greater importance; at further distances, other factors also come into play. Stereoscopic vision depends upon having two eyes, each with good visual acuity, and is based on the ability of the brain to analyze the visual input from these two sources of information that are spaced a few inches apart and, as a result, view an object from two slightly different angles. Using innate the neurological connections involving the eyes, the optic nerves, and the visual cortex of the brain, a person learns from infancy to use these angular differences to estimate distance and to determine the relative placement of objects in the field of vision, as demonstrated here:

*Measured in seconds of arc, this is the **angle** at which the depth of the object can be perceived*



*A visual estimate by an individual who is represented by the two eyes at the left, above, of the distance from point A to point B (about 1 ¾ inches in this example) requires “distance perception”; a correct recognition that point B is closer to the observer than point C requires “depth perception”; both capabilities are necessary in determining the placement of the dark bar in space, and are important in navigating safely and efficiently in a 3-dimensional world.*

Stereoscopic vision requires good visual acuity in each eye, and successful information processing by the brain. Normal stereoscopic vision is considered to be 20 to 40 seconds of arc though, for some jobs, values of 60 to 100 seconds of arc may be acceptable. In addition to stereoscopic vision, the perception of depth and the relative location of objects in the field of vision includes (particularly at distances greater than several feet from the viewer) such monocular visual cues as granularity (how much detail is visible in the objects being observed); interposition (which object appears to be in front of or behind another); relative size (which object of familiar characteristics appears to be larger); linear perspective (reflecting the way lines appear to converge to a point in the distance); shading (in our early development, we learn that light usually comes from above us, so the area or nature of the shading of an object provides information regarding which portions of the object extend towards or away from our eyes, such as convexity and concavity); and parallax (in which an object that is farther away from us appears to move less within our field of vision than an object that is closer to us, as we move from side to side).

Depth perception test results generally are reported as the number correct out of the number tested, or in seconds of arc, and are then interpreted by the examiner as demonstrating normal





### Does a lack of depth perception pose a safety risk or undermine the efficiency of the job?

It may. Depending on the workplace hazards and the functional requirements of a particular job, the lack of what we have referred to as normal “depth perception”, including stereoscopic vision, the recognition of monocular cues, and the ability to process visual information leading to both distance and depth perception, may present important challenges to safe and efficient job performance. Work settings that include trip hazards (e.g., tree roots, raised door sills, electrical wiring or cables) require the ability to determine both distance and depth in order to reduce the risk of falls. Driving a motor vehicle requires the ability to judge with some accuracy the distance to another vehicle, or hazard in the road to be avoided, or the distance that will be required to slow or stop the vehicle safely. It must be remembered, however, that the vision testing described in this guide is for screening purposes, to identify possible problems for which further evaluation may be necessary. The most important factor in assessing safety risk or performance efficiency is observation of that performance in safe but realistic situations, where the effects of a possible vision defect can be evaluated for its possible impact on the individual’s abilities.

What may be ironic is that a complete lack of vision in the “bad” eye may pose less of a problem for some individuals than simply having poor vision in that eye because, in the latter situation, the information presented to the brain contains both clear and unclear information, which the brain attempts to fuse into one image. This combination may confuse the process of interpreting the image and determining depth, distance, and other aspects of what is being viewed.

### Granting a waiver despite a lack of normal depth perception

A waiver despite a lack of normal depth perception may be granted when, in the judgment of a deciding official, an individual with a vision deficit has demonstrated that they have sufficient experience, skills, knowledge, and coping methods to be able to carry out all of the functional requirements of their job, and to do so safely and efficiently, despite their vision deficit. In this situation, despite the individual’s inability to fulfill one or more of the factors described in the agency’s medical standards as demonstrating compliance with those standards (e.g., normal depth perception), the vision standard related to depth perception is waived for that individual for the current evaluation cycle. However, the issue should be re-evaluated every time an examination or clearance evaluation normally would be conducted for that individual, and every time there is a significant change in job duties, the work environment, or the individual’s vision or other health factors. This is intended to ensure that the individual continues to be able to perform the duties safely and efficiently. The factors discussed in the preceding sections should be considered when making this sort of decision.

### Granting a waiver with mitigations for a lack of normal depth perception

Similar to a waiver without mitigations, a waiver with mitigations may be granted when, in the judgment of a deciding official, an individual who does not meet a medical standard has demonstrated that they have sufficient experience, skills, or knowledge to be able to carry out a job or function safely and efficiently despite their lack of normal depth perception if certain steps or actions are taken that are intended to minimize the risks presented by that deficit. As

developed by the Interagency Wildland Firefighter Medical Standards Program, and modified for purposes of this more generic guide, mitigations related to depth perception may involve such measures as:

1. Notifying subordinates, coworkers, and supervisors about your abnormal depth perception to mitigate a safety risk to yourself or others,
2. Ensure you and your line supervisor assess your duties for potential hazards encountered during work operations to include mitigation steps for visual hazards,
3. Wear ANSI approved personal protective eyewear equipment during field operations,
4. Carry sufficient pairs of corrective lenses (glasses) in case(s) to correct your vision to 20/40 or better in each eye at all times,
5. Use Best Safety Practices when operating any government motorized vehicle or power tool,
6. Utilize a spotter when backing a vehicle or trailer,
7. Operate motor vehicles during daylight hours only,
8. Operate motor vehicles during daylight hours only, unless evaluation by the government license examiner determines that night time operations can be safely allowed,
9. Utilize and carry a spare high intensity beam headlamp at all times for use at night to improve your depth perception.

Specific mitigations should be based on unique aspects of the individual's vision condition, the circumstances of the job, and the environment in which it is to be carried out.

#### Reasonable accommodations for an employee with a lack of normal depth perception

As noted on page 1, the Rehabilitation Act requires the accommodation of disabled individuals if the individual is qualified and the accommodation is reasonable. In other words, granting the accommodation would not impose an undue hardship on the operations of the agency. Determining if an accommodation would pose such hardship depends on:

- “(i) *The overall size of the agency's program with respect to the number of employees, number and type of facilities and size of budget;*
- (ii) *The type of agency operation, including the composition and structure of the agency's work force; and*
- (iii) *The nature and the cost of the accommodation.”*

According to the Act, reasonable accommodation “*may include, but shall not be limited to:*

- (i) *Making facilities readily accessible to and usable by individuals with handicaps; and*
- (ii) *Job restructuring, part-time or modified work schedules, acquisition or modification of equipment or devices, appropriate adjustment or modification of examinations, the provision of readers and interpreters, and other similar actions.”*

These factors, among others that may be applicable to the individual and local circumstances of the job, must be considered when a determination is to be made regarding whether or not an accommodation can or should be granted. Any accommodation that is to be considered for an employee must have an established, direct, risk-avoidance or task-accomplishment value related to the specific medical condition(s). Most medical standards have associated with them some form of narrative or description of the “basis” for the standard, and it may be

helpful to review this information when considering whether an accommodation is appropriate.

If a waiver, waiver with mitigations, or accommodation are not considered reasonable

After a careful consideration of the functional requirements of the individual's specific job, and the impact of the vision impairment on their ability to perform the job safely and efficiently, it may be determined that the standard cannot be waived, with or without mitigations, and no accommodation would be both reasonable and effective in overcoming the limitations or risks presented by the condition. In such situations, personnel action may be necessary to separate the individual from their current job, either by reassignment, separation, or retirement.

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This guide was prepared by:

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*Federal Occupational Health*

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***When an Employee Doesn't Meet the Agency's Vision Standard***  
***-- Monocular Vision --***  
**An Overview for Federal Supervisors and Medical Standards Program Managers**

*July 2009*

**Introduction**

Agency managers frequently are faced with a need to make decisions regarding such things as granting waivers, approving mitigations or accommodations, or taking personnel action when employees are unable to meet medical standards. A medical standard issue occasionally encountered is related to monocular vision, or the lack of effective vision in one eye, such that the individual is unable to meet an established agency standard. Monocular vision may be due to the physical loss of an eye, the failure of an eye to form normally, or the loss of significant visual acuity in an eye as a result of injury or disease. For purposes of this guide, the term “monocular vision” will be used to refer to any of a number of conditions that range from the physical lack of an eye to situations in which an eye is present but does not provide useful vision information. This brief guide is intended to assist supervisors and program managers to evaluate the possible significance of monocular vision, and things to consider when an employee is unable to meet an agency's vision standard.

*Please Note: This guide is intended for general informational purposes only. It reflects the views of the author, but is not intended to replace or supersede more comprehensive, authoritative, or official agency or professional standards, guidelines, or policies.*

**Basis for Vision Standards**

A vision standard that requires effective binocular vision (particularly binocular vision of a specified acuity) may be established for a group or classification of employees when the ability to see well with both eyes has been identified as pertinent to the safety of employees and the efficient performance of their job duties. The specific standards that relate to vision are identified and established through processes that involve making worksite observations and gathering information from employees, supervisors, and medical and safety professionals, then giving careful consideration to the vision factors that are considered to be necessary in order for an individual to carry out the essential functions of the job safely and efficiently, including early visual warning of hazards or threats, vision redundancy (i.e., two functioning eyes, in case one becomes injured while the employee is in a hazardous situation), and accurate assessment of visual cues that relate to the work to be done. In addition, it is recognized that some work tasks that require healthy vision may have to be carried out under particular circumstances and environmental conditions that may not be present when an individual's vision is being tested in the controlled environment of a medical clinic. This includes highly variable lighting conditions, work tasks that require close attention or rapid identification, distractions or hazards in the environment, wind and blown dust, and the presence of irritants or fumes.

### **Legal Requirements**

While this brief guide is not intended as a substitute for the expertise of professional human resources personnel, or the more complete manuals and guidelines available from other agencies, such as the Office of Personnel Management, the manager should be aware of some pertinent regulations as they consider appropriate actions to take when an employee or applicant does not meet a vision standard. According to Federal law (5 CFR 339.102(c)), *“failure to meet a properly established medical standard or physical requirement ... means that the individual is not qualified for the position unless a waiver or reasonable accommodation is indicated... .”* As a result, if an individual is monocular and is unable to meet the agency's established vision standard, some type of response is necessary, either by the employee or by management. This may include such actions as: waiving the standard if the individual can demonstrate that they can perform the essential functions of their job safely and efficiently despite their monocular vision; providing a waiver accompanied by agency-mandated mitigations in order to minimize the risks related to the vision deficit; providing a reasonable accommodation if the employee is found to be a qualified disabled individual; arranging for a transfer to another position where an individual's vision is less critical; or termination of employment.

### **Waivers**

Federal law (5 CFR 339.204) requires an agency to *“waive a medical standard or physical requirement... when there is sufficient evidence that an applicant or employee... can perform the essential duties of the position without endangering the health and safety of the individual or others.”* As a result, if an individual demonstrates a current and true ability to safely and efficiently perform the requirements of a job, and to do so despite a vision deficit (such as monocular vision) and under all of the likely conditions and circumstances that may be encountered during the course of carrying out that job, the standard must be waived at that time and for that individual. A waiver may be time limited (e.g., it must be reevaluated every time a clearance examination and/or review is done), and is subject to reevaluation if the individual's health or the nature of the job changes. In some cases, a waiver may be accompanied by agency-mandated mitigations that are intended to minimize potential risks related to the vision deficit.

### **Accommodations**

Federal law (29 CFR 1614.203, the “Rehabilitation Act”) requires managers to *“make reasonable accommodation to the known physical or mental limitations of an applicant or employee who is a qualified individual with handicaps unless the agency can demonstrate that the accommodation would impose an undue hardship on the operations of its program.”* A qualified individual means *“an individual with handicaps who, with or without reasonable accommodation, can perform the essential functions of the position in question without endangering the health and safety of the individual or others,”* and meets the other requirements for the position.

The granting of waivers, accommodations, and mitigations should never be considered as an automatic response when a monocular vision condition is encountered. Each case must be considered on a strictly case-by-case basis to ensure that the most appropriate course of action is taken, for the safety of the individual and for benefit of the agency.

**Agency Response to a Finding of Monocular Vision**

How is an employee's vision recorded, and what do the results mean? How does a manager know if an employee's vision condition poses a safety risk or may be undermining the efficiency of the program? What are the safety risks associated with monocular vision? When can (or should) management grant a waiver (with or without mitigations), a step that means, for that particular employee, management is going to allow the employee to continue to work despite the failure to meet an established standard? What types of accommodations are possible, and reasonable, in response to an employee's monocular vision? This overview will address these questions to help guide the manager to respond in a fair and responsible way when an employee is unable to meet the vision standard.

**How vision screening tests may be done**

For general medical clearance screening purposes, there are several measures of vision that commonly are conducted. These specific tests are carried out because they provide pertinent information about an individual's functional vision capabilities, and because they can be done in most clinics and physicians' offices, with commonly available equipment. The results of these tests may be recorded on an exam form using one of several formats, such as the following:

|  |   |
|--|---|
| <p><b><u>Visual Acuity</u></b></p> <p><u>Uncorrected vision (Snellen Units)</u></p> <p>Both Near 20/____ Right Near 20/____ Left Near 20/____</p> <p>Both Far 20/____ Right Far 20/____ Left Far 20/____</p> <p><u>Corrected vision (Snellen Units)</u></p> <p>Both Near 20/____ Right Near 20/____ Left Near 20/____</p> <p>Both Far 20/____ Right Far 20/____ Left Far 20/____</p> | <p><b><u>Color Vision</u></b></p> <p><u>Type of test</u></p> <p><input type="checkbox"/> Ishihara plate    <input type="checkbox"/> Function test (Yarn, wire, etc.)</p> <p><input type="checkbox"/> Other (specify _____)</p> <p>Normal    Abnormal    Number Correct:</p> <p><input type="checkbox"/>    <input type="checkbox"/>    _____ of _____ tested</p> <p>Can see Red/Green/Blue/Yellow?    <input type="checkbox"/> Yes    <input type="checkbox"/> No</p> |
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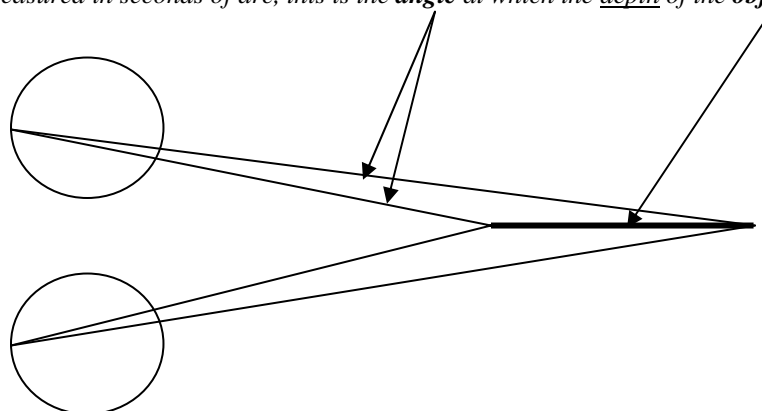
**Far vision** testing is a measure of an individual's ability to see objects clearly when they are at a distance, with or without the use of corrective lenses. Such distances may range from many feet away to several miles.

**Color vision** testing is an assessment of an individual's ability to identify colors or hues accurately. Vision depends on two primary types of light receptor cells in the retina of the eye: rods, which contain a single type of photopigment and only respond to light of a limited frequency range; and cones, which have one of three different photopigments which respond to light of three different wavelengths, which are perceived as blue, green, and red. For some agencies, the primary question regarding color vision simply is whether or not the individual can distinguish the colors red, green, blue, and yellow; for other agencies, a more precise color vision capability is necessary. The measurement of color vision may be important for employees whose job requires that they be able to distinguish colors accurately, such as may be the case for electricians (who may need to identify specific wires based on colors and patterns), drivers (who must identify traffic lights, particularly when they appear in a non-traditional order), law enforcement officers (who must be able to identify colors of clothing, or hair, or automobiles, for example), or inspectors (who must identify and trace the path of color-coded pipes and valves). Testing for color vision also may be important in the detection of the effects of certain metal, chemical, or infectious exposures.

**Depth perception** may be measured using a vision testing machine, or by a non-standardized challenge test administered by the examiner, and reflects an individual's ability to determine the depth or apparent distance of an object from the viewer or in relation to other objects. This ability depends on several factors. Within several feet of the viewer, stereoscopic vision has greater importance; at further distances, other factors also come into play. Stereoscopic vision depends upon having two eyes, each with good visual acuity, and is based on the ability of the brain to analyze the visual input from these two sources of information that are spaced a few inches apart and, as a result, view an object from two slightly different angles. Using innate the neurological connections involving the eyes, the optic nerves, and the visual cortex of the brain, a person learns from infancy to use these angular differences to estimate distance and to determine the relative placement of objects in the field of vision, as demonstrated here:



*Measured in seconds of arc, this is the **angle** at which the depth of the **object** can be perceived*

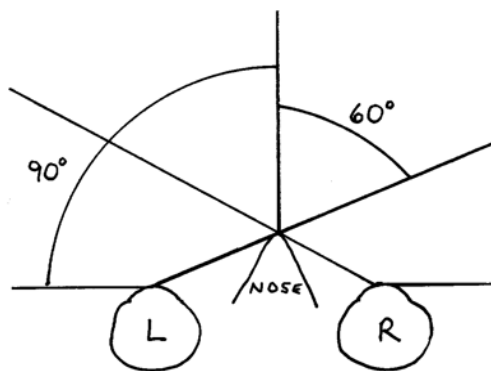


Stereoscopic vision requires good visual acuity in each eye, and successful information processing by the brain. Normal stereoscopic vision is considered to be 20 to 40 seconds of arc though, for some jobs, values of 60 to 100 seconds of arc may be acceptable. In addition to stereoscopic vision, the perception of depth and the relative location of objects in the field of vision may include such monocular visual cues as granularity (how much detail is visible in the objects being observed); interposition (which object appears to be in front of or behind another); relative size (which object of familiar characteristics appears to be larger); linear perspective (reflecting the way lines appear to converge to a point in the distance); shading (in our early development, we learn that light usually comes from above us, so the area or nature of the shading of an object provides information regarding which portions of the object extend towards or away from our eyes, such as convexity and concavity); and parallax (in which an object that is farther away from us appears to move less within our field of vision than an object that is closer to us, as we move from side to side).

Depth perception test results generally are reported as the number correct out of the number tested, or in seconds of arc, and are then interpreted by the examiner as demonstrating normal or abnormal findings. If a standardized testing method is not available, or the patient has difficulty using the vision testing machine, a practical or challenge test of depth perception may involve having the individual reach out with an index finger to touch the examiner's finger repeatedly as it is moved about in front of the patient, thereby demonstrating an ability to determine the position of an object in three-dimensional space (which includes depth, or distance, from the patient). Depth perception may be an important factor for purposes of safety (e.g., driving a vehicle and correctly judging safe following and stopping distances; avoiding tripping over objects within the work zone; judging the distance to a platform onto which an employee must step or drop) or performance (e.g., reaching out to place equipment in the bed of a truck or onto a shelf; judging the distance that will be reached by a tree being taken down; or acquiring a target when using a firearm).

**Peripheral vision** is the function of visually detecting light, movement, or the presence of objects at the periphery of our visual field, rather than in front of us where we generally focus our attention. It depends on the function of light receptors in the eye called rods, which are found in the greatest concentration in the periphery of the retina, away the area of central vision (the macula), which depends primarily on cells called cones. Rods are important for night vision and low-light situations, much more so than cones and central vision. Peripheral

vision is supposed to be recorded in degrees from the mid-line, with one measurement to the nasal side of the eye (towards the mid-line) and one measurement to the temporal side (to the far right or left side of the individual) though, for some reason, these measurements very commonly are recorded by clinics incorrectly on exam forms, and a careful interpretation of the recorded results is necessary. In general, a maximum nasal screening test result is about  $60^\circ$ , and a maximum temporal result is  $85^\circ$  to  $90^\circ$ , or sometimes greater, for a total of approximately  $150^\circ$ , though individual findings depend on such factors as the shape of the bridge of the nose and whether the eyes are sunken or protruding on the face (relative to the nose, or to the side of the face and eye socket), and measurements commonly are recorded only to a limit of  $45^\circ$  nasally and  $85^\circ$  temporally. The following graphic demonstrates these primary physical limiting factors in peripheral vision:



*The “L” and the “R” represent an individual’s right and left eyes, as seen from above, and with the nose located between them. The degrees shown are for the left eye, demonstrating  $90^\circ$  of temporal peripheral vision (measured from the mid-line), and  $60^\circ$  of nasal vision (also from the mid-line), for a total of  $150^\circ$ . The area above the “R” eye and below the  $60^\circ$  arc represents that portion of the field of vision that would be lost to a person who does not have vision in the right eye, unless adaptive measures are taken.*

Peripheral vision is important for situational awareness during normal light conditions where the detection and timely and appropriate response to potential physical hazards may be necessary (such as moving machinery, or the presence of persons or animals that may be harmful). It also is important simply for the receipt of visual information about an individual’s surroundings in low light or near-dark situations.

### Does monocular vision pose a safety risk or undermine the efficiency of the job?

It may. Depending on the workplace hazards, or the functional requirements of the particular job, the lack of an eye, or the lack of normal function of an eye, will reduce the richness of the visual information being received and analyzed by the individual. Monocular vision eliminates the stereoscopic vision component of depth perception, and it reduces the extent of peripheral vision on the effected side unless regular adaptive measures are taken, which may be quite natural for a person born with monocular vision but may not be for someone who has lost vision or an eye more recently. Monocular vision may result in the need for greater physical exposure and risk for the individual in situations where avoiding notice is important, such as when the person may have to emerge from hiding sufficiently for the “good” eye to be used to see around obstacles or screens. It also reduces the amount of visual information gathered and processed by the brain, which may be critical in situations where accurate identification of objects (e.g., an armed opponent) may be important for safety. Monocular vision also means that the individual lacks a redundancy so that, if the remaining eye becomes impaired in any way (such as by direct physical injury, or by dust or other foreign matter), they may become functionally blind until the problem can be resolved.

The impact of monocular vision for an individual may vary depending on when the loss of vision occurred. A person who is born with only one normally functioning eye knows only the vision they have experienced since infancy, and they may learn to account for the otherwise-reduced visual information available to them by adapting such measures as frequent conscious or unconscious turning of the head (to point the head and the healthy eye toward the side with absent of functionally limited vision) in order to scan the environment and increase the visual information that can be gathered and processed. Such an individual tends to develop other senses, such as hearing, as well as vision in the healthy eye, and may unconsciously learn to utilize those senses more effectively and thoroughly than might otherwise be the case. An individual who loses vision in an eye later in life, particularly if the loss is quite recent (relative to the time of the agency's medical screening process), will have had less time to develop these other mechanisms to help overcome the lack of normal vision.

#### Granting a waiver for monocular vision

A waiver for monocular vision may be granted when, in the judgment of a deciding official, an individual with a vision deficit has demonstrated that they have sufficient experience, skills, knowledge, and coping methods to be able to carry out all of the functional requirements of their job, and to do so safely and efficiently, despite their vision deficit. In this situation, despite the individual's inability to fulfill one or more of the factors described in the agency's medical standards to demonstrate compliance with the standard (e.g., 20/20 uncorrected far vision in each eye), the standard is waived for that individual for the current evaluation cycle. However, the issue should be re-evaluated every time an examination or clearance evaluation normally would be conducted for that individual, and every time there is a significant change in job duties, the work environment, or the individual's vision or other health factors. This is intended to ensure that the individual continues to be able to perform the duties safely and efficiently. The factors discussed in the preceding sections should be considered when making this sort of decision.

#### Granting a waiver with mitigations for monocular vision

Similar to a waiver without mitigations, a waiver with mitigations may be granted when, in the judgment of a deciding official, an individual who does not meet a medical standard has demonstrated that they have sufficient experience, skills, or knowledge that they are considered likely to be able to carry out a job or function safely and efficiently despite their monocular vision if certain steps or actions are taken that are intended to minimize the risks presented by that deficit. This may involve such measures as requiring the presence of a spotter for individuals who drive and must back up their vehicles, or requiring the use of safety goggles at all times when working in environments where the risk of harm to the remaining healthy eye is greater than normal. It may involve requiring the individual to notify supervisors and coworkers of their condition so that others are aware of potential limitations or difficulties the individual may have with vision. These mitigations should be specified based on unique aspects of the individual's vision condition, the circumstances of the job, and the environment in which it is to be carried out.

#### Reasonable accommodations for an employee with monocular vision

As noted on page 1, the Rehabilitation Act requires the accommodation of disabled individuals if the individual is qualified and the accommodation is reasonable. In other words, granting the accommodation would not impose an undue hardship on the operations of the agency. Determining if an accommodation would pose such hardship depends on:

- “(i) The overall size of the agency's program with respect to the number of employees, number and type of facilities and size of budget;*
- (ii) The type of agency operation, including the composition and structure of the agency's work force; and*
- (iii) The nature and the cost of the accommodation.”*

According to the Act, reasonable accommodation “*may include, but shall not be limited to:*

- (i) Making facilities readily accessible to and usable by individuals with handicaps; and*
- (ii) Job restructuring, part-time or modified work schedules, acquisition or modification of equipment or devices, appropriate adjustment or modification of examinations, the provision of readers and interpreters, and other similar actions.”*

These factors, among others that may be applicable to the individual and local circumstances of the job, must be considered when a determination is to be made regarding whether or not an accommodation can or should be granted. Any accommodation that is to be considered for an employee must have an established, direct, risk-avoidance or task-accomplishment value related to the specific medical condition(s). Most medical standards have associated with them some form of narrative or description of the “basis” for the standard, and it may be helpful to review this information when considering whether an accommodation is appropriate.

#### If a waiver, waiver with mitigations, or accommodation are not considered reasonable

After a careful consideration of the functional requirements of the individual's specific job, and the impact of the vision impairment on their ability to perform the job safely and efficiently, it may be determined that the standard cannot be waived, with or without mitigations, and no accommodation would be both reasonable and effective in overcoming the limitations or risks presented by the condition. In such situations, personnel action may be necessary to separate the individual from their current job, either by reassignment, separation, or retirement.

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This guide was prepared by:

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*Occupational Medical Consultant*  
*Federal Occupational Health*

## Alcohol and Substance Abuse

Briefing paper for FFAST

May 9, 2003

During the FY03 Interagency Wildland Firefighter Medical Qualification Standards implementation program four instances have arisen which require an immediate review of the questions asked on page 4 of the Exam Form (Baseline/Periodic/Exit) under the general medical history section for alcohol and drug use.

These four specific instances are as follows:

- (1) An employee self-disclosed alcohol and illegal drug (cocaine) abuse with subsequent attempts for rehabilitation are not successful. The Central Medical Consultant (CMC) contacted both the alcohol and drug abuse centers confirming the unsuccessful rehabilitation process. The CMC provided to the Interagency Medical Standards Program Manager a non-clearance letter. I forwarded the medical issues surrounding the non-clearance to the employee's Servicing Personnel Officer.
- (2) An IHS clinic automatically forwards temporary employee's alcohol histories to the CMC. The CMC must then make a determination if the alcohol history indicates occasional use, dependence, or abuse.
- (3) A permanent employee self-disclosed marijuana recreational use. The CMC must then make a determination if the illegal drug use indicates occasional use, dependence, or abuse. Does this self-disclosed information place the Agency at risk knowing that recreational use occurs should an incident/accident occur during work hours which could be related back to acute/chronic effects from illegal drug use?
- (4) A permanent employee self-disclosed marijuana use for migraine headaches without their personal physician's knowledge or consent. Again the CMC must determine occasional use, dependence, or abuse. The CMC directed the employee to visit with their personal physician to determine a medically recognized treatment modality, not self medicating with an illegal drug.

In an attempt to eliminate subjective interpretations of the medical standards referencing occasional use/dependence/abuse of alcohol or illegal drug use, John Gould requested Kevin Jensen and Jay Paulsen, MD to present a past history on the medical standards specific to alcohol and illegal drug use. The file Alcohol and Substance Abuse 041103.doc provides this information.

**Action Item:**

- 1) Adopt the “**Possible Edits to the WLFF Medical History, Examination, and Clearance Form (page 4)**” as noted in the Alcohol and Substance Abuse 041103.doc. OR
- 2) Modify the Psychiatric Standard language (change in italics) to “No evidence by physical examination and medical history of *current* psychiatric conditions (including alcohol or substance *dependence or abuse*) likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job (see page 2).

**Recommendation:**

Adopt the “**Possible Edits to the WLFF Medical History, Examination, and Clearance Form (page 4)**”

**Conclusion:**

Pursuing one of the above two suggested recommendations eliminates the subjective possibilities which currently exist yet do not weaken the program as alcohol and illegal drug abuse are issues which I feel should lead to non-clearance pending EAP intervention through the Servicing Personnel Offices.

## Asthma and Inhalers

The current Chest And Respiratory System Standard specifies that:<sup>1</sup>

*“The applicant/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:*

- *A physical exam of the respiratory system that is within the range of normal variation; and*
- *A pulmonary function test (baseline exam) showing:*
  - o *forced vital capacity (FVC) of at least 70% of the predicted value; and*
  - o *forced expiratory volume at 1 second (FEV<sub>1</sub>) of at least 70% of the predicted value; and*
  - o *the ratio FEV<sub>1</sub>/FVC of at least 70% of the predicted value; and*
- *No evidence by physical examination and medical history of respiratory conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.*

*Note: The requirement to use an inhaler (such as for asthma) requires agency review.”*

The current basis for the Chest and Respiratory System standard relates:<sup>2</sup>

*“(A) the firefighter’s need for a healthy respiratory system and residual aerobic capacity with (B) the essential functions and work conditions of a wildland firefighter, including arduous exertion, carrying heavy loads, and extensive walking and climbing under conditions that may include very steep terrain, high altitudes, airborne particulates, and allergens. Some chest and respiratory conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions. The stated standards of 70% of predicted values for forced vital capacity (FVC), forced expiratory volume at 1 second (FEV<sub>1</sub>), and the ratio of FEV<sub>1</sub>/FVC are intended as screens for further evaluation, not mandatory values. The requirement for agency review when inhalers are used is based on both the general incompatibility of inhalers and high heat or fire (according to guidance from inhaler manufacturers) and concern regarding the degree of respiratory sensitivity an individual may bring to a setting of high irritant exposure.”*

The primary questions here are whether or not the requirements of the job and the conditions of employment would be expected to aggravate, accelerate, exacerbate or permanently worsen a firefighter’s respiratory condition and inordinately threaten his health and safety, and whether those conditions of employment may exceed the limitations of his medical device (his inhaler).

One firefighter who sought a waiver was found to have a VO<sub>2</sub> max of 32.1 ml/kg/min which, according to documentation he provided, is considered by The Cooper Institute for Aerobics Research to be in the “good” range for a man of his age, when corrected for altitude. The VO<sub>2</sub>

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” pages 11.

<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty)”, page 4.

max refers to the “maximal capacity of the subject’s respiratory system, or aerobic capacity.”<sup>3</sup> It should be noted, however, that according to respiratory physiology research that was used as the basis for the Pack Test, “*since 1975 a score of 45 (mL/kg/min) or higher has been the minimum for wildland firefighters required to do arduous work.*” This was validated by studies of the energy expenditure and oxygen demands of individuals carrying out representative firefighting tasks.

Regarding the use of an inhaler, the basis for concern in wildland firefighters has been at least two-fold. First, individuals whose respiratory condition is such that it requires the use of an inhaler (of any type) have demonstrated that their condition is not truly static and stable; i.e., it periodically requires the use of a potent medication to open airways that have become constricted in response to some form of a trigger, which may be environmental or psychological in nature. Those triggers may occur under the very circumstances (e.g., the stress of heavy smoke, or the flare up of a fire) in which a firefighter must be able to respond quickly, decisively, and effectively in order to protect his health and safety, or that of co-workers. Second, medications and their delivery devices have limitations in how they can be stored, and the circumstances under which they can be used safely and effectively.

In the recent firefighter’s case, he used an inhaler, Azmacort, which involves a pressurized container. The manufacturer for this product specifies that the user must “*not use or store near heat or open flame,*” and “*exposure to temperatures above 120° may cause bursting*” of the canister, an event which may cause injury and certainly would render the device inoperative. To protect the medication in the canister and maintain its effectiveness, it is to be stored at a “*Controlled Room Temperature [of] 20 to 25°C (68 to 77° F),*” as defined by the USP (U.S. Pharmacopeia). The USP defines “*Controlled Room Temperature*” as “*a temperature maintained thermostatically that encompasses the usual and customary working environment of 20 to 25°C (68 to 77° F) [and] that allows for brief deviations between 15°C and 30°C (59° – 86° F) that are experienced in pharmacies, hospitals, and warehouses.*”<sup>4</sup> The USP specifies that storage temperatures “*are stated ... with respect to the temperatures at which Pharmacopeial articles shall be stored when stability data indicate that storage at a lower or higher temperature produces undesirable results,*”<sup>5</sup> or when temperature extremes may compromise the stability of the drugs and degrade their effectiveness. Concerns such as these have led to the inclusion of the restriction in the Medical Standards related to the use of inhalers, particularly pressurized inhalers, though the temperature extremes may be pertinent for non-pressurized inhalers or other medications if the drugs involved are temperature sensitive.

While there are non-pressurized medication delivery devices available for the treatment of asthma, including dry powder inhalers, the medications delivered by these devices primarily are used to prevent bronchoconstriction rather than for treatment of acute attacks. The only medications currently available and recommended for acute asthma attacks are those provided through pressurized inhalation devices, or devices such as nebulizers that would be limited to use within a medical facility or in other special circumstances. The Wildland Firefighter Medical

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<sup>3</sup> *Fitness and Work Capacity*, Second Edition, Sharkey, Brian (Project Leader), USDA Forest Service, Technology & Development Program, Missoula, Montana, April 1997, pages 5-6.

<sup>4</sup> U.S. Pharmacopeia, USP Quality Review, No. 40, Revised 6/94

<sup>5</sup> U.S. Pharmacopeia, USP Quality Review, Vol. 24, No. 6, Nov.-Dec. 1998



Standards Program is not involved in the direction of medical care for any individual, and all medical diagnosis and treatment decisions must be made by the firefighter and his/her physician. As a result, the best approach to preventing asthmatic attacks or responding to attacks when they occur must be determined by those parties. This Program can only indicate what medical conditions or treatments are considered to be compatible with the functional requirements and environmental factors that may be encountered during wildland firefighting, and what conditions and treatments are considered to be incompatible due to the health and safety risks they may pose for the firefighter or his/her co-workers. Whether or not a specific firefighter requires a medication provided through the use of a pressurized inhaler, or what medication (if any) that might be, is within the purview of him and his physician.

## WLFF Blood Pressure Issue

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the March 22-23, 2005 WLFF Interagency Medical Standards Team Meeting,  
New Orleans, Louisiana*

### Issue

A question has been raised about the discrepancy in the blood pressure values presented in the medical standards, and as highlighted in **bold**, below.

### Current Standard

The applicable section of the current FFALC-approved standards<sup>1</sup> specifies that:

*“The applicant/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; and  
....*
- *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....*

*CONDITIONS WHICH MAY RESULT IN DISQUALIFICATION INCLUDE,  
BUT ARE NOT LIMITED TO, THE FOLLOWING EXAMPLES:*

- ....
- 3. *HYPERTENSION that cannot be controlled to a level of **160/90** or less, or requires the use of any medication that affects the ability of the individual to safely and effectively carry out the requirements of the function, may be disqualifying.*
- .....”

The standard was based on<sup>2</sup>:

*“... (A) the firefighter’s need for a healthy cardiovascular system and a low risk of sudden or subtle incapacitation with (B) the essential functions and work conditions of a wildland firefighter, including arduous exertion, lifting and carrying heavy loads, extensive walking and climbing, and rapid pull out to safety zones under conditions that may include very steep terrain, isolated and remote sites, extreme heat, dehydration, and*

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” pages 8-9.

<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 3.

*long work assignments. Some cardiac conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions. The standard for blood pressure was set at 140/90 or below (with or without medication). Above this level is considered to be hypertension (high blood pressure), a condition associated with increasing risk of cardiovascular morbidity and mortality.”*

## **Discussion**

The values used for the systolic blood pressure (the top value in the reading) in the standards and in the basis document were intentionally different. One value relates to the definition of high blood pressure, and the health-related goal that should be sought for all individuals, particularly those in whom the Government has a vested interest as an employee engaging in arduous exertion in high risk areas. The other value relates to those individuals who have been identified as having high blood pressure and who are actively engaging in measures to lower that blood pressure, but who have not yet attained the desired normotensive state.

According to current National Institutes of Health (NIH) guidelines and definitions,<sup>3</sup> “hypertension (high blood pressure) is when your blood pressure frequently goes over 140/90” and “pre-hypertension is blood pressure readings from 120-139 over 80-89 on most measurements.” So, regular measurements of over 120/80 raises a flag of concern, and measurements of over 140/90 may lead to a diagnosis of hypertension, which is a known risk factor for cardiovascular, cerebrovascular, and renal disease, among other conditions.

The importance of hypertension is summarized by the “Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.”<sup>4</sup> The report notes that

*“in those older than age 50, systolic blood pressure (BP) of greater than 140 mm Hg is a more important cardiovascular disease (CVD) risk factor than diastolic BP; beginning at 115/75 mm Hg, CVD risk doubles for each increment of 20/10 mm Hg; those who are normotensive at 55 years of age will have a 90% lifetime risk of developing hypertension; prehypertensive individuals (systolic BP 120-139 mm Hg or diastolic BP 80-89 mm Hg) require health-promoting lifestyle modifications to prevent the progressive rise in blood pressure and CVD;...”*

However, guidelines provided by the Department of Transportation for a Commercial Drivers License (which we have used as a resource due to the scientific manner in which they were developed, and the importance for many firefighters of driving large vehicles on public highways) recognize blood pressure values between 161 and 180 systolic and 91 to 104 diastolic as “mild hypertension” and allow a driver to continue to drive for up to three months while endeavoring to lower the pressure to 160/90 or lower. According to the Cardiovascular Advisory

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<sup>3</sup> National Institutes of Health, Medline Plus: <http://www.nlm.nih.gov/medlineplus/ency/article/003082.htm>

<sup>4</sup> Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, Hypertension. 2003 Dec;42(6):1206-52

Panel Guidelines for the Medical Examination of Commercial Motor Vehicle Drivers,<sup>5</sup> this is because

*“in general, isolated hypertension is unlikely to cause sudden incapacitation, although the presence of target organ damage, particularly when the cerebrovascular system is involved, increases the likelihood. Acute incapacitation is more likely to be caused by a sudden ischemic coronary event.*

*Acute manifestations of an elevated BP can include sudden stroke, acute pulmonary edema, subarachnoid hemorrhage, aortic dissection, or aortic aneurysm rupture....*

*There is also strong prospective, randomized trial evidence that effective hypertension management reduces cardiovascular morbidity and mortality in the primary and secondary settings. Healthy lifestyle modification and pharmacotherapy are the mainstays of anti-hypertensive treatment regimens. Contemporary medical therapies are effective in lowering BP, reducing complications, and are generally regarded as safe....*

There are other factors in the WLFF medical standards that contribute to our consideration of a firefighter's cardiovascular health, such as medical history, pulse, and physical exam, so hypertension is not considered in isolation of its potential target organ damage.

In the WLFF Medical Standards, the example given for the actual standard (“a cardiovascular system that is sufficient for the individual to safely and efficiently carry out the requirements of the job”) is a “blood pressure of less than or equal to **140** mmHg systolic and 90 mmHg diastolic.” One of the listed “conditions which may result in disqualification” includes “hypertension that cannot be controlled to a level of **160/90.**” The intention was to aim for the standard of 140/90 or lower, but to allow a higher value in an individual who is under treatment, since the problem is being addressed and the aim of the health care provider is (likely to be) to get the blood pressure into the normal range. Unfortunately, this variation in values has caused some confusion since it may appear to be a typographical or other error in the documents.

**Recommendation:**

The recommendation of this consultant is to change the documents to be internally consistent, and to change the standard to reflect only the 140/90 values throughout. The reviewing medical officers still will need to consider each case individually, and apply the findings to the actual standard of “a cardiovascular system that is sufficient for the individual to safely and efficiently carry out the requirements of the job.”

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<sup>5</sup> Cardiovascular Advisory Panel Guidelines for the Medical Examination of Commercial Motor Vehicle Drivers, FMCSA-MCP-02-002, October 2002

## **WLFF Cardiac Risk Assessment and Clearance Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the June 4, 2008 WLFF Interagency Medical Standards Team Meeting  
Boise, Idaho*

### **Issue:**

Within the Federal Interagency Wildland Firefighter Medical Qualification Standards Program, many firefighters are found at the time of their initial or periodic medical clearance evaluations to have risk factors for one or more forms of heart disease. These risk factors may include those that, for practical and pertinent purposes, cannot be changed, such as increasing age, male gender, and heredity. Risk factors also may include those that may be subject to modification, such as elevated levels of total or LDL-cholesterol, a low level of HDL-cholesterol, an elevated blood pressure, concurrent diabetes (Type 1 or 2), physical inactivity, obesity, and smoking, and contributory factors, such as stress and excessive alcohol consumption.<sup>1</sup> A question has been raised regarding the extent to which these risk factors should be considered when making clearance decisions, and that topic is the subject of this issue paper.

### **Current Standard:**

The applicable section of the current WLFF medical standards,<sup>2</sup> approved by the National Fire and Aviation Executive Board, specifies for the *Cardiac Standard* that the

*“applicant/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; and*
  - ✓ *a normal baseline electrocardiogram (minor, asymptomatic arrhythmias may be acceptable); and*
  - ✓ *no pitting edema in the lower extremities, and*
  - ✓ *normal cardiac exam.**
- *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.*

*Conditions Which May Result In Disqualification Include, But Are Not Limited To, The Following Examples:*

1. *PACEMAKERS or PROSTHETIC VALVES may be disqualifying.*

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<sup>1</sup> Risk Factors and Coronary Heart Disease, American Heart Association:

<http://www.americanheart.org/presenter.jhtml?identifier=235>

<sup>2</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty)”

*Documentation from the individual's cardiologist, stating that the individual is stable and can safely carry out the specified requirements of the function, under the specified conditions, will be necessary before a clearance can be granted.*

2. *CORONARY ARTERY DISEASE A successful completion of an exercise stress test, or documentation from the individual's cardiologist acknowledging the requirements of the function and the work conditions, may allow a clearance despite this diagnosis.*
3. *HYPERTENSION that cannot be controlled to a level of 160/90 or less, or requires the use of any medication that affects the ability of the individual to safely and effectively carry out the requirements of the function, may be disqualifying.*
4. *LEFT BUNDLE BRANCH BLOCK.*
5. *MYOCARDITIS/ ENDOCARDITIS/ PERICARDITIS (Active or recently resolved cases).*
6. *History of MYOCARDIAL INFARCTION. Documentation from the individual's cardiologist, stating that the individual is stable and can safely carry out the specified requirements of the function, under the specified conditions, will be necessary before a clearance can be considered.*
7. *VALVULAR HEART DISEASE such as mitral valve stenosis, symptomatic mitral valve regurgitation, aortic stenosis etc. Exceptions may be granted depending upon the current clinical findings and diagnostic studies.*
8. *DYSRHYTHMIAS: such as ventricular tachycardia or fibrillation, Wolff-Parkinson-White syndrome, and Paroxysmal Atrial Tachycardia, with or without block.*
9. *ANGINA PECTORIS or chest pain of unknown etiology.*
10. *CARDIOMYOPATHY from any cause.*
11. *CONGESTIVE HEART FAILURE*
12. *Any other condition not otherwise listed that may adversely affect safe and efficient job performance will be evaluated on a case-by-base basis."*

The standard was based on how the *Cardiac System* relates:

*“(A) the firefighter's need for a healthy cardiovascular system and a low risk of sudden or subtle incapacitation with (B) the essential functions and work conditions of a wildland firefighter, including arduous exertion, lifting and carrying heavy loads, extensive walking and climbing, and rapid pull out to safety zones under conditions that may include very steep terrain, isolated and remote sites, extreme heat, dehydration, and long work assignments. Some cardiac conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions. The standard for blood pressure was set at 140/90 or below (with or without medication). Above this level is considered to be hypertension (high*

*blood pressure), a condition associated with increasing risk of cardiovascular morbidity and mortality.”<sup>3</sup>*

**Background:**

According to information provided at a Department of the Interior Medical Standards Program Managers meeting in November 2007, “*between 16 and 34% of the initial exams of employees (depending on employee category) have resulted in a medical finding that requires follow up... .*” Similar findings have been reported at other meetings of this Team, and a summary likely will be presented during the current Team meeting to address the issue of firefighters who have been identified over the past year, at least initially, as having had their medical clearance withheld due to a medical condition that has been diagnosed or treated by the firefighter’s own physicians, and cardiovascular conditions represent a significant portion of these identified conditions. Among others, those conditions may include the presence of pacemakers or prosthetic valves, and the diagnosis of coronary artery disease, hypertension (greater than 140/90), left bundle branch block, myocarditis, endocarditis, pericarditis, prior myocardial infarction, valvular heart disease, dysrhythmia, angina pectoris, cardiomyopathy, or congestive heart failure.

When a firefighter’s physician has diagnosed a heart-related condition, such as one or more of those listed above, the Program and its medical review officers (MROs) can and should consider the risk of aggravating, accelerating, exacerbating, or permanently worsening that condition as a result of the firefighter carrying out the functional requirements of the job. Also of concern is the risk to the firefighter and to others, and to the accomplishment of the mission, should a firefighter have a significant cardiac event, such as a cardiac arrest or arrhythmia, and experience a sudden incapacitation while driving, or while working in a remote location, or under particularly hazardous circumstances. Clearances justifiably may be withheld as a result of these medical conditions, or until sufficient information has been presented to establish that the risks are not medically or functionally significant.

Federal regulations (5 CFR 339: Medical Qualification Determinations) state in section 339.206 that, for

*“positions with medical standards or physical requirements, or positions subject to medical evaluation programs, a history of a particular medical problem may result in medical disqualification only if the condition at issue is itself disqualifying, recurrence cannot medically be ruled out, and the duties of the position are such that a recurrence would pose a reasonable probability of substantial harm.”*

In general, the summaries of clearance actions cited above represent only those firefighters whose medical conditions have led to a clearance-related action. Those

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<sup>3</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty)”

summaries do not include those firefighters who were noted only as having risk factors for a significant medical condition. A question has been raised regarding the extent to which such risk factors should be considered when clearance decisions are being made. As noted earlier, cardiac risk factors include those that, for practical and pertinent purposes, cannot be changed, such as increasing age, male gender, and heredity. Risk factors also include those that may be subject to modification, such as elevated levels of total or LDL-cholesterol, a low level of HDL-cholesterol, an elevated blood pressure, concurrent diabetes (Type 1 or 2), physical inactivity, obesity, and smoking. In addition, there are contributory factors for cardiac disease, such as stress and excessive alcohol consumption. It is important for the Program, its MROs, and its consultants to be consistent and defensible in their consideration of risk factors in order both to be fair to the firefighter, since it may impact employment decisions, and to assure that clearance actions are both legal and rational, since they may impact the agency's ability to accomplish its firefighting mission and manage the agency's liability.

In 5 CFR 339.104, the regulations state that, for "*purposes of this part-- Medical condition means health impairment which results from injury or disease... .*" This reflects the point that, related to a medical clearance, a medical condition is associated with or involves some form of impairment, not just the risk of future impairment, since the regulations note that a covered impairment "*results from injury or disease... .*" A diagnosed medical condition, such as coronary artery disease, or valvular heart disease, or any of the other conditions listed under the Cardiac Standard, clearly may qualify as a condition covered by this section of the regulations, depending on the current status of the condition, the risk of a significant aggravation, acceleration, exacerbation, or permanent worsening of that condition, and the likelihood of an event related to or resulting from that condition that threatens the safety of the firefighter or others. However, risk factors for a medical condition only indicate factors that may lead to the development of the medical condition, but may not themselves be a medical condition, or "*health impairment,*" as defined in the regulations.

As presented in the National Heart, Lung, and Blood Institute's "Estimating Coronary Heart Disease (CHD) Risk Using Framingham Heart Study Prediction Score Sheets"<sup>4</sup> (copies provided), the risk factors for heart disease each contribute to the overall risk of developing heart disease, some much more than others, but no one factor means that the individual with that risk factor has or will develop heart disease, or will suffer the consequences of heart disease. For example, a 56 year old man, who has normal cholesterol and HDL-cholesterol levels, normal blood pressure, does not smoke, and does not have diabetes, still has an estimated 7% chance, or risk, of developing coronary heart disease over the next 10 years just because he is a male who has reached middle age. These risk estimates also mean that the same man has a 93% chance of not developing heart disease over that time period. Further, even if he does develop heart disease, the estimates do not address the seriousness of the condition (though all heart disease should be considered to be serious, and must be considered carefully on a case-by-case basis).

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<sup>4</sup> <http://www.nhlbi.nih.gov/about/framingham/riskabs.htm>



Some risk factors for coronary heart disease are themselves medical conditions, such as diabetes and hypertension. These medical conditions may be aggravated, accelerated, exacerbated, or permanently worsened as a result of carrying out the functional requirements of the job of wildland firefighting, and consideration of restrictions or other action may be required for firefighters who have been identified as having one or more of such conditions. Other risk factors, such as an elevated cholesterol level or a history of smoking, may be present in some cases for an individual's entire life with no apparent impairment and without leading to a diagnosis of heart disease. This may be due to the presence of protective genetic factors, or a lack of aggravating genetic factors, or to some other factors that are not yet fully understood.

In general, the mere risk of an event, unless that risk substantially exceeds that of the population at large, presents challenges to a program wishing to use that risk as the basis for restricting some aspect of an individual's employment. A case might be made that a 70 year old man, with a total cholesterol of 290 mg/dL, and HDL-cholesterol of 30 mg/dL, a blood pressure of 170/110 mmHg, with diabetes, and who smokes, would present a valid concern regarding his ability to engage safely in wildland firefighting, without undue risk to co-workers, the mission, and the agency, since his risk of coronary heart disease over the next 10 years would be well over 50%, compared to a risk of about 14% for a similarly aged man without the other risk factors. However, it would not just be the risk factors themselves but also the presence of both diabetes and hypertension as significant medical conditions in this example that would prompt most MROs to request further medical information and the opinion of the individual's personal physician(s) regarding the ability of the individual to engage safely in the arduous duties of wildland firefighting.

Once a medical condition (as opposed to a risk factor) has been identified, by the firefighter or by his/her physician, the MRO may be justified fully in requesting further medical documentation before a clearance decision is made. In 5 CFR 339.104, medical documentation is defined as "*a statement from a licensed physician or other appropriate practitioner which provides information the agency considers necessary to enable it to make a employment decision,*" though the current regulations do not specify the circumstances under which an agency may require additional medical documentation (this, hopefully, will be addressed in a revision of 5 CFR 339 that is under current review for approval). If additional medical documentation is requested, Section 104 clearly addresses what is considered to be "*acceptable*" for this purpose:

*"the diagnosis or clinical impression must be justified according to established diagnostic criteria and the conclusions and recommendations must not be inconsistent with generally accepted professional standards. The determination that the diagnosis meets these criteria is made by or in coordination with a physician or, if appropriate, a practitioner of the same discipline as the one who issued the statement. An acceptable diagnosis must include the following information, or parts identified by the agency as necessary and relevant:*

- (a) The history of the medical conditions, including references to findings from previous examinations, treatment, and responses to treatment;*

- (b) Clinical findings from the most recent medical evaluation, including any of the following which have been obtained: Findings of physical examination; results of laboratory tests; X-rays; EKG's and other special evaluations or diagnostic procedures; and, in the case of psychiatric evaluation or psychological assessment, the findings of a mental status examination and the results of psychological tests, if appropriate;*
- (c) Diagnosis, including the current clinical status;*
- (d) Prognosis, including plans for future treatment and an estimate of the expected date of full or partial recovery;*
- (e) An explanation of the impact of the medical condition on overall health and activities, including the basis for any conclusion that restrictions or accommodations are or are not warranted, and where they are warranted, an explanation of their therapeutic or risk avoiding value;*
- (f) An explanation of the medical basis for any conclusion which indicates the likelihood that the individual is or is not expected to suffer sudden or subtle incapacitation by carrying out, with or without accommodation, the tasks or duties of a specific position;*
- (g) Narrative explanation of the medical basis for any conclusion that the medical condition has or has not become static or well stabilized and the likelihood that the individual may experience sudden or subtle incapacitation as a result of the medical condition. In this context, "static or well-stabilized medical condition" means a medical condition which is not likely to change as a consequence of the natural progression of the condition, specifically as a result of the normal aging process, or in response to the work environment or the work itself. "Subtle incapacitation" means gradual, initially imperceptible impairment of physical or mental function whether reversible or not which is likely to result in performance or conduct deficiencies. "Sudden incapacitation" means abrupt onset of loss of control of physical or mental function."*

The challenge to the MRO, as it relates to the above discussion, is to deal with the generally narrow gray area that falls between the presence of only risk factors on one side and significant medical conditions or diagnoses on the other: deciding when there is sufficient concern raised by a pattern or severity of risk factors to justify withholding a clearance when a medical diagnosis has not yet been identified. In most cases, fortunately, individuals will have either a diagnosis of a condition that will justify clarification and confirmation that they can perform their work safely, or will only have a set of risk factors that do not rise to the level of forcing a decision to withhold a clearance pending the receipt of additional information. Ultimately, however, it is the MRO's role to evaluate the information available and to formulate a medical opinion regarding the adequacy of that information for clearance purposes.

**Recommendation:**

As a result of the foregoing considerations, the recommendation of this consultant is that the IMST should inform the MSP Program Manager that reaching negative clearance decisions by the MRO related to the Cardiac Standard that are based solely on risk factors for coronary artery disease is not warranted. However, a pattern of significant risk factors does justify the RMO to seek additional information through the "Pending" further evaluation process in order to sufficiently resolve the MRO's concern regarding the firefighter's health and safety.

## **WLFF Color Vision Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the March 22-23, 2005 WLFF Interagency Medical Standards Team Meeting,  
New Orleans, Louisiana*

### **Issue**

A question regarding the type of color vision testing being performed was raised during the course of the actual review of firefighter examination forms by the Central Medical Consultant. It was noted that, while there are a variety of measures that can be used to test for color vision deficiency (e.g., Ishihara plates, Titmus vision tester, Farnsworth D-15, and various “alternative” tests such as colored yarn or paper), these tests are only effective in detecting red/green color vision deficiency, not yellow/blue. There currently are no widely-available and established testing methods for detecting a yellow/blue color deficiency. There was concern that this might have significance regarding our assessment of firefighters’ color vision under the standard.

### **Current Standard**

The applicable section of the current FFALC-approved standards<sup>1</sup> specifies that:

*“The applicant/incumbent must be able to see well enough to safely and efficiently carry out the requirements of the job. This requires binocular vision, far visual acuity, depth perception, peripheral vision, and color vision, which may be demonstrated by:*

...

- *Color vision sufficient to distinguish at least red, green, and amber (yellow); and*

...

- *No ophthalmologic condition that would increase ophthalmic sensitivity to bright light, fumes, or airborne particulates, or susceptibility to sudden incapacitation.*

.....”

The standard was based on<sup>2</sup>:

*“...(A) the firefighter’s need to be able to see (including binocular vision, visual acuity, depth perception, peripheral vision, and color vision) with (B) the essential functions and work conditions of a wildland firefighter, including driving, ... and rapid pull out to safety zones under conditions that may include very steep terrain, rocky, loose or muddy ground surfaces, open holes or drop offs, and dim light or darkness. ... the color vision requirement is for red/green/amber (yellow), consistent with Department of Transportation regulations for commercial driving and the need for safe and efficient function under expected fire fighting conditions. ... Some vision conditions, including*

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” pages 8-9.

<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 3.

*those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions.”*

### **Discussion**

The issue of color vision assessment was discussed at the October 15-16, 2003 WLFF Medical Standards Team meeting in Missoula, Montana. There had been a concern that *“the color vision standard and testing is being waived in every case where an incumbent shows color vision deficiency. This test apparently has little bearing on firefighter ability and should certainly be considered for elimination as a cost cutting element.”* However, it was decided by the Team that, while firefighters who have a color vision deficiency have been granted waivers, this is not a basis for elimination of the test for color vision since it is important for the agency (and possibly the firefighter him/herself) to know this deficit exists, and the agency can provide guidance related to color vision in the waiver/accommodation letters. This may include avoiding assignment to driving duties and special attention to escape route flagging in crews to which a color vision deficient firefighter is assigned. This relates to a Forest Service study that documented the importance of color vision as it relates to firefighting.<sup>3</sup> The September 2001 Tech Tips article noted:

*“Our field evaluations indicated that hot-pink flagging was the easiest color to see and was visible at the greatest distance. Lime-green flagging showed up poorly to participants with normal color vision, but colorblind participants saw the lime-green flagging best.”*

*“Based on the field evaluations, we recommend that hot-pink flagging marked ESCAPE ROUTE be used to identify escape routes and safety zones. Crews with colorblind members may wish to carry both hot-pink ESCAPE ROUTE and lime-green flagging to identify their escape routes.”*

About 8% of males and 0.5% of females have a color vision deficiency<sup>4</sup> and, of those, about 99% have difficulty distinguishing red and green hues from each other. Only a very small percentage of people with a color vision deficiency have difficulty distinguishing yellows and blues (possibly as low as 0.1%). Current color vision assessment methods used in clinical practice are effective in detecting red/green color vision deficiency, so they are useful in detecting about 99% of all people with a color vision deficiency. While not perfect, they are effective as a screening tool for the general population.

Consideration has been given to devising a standard method for applying alternative color testing methods (e.g., standard sets of colored yarn or paper, items that have no intrinsic color cues based on their shape or general nature that would assist the person being tested to identify the individual colors). This may be a way to address the failure of the common testing methods to detect yellow/blue color vision deficiencies. However, such methods have not been widely tested for validity or standardization in their use in clinical situations, and their distribution to the

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<sup>3</sup> “Flagging for Firefighting Escape Routes and Safety Zones,” Bob Beckley, Fire Tech Tips, MTDC, September 2001

<sup>4</sup> “Borish’s Clinical Refraction,” William J. Benjamin, OD, MS, PhD, Editor, W.B. Saunders Company, Philadelphia, 1998, p. 243.

numerous clinical sites at which they would have to be used would involve an additional logistical arrangements that may not be worth the limited benefit to be gained.

**Recommendation:**

The recommendation of this consultant is to continue to use the current color vision testing methods in our screening program since they are widely available, inexpensive, and highly effective for the most common forms of color vision deficiency. The specific color vision testing method should be selected by the clinical site, based on locally available tools or equipment, and the ability of an applicant or firefighter to distinguish red / green / yellow should be indicated on the examination form. If all of the Ishihara plates are recorded as having been viewed correctly, a presumption can be made that the key colors can be distinguished. If any of the plates are missed during the test, an alternative test should be done using readily available objects in the testing environment. If the logistics involved do not appear to pose an unreasonable barrier for the company, it may be of value for CHS as the clinical services vendor for this program to consider developing a standard package of materials for this alternative test.

## **WLFF Drug and Alcohol Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For consideration by the Interagency Medical Standards Team and Federal Fire and Aviation  
Safety Team  
June 29, 2005*

### **Issue**

A concern was raised recently by a Fire Management Officer (FMO) regarding individuals who have a history of alcohol or drug abuse but, according to the FMO, have had their medical clearances held up despite their being “*good workers who show up for work on time and work hard all day. All five of these people are subject to DOI preemployment [actually, preplacement] and random drug testing, as well as workplace performance standards with regard to alcohol.*” As noted by the Federal Fire and Aviation Safety Team (FFAST) member who brought this concern forward to the Interagency Medical Standards Team, there had been an understanding that “*alcohol consumption is a lifestyle decision, and if over-consumption or habitual consumption became a medical problem it would present itself physiologically through liver dysfunction etc. Until such time it is the supervisor’s duty to deal responsibly with performance problems that result from alcohol abuse.*”

In order to deal with the perception that “*people who admit to a history of drug or alcohol abuse are automatically suspended until they pay for an evaluation that confirms they are competent to fight fires*” and that the agencies “*demand that they prove they are rehabilitated enough to fight fires,*” the FAS proposed that “*a history of drug or alcohol abuse not automatically put an employee in the pending category*” since “*we have an adequate screening system that has been implemented to protect us from drugs and alcohol as social problems*” and he saw “*no need to create further restrictions.*”

### **Current Standard:**

The applicable section of the current NFAEB-approved standards<sup>1</sup> specifies that:

*“The applicant/incumbent must have judgment, mental functioning, and social interaction/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 conditions (including alcohol or substance abuse) likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.*

***CONDITIONS WHICH MAY RESULT IN DISQUALIFICATION INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING EXAMPLES:***

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” page 7.

*(All diagnoses must be consistent with the diagnostic criteria as established by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, DSM-IV.)*

...

12. *Organic Brain Syndrome*

...

14. *Any other condition not otherwise listed that may adversely affect safe and efficient job performance will be evaluated on a case-by-base basis.*"

The standard was based on:<sup>2</sup>

*"(A) the firefighter's need for judgment, mental functioning, and social/behavior skills with (B) the essential functions and work conditions of a wildland firefighter, including working on small and large teams, flying in helicopters and fixed wing aircraft, and rapid pull out to safety zones under conditions that may include isolated or remote sites, snakes, close quarters with large numbers of other workers, limited and disrupted sleep, and long work hours. Some psychiatric conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions."*

In addition, there are other standards that may be impacted directly by the abuse of drugs or alcohol, including the Central and Peripheral Nervous System Standard, Vestibular System Standard, and the Gastrointestinal System Standard. Other standards may be impacted less directly by drug and alcohol abuse.

### **Discussion:**

The medical history and examination forms used in the Interagency Medical Standards Program were modified a few years ago to be sure the focus on alcohol and drug use was on the diagnosis of a medical condition, not simply the presence of a behavior of some periodic over-indulgence in these substances. The annual form specifically requests responses to the following:

“ ...

2. *Diagnosed or treated for alcoholism or alcohol dependence?*

3. *Diagnosed as dependent on drugs or treated for drug abuse?*

*Please explain any YES answers, including date(s)."*

The baseline / periodic / exit form similarly requests responses to:

“ ...

G. *Have you ever been diagnosed with or treated for alcoholism or alcohol dependence? (If Yes, please describe fully)*

H. *Have you ever been diagnosed as being dependent on illegal drugs, or treated for drug abuse? (If Yes, please describe fully)"*

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<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 2.



These queries give the respondent an opportunity to provide further information to allow a meaningful evaluation of the significance of the history. If the respondent does not provide that information, or the information is incomplete, the reviewing medical officer is left with a potentially significant problem (not just alcohol use, or even abuse, but “alcoholism” or “alcohol dependence,” or a dependence on drugs or a history of treatment for drug abuse), and since that problem can’t be explained by the available information, further information must be requested, which may be associated with a delay in processing the clearance.

The diagnosis of substance abuse and dependence, for both alcohol and other drugs, is not made or taken lightly. It is based on the following criteria:<sup>3</sup>

#### Abuse

The individual “*is not dependent on the substance and reports one or more of the following symptoms in the past year.*”

1. *Recurrent use resulting in failure to fulfill major role obligations at work, school, or home*
2. *Recurrent substance use in situations in which it is physically hazardous (e.g., driving and automobile)*
3. *Recurrent substance-related legal problems*
4. *Continued use despite having persistent or recurrent social or interpersonal problems”*

#### Dependence

The individual “*is defined as being dependent on a substance if he or she reports three or more of the following symptoms in the past year.*”

1. *Tolerance—discovering less effect with same amount (needing more to become intoxicated)*
2. *Withdrawal (characteristic withdrawal associated with type of drug)*
3. *Using more or for longer periods than intended*
4. *Desire to or unsuccessful efforts to cut down or control substance use*
5. *Considerable time spent in obtaining or using the substance or recovering from its effects*
6. *Important social, work, or recreational activities given up or reduced because of use*
7. *Continued use despite knowledge of problems caused by or aggravated by use”*

The condition is serious, for both the individual and those with whom he or she interacts. As noted by the National Institutes of Health,<sup>4</sup>

*“Alcoholism is a type of drug addiction. There is both physical and psychological dependence with this addiction. Physical dependence reveals itself by withdrawal symptoms when alcohol intake is interrupted, tolerance to the effects of alcohol, and*

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<sup>3</sup> Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)

<sup>4</sup> National Institutes of Health, National Library of Medicine, Medline Plus: Alcoholism:  
<http://www.nlm.nih.gov/medlineplus/ency/article/000944.htm>

*evidence of alcohol-associated illnesses.*

*Alcohol affects the central nervous system as a depressant, resulting in a decrease of activity, anxiety, tension, and inhibitions. Even a few drinks can result in behavioral changes, a slowing in motor performance, and a decrease in the ability to think clearly. Concentration and judgment become impaired. In excessive amounts, intoxication may result.*

*Alcohol also affects other body systems. Irritation of the gastrointestinal tract can occur with erosion of the lining of the esophagus and stomach causing nausea and vomiting, and possibly bleeding. Vitamins are not absorbed properly, which can lead to nutritional deficiencies with the long-term use of alcohol. Liver disease, called alcoholic hepatitis, may also develop and can progress to cirrhosis. The heart muscle may be affected. Sexual dysfunction may also occur, causing problems with erections in men and cessation of menstruation in women.*

*Alcohol affects the nervous system and can result in nerve damage and severe memory loss. Chronic alcohol use also increases the risk of cancer of the larynx, esophagus, liver, and colon. Alcohol consumption during pregnancy can cause severe birth defects. The most serious is fetal alcohol syndrome, which may result in mental retardation and behavior problems. A milder form of the condition which can still cause lifelong impairment is called fetal alcohol affects.*

*The social consequences of problem drinking and alcohol dependence can be as serious as the medical problems. People who abuse or are dependent on alcohol have a higher incidence of unemployment, domestic violence, and problems with the law. About half of all traffic deaths are related to alcohol use.”*

Regarding the prognosis those with this condition, the same source cites:

*“Only 15% of those with alcohol dependence seek treatment for this disease. Relapse after treatment is common, so it is important to maintain support systems in order to cope with any slips and ensure that they don't turn into complete reversals. Treatment programs have varying success rates, but many people with alcohol dependency have a full recovery.”*

The Interagency Medical Standards Program is not oriented towards disqualifying any individual. It is intended “to aid the examining physician, the designated medical review officer(s), and officials of the involved agencies when determining whether medical conditions may hinder an individual's ability to safely and efficiently perform the requirements of a wildland firefighter without undue risk to himself/herself or others.”<sup>5</sup> When a diagnosis of substance abuse has been made, it does not mean that the individual is unable to perform the duties of a wildland firefighter, but it does mean that information is necessary to confirm that the

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<sup>5</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” page 1.

individual is under treatment that has been sufficiently effective to allow them to perform their job duties safely and efficiently, and in the settings and under the conditions that may be expected to occur while carrying out those duties.

**Recommendation:**

The recommendation of this consultant is to maintain the Medical Standards program as currently established related to substance use and abuse. Firefighters should be encouraged both to be honest in reporting their relevant medical histories, and to provide sufficient information to allow the medical review officer to make an informed decision regarding the individual's current status as it relates to substance abuse and its treatment.

## **WLFF Electrocardiogram Issue**

### **Recommendation:**

The recommendation of the WLFF Medical Standards Team is to leave the medical standard and the testing procedures related to electrocardiograms as currently presented in the FFALC-approved program, i.e., an EKG should be obtained on all baseline examinations for permanent employees.

### **Issue:**

A recent document prepared by or for the Forest Service presented a position that:

*“Some tests contribute significantly to cost and may not provide relevant information concerning the employees condition. ... The cost of the Electro-cardiogram (ECG) adds significantly to the baseline exams. It is proposed the requirement for this test be postponed to age 40 or 45 as recommended by the American College of Cardiology for asymptomatic adults.”<sup>1</sup>*

### **Current Standard:**

The applicable section of the current FFALC-approved standards<sup>2</sup> specifies that:

*“The applicant/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:
  - ...
    - o *a normal baseline electrocardiogram (minor, asymptomatic arrhythmias may be acceptable); and*
    - ...
      - o *normal cardiac exam.**
- *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.*

#### ***CONDITIONS WHICH MAY RESULT IN DISQUALIFICATION INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING EXAMPLES:***

- ...
  - 4. ***LEFT BUNDLE BRANCH BLOCK.***
  - ...
    - 8. ***DYSRHYTHMIAS:*** *such as ventricular tachycardia or fibrillation, Wolff-Parkinson-White syndrome, and Paroxysmal Atrial Tachycardia, with or without block.*

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<sup>1</sup> “An Analysis of Medical Standard Implementation for the USDA Forest Service: Fire and Aviation Management; Washington, DC, August, 2003,” page 4.

<sup>2</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” page 9-10.

...  
*Any other condition not otherwise listed that may adversely affect safe and efficient job performance will be evaluated on a case-by-base basis.”*

The standard was based on:<sup>3</sup>

*“(A) the firefighter’s need for a healthy cardiovascular system and a low risk of sudden or subtle incapacitation with (B) the essential functions and work conditions of a wildland firefighter, including arduous exertion, lifting and carrying heavy loads, extensive walking and climbing, and rapid pull out to safety zones under conditions that may include very steep terrain, isolated and remote sites, extreme heat, dehydration, and long work assignments. Some cardiac conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions....”*

**Background:**

The WLFF Medical Standards program is not unique in calling for an electrocardiogram and other clinical procedures. The Occupational Safety and Health Administration requires a baseline resting twelve-lead electrocardiogram with interpretation for its compliance safety or health officers (CSHOs),<sup>4</sup> and the National Fire Protection Association calls for a baseline electrocardiogram for structural firefighters.<sup>5</sup>

The Department of Transportation does not mandate obtaining an electrocardiogram for commercial drivers, but covers the issue as follows:

*“An electrocardiogram (ECG) [is] ... required when findings so indicate. It is recommended that a baseline ECG be done at age 40, then every 6 years until age 55, then every 2 years thereafter, and an [exercise stress test] be done at age 45 if the individual manifests one or more cardiac risk factors or has a history of ischemic heart disease.”<sup>6</sup>*

The American College of Cardiology (ACC)/American Heart Association (AHA) notes that the electrocardiogram may be a very valuable tool:

*“Electrocardiography serves as the gold standard for the noninvasive diagnosis of arrhythmias and conduction disturbances, and it occasionally is the only marker for the presence of heart disease”<sup>7</sup>*

but its value is somewhat limited as a screening tool in the general population because

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<sup>3</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 4.

<sup>4</sup> OSHA Instruction PER 8-2.4 March 31, 1989 Directorate of Technical support.

<sup>5</sup> Medical Requirements for Fire Fighters, National Fire Protection Association, NFPA 1582, 1997 Edition, page 18.

<sup>6</sup> Department Of Transportation, Federal Highway Administration, 49 CFR Part 391.

<sup>7</sup> Kadish et al., ACC/AHA Clinical Competence Statement On Electrocardiography And Ambulatory Electrocardiography, J Am Coll Cardiol 2001.

*“routine ECG testing in asymptomatic persons, in whom the pretest probability of having [coronary artery disease (CAD)] is relatively low, is not an efficient process for detecting CAD or for predicting future coronary events.”<sup>8</sup>*

Because of this, and consistent with the note in the Forest Service report,

*“the American Heart Association (ACC/AHA) recommends baseline testing [only] for all persons over 40 years of age and for those about to have exercise stress testing.”<sup>9</sup>*

Regarding the use of the electrocardiogram as a baseline test, the U.S. Preventive Services Task Force writes that:

*“A screening ECG has been recommended to provide a ‘baseline’ to help interpret changes in subsequent ECGs... . [However,] only a small subset of the asymptomatic population is likely to benefit from having a baseline ECG... those with baseline ECG abnormalities suggestive of ischemia who subsequently develop acute noncardiac chest pain. Savings from preventing a few unnecessary hospitalizations among these patients must be weighted against the high costs of routine ECG screening in the large population of asymptomatic persons.”<sup>10</sup>*

At this time, the Task Force concludes:

*“There is insufficient evidence to recommend for or against screening middle-aged and older men and women for asymptomatic coronary artery disease with resting electrocardiography (ECG), ambulatory ECG, or exercise ECG...”*

though they also acknowledge that

*“screening individuals in certain occupations (pilots, truck drivers, etc.) can be recommended on other grounds [than looking for coronary artery disease], including possible benefits to public safety.”<sup>11</sup>*

Clearly there are two differing opinions on the use of EKGs, as it should be given one opinion is pointed toward the occupational health setting while the other is directed at the general population as a whole. False positives will occur in both scenarios. Guidance regarding routine screening examinations for the general public, such as those recommended by the U.S. Preventive Services Task Force, are not the same as employment exams in which the agency has both a responsibility and a liability related to the employee, his/her co-workers, and the general public. Safety and efficiency of job performance are factors that come into play with an employment exam that do not apply for the general public. Recognizing the employer/employee

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<sup>8</sup> U.S. Preventive Services Task Force. Guide to clinical preventive services, 2<sup>nd</sup> ed. Baltimore: Williams & Wilkins, 1996, page 4

<sup>9</sup> Ibid., page 8, referring to ACC/AHA. Guidelines for electrocardiography. A report of the American College of Cardiology/American Heart Association Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures (Committee on Electrocardiography). J Am Coll Cardiol 1992;19:473-481.

<sup>10</sup> Ibid. page 7.

<sup>11</sup> Ibid., page 10.

relationship, the Baseline examination utilizes the EKG as a pre-employment screening tool. The EKG should not be used as a health and wellness component looking for the natural progression of mortality associated with coronary disease in an aging population. In an environment with unlimited budgetary discretion, it would be desirable to incorporate another EKG in the Periodic examination beginning at 35 or 40 years of age for all firefighters irregardless of employment status. However, with limited funding available, the most correct use of the EKG remains as a pre-employment component. Verifying this are the findings of Wolff-Parkinson-White (WPW) syndrome in both of the last fiscal years, one in each year which resulted in medical treatment for two permanent employees. The latest WPW case was significant in that the treating cardiologist felt that risk of tachyarrhythmia, in an otherwise healthy 31 year old white male, was of sufficient risk given the arduous nature of wildland firefighting that radiofrequency ablation was performed.

## **WLFF Hearing and Hearing Aid Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the April 10, 2007 WLFF Interagency Medical Standards Team Meeting,  
Phoenix, Arizona*

### **Issue:**

The issue of significant hearing loss and either the use of, or the potential use of, hearing aids by wildland firefighters (WLFFs, or firefighters) has come up in at least 15 Interagency Medical Review Board (IMRB) cases to date, prompting considerable discussion, expressions of concern, and differences of opinion on the part of Board members and consultants to the Board regarding the acuity of hearing required and the appropriateness of hearing aid use by firefighters during active fire suppression-related tasks. This report presents background information and opinions of this consultant and others regarding the need for hearing acuity and the use of hearing aids by wildland firefighters, and makes recommendations on the subject for the Interagency Medical Standards Team (IMST).

### **Current Standard:**

The applicable section of the current Federal Fire and Aviation Leadership Council (FFALC)-approved medical standards<sup>1</sup> specifies that:

*“The applicant/incumbent must be able to hear well enough to safely and efficiently carry out the requirements of the job. This requires 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 the standards of the American National Standards Institute (see 29 CFR 1910.95); and*
- *Documentation of hearing thresholds of no greater than 40 dB at 500, 1000, 2000, and 3000 Hertz in each 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.*

*Note: The use of a hearing aid(s) to meet this standard is not permitted.”<sup>2</sup>*

The standard was based on how the Hearing system:

*“relates (A) the firefighter’s need to hear verbal communications and both natural and manmade warning sounds with (B) the essential functions and work conditions of a wildland firefighter, including working on small and large teams, driving, rapid pull out*

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty).”

<sup>2</sup> Similarly, NFPA 1582 also limits the use of hearing aids in meeting the hearing standard for structural firefighters, and their requirement by a firefighter to meet the standard would result in functional limitations being reported to management.



*to safety zones, and providing rescue or evacuation assistance under conditions that may include isolated and remote sites, falling rocks and trees, trucks and other large equipment. The hearing standard is set at an average threshold of no greater than 40 dB at 500, 1000, 2000, and 3,000 Hz in each ear, consistent with the DOT regulations for commercial drivers. This level is more lenient than that allowed by the NPFA 1582 standards (30 dB average threshold at these frequencies)<sup>3</sup>, or what is considered to be “normal” hearing (25 dB), but is felt to provide a reasonable hearing threshold level where louder than normal communications may be expected. Hearing aides are not permitted in meeting this standard, due both to the limitation in directional hearing afforded by hearing aides, and to the risk of dislodging of a hearing aid during critical or emergency periods when hearing must be acute. Some ear and hearing conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions.”<sup>4</sup>*

**Background:**

As noted in the Issue section, above, at least 15 cases have come before the IMRB in which hearing loss and the current or potential use of hearing aids has been an issue. In addition, based on information provided informally by IMRB members, there may be many other firefighters who use hearing aids but whose case has not come before the IMRB for review. The issue of an individual’s hearing acuity and the use of hearing aids by firefighters has been a concern within the program since its inception due to the need for acute hearing that was identified during the development process for the WLFF medical standards, based on hearing’s observed, reported, and commonly understood role in verbal communication, sound localization, and situational awareness. As is well understood by firefighters, and has been summarized in the Basis statement, above, this work is carried out in a hazardous environment in which situational awareness may be critically important for safety, health, and efficient job performance. In addition, conditions may involve low light or altered light situations that interfere with visual cues in the environment, and result in a heightened dependence upon other sensory cues, such as hearing. In response, it was decided by the IMST that “*hearing aides are not permitted ... due both to the limitation in directional hearing afforded by hearing aides, and to the risk of dislodging of a hearing aid during critical or emergency periods when hearing must be acute.*” How critical all these factors actually are, however, relative to other physical findings and experience when it comes to firefighter safety and efficient job performance, has been weighted differently by different members of the IMST and the IMRB. Further clarification or confirmation by the IMST of the relative importance of hearing is an issue that should be pursued in order to assure that the decisions, standards, and recommendations made by this Team reflect current science as well as practical experience.

A review of this subject by Lynn Cook, AuD (Doctor of Audiology), who is a board certified occupational audiologist and has served as an occupational audiology consultant for the Office of Personnel Management and the Department of the Navy for many years, provided consultative

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<sup>3</sup> Note: The standard for hearing was revised in the 2007 Edition of NFPA 1582, and now requires a 40 dB average of the thresholds for frequencies 500 through 3000 Hz in the unaided better ear for Category A considerations, and the same threshold average in either ear for Category B considerations.

<sup>4</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty).”

guidance in one of the WLFF cases involving a firefighter with hearing loss who reported the use of hearing aids. In her written report, Dr. Cook recommended strongly against the use of hearing aids under firefighting conditions, and provided the following reasoning for her opinion:

*“There are many reasons why hearing aids would be contraindicated in this type of arduous environment. Hearing aids are electronic instruments, and are thus subject to failure. Moisture is the hearing aid’s worst enemy. Excessive sweating, as well as the mist or direct spray from water hoses may significantly affect the performance of these battery-driven devices. Particulate matter permeating the atmosphere in the vicinity of a forest fire may also wreak havoc with the internal operation of a hearing aid. [An individual might carry a cleaning kit] while on duty, however, there is clearly not always time to stop and perform hearing aid maintenance while performing the duties of a wildland firefighter. Headgear or helmets may impede the microphone port of the hearing aid, causing malfunction or feedback. Hearing aids are incompatible with the use of hearing protective devices, which are often required in this position as protection against overexposure to noise. (Duties may involve operation of a chainsaw, riding an ATV, or exposure to sirens and other hazardous noises.) Finally, and perhaps most importantly, hearing aids in their present form do not restore hearing to normal levels for those with sensori-neural hearing loss. For the majority of users, hearing aids are least efficient in the presence of background noise, just when they are needed the most. Furthermore, auditory localization, which is a critical skill for a wildland firefighter, is worse for those with hearing loss when hearing aids are used, as compared to unaided performance. This is due to the significant modification in intensity and (especially) timing characteristics of the signal necessary for adequate localization imparted by the hearing aid.”*

As summarized in the attached guide, *When an Employee Doesn’t Meet the Agency’s Hearing Standard*,

*“Because we localize where sounds come from by a sophisticated mechanism in the brain that uses the time that a sound reaches one ear versus the other, as well as differences in loudness, the variety of frequencies, and a combination of these factors in the way sound reaches the two ears, hearing loss in one or both ears may disrupt this process. Hearing aids may further disrupt this process of sound localization because they interfere with the timing, intensity, and complex variety of frequencies the brain depends upon when attempting to identify the source of a sound. That is one of the reasons hearing aids may not be allowed under the medical standards for some jobs. Other reasons may involve the mechanics of hearing aids, including damage to the electronics, battery failure, and sensitivity to water or dirt that may be encountered and present safety risks in particular work settings.”*

The NFPA 1582 statement on the subject<sup>5</sup> is unambiguous, noting that “Hearing aid use is not considered a reasonable accommodation for the following reasons:

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<sup>5</sup> National Fire Protection Association, NFPA 1582 Standard on Comprehensive Occupational Medical Program for Fire Departments, 2007 Edition, copyright 2006, page 52

- (1) *U.S. FDA regulations (21 CFR 801.420) require that all hearing aids be labeled with a statement that hearing aids do not restore normal hearing.*
- (2) *Hearing aids are adjusted to restore one-third to one-fourth the measured loss in pure tone frequency range of 250 to 6000 Hz (National Acoustic Labs). This allows for improved hearing of speech but will not restore ability to hear or discriminate acoustic cues (such as collapsing wall/timber, gas leaks, traffic sounds) or radio broadcasts that are essential safety requirements at a fire or rescue scene.*
- (3) *Hearing aids seriously compromise the ability to localize acoustic cues so that the source of impending danger is confused and safety is imperiled.*
- (4) *Hearing aids are not calibrated to function in areas of high background noise (fire scene, rescue scene, traffic) or during radio transmissions.*
- (5) *Hearing aids are not reliable after submersion or heavy exposure to water.”*

These opinions regarding the limitations placed on the use of hearing aids in firefighting situations are supported by numerous studies that address the issue of hearing aids and directional hearing. There is some controversy about this subject, however, and alternative views and findings have been published as well (see References, below), though little research has been done that involves sound localization by hearing aid wearers while in the presence of background noise in a test setting, and none of the research I was able to locate addressed the issue of hearing aid failure due to water, particulate contamination, or loss of battery power, particularly in hazardous occupational settings. Specifically, no research was found that addressed the use of hearing aids under the known conditions of wildland firefighting, including very high levels of background noise and the risks involved in an untimely failure of one or more of the devices or their effect on sound localization. Of the articles that noted an ability to localize sounds while using a hearing aid, this ability generally was in spite of the hearing aid, not because of it (i.e., the hearing aid itself tended to impair sound localization, but when the hearing aid was not tightly fitted within the canal and the user could hear “around” the hearing aid they were able to localize sounds better than when the hearing aid fit tightly and prevented sound from bypassing the hearing aid). However, without the hearing aid, individuals have difficulty hearing at all, due to their basic hearing deficit. As a result, individuals who have a hearing deficit may localize sounds better without their hearing aids in place, if the sounds to be localized are loud enough to be heard above the hearing threshold, but without their hearing aids they may have difficulty even hearing the sounds needed for normal communication and detection of man-made or natural warnings.

**Recommendation:**

Based on the above, the recommendation of this consultant is that the WLFF Medical Standards Program not allow the use of hearing aids by firefighters while they are engaged in active wildland firefighting (fire suppression) duties. However, due to the importance of hearing acuity for safety and efficiency, firefighters also must meet the hearing standard as currently published, or be granted a waiver under limited circumstances where this action, along with appropriate and specific restrictions, has been determined not to inordinately risk the individual’s or coworkers’ safety.

This recommendation is based on a perception by this consultant of the high degree of importance of hearing acuity by firefighters, as well as the importance of their ability to localize sounds accurately under the conditions that may be encountered during wildland firefighting, in order to optimize the safe and efficient performance of WLFF duties. If practicing WLFF experts and decision-makers disagree with this perception, however, and feel that hearing acuity and noise localization are less critical than other physical and experience factors and can be compromised without undue risk to firefighter performance, health, and safety, and also that the loss of one or more functioning hearing aids does not present a sufficient risk to preclude their use during fire suppression work, then decisions reflecting those perceptions likely will be made and implemented that are contrary to the recommendations stated here.

**References:**

- A) NFPA 1582 Standard on Comprehensive Occupational Medical Program for Fire Departments, 2007 Edition; National Fire Protection Association
- B) “*When an Employee Doesn’t Meet the Agency’s Hearing Standard,*” a guide prepared by Jay Paulsen and Lynn Cook as “An Overview for Federal Supervisors and Medical Standards Program Managers” (see attached)
- C) A sample of pertinent articles includes:
  - 1) Leeuw AR, Dreschler WA, Speech understanding and directional hearing for hearing impaired subjects with in-the-ear and behind-the-ear hearing aids, *Scand Audiol* 1987; 16(1):31-6: **While “SRT [speech recognition threshold] values for the ITE [in the ear hearing aid] were significantly lower [i.e., better] than those for BTE [behind the ear],” “directional hearing was not improved by wearing an ITE.”**
  - 2) Noble W, Byrne D, A comparison of different binaural hearing aid systems for sound localization in the horizontal and vertical planes, *Br J Audiol* 1990 Oct; 24(5)335-46: **“ITC [in the ear canal] wearers ... showed a deterioration in aided over unaided performance,” and “in all conditions, aided and unaided, vertical plane localization was markedly disrupted in all the hearing impaired groups” and “was also disrupted, to a lesser but still substantial extent, in aided conditions for the non-impaired listeners.”**
  - 3) Kimberly BP, Dymond R, Gamer A, Bilateral digital hearing aids for binaural hearing, *Ear Nose Throat J* 1994 Mar;73(3):176-9: **“Both localization ability and speech-understanding-in noise are affected in the impaired listener” and when “localization performance is tested in impaired ears with conventional hearing aid fittings it is found to be worse than the unaided condition.”**
  - 4) Byrne D, Noble W, Glauerdt B, Effects of earmold type on ability to locate sounds when wearing hearing aids, *Ear Hear* 1996 Jun;17(3):218-28: **“The choice of earmold can effect aided localization,” and “people with conductive or mixed hearing losses may have poor auditory localization and ... this may be improved by the fitting of hearing aids.”**

- 5) Noble W, Sinclair S, Byrne D, Improvement in aided sound localization with open earmolds: observations in people with high-frequency hearing loss, J Am Acad Audiol 1998 Feb;9(1):25-34: ***“Closed earmolds affected localization, particularly in the frontal horizontal plane, but performance was restored to unaided levels in both of the open earmold conditions” which “are argued to improve aided sound localization ... by permitting undistorted access to low-frequency interaural time/phase differences.”***
- 6) Neuman A, Haravon A, Sislian N, Waltzman S, Sound-Direction Identification with Bilateral Cochlear Implants, Ear and Hearing Feb 2007;28:1: ***“sound-direction identification with bilateral cochlear implants is better than with a single implant.”*** [Note: this study only addressed sound localization in individuals whose hearing assistance was provided by a cochlear implant]
- 7) D’Angelo W, Bolia R, Mishler P, Morris L, Effects of CIC Hearing Aids on Auditory Localization by Listeners With Normal Hearing, J of Speech Language and Hearing Research Dec 2001;44:1209-14: ***“The findings indicate a statistically significant decrement in localization acuity, both in azimuth and elevation, occasioned by the wearing of CIC [completely-in-the-canal] hearing aids. However, the magnitude of this decrement was small compared to those typically caused by other ear-canal occlusions, such as earplugs, and would probably not engender mislocalization of real-world sounds.”*** [Note: this study was conducted with individuals who had normal hearing, and without background noise competition, rather than individuals with a hearing deficit for whom amplification was necessary in order to detect sounds]

# ***When an Employee Doesn't Meet the Agency's Hearing Standard***

## **An Overview for Federal Supervisors and Medical Standards Program Managers**

March 1, 2007

### **Introduction**

Agency managers frequently are faced with a need to make decisions regarding granting waivers, approving restrictions or accommodations, or taking personnel action when employees are unable to meet medical standards. A medical standard issue commonly encountered is related to a hearing deficit, or the inability to hear well enough to meet the established standard. A hearing deficit may be due either to sudden or gradual loss of normal hearing, or to a lack of normal hearing as a result of congenital causes. This brief guide is intended to assist supervisors and program managers to evaluate the significance of the problem and things to consider when an employee is found to have a hearing deficit and is unable to meet the hearing standard.

### **Basis for Hearing Standards**

A hearing standard may be established for a group or classification of employees when the ability to hear has been identified as pertinent to the safety of employees and the efficient performance of their job duties. The specific standard or hearing level required for a job is identified and established through a process that involves making worksite observations and gathering information from employees, supervisors, and medical and safety professionals, then giving careful consideration to the volume or loudness of sounds that must be heard accurately for communication and for detecting and accurately interpreting other pertinent work-related sounds. It is recognized that this communication and sound detection activity may have to be conducted under particular circumstances and environmental conditions that may not be present when hearing testing is conducted in a clinic situation.

### **Legal Requirements**

According to Federal law (5CFR339.102(c)), *“failure to meet a properly established medical standard or physical requirement ... means that the individual is not qualified for the position unless a waiver or reasonable accommodation is indicated... .”*

### **Waivers**

Federal law (5CFR339.204) requires an agency to *“waive a medical standard or physical requirement... when there is sufficient evidence that an applicant or employee... can perform the essential duties of the position without endangering the health and safety of the individual or others.”* So, despite a hearing loss, if, an individual demonstrates a current and true ability to safely and efficiently perform the requirements of a job, under all of the likely conditions and circumstances that may be encountered during the course of carrying out that job, the standard must be waived. However, if a hearing deficit is of a degree that sounds cannot be detected accurately at volumes that are considered important for employee safety and efficiency, some other type of response is necessary, either by the employee or by management, such as providing a reasonable accommodation if the employee is found to be a qualified disabled individual, arranging for a transfer to another position where an individual's ability to hear is less critical, or termination of employment.

### **Accommodations**

Federal law (29CFR1614.203, the “Rehabilitation Act”) requires managers to *“make reasonable accommodation to the known physical or mental limitations of an applicant or employee who is a qualified individual with handicaps unless the agency can demonstrate that the accommodation would impose an undue hardship on the operations of its program.”*

A qualified individual means “*an individual with handicaps who, with or without reasonable accommodation, can perform the essential functions of the position in question without endangering the health and safety of the individual or others*” and meets the other requirements for the position.

**Agency Response to a Hearing Deficit**

How is an employee’s hearing recorded, and what does it mean? How does a manager know if an employee’s hearing deficit poses a safety risk or may be undermining the efficiency of the program? What are the safety risks associated with a loss of the normal ability to hear? When can (or should) management grant a waiver, a step that means, for that particular employee, management is going to allow the employee to continue to work despite the failure to meet an established standard? What types of accommodations are possible, and reasonable, in response to an employee’s loss of normal hearing? This overview will address these questions to help guide the manager respond in a fair and responsible way when an employee is unable to meet the hearing standard.

**Audiograms, and what they mean**

As used within standard clinical and occupational practice, an audiogram is a printed record of the results of an individual’s hearing test. The test, when performed correctly, provides an accurate summary (for each ear separately) of the volume that specific sound frequencies must be presented to a person under controlled circumstances in order for them to be conscious of those sounds and for them to trigger a device to record that the sound was heard. The standard frequencies used for an audiogram generally include 500 cycles per second (recorded as Hertz, or Hz), which is a fairly low or deep sound, plus 1000 Hz, 2000 Hz, 3000 Hz, 4000 Hz, 6000 Hz, and 8000 Hz, which is a fairly high-pitched sound to the human ear. Most people can hear sounds of sufficient volume within these frequencies, which include the frequencies where much of our speech takes place (about 500 to 3000 Hz). The volume of sound that must be presented in order to be heard by an individual is measured in decibels (dB), and ranges from 0 to above 100 dB, though some individuals with particularly acute hearing can hear sounds with intensity levels of -5 dB or even lower.

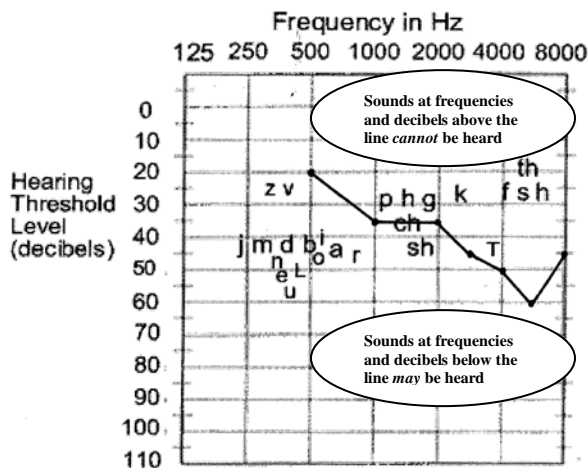
| <b>Examples Of The Decibel Levels Of Some Common Sounds</b> |  |
|---|--|
| <b>Decibels</b>   | <b>Activity or source of sound</b>   |
| 0 dB  | The volume at which a person with normal hearing can hear a sound at least 50% of the time |
| 10 dB   | The rustle of leaves   |
| 20 dB   | Water dripping   |
| 30 dB   | A whisper  |
| 40 dB   | A quiet radio in room  |
| 50 dB   | Moderate rainfall  |
| 60 dB   | Normal conversation, or a dishwasher   |
| 70 dB   | Busy traffic, a vacuum cleaner   |
| 80 dB   | An alarm clock   |
| 90 dB   | A lawnmower  |
| 100 dB  | A snowmobile or a chainsaw   |
| 110 dB  | Rock music   |
| 120 dB  | Jet plane takeoff, and where noise becomes painful for most people                         |

The results of an employee's audiogram might look like this, where the medical standard is included and the dB thresholds highlight in **red** the results that don't meet the standard, as well as those results shaded **yellow** that are not covered by the standard but nevertheless may be important when considering the individual's hearing abilities:

| Hz   | .5k  | 1k    | 2k    | 3k    | 4k | 6k | 8k |
|------|------|-------|-------|-------|----|----|----|
| R    | 20   | 35    | 35    | 45    | 50 | 60 | 45 |
| L    | 10   | 15    | 55    | 65    | 75 | 70 | 55 |
| Std. | 40dB | 40 dB | 40 dB | 40 dB | -  | -  | -  |

The above results are normal at the very low frequency, but begin to worsen quickly and don't meet the standard on the left at 2000 Hz, or in either ear at 3000 Hz. Hearing is quite poor in both ears at the frequencies above the agency standard, and the slight "improvement" you see at the higher frequencies is typically observed in hearing loss due to chronic noise exposure.

The picture below presents the audiogram results in the table, above, for the right ear, superimposed on a graph that shows approximately where certain speech sounds fall, both by loudness and by frequency, during normal conversation:



Degrees of Hearing Loss

- Normal = 0 – 19 dB
- Mild loss = 20 – 39 dB
- Moderate loss = 40 – 59 dB
- Severe loss = 60 – 79 dB
- Profound loss = 80 dB or more

As you can see, the softer sounds, such as **th**, **sh**, and **f**, are found at higher frequencies, as are most of the hard consonants, and most consonants are spoken more softly than vowels tend to be. If a person loses hearing acuity in the mid- to upper-frequencies, such as from 2000 to 6000 Hz, they have difficulty picking out these sounds and may misinterpret words that use them, unless they are spoken particularly loud, which itself can lead to distortion. The difference in how consonants and vowels are spoken (high versus low pitch, and louder versus softer volume) contributes to the way hearing loss interferes with a person's ability to understand what is said. A person whose hearing loss is similar to that in the diagram likely would hear the sounds that fall below the line, but would have difficulty hearing the sounds above the line.<sup>6</sup>

<sup>6</sup> The decibel descriptions, the graphic on page 3, and the information regarding the symptoms of hearing loss are all based on Hound Dog Hearing, <http://www.hdhearing.com/index.htm>



For different types and degrees of hearing loss, a person will have different functional deficits. For example, generally:

With a **mild hearing loss**, a person would be unable to hear soft sounds, or a whispered conversation in a quiet room. They likely would be able to hear a normal conversation in a quiet room but would have difficulty doing so in a noisy environment.

With a **moderate hearing loss**, a person would have considerable difficulty hearing a normal conversation in a quiet room. If there is background noise, the individual would not be able to understand many of the words without the ability to lip read.

With a **severe hearing loss**, a person would not be able to hear a conversation at all unless the speaker speaks loudly.

With a **profound hearing loss**, a person would not be able to understand speech even if the speaker speaks very loudly, and would only hear very loud sounds, such as a chainsaw.

Because we localize where sounds come from by a sophisticated mechanism in the brain that uses the time that a sound reaches one ear versus the other, as well as differences in loudness, the variety of frequencies, and a combination of these factors in the way sound reaches the two ears, hearing loss in one or both ears may disrupt this process. Hearing aids may further disrupt this process of sound localization because they interfere with the timing, intensity, and complex variety of frequencies the brain depends upon when attempting to identify the source of a sound. That is one of the reasons hearing aids may not be allowed under the medical standards for some jobs. Other reasons may involve the mechanics of hearing aids, including damage to the electronics, battery failure, and sensitivity to water or dirt that may be encountered and present safety risks in particular work settings.

#### Does the hearing deficit pose a safety risk or undermine the efficiency of the job?

It may. Depending on the workplace hazards, or the functional requirements of the particular job, a hearing deficit may result in a heightened risk of injury or communication error if it becomes too severe. An analysis of the types of work place hazards, and the importance of accurate verbal communication, is necessary in order to determine the level of hearing necessary and the types of risk posed by a deficit in hearing.

#### Safety risks associated with a hearing deficit

Not hearing a verbal direction correctly, or missing the warning provided by a piece of equipment that is malfunctioning, or not knowing where a hazard is coming from may present a major, or minimal, risk to an employee. Standards are established with the intent to take these factors into consideration.

#### Granting a waiver for a hearing deficit

A waiver may be granted when, in the judgment of a deciding official, an individual who does not meet a medical standard has demonstrated that they have sufficient experience, skills, or knowledge that they are able to carry out a job or function safely and efficiently despite their hearing deficit. In this situation, the requirement to meet the standard is waived for that individual for the current evaluation cycle, but the issue will need to be re-evaluated

each time an evaluation normally would be conducted to ensure that circumstances have not changed and the individual continues to be able to perform the duties safely and efficiently. The factors discussed in the preceding sections should be considered when making this sort of decision.

Reasonable accommodations for an employee with a hearing deficit

As noted on page 1, the Rehabilitation Act requires the accommodation of disabled individuals if the individual is qualified and the accommodation is reasonable. In other words, it would not impose an undue hardship on the operations of the agency. Determining if an accommodation would pose such hardship depends on:

- “(i) The overall size of the agency's program with respect to the number of employees, number and type of facilities and size of budget;*
- (ii) The type of agency operation, including the composition and structure of the agency's work force; and*
- (iii) The nature and the cost of the accommodation.”*

According to the Act, reasonable accommodation “*may include, but shall not be limited to:*

- (i) Making facilities readily accessible to and usable by individuals with handicaps; and*
- (ii) Job restructuring, part-time or modified work schedules, acquisition or modification of equipment or devices, appropriate adjustment or modification of examinations, the provision of readers and interpreters, and other similar actions.”*

These factors, among others that may be more applicable to the individual and local circumstances of the job, must be considered when a determination is to be made regarding whether or not an accommodation can or should be granted. Most medical standards have associated with them some form of narrative or description of the “basis” for the standard, and it may be helpful to review this information when considering whether an accommodation is appropriate.

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and

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## **Bronchodilator Inhalers and Firefighting Situations**

*For discussion at the 2003 Annual WLFF Interagency Medical Standards Team Meeting  
June 16-20, 2003, Fairbanks, Alaska*

### **Situation:**

*“If my physician prescribes a rescue inhaler for my asthma, how do I go through the waiver/accommodation process, given the current restriction that inhalers are not allowed on the fire line? It’s a classic Catch 22.”*

Concern has been raised about the appropriateness of the current medical standard related to the use of pressurized inhalers by wildland firefighters, and this issue was presented to the Team for consideration at this meeting.

### **Question:**

Should the medical standards be changed to remove (or change) the restriction on inhalers?

### **Current Standard:**

To clarify and possibly correct a misunderstanding about the current standard<sup>1</sup> related to the use of inhalers, the applicable section, which is included under the Chest and Respiratory System, is presented here:

*“The applicant/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:  
... .*

*No evidence by physical examination and medical history of respiratory conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job  
... .*

*Note: The requirement to use an inhaler (such as for asthma) requires agency review.*

#### ***CONDITIONS WHICH MAY RESULT IN DISQUALIFICATION INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING EXAMPLES:***

- 1. SIGNIFICANT OBSTRUCTIVE OR RESTRICTIVE PULMONARY DISEASE.***
- 2. ASTHMA must be considered on a case-by-case basis.***
- ... .***
- 12. Any other condition not otherwise listed that may adversely affect safe and efficient job performance will be evaluated on a case-by-base basis.”***

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” pages 10-11

The standard was based on how the pulmonary system:

*“relates (A) the firefighter’s need for a healthy respiratory system and residual aerobic capacity with (B) the essential functions and work conditions of a wildland firefighter, including arduous exertion, carrying heavy loads, and extensive walking and climbing under conditions that may include very steep terrain, high altitudes, airborne particulates, and allergens. Some chest and respiratory conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions... . The requirement for agency review when inhalers are used is based on both the general incompatibility of inhalers and high heat or fire (according to guidance from inhaler manufacturers) and concern regarding the degree of respiratory sensitivity an individual may bring to a setting of high irritant exposure.”<sup>2</sup>*

As noted, in the “Basis” document, there is no blanket or automatic disqualification applied to a firefighter as a result of their need for or use of an inhalation device. Instead, *“the requirement to use an inhaler ... requires agency review”* because of the variety of factors that may be involved with the disease and its treatment, and the variety of ways they may impact safe and efficient wildland firefighter job performance.

**Background:**

The bronchospasms of reactive airway diseases, such as asthma, involve a narrowing of the airways caused by contraction of the muscles that encircle the bronchial tubes, restricting or closing the airways in the lungs. This may be triggered by one or more of several factors,<sup>3</sup> including *allergenic, pharmacologic, environmental, occupational, infectious, emotional, and exercise-related* factors. Prevention and treatment of these bronchospasms may involve one or more of several medications (e.g., *antihistamines, decongestants, anti-inflammatory agents, anti-leukotrienes, and bronchodilators*) that may be taken orally or by inhalation,<sup>4</sup> or even intravenously.

Access to an appropriate and effective medication for “rescue” purposes (generally, bronchodilators) may be necessary for the safety and even survival of an individual at the time of an attack of bronchospasm. *Most other medications used by otherwise healthy individuals do not have the urgency and demand for immediate effectiveness that a bronchodilator may have.*

There is a wide variety of inhalation devices available for delivering bronchodilator or anti-inflammatory agents for preventing and treating bronchospasm, with some available over-the-counter (OTC) and some only by prescription. Because any pressurized or closed device may be at risk of bursting due to increased pressure if exposed to high temperatures, and certain inhalation devices may have volatile propellants and be flammable if the contents are exposed to

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<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 4

<sup>3</sup> E.R. McFadden, Jr., Asthma, in Harrison’s Principles of Internal Medicine, 13<sup>th</sup> Edition, McGraw-Hill, Inc., San Francisco, 1994, pages 1167-69

<sup>4</sup> “Tips to Remember: Asthma & Allergy Medications,” American Academy of Allergy Asthma & Immunology, <http://www.aaaai.org/patients/publicedmat/tips/asthmaallergymedications.stm>

high heat or open flame, manufacturers have recommended against the use of such devices in these situations.<sup>5</sup> At least one manufacturer's stated caution about avoiding exposure of their inhalation devices to high temperatures reflects that "at temperatures exceeding 120° Fahrenheit the pressure may exceed the physical tolerance of the metal canister."<sup>6</sup> They also state that "data is not available regarding the stability of albuterol in the metal canister at elevated temperatures." Further, they go on to say "the interiors of parked automobiles are known to exceed this temperature range, therefore we cannot recommend storage [of] Ventolin Inhalation Aerosol inside the glove compartment or other places where the temperature may exceed 120°." The concern about bursting would apply even if the device uses a non-flammable propellant.<sup>7</sup> Some other devices are not pressurized and do not contain flammable propellants, and would not pose the same types of bursting or flammability risk if used in areas of high heat or open flame, though the product may lose its effectiveness if stored under these conditions.<sup>8</sup>

Therefore, depending on the type of device, the propellant used, and the status of the individual's asthmatic control, it may or may not be safe for a firefighter to depend on an inhalation device for emergency and possibly life-saving respiratory relief of asthma symptoms under conditions of firefighting operations.

Restricting the use of inhalers by firefighters has been supported by case law, for certain conditions and situations. In one case,<sup>9</sup> the US District Court of Maryland ruled that a firefighter had "*failed to show that the type of accommodation which the county would have to make to allow him to perform his job despite his asthma would be reasonable, for purposes of [the] Rehabilitation Act; [the] county reasonably prohibited [the] use of [an] inhaler on [the] job since [the] firefighter's brand of inhaler could not be used or stored near open flame or exposed to high temperatures and would be difficult to use at [the] scene of [a] fire... .*" Further, when it restricted the use of an inhaler, "*the County was concerned with how a firefighter, at the scene of a fire, would use an inhaler, given the breathing apparatus, helmet, facepiece and gloves a firefighter wears,*" and they also were "*concerned with how long it would take for such medication to have effect.*" While the breathing apparatus and facepiece would not apply in the case of a wildland firefighter, and the helmet would be a different type than that used in structural firefighting, the issues of gloves, equipment (i.e., access to the medication), delays in medication action, and their potential use near heat and open flame remain.

The National Fire Protection Association (NFPA) does not take a specific stand related to the use of inhalation devices by structural firefighters.<sup>10</sup> Instead, the NFPA suggests several factors that

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<sup>5</sup> Schering Corporation, product insert for Proventil® brand of albuterol inhalation aerosol, January 2000, and GlaxoSmithKline, product insert for Ventolin® brand of albuterol inhalation aerosol, August 2001: "*Do not use or store near heat or open flame. Exposure to temperatures above 120°F may cause bursting.*"

<sup>6</sup> Personal communication, Anna W. Moore, R.Ph., GlaxoSmithKline, May 7, 2003

<sup>7</sup> GlaxoSmithKline, prescribing information for Ventolin® HFA brand of albuterol inhalation aerosol, June 2002: "*Do not use or store near heat or open flame. Exposure to temperatures above 120°F may cause bursting.*"

<sup>8</sup> GlaxoSmithKline, prescribing information for Serevent® Diskus® brand of salmeterol xinafoate inhalation powder, March 2003: "*Store at controlled room temperature, 20° to 25° C (68° to 77° F) in a dry place away from direct heat or sunlight.*"

<sup>9</sup> Huber v. Howard County, Civ. No. K-93-606, United States District Court, D. Maryland, April 15, 1994.

<sup>10</sup> National Fire Protection Association, NFPA 1582, "Medical Requirements for Fire Fighters," 1997 Edition, Appendix B-4.2 Asthma and Reactive Airway Disease

may be used in evaluating a firefighter, including the persistence of airway obstruction between actual attacks, the need and frequency of use of medications, the usual triggers for attacks, emergency or advanced treatment requirements, and other factors. The NFPA notes that “moderate asthma or worse could disqualify an individual for fire fighter duties.”

I was not able to find other wildland firefighter medical standards, such as those from other countries, that would apply to this discussion.

**Recommendation:**

The recommendation is to leave the medical standard related to the use of inhalation devices intact and unchanged. The current standard provides for the necessary attention to the important aspects of effectiveness and safety, while allowing flexibility in decision-making by medical and agency reviewers based on the facts of individual cases.

## **WLFF LASIK Surgery Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the April 11, 2006 WLFF Interagency Medical Standards Team Meeting,  
Monterey, California*

### **Issue**

Because of the increasing frequency with which incumbent and potential wildland firefighters are identified who have had the refraction-correcting procedure referred to as LASIK surgery, and because of the potential impact of this surgery on both the vision of the firefighter and physical integrity of the firefighter's eye(s) following surgery, a request was made for a recommendation for a protocol or standard for reviewing and approving individuals who have had this procedure.

### **Current Standard:**

The applicable section of the current FFALC-approved standards<sup>1</sup> specifies that:

*“The applicant/incumbent must be able to see well enough to safely and efficiently carry out the requirements of the job. This requires binocular vision, far visual acuity, depth perception, peripheral vision, and color vision, which may be demonstrated by:*

- *Far visual acuity uncorrected of at least 20/100 in each eye for wearers of hard contacts or spectacles; and*
- *Far visual acuity of at least 20/40 in each eye (if necessary) with contact lenses or spectacles; and*
- *Color vision sufficient to distinguish at least red, green, and amber (yellow); and*
- *Peripheral vision of at least 85° laterally in each eye; and*
- *Normal depth perception; and*
- *No ophthalmologic condition that would increase ophthalmic sensitivity to bright light, fumes, or airborne particulates, or susceptibility to sudden incapacitation.*

*Note: Contact lenses and spectacles are acceptable for correction of visual 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. Successful users of long-wear soft contact lenses are not required to meet the “uncorrected” vision guideline.”*

The standard was based on:<sup>2</sup>

*“(A) the firefighter’s need to be able to see (including binocular vision, visual acuity, depth perception, peripheral vision, and color vision) with (B) the essential functions and work conditions of a wildland firefighter, including driving, walking, climbing,*

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” page 7.

<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 2.

*constructing fire lines, and rapid pull out to safety zones under conditions that may include very steep terrain, rocky, loose or muddy ground surfaces, open holes or drop offs, and dim light or darkness. The limit for uncorrected far vision is set at 20/100 binocular, consistent with the National Fire Protection Association's Standard on Medical Requirements for Fire Fighters (NFPA 1582, 1997 Edition), and with a field assessment by the medical standards team in which different levels of acuity were considered in an operational setting related to the need for rapid or emergency movement under the conditions noted above. Long-term users of soft contact lenses are not subject to the uncorrected far vision standard. Corrected far vision is set at 20/40, and the color vision requirement is for red/green/amber (yellow), consistent with Department of Transportation regulations for commercial driving and the need for safe and efficient function under expected fire fighting conditions. Peripheral vision is set as 85° laterally, which is generally considered to be normal. Some vision conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions."*

### **Discussion:**

LASIK surgery, which refers to "laser-assisted in-situ keratomileusis," is one of several methods that may be used for correcting refractive errors of vision. Other available methods include LASEK (laser epithelial keratomileusis), which may be used with people who have especially thin corneas; PRK (photorefractive keratectomy), which involves "shaving" the surface of the cornea, rather than the portion of the cornea under a flap of surface tissue; and RK (radial keratotomy), one of the earliest refractive surgical procedures, which is rarely done anymore due to its higher rate of complications and poorer results than the newer methods.

LASIK surgery was developed in 1990 in Italy, and was introduced into the US in 1991. It may be used for farsightedness, nearsightedness, or astigmatism, and the risk of significant complications has dropped from as much as 5% in the late 1990s to less than 1% now, with careful selection of surgical candidates. Complications, when they do occur, include such things as incomplete correction of the problem, dry eyes, halos around bright lights (particularly at night), irregularities in vision, and infection. Rupture of the eye (through the weakened cornea), which occurred in some cases of RK surgery, is not a complication that should ever occur with LASIK when it is properly performed. If the cornea has been shaved too thinly, which would weaken the structure and make it more susceptible to rupture, visual acuity will be altered as a result of the bulging of the cornea, which is the primary refractive structure of the eye (the lens is for fine tuning of the refracted light), so this complication can be detected by non-ophthalmologists or eye surgeons by the standard assessment of visual acuity. Between 80 and 90% of people who undergo refractive surgery are able to do without their corrective lenses, at least most of the time.

A Food and Drug Administration summary of LASIK surgery<sup>3</sup> recommends the avoidance of "strenuous contact sports ... for at least four weeks after surgery," and notes that it "may take up to three to six months for ... vision to stabilize after surgery." Other complications, such as glare, dry eyes, sensitivity to light, blurred vision, and infection should all have been resolved (or

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<sup>3</sup> <http://origin.www.fda.gov/cdrh/LASIK/expect.htm>



detected and addressed as a result of standard follow up care) by a month or two following surgery.

The California Peace Officer Standards and Training (POST) guidelines related to medical clearances following LASIK surgery are helpful on this point.<sup>4</sup> These guidelines provide for clearances between one and three months after surgery if the individual is asymptomatic and has normal visual function.

Because of the consultative work provided to its various customer agencies, in late 2001 the Federal Occupational Health consulting physicians reviewed the issue of post-surgical medical clearances for individuals who have undergone LASIK and other refractive surgical procedures. Based on information gathered from their own ophthalmology consultants, the FOH physicians recommended waiting 3 months after LASIK surgery, 6 months after PRK, and 1 year after RK before granting medical clearances for individuals involved in law enforcement work, due to their potential for physical interpersonal contact, strenuous activity (which raises blood pressure, and the pressure within the eye), and altitude changes, depending on work assignments. One physician, who has worked with fighter pilots, indicated that medical clearances could be delayed as much as a year after refractive surgery. The FOH law enforcement program also requires documentation from the treating ophthalmologist that the individual's vision is stable and that the surgery has been considered successful.

Because no truly long-term follow up has been possible for the more recent forms of refractive surgery, including LASIK surgery, it is not possible to state with certainty what the risk may be for long-term complications, or which individuals are at most risk for complications beyond the immediate post-op period. Current recommendations may be need to be modified in the future as more information becomes available, and as surgical techniques evolve.

**Recommendation:**

This issue was discussed by telephone with the WLFF Medical Standards Program Central Medical Consultant, Dr. Larry Saladino, and a general consensus was achieved on the approach that might best meet the needs of the program. Based on the above, and the discussions with Dr. Saladino, the recommendation of this consultant (related to LASIK surgery and the medical standards for arduous duty wildland firefighting) is the following:

**In addition to meeting the specified vision requirements in the standards,**

- 1) if LASIK surgery has been done **90 days or less** prior to the date of the medical clearance screening exam, a clearance from the individual's treating ophthalmologist should be required; such a clearance must make clear that the ophthalmologist has reviewed and is aware of the functional requirements of wildland firefighting, as presented in the table that accompanies the medical standards, and is of the opinion that the individual is capable of safely carrying out the requirements of the job under the conditions of employment that may be encountered; and

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<sup>4</sup> POST Medical Screening Manual, Chapter XI, Vision Guidelines (Revised 10/02), page XI-63  
(<http://www.post.ca.gov/selection/medical.asp>)

- 2) if LASIK surgery has been done **more than 90 days** prior to the date of the medical clearance screening exam, the basic findings of the medical history portions of the screening exam forms will be used to assess symptoms and possible complications that may have occurred, and which may have an impact on a clearance decision.

## **WLFF NFPA 1582 Comparison Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the April 10, 2007 WLFF Interagency Medical Standards Team Meeting  
Phoenix, Arizona*

### **Issue:**

While the specific functional requirements of the job and the work settings are different, and the target audience and programmatic uses are not identical between the two programs, there may be considerable value in reviewing and comparing the medical standards and the basis for the standards that have been developed and implemented by the National Fire Protection Association (NFPA) for structural firefighters with those that have been developed and implemented for wildland firefighters (WLFFs). As an entity representing a large and nationally recognized group of subject matter experts, the NFPA provides in their standards document a valuable touchstone for the work that has been done by the Interagency Medical Standards Team for WLFFs. The following table is intended to reflect and compare the current WLFF medical standards with those of the most current edition of the NFPA,<sup>1</sup> along with notes on the way the NFPA standards are intended to be used and interpreted. Please note, however, that the NFPA 1582 standards and notes shown below have been interpreted and summarized by this consultant to the best of his ability, but do not necessarily represent the views of the NFPA.

| <b>WLFF Medical Standards</b>   | <b>NFPA 1582 Medical Standards*</b><br>Category A: precludes a <u>full</u> clearance<br>Category B: may preclude clearance  | <b>NFPA 1582</b><br>From “ <i>Chapter 9, Essential Job Tasks – Specific Evaluation of Medical Conditions in Members</i> ” and “ <i>Annex A Explanatory Material</i> ” | <b>Comment</b><br>Note: the WLFF “ <i>Conditions Which May Result in Disqualification...</i> ” serve a similar purpose as NFPA Chapter 9 |
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| <p><b><u>PSYCHIATRIC STANDARD</u></b><br/>The applicant/incumbent must have judgment, mental functioning, and social interaction/behavior that will provide for the safe and efficient conduct of the requirements of the job. This may be demonstrated by:</p> <ul style="list-style-type: none"> <li>• No evidence by physical examination and medical history of psychiatric conditions (including alcohol or substance abuse) likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.</li> </ul> | <p><b><u>6.21 Psychiatric Conditions</u></b><br/>A: Any psychiatric condition that results in the candidate not being able to safely perform one or more of the essential job tasks<br/>B: A history of psychiatric condition or substance abuse problem<br/>B: Requirement for medications that increase an individual’s risk of heat stress, or other interference with the ability to safely perform essential job tasks</p> | <p>Would require further evaluation regarding the impact on ability to perform duties safely<br/><br/>(see also <u>WLFF Medication Standard</u>)</p>                  | <p>Note that even tobacco use is a Category A condition for applicant structural firefighters</p>  |

<sup>1</sup> National Fire Protection Association, NFPA 1582 Standard on Comprehensive Occupational Medical Program for Fire Departments, 2007 Edition

| <p><b>WLFF Medical Standards</b></p>  | <p><b>NFPA 1582 Medical Standards*</b><br/>                     Category A: precludes a <u>full</u> clearance<br/>                     Category B: may preclude clearance</p>   | <p><b>NFPA 1582</b><br/>                     From “<i>Chapter 9, Essential Job Tasks – Specific Evaluation of Medical Conditions in Members</i>” and “<i>Annex A Explanatory Material</i>”</p>   | <p><b>Comment</b><br/>                     Note: the WLFF “<i>Conditions Which May Result in Disqualification...</i>” serve a similar purpose as NFPA Chapter 9</p>   |
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|   | <p><u>6.22 Chemicals, Drugs, and Medications</u><br/>                     A: Tobacco use (where state law allows)<br/>                     A: Evidence of illegal drug use detected through testing<br/>                     A: Evidence of clinical intoxication at the time of the examination</p>  |  |   |
| <p><u>PROSTHETICS, TRANSPLANTS, AND IMPLANTS STANDARD</u><br/>                     The presence or history of organ transplantation or use of prosthetics or implants are not of themselves disqualifying. However, the applicant/incumbent must be able to safely and efficiently carry out the requirements of the job. This may be demonstrated by:</p> <ul style="list-style-type: none"> <li>• 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.</li> </ul> | <p><u>6.9.1 Heart</u><br/>                     A: Implanted cardiac defibrillator<br/>                     A: Cardiac pacemakers<br/> <br/>                     B: Prosthetic heart valves (if fully anticoagulated)<br/> <br/> <u>6.6 Dental</u><br/>                     B: Orthodontic appliances<br/> <br/> <u>6.14 Extremities</u><br/>                     A: Bone hardware (e.g., metal plates, rods, artificial joints)</p>   | <p>Would require further evaluation regarding the impact on ability to perform duties safely</p>   | <p>WLFF Notes: For individuals with transplants, prosthetics, or implanted pumps or electrical devices, the examinee will have to provide for agency review documentation from his/her surgeon or physician that the individual (and, if applicable, his/her prosthetic or implanted device) is considered to be fully cleared for the specified functional requirements of wildland fire fighting.</p> |
| <p><u>IMMUNE SYSTEM/ALLERGIC DISORDERS STANDARD</u><br/>                     The applicant/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:</p> <ul style="list-style-type: none"> <li>• A general physical exam of all major body systems that is within the range of normal variation, including:                             <ul style="list-style-type: none"> <li>○ no evidence of current communicable disease that would be expected to</li> </ul> </li> </ul>   | <p><u>6.5 Ears and Hearing</u><br/>                     B: External otitis<br/>                     B: Mastoiditis<br/>                     B: Otitis media<br/> <br/> <u>6.7 Nose, Oropharynx, Trachea, Esophagus, and Larynx</u><br/>                     B: Allergic rhinitis<br/>                     B: Sinusitis, recurrent<br/> <br/> <u>6.8 Lungs and Chest Wall</u><br/>                     A: Active tuberculosis<br/>                     A: Asthma requiring bronchodilator or</p> | <p>(see also <u>WLFF Chest and Respiratory System Standard</u>)<br/> <br/>                     (see also <u>WLFF Medication Standard</u>)<br/> <br/> <u>9.8 Infectious Diseases</u><br/>                     Includes consideration of systemic, local, acute, and chronic infections, as well as post-infectious processes<br/> <br/>                     Attention must be given to the condition’s impact on body temperature, hydration, nutritional</p> |   |

| <p><b>WLFF Medical Standards</b></p>  | <p><b>NFPA 1582 Medical Standards*</b><br/>                     Category A: precludes a <u>full</u> clearance<br/>                     Category B: may preclude clearance</p>   | <p><b>NFPA 1582</b><br/>                     From “<i>Chapter 9, Essential Job Tasks – Specific Evaluation of Medical Conditions in Members</i>” and “<i>Annex A Explanatory Material</i>”</p>   | <p><b>Comment</b><br/>                     Note: the WLFF “<i>Conditions Which May Result in Disqualification...</i>” serve a similar purpose as NFPA Chapter 9</p> |
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| <p>interfere with the safe and effective performance of the requirements of the job; and</p> <ul style="list-style-type: none"> <li>○ no evidence of current communicable disease that would be expected to pose a threat to the health of any co-workers or the public; and</li> <li>● Normal complete blood count, including white blood count and differential; and</li> <li>● Current vaccination status for tetanus; and</li> <li>● 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.</li> </ul>  | <p>corticosteroid therapy for 2 or more month (consecutively) in the previous 2 years (see also <u>WLFF Chest and Respiratory System Standard</u>)</p> <p>B: Infectious diseases of the lung or pleural space</p> <p><u>6.17 Blood and Blood Forming Organs</u><br/>                     B: Anemia<br/>                     B: Leukopenia</p>   | <p>status, infectivity, pain, weakness, mobility, hearing, interruption of normal job duties (such as that related to the need for frequent or urgent toilet breaks), or other sudden incapacitation</p> <p>Recommended vaccinations and screening include:</p> <ol style="list-style-type: none"> <li>1) Tb (PPD)</li> <li>2) Hep C (baseline)</li> <li>3) Hep B vaccination</li> <li>4) Td vaccine every 10 years</li> <li>5) MMR vaccine</li> <li>6) Polio vaccine</li> <li>7) Hep A to high risk individuals</li> <li>8) Varicella vaccine</li> <li>9) Influenza vaccine</li> </ol>  |   |
| <p><u>MEDICATION STANDARD</u><br/>                     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.</p> <p>Each of the following points should be considered:</p> <ol style="list-style-type: none"> <li>1. Medication(s) (type and dosage requirements)</li> <li>2. Potential drug side effects</li> <li>3. Drug-drug interactions</li> <li>4. Adverse drug reactions</li> <li>5. Drug toxicity or medical complications from long-term use</li> </ol> | <p><u>6.22 Chemicals, Drugs, and Medications</u><br/>                     A: Narcotics, including methadone<br/>                     A: Sedative-hypnotics<br/>                     A: Drugs that prolong prothrombin time, PTT, or INR<br/>                     A: Beta-blockers<br/>                     A: High dose diuretics<br/>                     A: Central acting antihypertensives (e.g., clonidine)<br/>                     A: Inhaled bronchodilators<br/>                     A: Inhaled corticosteroids<br/>                     A: Systemic corticosteroids<br/>                     A: Theophylline<br/>                     A: Leukotriene receptor blockers<br/>                     A: High dose corticosteroids for chronic disease<br/>                     A: Anabolic steroids<br/>                     B: Cardiovascular agents<br/>                     B: Stimulants</p> | <p>(see also <u>WLFF Chest and Respiratory System Standard</u>)</p> <p>(see also <u>WLFF Endocrine and Metabolic System Standard</u>)</p> <p><u>9.16 Medications</u><br/>                     Includes prescribed and over-the-counter medications<br/>                     Problems may relate either to direct effects (e.g., somnolence, alteration in judgment or vigilance) or to indirect effects (e.g., dehydration, electrolyte disorders, myopathy)</p> <p><u>Anticoagulation:</u> Full dose anticoagulation raises the risk of internal bleeding from trauma, and compromises the firefighter’s ability to climb ladders, work at heights, walk or</p> |   |

| <p><b>WLFF Medical Standards</b></p>   | <p><b>NFPA 1582 Medical Standards*</b><br/>                     Category A: precludes a <u>full</u> clearance<br/>                     Category B: may preclude clearance</p>  | <p><b>NFPA 1582</b><br/>                     From “Chapter 9, Essential Job Tasks – Specific Evaluation of Medical Conditions in Members” and “Annex A Explanatory Material”</p>   | <p><b>Comment</b><br/>                     Note: the WLFF “Conditions Which May Result in Disqualification...” serve a similar purpose as NFPA Chapter 9</p>  |
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| <p>6. Drug-environmental interactions<br/>                     7. Drug-food interactions<br/>                     8. History of patient compliance</p>   | <p>B: Psychiatric medications<br/>                     B: Other than high-dose corticosteroids<br/>                     B: Antihistamines<br/>                     B: Muscle relaxants</p>   | <p>crawl in the dark along narrow and uneven surfaces, and work in proximity to hazards</p>  |   |
| <p><u>VISION STANDARD</u><br/>                     The applicant/incumbent must be able to see well enough to safely and efficiently carry out the requirements of the job. This requires binocular vision, far visual acuity, depth perception, peripheral vision, and color vision, which may be demonstrated by:</p> <ul style="list-style-type: none"> <li>• Far visual acuity uncorrected of at least 20/100 in each eye for wearers of hard contacts or spectacles; and</li> <li>• Far visual acuity of at least 20/40 in each eye corrected (if necessary) with contact lenses or spectacles; and</li> <li>• Color vision sufficient to distinguish at least red, green, and amber (yellow); and</li> <li>• Peripheral vision of at least 85° laterally in each eye; and</li> <li>• Normal depth perception; and</li> <li>• No ophthalmologic condition that would increase ophthalmic sensitivity to bright light, fumes, or airborne particulates, or susceptibility to sudden incapacitation.</li> </ul> | <p><u>6.4 Eyes and Vision</u><br/>                     A: Far visual acuity less than 20/40 binocular, corrected<br/>                     A: Far visual acuity less than 20/100 binocular, uncorrected (for those who require glasses or hard contact lenses)<br/>                     A: Monochromatic vision (if unable to use imaging devices, such as thermal cameras); does <u>not</u> include red/green color blindness<br/>                     A: Monocular vision<br/>                     B: Retinal detachment<br/>                     B: Ophthalmological procedures such as radial keratotomy, Lasik procedure or repair of retinal detachment<br/>                     B: Peripheral vision (horizontal) less than 110 degrees in the better eye or any condition that significantly affects peripheral vision in both eyes</p> | <p><u>9.12.3 Disorders of the Eyes or Vision</u><br/>                     Successful wearers of soft contact lenses (e.g., 6 mo. w/o problem) are not subject to the uncorrected vision standard<br/>                     Monocular vision, stereopsis without fusional capacity, inadequate depth perception, or loss of peripheral vision (greater than 110 degrees on confrontation) compromises the firefighter’s ability to work safely<br/>                     New monocular vision requires a minimum of 6 months for depth perception accommodation in order to safely perform other essential job tasks, but monocular vision still is not allowed under DOT/CDL regulations<br/>                     Two weeks for radial keratotomy and Lasik-type surgery, and 3 months for retinal detachment surgery, must pass to allow for stabilization and surgical recovery<br/> <u>A.9.12.3.1</u> notes that most people with monocular vision are able to function well after a 6 month accommodation period, though there is some loss of depth perception and peripheral vision. The loss of depth perception reportedly has not been shown to affect a person’s</p> | <p>WLFF Notes: Contact lenses and spectacles are acceptable for correction of visual 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. Successful users of long-wear soft contact lenses are not required to meet the “uncorrected” vision guideline.</p> |

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|  |   | <p>ability to perform essential firefighting tasks safely, though some specialized tasks may be difficult to perform and should be evaluated case-by-case.</p>  |   |
| <p><u><b>HEAD, NOSE, MOUTH, THROAT AND NECK STANDARD</b></u><br/>                     The applicant/incumbent must have structures and functions of the head, nose, mouth, 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:</p> <ul style="list-style-type: none"> <li>• A physical exam of the head, nose, mouth, throat, and neck that is within the range of normal variation, including:                             <ul style="list-style-type: none"> <li>○ Normal flexion, extension, and rotation of the neck; and</li> <li>○ Open nasal and oral airways; and</li> <li>○ Unobstructed Eustachian tubes; and</li> <li>○ No structural abnormalities that would prevent the normal use of a hard hat and protective eyewear; and</li> </ul> </li> <li>• Normal conversational speech; and</li> <li>• No evidence by physical examination and medical history of head, nose, mouth, 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 (see page 3).</li> </ul> | <p><u><b>6.3 Head and Neck</b></u><br/>                     A: Defect of skull preventing helmet use or leaving underlying brain unprotected from trauma<br/><br/>                     B: Deformities of the skull such as depressions or exostoses<br/>                     B: Deformities of the skull associated with evidence of disease of the brain, spinal cord, or peripheral nerves<br/>                     B: Loss of congenital absence of the bony substance of the skull<br/>                     B: Thoracic outlet syndrome<br/>                     B: Congenital cysts, chronic draining fistulas, or similar lesions<br/>                     B: Contraction of neck muscles</p> | <p>Would require further evaluation regarding the impact on ability to perform duties safely</p>  |   |
| <p><u><b>HEARING STANDARD</b></u><br/>                     The applicant/incumbent must be able to hear well enough to safely and efficiently carry out the requirements of the job. This requires binaural hearing (to localize sounds) and auditory acuity, which may be demonstrated</p>  | <p><u><b>6.5 Ears and Hearing</b></u><br/>                     A: Average hearing loss in the unaided better ear greater than 40 dB at 500 – 3000 Hz<br/><br/>                     B: Unequal hearing loss</p>  | <p><u><b>9.12.4 Abnormal Hearing</b></u><br/>                     Abnormal hearing requiring a hearing aid or impairing a member’s ability to hear and understand the spoken voice under conditions of high background noise, or hear, recognize, and</p> | <p>WLFF Notes: The use of a hearing aid(s) to meet this standard is not permitted.</p>  |

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| <p>by:</p> <ul style="list-style-type: none"> <li>• A current pure tone, air conduction audiogram, using equipment and a test setting which meet the standards of the American National Standards Institute (see 29 CFR 1910.95); and</li> <li>• Documentation of hearing thresholds of no greater than 40 dB at 500, 1000, 2000, and 3000 Hertz in each ear; and</li> <li>• 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.</li> </ul> | <p>B: Average uncorrected hearing deficit at 500 – 3000 Hz greater than 40 dB in either ear<br/>                     B: Tinnitus</p>  | <p>directionally locate cries or audible alarms, compromises the member’s ability to safely perform several essential job functions.</p> <p><u>A.9.12.4.1</u><br/>                     Hearing aid use is not considered a reasonable accommodation because:</p> <ol style="list-style-type: none"> <li>(1) U.S. FDA regulations (21 CFR 801.420) require that all hearing aids be labeled with a statement that hearing aids do not restore normal hearing.</li> <li>(2) Hearing aids are adjusted to restore one-third to one-fourth the measured loss in pure tone frequency range of 250 to 6000 Hz (National Acoustic Labs). This allows for improved hearing of speech but will not restore ability to hear or discriminate acoustic cues (such as collapsing wall/timber, gas leaks, traffic sounds) or radio broadcasts that are essential safety requirements at a fire or rescue scene.</li> <li>(3) Hearing aids seriously compromise the ability to localize acoustic cues so that the source of impending danger is confused and safety is imperiled.</li> <li>(4) Hearing aids are not calibrated to function in areas of high background noise (fire scene, rescue scene, traffic) or during radio transmissions.</li> <li>(5) Hearing aids are not reliable after submersion or heavy exposure to water.”</li> </ol> |   |



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| <p><u>DERMATOLOGY STANDARD</u><br/>                     The applicant/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:</p> <ul style="list-style-type: none"> <li>• A physical exam of the skin that is within the range of normal variation; and</li> <li>• 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.</li> </ul>                             | <p><u>6.16 Skin</u><br/>                     A: Metastatic or locally extensive basal or squamous cell carcinoma or melanoma<br/>                     B: Skin conditions of a chronic or recurrent nature that cause skin openings or inflammation or irritation of the skin surface<br/>                     B: Surgery or skin grafting<br/>                     B: Mycosis fungoides<br/>                     B: Cutaneous lupus erythematosus<br/>                     B: Raynaud’s phenomenon<br/>                     B: Scleroderma<br/>                     B: Vasculitic skin lesions<br/>                     B: Atopic dermatitis / eczema<br/>                     B: Contact or seborrheic dermatitis<br/>                     B: Stasis dermatitis<br/>                     B: Albinism, Marfan syndrome, and other genetic conditions<br/>                     B: Folliculitis, pseudo-folliculitis, miliaria, keloid folliculitis<br/>                     B: Furuncles, carbuncles, or severe acne<br/>                     B: Bullous disorders<br/>                     B: Urticaria or angioedema</p> | <p>All considerations relate to the integrity of the skin as a barrier, or the risk of injury, or compromise in the ability to safely carry out job duties</p>  |  |
| <p><u>VASCULAR SYSTEM STANDARD</u><br/>                     The applicant/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:</p> <ul style="list-style-type: none"> <li>• A physical exam of the vasculature of the upper and lower extremities that is within the range of normal variation, including:                             <ul style="list-style-type: none"> <li>○ no evidence of phlebitis or thrombosis; and</li> <li>○ no evidence of venous stasis; and</li> </ul> </li> </ul> | <p><u>6.9 Heart and Vascular System</u><br/>                     A: Thoracic or abdominal aneurysm<br/>                     A: Carotid artery stenosis or obstruction with 50 % or more reduction in blood flow<br/>                     A: Peripheral vascular disease with symptomatic claudication<br/>                     B: Vasospastic phenomena, such as Raynaud’s<br/>                     B: Thrombophlebitis and varicosities</p>  | <p>(see <u>WLFF Medication Standard</u>)<br/>                     All considerations relate to issues of potential risk of sudden incapacitation, limitations of endurance, possible pain, loss of balance, or other functional impairment</p>              |  |

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| <ul style="list-style-type: none"> <li>o no evidence of arterial insufficiency; and</li> <li>• No evidence by physical examination and 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.</li> </ul>  | <p>B: Chronic lymphedema due to lymphadenopathy or venous valvular incompetency</p> <p>B: Congenital or acquired lesions of the aorta or major vessels</p> <p>B: Circulatory instability (e.g., orthostatic hypotension, peripheral vasomotor disturbances)</p> <p>B: History of surgical repair of aneurysm of a major vessel</p> <p><u>6.15 Neurological Disorders</u></p> <p>A: Cerebral arteriosclerosis as evidenced by a history of transient ischemic attack, reversible ischemic neurological deficit, or ischemic stroke</p> <p>A: Uncorrected cerebral aneurysm</p> <p>B: History of subarachnoid or intraparenchymal hemorrhage</p> |  |  |
| <p><u>CARDIAC STANDARD</u><br/>                     The applicant/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:</p> <ul style="list-style-type: none"> <li>• A physical exam of the cardiovascular system that is within the range of normal variation, including:                             <ul style="list-style-type: none"> <li>o blood pressure of less than or equal to 140 mmHg systolic and 90 mmHg diastolic; and</li> <li>o a normal baseline electrocardiogram (minor, asymptomatic arrhythmias may be acceptable); and</li> <li>o no pitting edema in the lower</li> </ul> </li> </ul> | <p><u>6.9 Heart and Vascular System</u></p> <p>A: CAD, MI, angina, coronary bypass surgery, angioplasty, etc.</p> <p>A: Cardiomyopathy , CHF, or signs of right or left ventricular compromise</p> <p>A: Acute pericarditis, endocarditis, or myocarditis</p> <p>A: Recurrent syncope</p> <p>A: History of V-tach or V-fib due to ischemic or valvular heart disease or cardiomyopathy</p> <p>A: Third degree A-V block</p> <p>A: IHSS</p> <p>A: Hypertension with evidence of end organ damage, or not controlled by approved medications</p>   | <p>The reader is directed to section <u>9.4 Cardiovascular Disorders</u> and <u>A.6.9.1-.2</u> for more complete commentary and guidance on this system, which is more extensive that is practical to extract and incorporate here. Some key points, however, include cautions related to:</p> <ol style="list-style-type: none"> <li>1)angina, even if relieved with medication</li> <li>2)lower than normal left ventricular ejection fraction</li> <li>3)maximal exercise tolerance of less than 42 mL O<sub>2</sub>/min/kg, or less than 12 METS</li> <li>4)history of MI, angina, or CAD</li> </ol> | <p>WLFF Notes:</p> <ol style="list-style-type: none"> <li>1. PACEMAKERS or PROSTHETIC VALVES may be disqualifying. Documentation from the individual’s cardiologist, stating that the individual is stable and can safely carry out the specified requirements of the function, under the specified conditions, will be necessary before a clearance can be granted.</li> <li>2. CORONARY ARTERY DISEASE A successful completion of an exercise stress test, or documentation from the individual’s cardiologist acknowledging the requirements of the function and the</li> </ol> |

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| <p>extremities, and<br/>                     o normal cardiac exam.<br/>                     • 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.</p>   | <p>B: Valvular lesions, including prosthetic valves<br/>                     B: Recurrent supraventricular or atrial tachycardia, flutter, or fibrillation<br/>                     B: Left bundle branch block<br/>                     B: Second degree A-V block (w/o structural heart disease)<br/>                     B: Sinus pause more than 3 seconds<br/>                     B: Ventricular arrhythmia (e.g. multifocal PVCs)<br/>                     B: Cardiac hypertrophy or hypertrophic cardiomyopathy<br/>                     B: History of congenital abnormality<br/>                     B: Chronic pericarditis, endocarditis, or myocarditis</p>  | <p>with persistent risk factors for plaque rupture (tobacco use; HBP despite Rx; cholesterol of 180 or more, or LDL of 100 or more, despite treatment; or HbA1c above 7 despite exercise and/or weight reduction)<br/>                     5) moderate to severe mitral valve stenosis<br/>                     6) severe uncontrolled hypertension (systolic over 180, diastolic above 100, or mean pressure above 120, calculated as 1/3 systolic + 2/3 diastolic)</p>  | <p>work conditions, may allow a clearance despite this diagnosis.<br/>                     3. HYPERTENSION that cannot be controlled to a level of 160/90 or less, or requires the use of any medication that affects the ability of the individual to safely and effectively carry out the requirements of the function, may be disqualifying.</p> |
| <p><u>CHEST AND RESPIRATORY SYSTEM STANDARD</u><br/>                     The applicant/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:<br/>                     • A physical exam of the respiratory system that is within the range of normal variation;<br/>                     • and<br/>                     • A pulmonary function test (baseline exam) showing:<br/>                     o forced vital capacity (FVC) of at least 70% of the predicted value; and<br/>                     o forced expiratory volume at 1 second (FEV1) of at least 70% of the predicted value; and<br/>                     o the ratio FEV1/FVC of at least 70% of the predicted value; and<br/>                     • No evidence by physical examination and</p> | <p><u>6.8 Lungs and Chest Wall</u><br/>                     A: Active hemoptysis<br/>                     A: Current empyema<br/>                     A: Pulmonary hypertension<br/>                     A: Active tuberculosis<br/>                     A: FVC or FEV<sub>1</sub> less than 70 % of predicted (due to impact on the use of SCBA)<br/>                     A: FEV<sub>1</sub> / FVC less than 75 % of predicted and both FEV<sub>1</sub> and FVC less than 80 % of predicted, with obstructive lung disease (emphysema, chronic bronchitis, asthma)<br/>                     A: Asthma or reactive airway disease that required bronchodilator or corticosteroid therapy for 2 or more consecutive months during the past 2 years (see exception in the next column)<br/>                     B: Pulmonary resectional surgery, chest</p> | <p><u>6.8.1.1 Asthma (exceptions):</u><br/>                     1) asthma has resolved without symptoms or medications<br/>                     2) if allergic, allergen avoidance or desensitization has been successful<br/>                     3) spirometry demonstrates adequate reserve (FVC and FEV<sub>1</sub> equal to or greater than 90 % of predicted and no bronchodilator response measured while on no bronchodilator on the day of testing)<br/>                     4) normal or negative response (less than 20% decline in FEV<sub>1</sub>) to cold air, exercise [12 METS], or methacholine challenge<br/> <br/> <u>9.7.6 Asthma</u><br/>                     This section lists a series of specific steps and criteria that must be met in</p> | <p>WLFF Notes: The requirement to use an inhaler (such as for asthma) requires agency review.<br/>                     3. 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.</p>                                |

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| <p>medical history of respiratory conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.</p>  | <p>wall surgery, and pneumothorax<br/>                     B: Pleural effusion<br/>                     B: Fibrothorax, chest wall deformity, and diaphragm abnormalities<br/>                     B: Interstitial lung diseases<br/>                     B: Pulmonary vascular diseases or history of pulmonary embolism<br/>                     B: Bronchiectasis<br/>                     B: Infectious diseases of the lung or pleural space<br/>                     B: Cystic fibrosis<br/>                     B: Central or obstructive apnea</p>   | <p>order to avoid restrictions; it relates closely to the points presented above.</p> <p><u>9.7.4 Tracheostomy</u><br/>                     This procedure compromises the ability to communicate effectively or clear secretions or inhaled particulates</p> <p><u>9.7.7 – 9.7.24</u> provides further information about specific respiratory and chest conditions</p> <p><u>A.6.8.1.1</u> notes that, for candidates who report having temporary, resolved bronchospasm (asthma), they should have an FVC and FEV<sub>1</sub> of greater than or equal to 90 % of predicted in order to demonstrate sufficient reserve if bronchospasm were to reoccur due to occupational exposures or challenges</p> |   |
| <p><u>ENDOCRINE AND METABOLIC SYSTEM STANDARD</u><br/>                     Any excess or deficiency in hormonal 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/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:</p> <ul style="list-style-type: none"> <li>• A physical exam of the skin, thyroid, and eyes that is within the range of normal variation; and</li> <li>• Normal fasting blood sugar level; and</li> </ul> | <p><u>6.18 Endocrine and Metabolic Disorders</u><br/>                     A: Type 1 (i.e., insulin dependent) diabetes mellitus, unless a candidate meets a series of criteria related to adequate management, control, and lack of end organ damage (retinal exam, renal function, neuropathy, cardiac function), and has been cleared by an endocrinologist.<br/>                     A: Insulin-requiring Type 2 diabetes mellitus, unless a candidate meets a series of criteria related to adequate management, control, and lack of end organ damage (retinal exam, renal function, neuropathy, cardiac function), and has been cleared by an endocrinologist.</p> | <p><u>9.6 Endocrine and Metabolic Disorders</u><br/>                     This section provides a detailed set of criteria for the clinical evaluation and clearance of insulin-dependent as well as non-insulin dependent individuals, and the reader is referred to the NFPA 1582 manual for specifics</p> <p>A.6.18 provides background information about the nature of diabetes and the types of treatment that may be used, but is beyond the scope of the present document. However, the section does specify that the risk of hypoglycemia is the major concern in regard to those with diabetes who are or want to become firefighters,</p>   | <p>WLFF Notes:<br/>                     5. HYPERGLYCEMIA without a history of diabetes will require additional tests, including, but not limited to a glycohemoglobin (or hemoglobin A1C) and fasting glucose before a final medical determination is made.</p> |

| <b>WLFF Medical Standards</b>  | <b>NFPA 1582 Medical Standards*</b>  | <b>NFPA 1582</b>  | <b>Comment</b>   |
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| <ul style="list-style-type: none"> <li>• Normal blood chemistry results; and</li> <li>• No evidence by physical examination (including laboratory testing) and history of endocrine/metabolic conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.</li> </ul>   | <p>Category A: precludes a <u>full</u> clearance<br/>                     Category B: may preclude clearance</p> <p>B: Diseases of the adrenal, pituitary, parathyroid, or thyroid gland of clinical significance<br/>                     B: Nutritional deficiency diseases or other metabolic disorder<br/>                     B: Diabetes mellitus, not on insulin therapy but controlled by diet, exercise, and/or oral hypoglycemic agents, unless a series of listed criteria are met, related to stable blood glucose levels (i.e., an HbA1c less than 8 done within the past 3 months), no episodes of hypoglycemia, and normal retinal, renal, neurological, and cardiac findings</p> | <p>From “Chapter 9, Essential Job Tasks – Specific Evaluation of Medical Conditions in Members” and “Annex A Explanatory Material”</p> <p>and this risk is greatest for those who are insulin dependent. This is aggravated by the work task and environmental conditions which firefighting may involve.</p>   | <p>Note: the WLFF “Conditions Which May Result in Disqualification...” serve a similar purpose as NFPA Chapter 9</p>   |
| <p><b><u>THE CONDITION OF PREGNANCY</u></b><br/>                     If a female applicant or incumbent raises the issue of pregnancy as the basis for a request for a special benefit, a change in duty status, or job restrictions, then justification and clarifying information for that request must be provided by the woman’s obstetrician or primary care physician, along with the estimated time period the special conditions are expected to apply.</p>  | <p><b><u>6.11 Reproductive System</u></b><br/>                     B: Pregnancy, for its duration</p>  |   |  |
| <p><b><u>HEMATOPOIETIC SYSTEM STANDARD</u></b><br/>                     The applicant/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:</p> <ul style="list-style-type: none"> <li>• A physical exam of the skin that is within the range of normal variation; and</li> <li>• A complete blood count (including hemoglobin, hematocrit, platelets, and</li> </ul> | <p><b><u>6.17 Blood and Blood-Forming Organs</u></b><br/>                     A: Hemorrhagic states requiring replacement therapy<br/>                     A: Sickle cell disease (homozygous)<br/>                     A: Clotting disorders<br/>                     B: Anemia<br/>                     B: Leukopenia<br/>                     B: Polycythemia vera<br/>                     B: Splenomegaly</p>   | <p><b><u>9.16.4 Anticoagulation</u></b><br/>                     Full-dose anticoagulation compromises the member’s ability to perform essential job task 8 [climbing ladders, operating from heights, walking or crawling in the dark along narrow and uneven surfaces, and operating in proximity to electrical power lines and/or other hazards] due to the risk of internal bleeding from trauma with</p> | <p>WLFF Notes:<br/>                     1. ANEMIA-- Generally considered as a hematocrit of less than 39% and a hemoglobin of less than 13.6 gm/dl for males, or a hematocrit of less than 33% and a hemoglobin of 12 gm/dl for females. If anemia does exist but physical performance levels and pulmonary function are normal, this condition may be acceptable.</p> |

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| <p>white blood count, with differential) that is within the normal range; and</p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>  | <p>B: History of thromboembolic disease</p>  | <p>potential for rapid incapacitation from shock or central nervous system hemorrhage</p>  |  |
| <p><u><b>MUSCULOSKELETAL SYSTEM STANDARD</b></u><br/>                     The applicant/incumbent must have a musculoskeletal system that is sufficient for the individual to safely and efficiently carry out the functional requirements of the job. This may be demonstrated by:</p> <ul style="list-style-type: none"> <li>• A physical exam of the upper and lower extremities, neck, and back that is within the range of normal variation for strength, flexibility, range of motion, and joint stability; and</li> <li>• 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.</li> </ul> | <p><u><b>6.13 Spine and Axial Skeleton</b></u><br/>                     A: Scoliosis (thoracic or lumbar) of 40 degrees or more<br/>                     A: Vertebral fusion surgery<br/>                     A: Spinal rod surgery, with rods still in place<br/>                     A: Any spinal or skeletal condition producing sensory or motor deficits or pain due to nerve compression<br/>                     A: Any condition that frequently or on a recurring basis requires the use of narcotics<br/>                     A: Cervical vertebral fractures, with multiple vertebral body compression greater than 25%; evidence of posterior element involvement, dislocation, abnormal exam, ligament instability, symptomatic, and/or less than 6 months post injury or 1 year since surgery<br/>                     A: Thoracic vertebral fractures with vertebral body compression greater than 50%, evidence of posterior element involvement, nerve root damage, disc involvement, dislocation, abnormal exam, ligament instability, symptomatic, and/or less than 6 months post injury or 1 year since surgery</p> | <p><u><b>9.9 Spine Disorders</b></u><br/>                     Conditions include spinal fusion, ankylosing spondylitis, significant radiculopathy, structural abnormalities, fractures, dislocations, herniations (of the nucleus pulposis)</p> <p><u><b>9.10 Orthopedic Disorders</b></u><br/>                     Conditions include injuries, illnesses, amputations, ligamentous or cartilage disease or damage, joint replacements, artificial joints, limitations in range of motion, joint reconstructions, fractures, appliances, bone grafts, chronic osteoarthritis or traumatic arthritis, inflammatory arthritis, reflex sympathetic dystrophy, osteomyelitis, and septic arthritis</p> <p><u><b>A.6.3.2.2(3)</b></u> The contraction of neck muscles can result in inability to properly wear protective equipment and the inability to safely perform functions due to limited flexibility</p> | <p>WLFF Notes: For individuals who require the use of a prosthetic device, the examinee will have to provide for agency review documentation from his/her surgeon or physician that the individual (and, if applicable, his/her prosthetic device) is considered to be fully cleared for the essential functions of the job.</p> |

| <p><b>WLFF Medical Standards</b></p> | <p><b>NFPA 1582 Medical Standards*</b><br/>                     Category A: precludes a <u>full</u> clearance<br/>                     Category B: may preclude clearance</p>   | <p><b>NFPA 1582</b><br/>                     From “Chapter 9, Essential Job Tasks<br/>                     – Specific Evaluation of Medical<br/>                     Conditions in Members” and<br/>                     “Annex A Explanatory Material”</p> | <p><b>Comment</b><br/>                     Note: the WLFF “Conditions Which<br/>                     May Result in Disqualification...” serve<br/>                     a similar purpose as NFPA Chapter 9</p> |
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|                                      | <p>A: Lumbosacral vertebral fractures with vertebral body compression greater than 50%, evidence of posterior element involvement, nerve root damage, disc involvement, dislocation, fragmentation, abnormal exam, ligament instability, symptomatic, and/or less than 6 months post injury or 1 year since surgery</p> <p>B: Congenital or developmental malformations of the back, particularly those that can cause instability, neurological deficits, pain, or limit flexibility</p> <p>B: Scoliosis with less than 40 degrees</p> <p>B: Arthritis of the cervical, thoracic, or lumbosacral spine</p> <p>B: Facet atrophism, high lumbosacral angle, hyperlordosis, Schmorl’s nodes, Scheuermann’s disease, spina bifida occulta, spondylolisthesis, spondylolysis, or transitional vertebrae</p> <p>B: History of infections or infarcts in the spinal cord, epidural space, vertebrae, or axial skeletal joints</p> <p>B: History of diskectomy or laminectomy or vertebral fractures</p> <p><u>6.14 Extremities</u></p> <p>A: Bone hardware such as metal plates or rods supporting bone during healing</p> <p>A: History of total joint replacement</p> <p>A: Amputation or congenital absence of upper extremity limb (hand or higher)</p> <p>A: Amputation of either thumb proximal</p> |   |  |

| <p><b>WLFF Medical Standards</b></p> | <p><b>NFPA 1582 Medical Standards*</b><br/>                     Category A: precludes a <u>full</u> clearance<br/>                     Category B: may preclude clearance</p>   | <p><b>NFPA 1582</b><br/>                     From “Chapter 9, Essential Job Tasks<br/>                     – Specific Evaluation of Medical<br/>                     Conditions in Members” and<br/>                     “Annex A Explanatory Material”</p> | <p><b>Comment</b><br/>                     Note: the WLFF “Conditions Which<br/>                     May Result in Disqualification...” serve<br/>                     a similar purpose as NFPA Chapter 9</p> |
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|                                      | <p>to the mid-proximal phalanx</p> <p>A: Amputation or congenital absence of lower-extremity limb (foot or above)</p> <p>A: Chronic non-healing or recent bone grafts</p> <p>A: History of more than one dislocation of shoulder without surgical repair or with history of recurrent shoulder disorders within the last 5 years with pain or loss of motion, and with or without radiographic deviations from normal</p> <p>B: History of shoulder dislocation with surgical repair</p> <p>B: Significant limitation of function of shoulder, elbow, wrist, hand, or finger due to weakness, reduced ROM, atrophy, unequal length, absence, or partial amputation</p> <p>B: Significant lack of full function of hip, knee, ankle, foot, or toes due to weakness, reduced range of motion, atrophy, unequal length, absence, or partial amputation</p> <p>B: History of meniscectomy or ligamentous repair of knee</p> <p>B: History of intra-articular, malunited, or nonunion of upper or lower extremity fracture</p> <p>B: History of osteomyelitis, septic, or rheumatoid arthritis</p> <p><u>6.15 Neurological Disorders</u></p> <p>A: Hemiparalysis or paralysis of a limb</p> <p>A: Progressive muscular dystrophy or atrophy</p> <p>B: Clinical disorders with paresis,</p> |   |  |



| <p><b>WLFF Medical Standards</b></p>  | <p><b>NFPA 1582 Medical Standards*</b><br/>                     Category A: precludes a <u>full</u> clearance<br/>                     Category B: may preclude clearance</p>   | <p><b>NFPA 1582</b><br/>                     From “Chapter 9, Essential Job Tasks – Specific Evaluation of Medical Conditions in Members” and “Annex A Explanatory Material”</p>   | <p><b>Comment</b><br/>                     Note: the WLFF “Conditions Which May Result in Disqualification...” serve a similar purpose as NFPA Chapter 9</p>  |
|---|---|--|---|
|   | <p>dyscoordination, deformity, abnormal motor activity, ...</p>   |  |   |
| <p><b><u>CENTRAL AND PERIPHERAL NERVOUS SYSTEM AND VESTIBULAR SYSTEM STANDARD</u></b><br/>                     The applicant/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:</p> <ul style="list-style-type: none"> <li>• A physical exam of the cranial and peripheral nerves and the vestibular and cerebellar system that is within the range of normal variation, including:                             <ul style="list-style-type: none"> <li>○ intact cranial nerves, I-XII; and</li> <li>○ normal vibratory sense in the hands and feet; and</li> <li>○ normal proprioception of the major joints; and</li> <li>○ normal sensation of hot and cold in the hands and feet; and</li> <li>○ normal sense of touch in the hands and feet; and</li> <li>○ normal reflexes of the upper and lower extremities; and</li> <li>○ normal balance (e.g., heel-toe walk; Romberg; balance on one foot); and</li> </ul> </li> <li>• Normal basic mental status evaluation (e.g., person, place, time, current events); and</li> <li>• 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.</li> </ul> | <p><b><u>6.5 Ears and Hearing</u></b><br/>                     A: Chronic vertigo or impaired balance as demonstrated by the inability to tandem gait walk</p> <p><b><u>6.15 Neurological Disorders</u></b><br/>                     A: Ataxias of heredo-degenerative type<br/>                     A: Cerebral arteriosclerosis as evidenced by a history of transient ischemic attack, reversible ischemic neurological deficit, or ischemic stroke<br/>                     A: Hemiparalysis of paralysis of a limb<br/>                     A: Multiple sclerosis with activity or evidence of progression within previous 3 years<br/>                     A: Myasthenia gravis with activity or evidence of progression within previous 3 years<br/>                     A: All epileptic conditions including simple partial, complex partial, generalized, and psychomotor seizure disorders other than as allowed (i.e., 6.15.1.1: A candidate with epileptic conditions shall have had complete control during the previous 5 years)</p> <p>B: Congenital malformations<br/>                     B: Migraine</p> | <p><b><u>9.13.6 Epileptic Conditions</u></b><br/>                     To be medically qualified a candidate shall meet all of the following:<br/>                     (1) No seizures for 1 year off all anti-epileptic medication or 5 years seizure free on a stable medial regimen<br/>                     (2) Neurologic examination is normal<br/>                     (3) Imaging (CAT or MRI scan) studies are normal<br/>                     (4) Awake and asleep EEG studies with photic stimulation and hyperventilation are normal<br/>                     (5) A definitive statement from a qualified neurological specialist that the candidate meets the criteria specified [above] and that the candidate is neurologically cleared for fire-fighting training and the performance of a fire fighter’s essential job tasks</p> | <p>WLFF Notes:<br/>                     16. SEIZURES<br/>                     Between 40 and 70 percent of people with a single, brief, generalized tonic-clonic seizure, who are found to have a normal EEG and no identified underlying cause for the seizure, will go on to experience further seizures if untreated. Also, approximately half of patients who become seizure-free on appropriate medication will be able to stop their medications and remain seizure-free. Those most likely to remain seizure-free are those who:</p> <ol style="list-style-type: none"> <li>1) have had no seizures for 2 to 4 years;</li> <li>2) had few seizures before the condition was medically controlled;</li> <li>3) required only one medication to obtain control;</li> <li>4) have a normal neurologic examination;</li> <li>5) have no identified structural lesion responsible for the seizures; and</li> <li>6) have a normal electroencephalogram (EEG) at the end of the treatment period.*</li> </ol> <p>An individual with a history of seizures must meet the following criteria before a medical clearance can be granted:</p> <ol style="list-style-type: none"> <li>1. the individual must be seizure-free for two years, with or without medication; and</li> <li>2. present for MRO review at the end of that two year period the normal</li> </ol> |

| <p><b>WLFF Medical Standards</b></p>   | <p><b>NFPA 1582 Medical Standards*</b><br/>                     Category A: precludes a <u>full</u> clearance<br/>                     Category B: may preclude clearance</p>   | <p><b>NFPA 1582</b><br/>                     From “Chapter 9, Essential Job Tasks<br/>                     – Specific Evaluation of Medical<br/>                     Conditions in Members” and<br/>                     “Annex A Explanatory Material”</p> | <p><b>Comment</b><br/>                     Note: the WLFF “Conditions Which<br/>                     May Result in Disqualification...” serve<br/>                     a similar purpose as NFPA Chapter 9</p>  |
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|  |   |   | <p>results of the individual’s electroencephalogram (EEG); and<br/>                     3. provide a written opinion from the individual’s neurologist and, if necessary, a neurologist selected by the employing agency, regarding the ability of the individual to safely and efficiently carry out the specified requirements of the function, under the anticipated work conditions.<br/>                     *Harrison’s Principles of Internal Medicine, 13th Edition, McGraw-Hill, Inc., San Francisco, page 2232</p>  |
| <p><u>GASTROINTESTINAL SYSTEM STANDARD</u><br/>                     The applicant/incumbent must have a gastrointestinal tract that is sufficient for the individual to safely and efficiently carry out the requirements of the job. This may be demonstrated by:</p> <ul style="list-style-type: none"> <li>• A physical exam and evaluation of the gastrointestinal tract that is within the range of normal variation; and</li> <li>• Normal liver function and blood chemistry laboratory tests; and</li> <li>• 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.</li> </ul> | <p><u>6.10 Abdominal Organs and Gastrointestinal System</u><br/>                     A: Presence of uncorrected inguinal / femoral hernia regardless of symptoms<br/><br/>                     B: Cholecystitis<br/>                     B: Gastritis<br/>                     B: GI bleeding<br/>                     B: Acute hepatitis<br/>                     B: Hernia, including uncorrected umbilical, ventral, or incisional if significant risk exists for infections or strangulation; significant symptomatic hiatal hernia if associated with asthma, recurrent pneumonia, chronic pain, or chronic ulcers; surgically corrected hernia<br/>                     B: Inflammatory bowel disease or irritable bowel syndrome<br/>                     B: Intestinal obstruction<br/>                     B: Pancreatitis</p> |   | <p>WLFF Notes:<br/>                     2. ACUTE VIRAL HEPATITIS (After being asymptomatic for three (3) months an applicant may be re-evaluated).<br/>                     3. CROHN’S DISEASE / ULCERATIVE COLITIS / REGIONAL ENTERITIS/SPRUE or IRRITABLE BOWEL SYNDROME (these conditions, controlled with surgical and/or medication treatments, will be reviewed on a case-by-case basis).<br/>                     4. COLOSTOMIES, unless the precipitating condition has stabilized and the applicant/ incumbent demonstrates successful management of the colostomy, considering the requirements of the function and the work conditions.<br/>                     14. GASTRIC OR BOWEL RESECTION, if there is any evidence (historical or physical) of pain, hemorrhage, fainting episodes or dietary</p> |

| <b>WLFF Medical Standards</b>  | <b>NFPA 1582 Medical Standards*</b><br>Category A: precludes a <u>full</u> clearance<br>Category B: may preclude clearance   | <b>NFPA 1582</b><br>From “Chapter 9, Essential Job Tasks<br>– Specific Evaluation of Medical<br>Conditions in Members” and<br>“Annex A Explanatory Material” | <b>Comment</b><br>Note: the WLFF “Conditions Which<br>May Result in Disqualification...” serve<br>a similar purpose as NFPA Chapter 9 |
|--|--|--|---|
|  | B: Diverticulitis<br>B: History of gastrointestinal surgery<br>B: Peptic or duodenal ulcer or Zollinger-<br>Ellison syndrome<br>B: Asplenia<br>B: Cirrhosis, hepatic or biliary<br>B: Chronic active hepatitis   |  | restrictions that could interfere with the<br>performance of the job.   |
| <p><u>GENITOURINARY SYSTEM STANDARD</u><br/>                     The applicant/incumbent must have a<br/>                     genitourinary system that is sufficient for the<br/>                     individual to safely and efficiently carry out the<br/>                     requirements of the job. This may be<br/>                     demonstrated by:</p> <ul style="list-style-type: none"> <li>• A normal clean catch urinalysis; and</li> <li>• No evidence by physical examination and<br/>                     medical history of genitourinary conditions<br/>                     likely to present a safety risk or to worsen<br/>                     as a result of carrying out the essential<br/>                     functions of the job.</li> </ul> | <p><u>6.11 Reproductive System</u><br/>                     B: Dysmenorrhea<br/>                     B: Endometriosis, ovarian cysts, or other<br/>                     gynecological conditions<br/>                     B: Testicular or epididymal mass</p> <p><u>6.12 Urinary System</u><br/>                     A: Renal failure or insufficiency<br/>                     requiring continuous ambulatory<br/>                     peritoneal dialysis (CAPD) or<br/>                     hemodialysis</p> <p>B: Diseases of the kidney<br/>                     B: Diseases of the ureter, bladder, or<br/>                     prostate</p> |  |   |

\* The NFPA standards implicitly (and frequently explicitly) include a general Category A standard related to “any condition that results in the candidate not being able to safely perform one or more of the essential job tasks,” but this “standard” is not repeated in the listings above.

## **WLFF Pulse Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the March 22-23, 2005 WLFF Interagency Medical Standards Team Meeting,  
New Orleans, Louisiana*

### **Issue**

A DVD has been developed by CHS to educate the providers who perform WLFF Annual Exams, since these exams may be performed by individuals from a variety of health professional backgrounds. These include health aides (in Alaska), nurses, EMTs, and others, with an occasional exam performed by a physician, nurse practitioner or physician's assistant. Because there are no explicit values for cardiac pulse presented in the WLFF Medical Standards, and it was felt that guidance should be provided in the DVD to assist examiners in dealing with individuals whose pulse is fast or slow (e.g. - less than 40 or more than 100), considerable discussion on this point took place in November, 2004.

### **Current Standard**

The applicable section of the current FFALC-approved standards<sup>1</sup> specifies that:

*“The applicant/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:*

*...a normal baseline electrocardiogram (minor, asymptomatic arrhythmias may be acceptable); and*

*...*

*normal cardiac exam.*

• *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).*

***CONDITIONS WHICH MAY RESULT IN DISQUALIFICATION INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING EXAMPLES:***

*....*

***4. LEFT BUNDLE BRANCH BLOCK.***

*....*

***8. DYSRHYTHMIAS: such as ventricular tachycardia or fibrillation, Wolff-Parkinson-White syndrome, and Paroxysmal Atrial Tachycardia, with or without block.***

*....”*

The standard was based on<sup>2</sup>:

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” pages 8-9.

<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 3.

*“(A) the firefighter’s need for a healthy cardiovascular system and a low risk of sudden or subtle incapacitation with (B) the essential functions and work conditions of a wildland firefighter, including arduous exertion, lifting and carrying heavy loads, extensive walking and climbing, and rapid pull out to safety zones under conditions that may include very steep terrain, isolated and remote sites, extreme heat, dehydration, and long work assignments. Some cardiac conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions.....”*

### **Discussion**

The standard does not specify a value for a normal pulse, requiring only that the applicant/incumbent is to have a cardiovascular system that is sufficient for the individual to safely and efficiently carry out the requirements of the job. They should have a normal cardiac exam, however, and should not have a dysrhythmia (or arrhythmia, an irregular heart rhythm). An arrhythmia may include a pulse that is too slow, too fast, or irregular in pattern.

According to the American Heart Association,<sup>3</sup>

*“A normal heart beats 60 to 100 times a minute. The term arrhythmia refers to any change from the normal sequence of electrical impulses, causing abnormal heart rhythms. This can cause the heart to pump less effectively. Some arrhythmias are so brief (for example, a temporary pause or premature beat) that the overall heart rate or rhythm isn't greatly affected. But if arrhythmias last for some time, they may cause the heart rate to be too slow or too fast or the heart rhythm to be erratic. The term tachycardia refers to a heart rate of more than 100 beats per minute. Bradycardia describes a rate of less than 60 beats per minute”.*

This is important because

*“Rapid heart beating can produce symptoms of palpitations, rapid heart action, dizziness, lightheadedness, fainting or near fainting. Heartbeats may have either a regular or irregular rhythm. Rapid heart beating in the ventricles — called ventricular tachycardia — can be life-threatening. The most serious cardiac rhythm disturbance is ventricular fibrillation, where the lower chambers quiver and the heart can't pump any blood. Collapse and sudden death follows unless medical help is provided immediately.”*

And

*“A heart rhythm that's too slow can cause fatigue, dizziness, lightheadedness, fainting or near-fainting spells.”*

However, a slow heart beat or pulse also may be due to high levels of aerobic conditioning, which allows the heart to beat slower and more effectively, and still meet the oxygen and nutrient needs of the body.

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<sup>3</sup> American Heart Association, <http://www.americanheart.org/presenter.jhtml?identifier=560>

In order to avoid labeling a well conditioned firefighter as having an arrhythmia (bradycardia) when being evaluated by a health care provider with limited training or experience, as well as to have a standard means of evaluating individuals in the program, some guidance was felt to be necessary.

**Recommendation:**

The recommendations of the consultants who discussed this issue last fall were as follows:

- 1) it should be emphasized that there is no “pulse standard” for the WLFF Program; the following measures are intended only as guidelines to help interpret the intent of the standard (“*a cardiovascular system that is sufficient for the individual to safely and efficiently carry out the requirements of the job*”).
- 2) any firefighter who knows he/she has a condition that might be at odds with the written medical standards should bring to the screening appropriate information from their medical records or other clarifying information from their physician that confirms their good health status despite their unusual condition or health findings.
- 3) if the pulse is found to be “irregular,” the firefighter should be deferred to CHS for further evaluation.
- 4) if the pulse is faster than 100 beats per minute, the firefighter should be allowed to rest for 5 to 10 minutes, then have the pulse rechecked; if the pulse is still elevated above 100, the firefighter should be deferred to CHS for further evaluation.
- 5) if the pulse is in the 40 to 50 range, the firefighter is to “jog-in-place” for one minute, then recheck the pulse; if the pulse is still less than 50, the firefighter should be deferred to CHS for further evaluation.
- 6) if the pulse is less than 40, the firefighter should automatically be deferred to CHS for further evaluation.

*[Extracted from a write up for an Interagency Medical Review Board case presentation, Boise, Idaho, June 5, 2007, and edited to reflect recommendations made by the FFAST at that IMRB meeting]*

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...

However, the changes that are to be made in evaluating compliance with the standard will fully replace what currently is presented above, beginning with and then following item #17 in the standard for the *Central and Peripheral Nervous System and Vestibular System*. Those changes will result in the following:

*...[all that precedes this section in the standard remains the same]*

*17. Any other condition not otherwise listed that may adversely affect safe and efficient job performance will be evaluated on a case-by-base basis.*

*In order to be considered for a medical clearance to perform arduous duty wildland firefighting, 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:*

- 1) the physician's printed or typed name (i.e., legible), signature, and date;*
- 2) confirmation that the physician has reviewed and is familiar with the Essential Functions And Work Conditions Of A Wildland Firefighter (the job table developed for arduous duty wildland firefighters);*
- 3) a summary of all current medications, along with any known side effects experienced or expected to be experienced by the firefighter;*
- 4) the known or suspected triggers or factors that may lead to seizure activity for the firefighter;*
- 5) the results of the most recent diagnostic testing, such as an EEG*
- 6) the firefighter's overall medical prognosis, related to his/her seizure disorder; and*
- 7) the estimated risk or likelihood of future seizure activity the firefighter might experience, of any degree of severity.*

...

## **WLFF Self Certification Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the June 4, 2008 WLFF Interagency Medical Standards Team Meeting  
Boise, Idaho*

### **Issue:**

Within the Federal Fire and Aviation Safety Team, a question has been raised regarding whether incumbent firefighters (i.e., those who have been evaluated and cleared previously under the MSP, with or without a waiver/accommodation) should be given the opportunity to self-certify on the medical history form at the time of a subsequent medical evaluation that a chronic medical condition has remained static and stable since the previous evaluation. It has been proposed that such a self-certification might be appropriate if, at that time of the previous medical clearance determination, the condition had been found either to be compatible with the medical standards (i.e., a full medical clearance was determined to be warranted despite the condition), or that compliance with the standard could be afforded through the waiver/accommodation process with a determination that the firefighter could perform all of the functional requirements of the job safely and efficiently despite the condition, and the condition had been found to be static and stable. This, then, is the topic of this paper for consideration by the WLFF IMST: should a self-certification section be added to the medical history forms for WLFF medical clearance evaluations?

### **Current Standard:**

The issue in question would apply to all of the medical standards that have been established for the WLFF MSP. Those standards essentially require some version of the following concept:

*“The applicant/incumbent must have [or be able to] XYZ sufficient for the safe and efficient conduct of the requirements of the job. This may be demonstrated by:*

- [specified factors]; and*
- No evidence by physical examination and medical history of XYZ conditions likely to present a safety risk or to worsen as a result of carrying out the essential functions of the job.”*

### **Background:**

The basis for the issue in question is whether or not a given medical condition, identified or brought to the attention of the agency during the medical clearance process, is one that would be expected to remain permanently static and stable, or is one that may be expected to change over time.

For purposes of the MSP, conditions that would be expected to remain permanently static and stable are those that, once they have been considered and approved for a waiver or accommodation, may not require further medical documentation or follow up in order to be approved for continued waiver/accommodation following subsequent medical clearance cycles, as long as the functional requirements of the job and the conditions under which the job is to be performed have not changed. Examples of such conditions include amputations, color blindness, and other anatomic conditions that are not expected



to change unless the individual experiences a subsequent injury or illness that changes the underlying condition in some substantial way.

Conditions that would be expected to change over time are those that inherently may be subject to sudden or subtle worsening (or improvement) in response to such factors as progression (or resolution) of the underlying condition, loss (or increase) of the effectiveness of medications or other therapies used to treat the condition, or the impact of changes in other body systems on the condition. Examples include such conditions as diabetes and cardiovascular disease.

Diabetes is a condition that may be due to a failure of a person's pancreas to produce insulin (Type I), or to a decrease in the sensitivity of tissues to the insulin that the person's pancreas is able to produce, resulting both in a relative insulin deficiency and a number of other hormone-related metabolic effects (Type II). In either Type I or Type II diabetes, a carefully managed balance of medications, diet, and activity must be achieved in order to slow the effects of this currently incurable condition. The treatment balance is aimed at avoiding wide swings in blood sugar levels: blood sugar that is too low may result in alterations in energy, attention, mental function, and consciousness, and it may lead to death; levels that are too high may result in a lack of the primary cellular fuel for the cells, which may lead to a metabolic (ketotic) acidosis as fats are burned instead, and the person may experience altered energy, attention, mental function, and consciousness, and this may progress to death. Chronic elevations in blood sugar are associated with several serious complications, including cardiovascular disease, renal disease, peripheral vascular disease, and stroke. Even with close monitoring of blood sugar levels and the careful and appropriate use of one or several forms of the many types of insulin, progression of the complications of diabetes is common. A close working relationship between the diabetic patient and their health care provider is important in order to manage the condition most effectively, and to identify and respond to complications of the condition in a timely manner to slow their progression.

Cardiovascular disease may be due to a wide variety of factors, including high blood pressure, diet, exercise patterns, genetic predisposition, and some types of infection. The treatments that may be provided are highly variable, and depend on such factors as the underlying cause of the individual's cardiovascular disease, their response to one or more of the wide variety of medications that may be used in its treatment, and the lifestyle choices that an individual makes on a day to day, and year to year, basis. The effects of cardiovascular disease may be subtle and develop slowly, or they may occur quickly and catastrophically. As described by the American Heart Association<sup>1</sup>,

*“In 90 percent of adult victims of sudden cardiac death, two or more major coronary arteries are narrowed by fatty buildups. Scarring from a prior heart attack is found in two-thirds of victims. When sudden death occurs in young adults, other heart abnormalities are more likely causes. Adrenaline released during intense physical or athletic activity often acts as a trigger for sudden death when these abnormalities are present. Under certain conditions, various heart*

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<sup>1</sup> Sudden Cardiac Death, American Heart Association:  
<http://www.americanheart.org/presenter.jhtml?identifier=4741>

*medications and other drugs — as well as illegal drug abuse — can lead to abnormal heart rhythms that cause sudden death.”*

It may be very difficult for an individual with a history of cardiovascular disease to know the status of their condition without regular follow up with the health care provider, and information regarding the status of the heart condition, and the medications, their side effects, and the response to them, is very important in maintaining the health of the individual and minimizing the risk of progression, or catastrophic worsening, of the condition.

Subtle changes in health status may occur with conditions such as diabetes and cardiovascular disease, and those changes may not be apparent to the individual without appropriate testing, tracking of data, and evaluation by a health care provider. Submission of records documenting that testing, tracking, and evaluation for review by the CHS medical review officer helps to provide for a sound basis for CHS' recommendations to the agency regarding the medical clearance status of an individual firefighter.

**Recommendation:**

It is the recommendation of this consultant that the addition of a self-certification section to the WLFF medical clearance forms (separate from the current, basic, self-certified medical history sections of those forms) should not be pursued. Instead, it is my recommendation that CHS have (or maintain) within its data systems a record of the results of prior medical clearance evaluations, including any waiver/accommodation decisions that have been made, so that this information can be taken into consideration in the evaluation of the history and examination results obtained during subsequent examination cycles. Conditions that are considered to be permanent in nature, are likely to remain static and stable (e.g., amputations, color blindness), and for which the firefighter has been through the administrative waiver/accommodation process might be granted in subsequent years a “Cleared with Restrictions” determination by the CHS medical review officer(s), at their discretion, depending on the other findings from the medical evaluation and confirmation that the conditions of employment have not changed in a way that would be expected to impact the condition and the waiver/accommodation decision that had been granted previously. Conditions that are considered to be subject to change over time, and are not likely to remain truly static and stable over long periods of time, even if they are under appropriate treatment (e.g., diabetes and cardiovascular disease), should not be considered for an automatic waiver based on the certification by the incumbent that the condition has not changed. Current medical documentation, appropriate to the condition, should be requested and reviewed by CHS and, depending on the information provided, the waiver/accommodation process prior to the renewal of a previous waiver/accommodation decision.

## **WLFF Sleep Apnea Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the June 4, 2008 WLFF Interagency Medical Standards Team Meeting  
Boise, Idaho*

### **Issue:**

The Central Medical Consultant for the Wildland Firefighter Medical Standards Program (MSP) has reported that CHS has *“been seeing a number of wildland firefighters who have sleep apnea and are in various stages of compliance with therapy. Since some of these individuals may drive for work,”* a request was made *“to research what information should be critical to the clearance process.”* This paper addresses this issue.

### **Current Standard:**

While sleep apnea is not a condition that has been cited explicitly in the MSP medical standards, the primary applicable sections of the current FFALC-approved standards<sup>1</sup> specify that, for the Respiratory System standard:

*“The applicant/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:*

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

*...”*

And, for the Central and Peripheral Nervous System and Vestibular System:

*“The applicant/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:*

*...”*

- *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.*

*Conditions Which May Result In Disqualification Include, But Are Not Limited To, The Following Examples:*

*...”*

- 17. Any other condition not otherwise listed that may adversely affect safe and efficient job performance will be evaluated on a case-by-base basis.”*

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” page 11 and 14.

The Respiratory System standard:

*“relates (A) the firefighter’s need for a healthy respiratory system and residual aerobic capacity with (B) the essential functions and work conditions of a wildland firefighter, including arduous exertion, carrying heavy loads, and extensive walking and climbing under conditions that may include very steep terrain, high altitudes, airborne particulates, and allergens. Some chest and respiratory conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions. The stated standards of 70% of predicted values for forced vital capacity (FVC), forced expiratory volume at 1 second (FEV<sub>1</sub>), and the ratio of FEV<sub>1</sub>/FVC are intended as screens for further evaluation, not mandatory values... .”<sup>2</sup>*

The Central and Peripheral Nervous System and Vestibular System standards:

*“relate (A) the firefighter’s need for balance, sensation of surroundings and self, and a low risk of sudden or subtle incapacitation with (B) the essential functions and work conditions of a wildland firefighter, including use of hand and power tools, flying in helicopters and fixed wing aircraft, and extensive walking and climbing under conditions that may include isolated and remote sites, very steep terrain, rocky, loose, or muddy ground surfaces, wet leaves and grass, heights, open holes and drop offs, falling rocks and trees, trucks and other large equipment, and high heat. Some sensory conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions.”<sup>3</sup>*

Other standards that may be applicable, depending on the specific cause of the sleep apnea and the treatment modality(ies) used for an individual firefighter, include the Medication Standard, and the Head, Nose, Mouth, Throat and Neck Standard, but the pertinent aspects for consideration under all of the various standards are conveyed by those presented above. Related to these standards, pertinent Physical Exposure examples from the Job Table (the *“Essential Functions and Work Conditions of a Wildland Firefighter”*), which is included on page 3 of the Medical Standards, include such factors as *“trucks and other large equipment,” “limited/disrupted sleep,”* and *“hunger/irregular meals.”* Pertinent Time/Work Volume factors include *“long hours (minimum of 12 hour shifts),” “irregular hours,” “shift work,” “time zone changes,”* and *“multiple and consecutive assignments.”* A pertinent Physical Requirement example from the Job Table is the ability of the firefighter to *“drive or ride for many hours”* and, in general, it is important to recognize that the work of the firefighter may be carried out in extremely hazardous environments where lapses in attention or consciousness may have catastrophic consequences.

### **Background:**

Sleepiness, with its resulting implications for attentiveness, efficiency, and safety, may be due to inadequate time available for sleep, as well as to sleep that is insufficiently restful. Regardless of the specific cause, sleepiness on the job should be an area of concern for wildland firefighters, managers, and safety professionals. Inadequate sleep time may be

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<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 4.

<sup>3</sup> Ibid, page 5.

related to short periods of time allowed or allotted for the activity of sleep, or to the inability of the individual to achieve a state of restful sleep once it has been attempted, often as a result of internal or extraneous distractions (e.g., persistent or troubling thoughts, loud noises, airway irritants, or uncomfortable sleeping surfaces). Insufficiently restful sleep may be due to interruptions in the sleep process, such as that caused by medications, alcohol, excessive fatigue, or medical conditions, such as sleep apnea, the focus of this issue paper.

As summarized by the American Sleep Apnea Association<sup>4</sup>,

*“The Greek word ‘apnea’ literally means ‘without breath.’ There are three types of apnea: obstructive, central, and mixed; of the three, obstructive is the most common. Despite the difference in the root cause of each type, in all three, people with untreated sleep apnea stop breathing repeatedly during their sleep, sometimes hundreds of times during the night and often for a minute or longer.*

*Obstructive sleep apnea (OSA) is caused by a blockage of the airway, usually when the soft tissue in the rear of the throat collapses and closes during sleep. In central sleep apnea, the airway is not blocked but the brain fails to signal the muscles to breathe. Mixed apnea, as the name implies, is a combination of the two. With each apnea event, the brain briefly arouses people with sleep apnea in order for them to resume breathing, but consequently sleep is extremely fragmented and of poor quality.*

*Sleep apnea is very common, ... and affects more than twelve million Americans, according to the National Institutes of Health [or between 2 and 4% of Americans<sup>5</sup>]. Risk factors include being male, overweight, and over the age of forty, but sleep apnea can strike anyone at any age, even children. ...*

*Untreated, sleep apnea can cause high blood pressure and other cardiovascular disease, memory problems, weight gain, impotency, and headaches. Moreover, untreated sleep apnea may be responsible for job impairment and motor vehicle crashes. Fortunately, sleep apnea can be diagnosed and treated. Several treatment options exist, and research into additional options continues.”*

As can be seen, there are both acute and chronic effects of sleep apnea. While the chronic effects are important to the overall health of the firefighter, the acute effects may present more immediate risks to the health and well being of the firefighter and those with whom he interacts, such as fellow crew members, and the members of the public that he may encounter while driving on public roads. In one Australian study<sup>6</sup>, it was found that the sleepiest 5% of drivers who completed one of two sleepiness questionnaires “*had an increased risk of an accident,*” with odds ratios for such accidents

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<sup>4</sup> Sleep Apnea Information, American Sleep Apnea Association:  
<http://www.sleepapnea.org/info/index.html>

<sup>5</sup> Occupational screening for obstructive sleep apnea in commercial drivers, Gurubhagavatula, Indira, et.al., American Journal of Respiratory and Critical Care Medicine; 2004, Vol. 170, pp 371-6

<sup>6</sup> Sleepiness, sleep-disordered breathing, and accident risk factors in commercial drivers, Howard, Mark E, et.al., American Journal of Respiratory and Critical Care Medicine; 2004, Vol. 170, pp 1014-21

about double that of others in the study. This risk increased to about 2.4 times normal when the driver was using a sedating form of an antihistamine medication, such as that used for allergy symptoms. In a German study<sup>7</sup>, people with obstructive sleep apnea syndrome (OSAS) were found to “*have an accident rate between two and seven times higher than normals.*” A Japanese<sup>8</sup> study states that automobile “*accidents and near-misses were found in 54.5% and 50.0% in patients with OSAS.*”

Probably the most common sign of obstructive sleep apnea is loud and chronic snoring, often with pauses in breathing that may be followed by choking or gasping as breathing resumes, though not everyone who snores has sleep apnea. Other signs and symptoms of sleep apnea include morning headaches, memory or learning problems, not being able to concentrate, feeling irritable, being depressed, having mood swings or personality changes, having to get up to urinate at night, and having a dry throat upon awakening.

Sleep apnea is diagnosed most appropriately by a review of the individual’s medical history, the conduct of a physical exam, and consideration of the results of sleep studies, generally performed by a sleep specialist. The sleep study assesses brain activity, eye movement and other muscle activity, breathing and heart rate, the amount of air that moves in and out of the lungs during sleep, and the level or amount of oxygen dissolved in the patient’s blood. The study requires at least one overnight stay in a sleep center, and the services of trained specialists, both to conduct the study and to analyze the results, so it is not compatible with a widespread screening process for large groups of people.

However, according to a study published recently in the Journal of Clinical Sleep Medicine,<sup>9</sup> a single question (“*Please measure your sleepiness on a typical day: (0 = none, 10 is highest)*”) could “*reliably predict normal and abnormal ESS [Epworth Sleepiness Scale<sup>10</sup>] scores respectively,*” though not as well as a multiple sleep latency test<sup>11</sup> (MSLT). Scores of less than or equal to 2 on the single question test were

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<sup>7</sup> Estimation of accident risk in obstructive sleep apnea syndrome (OSAS) by driving simulation, Orth, M., et.al., Pneumologie, 2002; 56(1):13-8

<sup>8</sup> Daytime sleepiness and automobile accidents in patients with obstructive sleep apneasyndrome, Noda, Akiko, et.al., Psychiatry and Clinical Neurosciences 52 (2) , 221-222

<sup>9</sup> Zallek, Sarah Nath, et.al., A Single Question as a Sleepiness Screening Tool, Journal of Clinical Sleep Medicine, April 15, 2008; 04:02; 143-148.

<sup>10</sup> The Epworth Sleepiness Scale is a frequently used tool that utilizes eight focused questions; the tested individual provides estimates of their risk of dozing while engaged in a series of activities, with the level of risk given a point value. The total points provides a guide to whether a referral to a sleep specialist is warranted for further evaluation.

<sup>11</sup> A multiple sleep latency test, or MSLT, is a type of study used to determine how quickly an individual falls asleep under controlled circumstances. The concept is that an individual generally will fall asleep in less time as their level of sleepiness increases. By measuring brain waves, heartbeats, eye and chin movements, and how quickly and how often the individual enters the rapid-eye-movement (REM) stage of sleep, sleep disorders may be detected. For more information, see <http://www.sleepeducation.com/Topic.aspx?id=38>, by the American Academy of Sleep Medicine.

associated reliably with normal results, and scores of 9 or greater were associated with abnormal results, as compared to the ESS, and this simple method has been proposed by the study authors as a screening tool for excessive sleepiness, which may be due to sleep apnea or other causes.

Once diagnosed, there are several ways that sleep apnea may be treated. As presented by the National Institutes of Health / National Heart, Lung, and Blood Institute,<sup>12</sup> these include lifestyle changes, mouthpieces, breathing devices, and surgery. No medications are felt to be effective for the specific treatment of this condition, but some medications, including nasal sprays, drops, and oral medications, may be used in treating associated or complicating factors, such as allergies. Lifestyle changes include: avoiding alcohol and sedating medications (unfortunately, these include medications that may be used for allergies that may complicate the sleep apnea condition); losing weight (if overweight or obese); sleeping on one's side, instead of on the back (which may allow the uvula and other soft tissues of the throat to drop back into the airway); and stopping smoking. A mouthpiece (a type of oral appliance) may help by keeping the airway clear. These may be over-the-counter devices, or they can be custom-fit plastic inserts that hold the tongue in place and keep the throat from collapsing on itself. Breathing devices include various versions of continuous positive airway pressure (CPAP) machines that use pressurized air hoses and a mask on the nose, or the mouth and nose, to maintain a flow air into the upper airways to stop the airways from becoming narrowed or blocked during sleep. Finally, surgery may be necessary in some cases of sleep apnea to widen breathing passages by removing, shrinking, or stiffening excess tissue in the mouth and throat, or by resetting the lower jaw to keep it from blocking the airways.

The problems of sleepiness related to sleep apnea can be reduced considerably with effective treatment. In a 1997 study<sup>13</sup> of 547 sleep apnea patients conducted in France that used questionnaires covering the 12 months before starting and then after using CPAP for 12 months, the number of motor vehicle accidents decreased from 60 to 36, and near-misses decreased from 151 to 32 ( $p < 0.01$ ). The number of "*days in the hospital related to accidents*" went 885 days to 84 days over this time period.

Clearly, identifying individuals with undiagnosed or inadequately treated symptomatic sleep apnea could have important implications for safety. Effective methods for screening for this condition have been considered in a number of studies. As noted above, a single question tool was nearly as effective as the Epworth Sleepiness Scale at identifying individuals who suffer from significant sleepiness. In a 2004 study<sup>14</sup> of 406 commercial drivers, "*a two-stage approach with symptoms (of sleep apnea) plus body mass index [BMI] for everyone, followed by oximetry for a subset*" of the population achieved "*91% sensitivity and specificity*" in identifying those with the condition and

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[http://www.nhlbi.nih.gov/health/dci/Diseases/SleepApnea/SleepApnea\\_LivingWith.html](http://www.nhlbi.nih.gov/health/dci/Diseases/SleepApnea/SleepApnea_LivingWith.html)

<sup>13</sup> Accidents in obstructive sleep apnea patients treated with nasal continuous positive airway pressure: A prospective study, Cresge, Lille, et.al., *Chest*; 1997, Vol. 112, No. 6; pp 1561-6

<sup>14</sup> Occupational screening for obstructive sleep apnea in commercial drivers, Gurubhagavatula, Indira, et.al., *American Journal of Respiratory and Critical Care Medicine*; 2004, Vol. 170, pp 371-6

distinguishing them from those without the condition, with a “*negative likelihood ratio of 0.10.*”<sup>15</sup> Without the second stage, which called for the use of oximetry (the article does not specify the method, but this likely was pulse oximetry, which uses a simple and painless finger clip device), and the screening depending only on the individual’s symptoms and BMI, the results dropped, but were still “*81% sensitive and 73% specific, with a negative likelihood ratio of 0.26.*”

The role of a medical screening program, such as that of the Wildland Firefighter Medical Standards Program, is not to diagnose and treat firefighters or other employees. However, the program does have an important role in assuring that firefighters who have been identified as having significant medical conditions, such as OSAS, have those conditions under sufficient control to allow them to carry out the essential functions of their jobs with safety and efficiency. The effective treatment of OSAS, when the condition has not been resolved successfully with lifestyle changes (e.g., weight loss, avoiding alcohol and sedating medications, stopping smoking, and changing sleeping position), appropriate use of allergy medications or decongestants, or surgical procedures, requires the ongoing use of oral appliances or breathing devices. All of these measures, besides surgery, require the ongoing, active participation of the individual if there is to be a likelihood of a successful outcome. If an oral device is required, the firefighter simply needs to have one or more of the devices with them and in use while sleeping whenever they’re involved with firefighting, either during preparations for deployment or while on assignment, to help to assure that they’re getting sound sleep. When a breathing device is required, such as a CPAP machine, the firefighter faces a more significant challenge due to the requirements for carrying, cleaning, maintaining, and powering the electrical device while on fire assignments, and it must be used on a regular basis in order to continue to achieve an effective level of sleep.

From a clearance perspective, what is important is for the Medical Review Officer (MRO) to achieve a degree of confidence that the firefighter’s treatment has been (and continues to be) successful, and the medical condition is under sufficient control for the firefighter to be able to perform their duties safely and efficiently. This requires that they be able to obtain sufficient sleep on a regular basis to prevent a degree of sleepiness that increases the risk of accidents, whether due to motor vehicles or to lapses in judgment while using tools or navigating in dangerous terrains.

In the opinion of this consultant, it would be impractical for the MSP to screen with an eight question ESS, or even a two-step questionnaire/calculated BMI (and, if abnormal, carry out oximetry), for the 16,000 to 20,000 wildland firefighters who must be screened each year who may need to drive, and who may be at risk of having a sleep disorder. And, since the MSP is not intended to serve a diagnosis and treatment management role, sleep studies and MSLTs do not belong in the program (even if performing them would not be prohibitively expensive and a logistical nightmare). However, the question remains regarding how the MSP should respond to cases of OSAS that have been diagnosed by others and identified to the MSP during the clearance process. The current method for identifying sleep apnea in the MSP involves having firefighters answer the

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<sup>15</sup> The negative likelihood ratio, or NLR, is calculated as [false negative rate / true negative rate] and is used to test non-nested complementary hypotheses.



following questions, found on page 6 of 17 on the Baseline/Periodic Medical History and Exam Form:

|  |                             |   |
|--|-----------------------------|---|
| 42) Have you ever been diagnosed with sleep apnea? | <input type="checkbox"/> No | <input type="checkbox"/> Yes<br>Date diagnosed: _____<br>Have you ever been advised to use a CPAP machine?<br><input type="checkbox"/> No<br><input type="checkbox"/> Yes, but I <u>do not</u> use CPAP now<br><input type="checkbox"/> Yes, and I <u>do</u> use CPAP now<br>Other treatments: _____<br>Current status: _____ |
|--|-----------------------------|---|

and on page 4 of 14 on the Annual Medical History and Rating Form:

|   |                             |  |
|---|-----------------------------|--|
| 26) Do you have any type of lung disease other than asthma (reactive airway disease, emphysema, COPD, sleep apnea, etc.)? | <input type="checkbox"/> No | <input type="checkbox"/> Yes<br>Diagnosis: _____<br>Current status: _____<br>Have you used an inhaler within the past 2 years?<br><input type="checkbox"/> No<br><input type="checkbox"/> Yes (give dates, name(s) of inhalers and frequency of use) _____ |
|---|-----------------------------|--|

The questions ask only for a diagnosis of sleep apnea and, in the Baseline/Periodic form, information about the use of a CPAP machine, other treatments, and the firefighter’s current status. This may not be sufficient, given the significance of the problem.

**Recommendation:**

The recommendations of this consultant are the following: First, for question 26 on the Annual form, consideration should be given to separating the issue of sleep apnea into its own question, distinct from that of the various respiratory conditions that are listed. Second, consideration should be given to modifying the information requested when a “Yes” response is made on either of the forms, with language or questions similar to the following:

|                              |  |
|------------------------------|--|
| <input type="checkbox"/> Yes | Date diagnosed: _____<br>Has your sleep apnea been treated with: (complete all that apply)<br><input type="checkbox"/> Medication. If so, which one(s): _____<br><input type="checkbox"/> Surgery. If so, when? _____<br><input type="checkbox"/> Oral appliance (mouthpiece, tongue guard, etc.)<br>Do you use the appliance currently?<br><input type="checkbox"/> No (why not? _____)<br><input type="checkbox"/> Yes<br>Have you ever been advised to use a CPAP machine?<br><input type="checkbox"/> No<br><input type="checkbox"/> Yes, but I <u>do not</u> use CPAP now<br>Why not? _____<br><input type="checkbox"/> Yes, and I <u>do</u> use CPAP now<br>Date started: _____<br>On a scale of 0 (not at all) to 10 ( <u>very</u> much so), how sleepy are you on a typical day? _____ |
|------------------------------|--|

This expanded information on the current diagnosis and treatment approaches provided by the firefighter’s own health care providers would allow the CHS MRO to understand more fully than at present the firefighter’s current status regarding this sleep disorder, if it has been diagnosed. With this understanding, the MRO could (and likely should) request

follow up medical information from the firefighter's treating physician when a "Yes" response is given to these numbered questions on either form, and the condition clearly is not under adequate control as evidenced by this initial information that has been provided. Follow up information from the treating physician should address the opinion of that physician regarding whether or not the firefighter can perform the essential functions of the job in a safe and efficient manner, as it relates to the diagnosis of sleep apnea and its treatment. In addition, for users of CPAP machines, the firefighter will need to explain the arrangements that have been made by him/her (and, as appropriate, his/her physician and fireline management) to operate and maintain the device in a safe and effective manner while on fire assignments.

## **WLFF Stinging Insect Allergy Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the April 11, 2006 WLFF Interagency Medical Standards Team Meeting,  
Monterey, California*

### **Issue**

A question was raised recently about how the WLFF Medical Standards Program should handle cases in which a firefighter is identified through the medical screening program as having a history of allergic reactions to the venom of any of the stinging insects.

### **Current Standard:**

The applicable section of the current FFALC-approved standards<sup>1</sup> specifies that:

*“The applicant/incumbent must ... 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 exam of all major body systems that is within the range of normal variation, ... and*
- *Normal complete blood count, including white blood count and differential; and ...*
- *No evidence by physical examination and medical history of ... 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.*

*Conditions which may result in disqualification include, but are not limited to, the following examples:*

...

*10. Any other condition not otherwise listed that may adversely affect safe and efficient job performance will be evaluated on a case-by-base basis.”*

The standard was based on:<sup>2</sup>

*“(A) the firefighter’s need to be free of infectious disease, immune system, or allergy conditions likely to present a safety risk to self or others with (B) the essential functions and work conditions of a wildland firefighter, including arduous exertion, driving or riding for many hours, and providing rescue or evacuation assistance under conditions that may include isolated or remote sites, allergens, close quarters with large numbers of other workers, and long assignments. Some immune system/allergic conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions.”*

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” page 6.

<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 2.

**Discussion:**

According to the American College of Allergy, Asthma & Immunology (ACAAI)<sup>3</sup>, between 0.5% and 5 percent of the population in this country are subject to anaphylaxis as a result of insect stings, which result in over 40 deaths and send more than ½ million people to emergency rooms every year. Most of these stings are from wasps, yellow jackets, and hornets (Family Vespidae), or bees (Family Apidae), or fire ants (Family Formicidae).

Examples of the primary stinging insect varieties:



Wasp



Hornet



Bee



Yellow Jacket



Fire Ant

Most stings from these insects result in a local reaction, due to the injection of venom. Venom is a water-based solution that includes a variety of proteins, peptides, and vasoactive amines, substances that cause IgE to be released within the skin and other tissues. The envenomation generally causes pain, itching, redness, and swelling at the site of the sting. The reaction can be mild and limited to the immediate vicinity of the sting, or it can extend to involve a much larger area and can even occlude blood flow to the distal parts of a limb, for example, if a sting is on an arm or leg. One or more stings at some point in the past are necessary for sensitization to the venom to occur, though an individual may or may not be aware of that exposure and sensitization does not occur in all individuals or following every envenomation. Once sensitization has occurred, however, further stings are more likely to cause a large scale release of histamine and other immune system agents that may result in either anaphylaxis (a systemic reaction) or major local reactions.

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<sup>3</sup> [http://www.medem.com/medlb/article\\_detailb.cfm?article\\_ID=ZZZMO0FIA9C&sub\\_cat=530](http://www.medem.com/medlb/article_detailb.cfm?article_ID=ZZZMO0FIA9C&sub_cat=530)

While about half of all deaths due to insect stings occur in people who have no known prior reactions to such stings, about 60% of people who have had a systemic reaction (anaphylaxis) due to an insect sting will have another systemic reaction with subsequent stings. Preparation and prevention are key considerations for the health and safety of all people with a risk of exposure, but particularly for those who have had a previous systemic reaction.

Once an individual has been identified as being sensitive to stinging insects, it is important for them to take steps to protect themselves from subsequent exposure to venom (i.e., they should avoid getting stung) and to be prepared to treat the allergic reactions that are at greater risk of occurring (i.e., they should have a means of treating the reaction readily available). Epinephrine is the most effective medication for preventing and treating anaphylaxis, though it may be combined with (or preceded by) the use of antihistamines (e.g., diphenhydramine, or Benadryl) or, in a medical facility, followed by injectable steroids. The easiest form of epinephrine for use by individuals may be the EpiPen, an autoinjector device that delivers a single dose of 0.3 mg of epinephrine by “stabbing” the unit into the lateral aspect of the thigh, exposing the needle and injecting the medication into the large lateral quadriceps muscle, well away from the large blood vessels or nerve bundles that otherwise may be hit by the injection. Intravascular injections may cause stroke (due to the sudden and significant rise in blood pressure from such a dose) or loss of limbs (due to the occlusion of major blood vessels by the action of the drug, a particularly problem for the hands, feet, or digits). Repeat doses may be necessary in severe cases, but the medication generally is highly effective in preventing and treating allergic reactions.

A drawback to the EpiPen and other forms of epinephrine, however, is the fact that the medication must be protected from extremes of temperature. The manufacturer (Dey®, an affiliate of Merck KGaA) specifies that the EpiPen is to be stored at 77°F, with temperature variations only allowed from 59°F to 85°F.<sup>4</sup> This is a narrow temperature range for a medication that may be required for use in the sort of environmental situations that may be encountered by wildland firefighters. Also, the medication specifically is not to be refrigerated, due to the risk of precipitation of the drug, so this is not an option for maintaining a stable storage environment.

**Recommendation:**

Because of the relatively common problem of significant insect allergies among the general population, which includes both incumbent and potential wildland firefighters, it is appropriate for the WLFF Medical Standards Program to have in place a plan for how cases should be managed when this historical finding comes up in the course of case reviews.

It is the recommendation of this consultant that any individual who has been identified as having a history of a systemic allergic reaction to insect stings should be required to submit and have on file certain medical documentation before being considered for a medical clearance for wildland firefighting. The medical documentation should consist of a signed and dated letter from the firefighter’s personal physician, on the physician’s letterhead stationery, that:

- a) confirms that the individual holds a current valid prescription for epinephrine (generally in the form of at least one dose [and preferably more] of epinephrine or EpiPen autoinjectors);

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<sup>4</sup> [http://www.epipen.com/epipen\\_prescribing.aspx](http://www.epipen.com/epipen_prescribing.aspx)

- b) confirms that the prescription will remain valid (including approved refills) through the period that is to be covered by the wildland firefighter medical clearance;
- c) confirms that the individual has been fully informed of the manner in which the epinephrine is to be administered, should a sting occur;
- d) confirms that the physician is aware of the nature of the work and the potential types of assignments, temperature extremes, environmental conditions, and geographic locations in which the firefighter may be assigned for duty, and in which the epinephrine may have to be stored and administered; and
- e) concurs that, in the opinion of the physician, the medication can be used safely and effectively by the individual.

Then, as part of the restrictions that should be applied to the firefighter if medical clearance is to be provided, the firefighter should be required at the time of each deployment to notify management of:

- a) the individual's history of a potentially-serious allergy;
- b) the need to carry epinephrine as a preventive and therapeutic measure, to be used if an exposure incident occurs; and
- c) the manner in which the firefighter intends to maintain the epinephrine in a temperature stable condition at all times during the period of deployment.

## **WLFF Vision Accommodation Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the April 11, 2006 WLFF Interagency Medical Standards Team Meeting,  
Monterey, California*

### **Issue**

The FFAST has proposed a modification to the automatic waiver with restrictions (2 sets of corrective lenses) that has been used to allow firefighters to be cleared for arduous wildland firefighting duty when they do not meet the uncorrected vision standard. In lieu of the current approach, they have proposed a performance standard whereby the individual firefighter would be required simply to have sufficient pairs of glasses to meet the standard. The definition of “sufficient pairs” may be a minimum of one, or it may include additional sets of lenses at the employee’s discretion, but it would be incumbent upon the firefighter always to be able to meet the standard for corrected far vision.

### **Current Standard:**

The applicable section of the current FFALC-approved standards<sup>1</sup> specifies that:

*“The applicant/incumbent must be able to see **well enough to safely and efficiently carry out the requirements of the job**. This requires binocular vision, far visual acuity, depth perception, peripheral vision, ... which may be demonstrated by:*

- *Far visual acuity uncorrected of at least 20/100 in each eye for wearers of hard contacts or spectacles; and*
- *Far visual acuity of at least 20/40 in each eye (if necessary) with contact lenses or spectacles; and...*
- *Peripheral vision of at least 85° laterally in each eye; and*
- *Normal depth perception; ...*

*Note: Contact lenses and spectacles are acceptable for correction of visual 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. Successful users of long-wear soft contact lenses are not required to meet the “uncorrected” vision guideline.”*

The standard was based on:<sup>2</sup>

*“(A) the firefighter’s need to be able to see (including binocular vision, visual acuity, depth perception, peripheral vision, ...) with (B) the essential functions and work conditions of a wildland firefighter, including driving, walking, climbing, constructing fire lines, and rapid pull out to safety zones under conditions that may include very steep*

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” page 7.

<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 2.

*terrain, rocky, loose or muddy ground surfaces, open holes or drop offs, and dim light or darkness. The limit for uncorrected far vision is set at 20/100 binocular, consistent with the National Fire Protection Association's Standard on Medical Requirements for Fire Fighters (NFPA 1582, 1997 Edition), and with a field assessment by the medical standards team in which different levels of acuity were considered in an operational setting related to the need for rapid or emergency movement under the conditions noted above. Long-term users of soft contact lenses are not subject to the uncorrected far vision standard. Corrected far vision is set at 20/40, ... consistent with Department of Transportation regulations for commercial driving and the need for safe and efficient function under expected fire fighting conditions. Peripheral vision is set as 85<sup>0</sup> laterally, which is generally considered to be normal. Some vision conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions."*

### **Discussion:**

The critical issue involving vision is summarized in the standard: the individual "*must be able to see well enough to safely and efficiently carry out the requirements of the job.*" Because of the safety factors related to working in a firefighting environment, it is important that a firefighter be able to see well enough to navigate in that environment, detecting with sufficient lead time and distance the visual cues that relate to possible threats to safety, and as well as the ongoing and intermittent tasks that must be carried out in the role of a firefighter. An individual with limited far visual acuity is less able to detect accurately and in a timely manner the objects and conditions in the environment that impact safe and efficient job performance. Thus, there are both safety factors (primarily related to the requirement for at least 20/100 uncorrected far vision) and efficiency factors (primarily related to the requirement for at least 20/40 corrected far vision) involved.

As noted in the standards, the expectation is for firefighters to have at least 20/40 far vision, corrected or uncorrected. For an individual whose far visual acuity is less than 20/40, corrective lenses are necessary in order to improve vision to at least this level of acuity for purposes of safety and efficiency. Vision less than this acuity would be likely to interfere with safe and efficient job performance, and also would limit the individual's ability to hold a state driver's license or to drive vehicles in a safe manner. Individuals with native (uncorrected) visual acuity that is in the range of 20/40 to 20/100 would be able to fully meet the expectation of the standard for acuity of 20/40 if they used appropriate corrective lenses (i.e., as long as the lenses corrected the individual's vision to at least 20/40).

An individual with less than 20/100 native visual acuity who lost his/her corrective lenses would be at a significant disadvantage in performing routine work or, much more importantly, in navigating a fire site safely, particularly under emergency, low light, or other vision-impacting conditions. For that reason, individuals whose uncorrected far visual acuity is less than 20/100 were considered by the Medical Standards Team to be at too great a safety risk to work in wildland firefighting operations. Corrective lenses address the need for corrected vision; they (obviously) do not address the need for a safe level of uncorrected vision, which may become critical in those emergency, low light, or vision-impacting conditions that may occur in wildland firefighting. As noted in the FFAST proposal, due "*to the nature of the fire line environment,*



*there is higher than normal potential for eyeglasses to be lost or broken.”* This also was conveyed in the Basis document by noting that *“uncorrected far vision is set at 20/100 binocular, consistent with ... NFPA 1582 ... and with a field assessment by the medical standards team in which different levels of acuity were considered in an operational setting related to the need for rapid or emergency movement under the conditions”* that may be encountered in firefighting.

An exception and compromise was made, however, in the form of a restriction that would call for a firefighter who did not have at least 20/100 uncorrected far visual acuity to carry at all times a second set of corrective lenses. This provision would increase the margin of safety for such an individual such that the loss of a primary set of corrective lenses may not render the individual completely visually impaired. A second set of lenses could be drawn upon as a way to assure that the individual’s visual acuity always met both the expectation of the standard for at least 20/40 far vision for normal operations, and also improved their vision to better than 20/100, which was considered to be the limit for safe operations under emergency conditions. This compromise was felt to be a reasonable means particularly for allowing experienced incumbents to avoid being prevented from contributing their expertise in firefighting as a result of a loss of far vision, and it was built into the forms as an efficient way to deal with an important medical standards issue.

While it has been argued that, *“If everyone is going to have the uncorrected far vision standard waived anyway, why not just change the standard?”* The Medical Standards Team’s response has been that the present approach provides for the pointed recognition by all parties involved that a firefighter has an issue that raises a concern related to far vision, and that it has been responded to with a specific restriction that is to be acknowledged by supervisors and management due to its safety implications. This would not be likely to take place if this component of the standard was simply removed.

In lieu of the current approach that has been recommended by the MST, the FFAST has proposed a performance standard whereby the individual firefighter would be required simply to have “sufficient pairs of glasses to meet the standard.” The definition of “sufficient pairs” may be a minimum of one, with additional sets of lenses at the employee’s discretion.

The concern of this consultant is that the proposed approach may miss the intent of the standard, which is to assure that firefighters are at all times *“able to see well enough to safely and efficiently carry out the requirements of the job,”* even in situations in which a set of their corrective lenses has been lost or broken, and when environmental conditions pose a heightened risk to their safety. Since the standard provides the expectation that a firefighter has far visual acuity of at least 20/40 at all times during normal work activities, and at least 20/100 in other circumstances (e.g., if they’ve lost the use of their corrective lenses), if a change in the way waivers and accommodations are considered related to vision, a better option might be for the program to revert to the basic standard and not medically approve any individual who does not have at least 20/100 far vision, corrected or uncorrected. Incumbent firefighters who believe they can safely perform their duties despite this level of visual deficiency could present their case before the Interagency Medical Review Board to see if the standard should be waived or a more individualized set of restrictions applied in their particular situation.

**Recommendation:**

The recommendation of this consultant is for the current standard waiver with restrictions to be maintained or, if a change is to be made, to remove the automatic waiver entirely and require individuals to present their case to the IMRB if they do not have at least 20/100 uncorrected far vision.

## **WLFF Vision Testing Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For discussion at the October 15-16, 2003 WLFF Interagency Medical Standards Team Meeting,  
Missoula, Montana*

### **Issue**

A recent document prepared by or for the Forest Service presented a position that “*vision testing is another potential cost containment area,*” citing that:

*“individuals that wear corrective lenses could simply be required to carry a second pair of glasses on the fireline.”*

Similarly, a position was presented that

*“the color vision standard and testing is being waived in every case where an incumbent shows color vision deficiency. This test apparently has little bearing on firefighter ability and should certainly be considered for elimination as a cost cutting element.”<sup>1</sup>*

These positions statements reflect assumptions that I believe are not justified and recommendations that are inconsistent with the approved standards.

### **Current Standard:**

The applicable section of the current FFALC-approved standards<sup>2</sup> specifies that:

*“The applicant/incumbent must be able to see well enough to safely and efficiently carry out the requirements of the job. This requires binocular vision, far visual acuity, depth perception, peripheral vision, and color vision, which may be demonstrated by:*

- *Far visual acuity uncorrected of at least 20/100 in each eye for wearers of hard contacts or spectacles; and*
- *Far visual acuity of at least 20/40 in each eye (if necessary) with contact lenses or spectacles; and*
- *Color vision sufficient to distinguish at least red, green, and amber (yellow); and*
- *Peripheral vision of at least 85° laterally in each eye; and*
- *Normal depth perception; and*
- *No ophthalmologic condition that would increase ophthalmic sensitivity to bright light, fumes, or airborne particulates, or susceptibility to sudden incapacitation.*

*Note: Contact lenses and spectacles are acceptable for correction of visual 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*

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<sup>1</sup> “An Analysis of Medical Standard Implementation for the USDA Forest Service: Fire and Aviation Management; Washington, DC, August, 2003”, page 4.

<sup>2</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” page 7.

*necessary personal protective equipment. Successful users of long-wear soft contact lenses are not required to meet the “uncorrected” vision guideline.”*

The standard was based on:<sup>3</sup>

*“(A) the firefighter’s need to be able to see (including binocular vision, visual acuity, depth perception, peripheral vision, and color vision) with (B) the essential functions and work conditions of a wildland firefighter, including driving, walking, climbing, constructing fire lines, and rapid pull out to safety zones under conditions that may include very steep terrain, rocky, loose or muddy ground surfaces, open holes or drop offs, and dim light or darkness. The limit for uncorrected far vision is set at 20/100 binocular, consistent with the National Fire Protection Association’s Standard on Medical Requirements for Fire Fighters (NFPA 1582, 1997 Edition), and with a field assessment by the medical standards team in which different levels of acuity were considered in an operational setting related to the need for rapid or emergency movement under the conditions noted above. Long-term users of soft contact lenses are not subject to the uncorrected far vision standard. Corrected far vision is set at 20/40, and the color vision requirement is for red/green/amber (yellow), consistent with Department of Transportation regulations for commercial driving and the need for safe and efficient function under expected fire fighting conditions. Peripheral vision is set as 85° laterally, which is generally considered to be normal. Some vision conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions.”*

### **Discussion:**

The Forest Service paper suggests that “*individuals that wear corrective lenses could simply be required to carry a second pair of glasses on the fireline.*” The problem with this suggestion is that it assumes that all firefighters who require corrective lenses both have prescriptions for vision correction that are current and provide adequate correction for their particular vision deficit, and have filled those prescriptions for corrective lenses that are compatible with WLFF field conditions and requirements. This is not a reasonable assumption. We very commonly find that an individual who takes their vision test while wearing their corrective lenses is unable to meet the vision standard because their prescription is out of date, or they have a vision problem that is not fully correctable by lenses. Having a second set of glasses that duplicates the insufficient or inaccurate correction of the first pair would do nothing to assure that an individual has vision sufficient to provide this aspect of safety on the fire line. Those who need corrective lenses but either don’t have a prescription or have not filled the prescription would also not be properly screened by the proposal.

The Forest Service paper also stated “*the color vision standard and testing is being waived in every case where an incumbent shows color vision deficiency. This test apparently has little bearing on firefighter ability and should certainly be considered for elimination as a cost cutting element.*” The test is a basic assessment and, for the annual exam, does not require more

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<sup>3</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 2.

equipment than pieces of string or paper, if a vision testing machine is not being used for other the other components of the exam. The Forest Service's comment appears to represent a significant misunderstanding regarding the nature of the waiver and accommodation process as it is used with medical standards. The fact that firefighters who have a color vision deficiency have been granted waivers is not a basis for elimination of the test for color vision. Without a test to identify those individuals who have a color vision deficiency, the agency (and possibly the firefighter him/herself) may not know this deficit exists, and would not know to provide the guidance that is included in the waiver/accommodation letters. Assignment to driving duties should be limited (and would be prohibited in cases where a CDL is required for driving heavy equipment on the highway).

It is interesting to note that the National Fire Protection Association does not require color vision testing for structural firefighters:

*“Formerly, color vision deficiency was listed as a Category B medical condition. However it is felt that within most cases this condition will not affect the ability of a fire fighter to perform the essential functions of his or her job. The fire service physician should consider the color vision deficiency of the individual and consider the color vision requirements of the fire fighter’s job and reach an individual determination.”<sup>4</sup>*

However, this standard applies to structural firefighters and color vision is required in other wildland firefighting jurisdictions. As an example, the Queensland (Australia) Fire and Rescue Authority specifies that

*“Firefighters must be able to distinguish colours essential for firefighting*

- In the first instance, the Ishihara test will be used as a screening test.*
- Those who are identified as having a colour vision defect will be required to undertake a practical test of tasks required of firefighters. The practical test will determine whether or not the individual is fit for firefighting. (Individuals who have no trouble in day-to-day activities discriminating between reds, greens, oranges, and browns are likely to pass the test.”<sup>5</sup>*

The Queensland Fire and Rescue Authority guidelines convey the requirement for color vision by firefighters, a recognition of alternative methods of testing, and the need for individual assessments of a firefighter's capabilities, all of which are reflected in the current WLFF medical standards.

Research conducted by the Forest Service also has documented the importance of color vision as it relates to firefighting.<sup>6</sup> The September 2001 Tech Tips article noted:

*“Our field evaluations indicated that hot-pink flagging was the easiest color to see and was visible at the greatest distance. Lime-green flagging showed up poorly to participants with*

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<sup>4</sup> Medical Requirements for Fire Fighters, National Fire Protection Association, NFPA 1582, 1997 Edition, page 11.

<sup>5</sup> Queensland Fire and Rescue Authority Information Pack 2001, page 32.

<sup>6</sup> “Flagging for Firefighting Escape Routes and Safety Zones,” Bob Beckley, Fire Tech Tips, MTDC, September 2001

*normal color vision, but colorblind participants saw the lime-green flagging best.”*

*“Based on the field evaluations, we recommend that hot-pink flagging marked ESCAPE ROUTE be used to identify escape routes and safety zones. Crews with colorblind members may wish to carry both hot-pink ESCAPE ROUTE and lime-green flagging to identify their escape routes.”*

This article adds to information in the “Basis” document, cited above, and supports the need for an assessment of a firefighter’s color vision. This assessment is not done to exclude a colorblind firefighter, but to identify those for whom special attention may be needed regarding safety precautions, and those who should not be assigned to driving duties on public roads.

Because of the difficulty that may be faced in locating clinical practices with standard vision testing machines in some of the remote locations, a compromise was made early in the Medical Standards development process to allow for a more limited vision assessment for annual examinations (only a corrected and uncorrected visual acuity and color vision assessment are done). When baseline and periodic examinations are done, peripheral vision and depth perception are added to these assessments.

**Recommendation:**

The recommendation of this consultant is to leave the medical standard and the testing procedures related to vision as currently presented in the FFALC-approved program. This includes an assessment of vision, including visual acuity, color vision, peripheral vision, and depth perception, which should be obtained for all baseline and periodic examinations. An assessment of visual acuity and color vision should be performed for all annual examinations, since the Annual form is used not just for periodic reassessment of permanent WLFFs but for the initial as well as the on-going assessment of AD/EFF WLFFs.

## **WLFF Whisper Test Issue**

Jay Paulsen, MD, MPH  
Federal Occupational Health

*For general use by WLFF Interagency Medical Standards Team (IMST),  
and as requested by the Medical Standards Program (MSP) Manager  
May 2009*

### **Issue**

In early 2009, a question was raised by the medical review officer staff for the Wildland Firefighter (WLFF) MSP regarding the reasoning behind the “whisper test” method used by the Program for conducting a firefighter’s screening hearing test when the Annual Medical History and Rating Form is used (the question only applied to “Annual” exams since OSHA-compliant audiograms, rather than whisper tests, are to be performed for Baseline, Periodic, and Exit exams). The question was raised because of the conflict that arises when a firefighter concurrently requires both a medical clearance to obtain a Commercial Drivers License (CDL) and a WLFF medical clearance. The method prescribed by the Department of Transportation (DOT) for a CDL medical clearance differs from that established for WLFFs. This issue paper is intended to discuss the background for the methods that were selected for use for hearing screening purposes in the WLFF medical standards program, to compare them with the methods prescribed by the DOT for such screening, and to make recommendations for decision-making and the future screening of hearing for WLFFs.

### **Current Standard:**

The applicable section of the current Federal Fire and Aviation Leadership Council (FFALC)-approved standards<sup>1</sup> specifies that:

*“The applicant/incumbent must be able to hear well enough to safely and efficiently carry out the requirements of the job. This requires 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 the standards of the American National Standards Institute (see 29 CFR 1910.95); and*
- *Documentation of hearing thresholds of no greater than 40 dB at 500, 1000, 2000, and 3000 Hertz in each 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.*

*Note: The use of a hearing aid(s) to meet this standard is not permitted.”*

The standard was based on:<sup>2</sup>

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<sup>1</sup> “Medical Standards and Review Criteria for Medical Review Officers” applicable to “Wildland Firefighter (Arduous Duty),” page 7.

*“(A) the firefighter’s need to hear verbal communications and both natural and manmade warning sounds with (B) the essential functions and work conditions of a wildland firefighter, including working on small and large teams, driving, rapid pull out to safety zones, and providing rescue or evacuation assistance under conditions that may include isolated and remote sites, falling rocks and trees, trucks and other large equipment. The hearing standard is set at an average threshold of no greater than 40 dB at 500, 1000, 2000, and 3,000 Hz in each ear, consistent with the DOT regulations for commercial drivers. This level is more lenient than that allowed by the NPFA 1582 standards (30 dB average threshold at these frequencies), or what is considered to be “normal” hearing (25 dB), but is felt to provide a reasonable hearing threshold level where louder than normal communications may be expected. Hearing aides are not permitted in meeting this standard, due both to the limitation in directional hearing afforded by hearing aides, and to the risk of dislodging of a hearing aid during critical or emergency periods when hearing must be acute. Some ear and hearing conditions, including those listed in the standards, may not be compatible with safe and efficient performance of wildland firefighter duties under these conditions.”*

**Discussion:**

Because of the safety factors related to working in a wildland firefighting environment, it is important that a firefighter be able to hear well enough to communicate effectively with other firefighters and the public, and to navigate safely in the firefighting environment, detecting with sufficient lead time and distance the auditory cues that relate to possible threats to health and welfare of the firefighter, coworkers, or the public. An individual with a hearing loss may be less able to detect accurately and in a timely manner the natural and man-made environmental warning and informational sounds, and the verbal communications, that impact safe and efficient job performance. Thus, there are both safety factors (primarily related to the early detection of pertinent warnings and environmental cues) and efficiency factors (primarily related to routine communications) involved with a WLFF’s hearing.

There are two primary methods that may be used as general screening tools for the initial assessment of a WLFF’s hearing (other tests may be used by specialists for more focused or precise assessments of an individual’s hearing status if a deficit is identified during the screening process). The two primary screening methods include: some form of a whisper test and the pure-tone audiogram. The current, approved standard draws attention to the use of OSHA/ANSI-compliant pure-tone audiograms,<sup>3</sup> what might be considered a “gold standard” for hearing screening because of the high degree of consistency and reproducibility of this method, but the use of a whisper test was not precluded by the standards document or the MSP. Consistent with regulations promulgated by the Office of Personnel Management (OPM) at 5 CFR 339 (Medical Determinations), the standard for WLFF medical clearances only requires an

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<sup>2</sup> “Basis for the Medical Standards: Approved by the Federal Fire and Aviation Leadership Council for the Function of: Wildland Firefighter (Arduous Duty),” page 3.

<sup>3</sup> An “OSHA/ANSI-compliant audiogram” is one that meets the regulatory requirements for a Hearing Conservation Program, as presented in 29 CFR 1910.95, Occupational noise exposure; such a program is required for employees whose workplace exposure to noise is 85 dB or more on an 8-hour time weighted average



individual “*to hear well enough to safely and efficiently carry out the requirements of the job.*” It should be remembered that either of these two primary methods is only part of a screening process provided by the employing agency through the MSP. At any time, a firefighter may provide his/her own medical documentation for consideration by the program if the firefighter feels that the screening process has not represented his medical status accurately.

A pure-tone audiogram, conducted according to the requirements of OSHA and including the related documentation and ear examination prior to the audiogram, may take as long as 20 to 30 minutes to complete and cost about \$40.<sup>4</sup> Such an audiogram requires the use of a properly calibrated audiometer, and the testing must be conducted in a setting where the volume of specific background sound frequencies can be monitored to assure that they do not exceed levels specified in the regulations, since these background sounds may interfere with the ability of the person being tested to hear the sounds that are being presented during the test. The resulting audiogram, however, when conducted properly, provides a reproducible, detailed summary of the volumes (measured in decibels, or dBs) at which sounds were detected by the patient when presented at the test frequencies of 500, 1000, 2000, 3000, 4000, 6000, and 8000 Hz. The pure-tone audiogram is useful both for establishing a baseline level of hearing acuity for newly hired or assigned firefighters, and also for detecting and documenting evidence of hearing loss when it occurs as a result of exposure to excessive noise, or other injuries or conditions. However, while the use of pure-tone audiometry is required for individuals who are enrolled in a Hearing Conservation Program (HCP) under 29 CFR 1910.95, the time, logistics, and cost factors involved with obtaining audiograms may present an unacceptable challenge in some situations, and for some agencies, when such audiograms are not required by regulation.

On February 23, 1999, the Interagency Medical Standards Team (IMST), which was responsible for the development of the medical standards for WLFFs, presented its recommendations for medical standards to the FFALC, which had chartered the medical standards development process for WLFFs. Along with the standards, the IMST presented the recommended evaluation process and administrative review procedures for a comprehensive implementation program for those standards. Included in the standards was reference to the use of audiograms for the assessment of a firefighter’s hearing. Following that 1999 meeting, it was recognized that it may not always be possible or practical to obtain audiograms for all firefighters, due primarily to logistical and cost factors, and the whisper test was considered as an alternative to the audiogram, even though the value of the whisper test is quite limited. At a March 26-28, 2002 meeting of the IMST, it was decided that, while the whisper test would not be allowed for baseline or periodic exams for firefighters who are permanent/career seasonal/term employees, the whisper test would be allowed for firefighters who are not full-time federal employees, such as temporary seasonal and AD/EFF firefighters, as well as for firefighters who are mid-cycle for their full medical examinations and are only required to complete the “Annual” form. The hearing standard would remain the same (i.e., “*to hear well enough to safely and efficiently carry out the requirements of the job*”), but the method to be used to assess hearing ability may be different depending on the firefighter’s employment category and the current place in the examination cycle. This approach was endorsed by the FFALC.

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<sup>4</sup> Personal communication with Federal Occupational Health clinical personnel

The medical standards for WLFFs were established as a stand-alone program that focused solely on the requirements of wildland firefighting, and no linkages or coordination with other job categories (e.g., law enforcement) were considered to be necessary. As a result, the only consideration given to the selection of a method for administering the whisper test was that it be based on methods that were acceptable to the medical community, and that it be easy to administer in a relatively consistent and reproducible manner in sometimes remote locations by providers who may not have access to an audiometer or similar types of medical equipment. The method selected for the WLFF MSP is one that was presented and discussed in a physical examination textbook that had been used in training by this consultant.<sup>5</sup> The textbook states that the “*test is performed in a quiet room with the examiner facing the ear to be tested. The other ear is blocked with the examiner’s hand. A rough hearing test is then performed one foot from the patient’s ear. If a patient cannot hear a whispered voice at one foot, he has at least a 30-decibel loss. This loss is 60 decibels if he cannot hear a spoken voice at one foot.*” While no explanation was provided in the textbook regarding the justification or basis for this specific method for conducting the test, the method was felt to be basic and easy to carry out in a variety of settings. As a result, it was decided by the IMST to incorporate this method into the instructions provided as part of the Annual exam form, and it has been used since at least 2002 in the WLFF MSP.

When a WLFF requires both a firefighter medical clearance and a CDL, a conflict arises regarding the testing method(s) that may be used in order to comply with the requirements for medical clearance for each function. According to 49 CFR 391.41(b)(11), which is the DOT regulation regarding the hearing assessment for a CDL,<sup>6</sup>

*“A person is physically qualified to drive a commercial vehicle if that person:  
First perceives a forced whispered voice in the better ear at not less than five feet with or without the use of a hearing aid.*

*or*

*If tested by use of an audiometric device, does not have an average hearing loss in the better ear greater than 40 decibels at 500 Hz, 1,000 Hz and 2,000 Hz with or without a hearing aid when the audiometric device is calibrated to the American National Standard, [formerly American Standard Association (ASA)] Z24.5-1951.*

*...*

*If an individual meets the criteria by using a hearing aid, the driver must wear that hearing aid and have it in operation at all times while driving. Also, the driver must be in possession of a spare power source for the hearing aid.*

*For the whispered voice test, the individual should be stationed at least 5 feet from the examiner with the ear being tested turned toward the examiner. The other ear is covered. Using the breath which remains after a normal expiration, the examiner whispers words or random numbers such as 66, 18, 23, etc. The examiner should not use only sibilants (s-*

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<sup>5</sup> Judge, Richard D. and Zuidema, George D., ed., *Methods of Clinical Examination: A Physiological Approach*, Third Edition, 1974, Little, Brown and Company, Boston, pp. 102-103

<sup>6</sup> <http://www.fmcsa.dot.gov/rules-regulations/administration/medical.htm>

*sounding test materials). If the individual fails the whispered voice test, the audiometric test should be administered.*

*If an individual meets the criteria by the use of a hearing aid, the following statement must appear on the Medical Examiner's Certificate "Qualified only when wearing a hearing aid."*

These methods of testing hearing, and the evaluation of the results, are different from that which has been established for WLFFs in several important ways. First, the DOT allows for the use of hearing aids, which are specifically excluded for WLFFs, for reasons discussed at length elsewhere,<sup>7</sup> and even is acknowledged by DOT as being problematic, for reasons that are not pertinent to the current discussion. Second, if an audiogram is done, the DOT standard only addresses the frequencies 500, 1000, and 2000 Hz, while the WLFF standard also includes 3000 Hz. Third, the methods prescribed for conducting the whisper test are different: the DOT requires the individual being tested to be “at least 5 feet from the examiner” and, for WLFFs, the test is to be done with 1 foot of separation. Fourth, the DOT calls for obtaining an audiogram if the individual fails the whisper test, but the WLFF program has no provision for requiring an audiogram if an individual fails the whisper test, though the results of an audiogram conducted by the firefighter’s personal health care provider will be accepted and considered as part of the further evaluation of the firefighter’s medical qualifications.

Regarding the use of hearing aids, this difference could be accommodated simply by allowing the test to be done twice when a firefighter has hearing aids; once with the hearing aids in place, and once with them removed, as long as the results distinctly convey which tests are done with and which are done without hearing aids, so distinct clearance decisions can be made for the different job functions (firefighting vs. driving with a CDL). In most settings, however, it is not possible to conduct a valid audiogram with hearing aids in place, due to feedback problems with the devices, so the need for such duplicate testing may not be at all common.

Regarding the frequencies to be tested, an audiogram obtained for a firefighter would cover (and exceed) the frequencies required for a CDL, so this should not pose a problem either for the reviewer or for the firefighter.

Moving to the fourth issue (that of obtaining an audiogram if the individual does not pass the whisper test), this would be an issue for temporary seasonal and AD/EFF firefighters, and for those permanent/career seasonal/term firefighters during their Annual cycles, if they fail the whisper test and also require a CDL, since those individuals would need to have an audiogram in order to comply with the requirements of the DOT.

The remaining distinction between the DOT requirements and those of the WLFF program is that of the method to be used in conducting the whisper test. As noted above, the method established for the WLFF program is based on the recommendations provided by Judge and Zuidema, and

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<sup>7</sup> See WLFF Hearing and Hearing Aid Issue, a paper developed for discussion at the April 10, 2007 WLFF Interagency Medical Standards Team Meeting, Phoenix, Arizona, and When an Employee Doesn't Meet the Agency's Hearing Standard: An Overview for Federal Supervisors and Medical Standards Program Managers, October 23, 2008

involves a 1-foot distance between the examiner and the patient. The method called for by the DOT requires a 5-foot distance. This consultant was unable to discover the background or basis for establishing a 5-foot distance requirement for the DOT test, despite extensive review of the available medical sources provided by the DOT<sup>8</sup> and a general Internet (Google™) search using multiple search criteria. However, the DOT requirement stands, and I also was unable to find an exception or DOT-acceptable alternative to the prescribed method in any of the DOT Internet-based sources.

### **The Problems Created:**

There are some basic conflicts that arise for examiners and reviewers as a result of the different whisper test methods prescribed for CDL and WLFF exams. Even using the whisper test (by either method) may present a dilemma for the medical review officer. The following examples present the situations that have been encountered and/or presented for consideration by the MSP:

- 1) a firefighter with a hearing loss that has been documented by a pure-tone audiogram obtained during a Periodic exam, and is given a waiver of the hearing standard, then passes the less sensitive whisper test during a subsequent Annual exam (should an unrestricted clearance be provided, since the firefighter passed whisper test, or should the known hearing deficit continue to be addressed through the waiver process?)
- 2) a firefighter needs both a WLFF and a DOT clearance (which whisper test protocol should the examiner use?)
- 3) a firefighter needs both a WLFF and a DOT clearance, but the examination is not being done in a clinical location (or for an employment category) that includes provision for an audiogram (how is the DOT-mandated follow up audiogram to be carried out?)

### **Recommendations:**

Because it has been determined by the WLFF agencies that the clinically preferred screening method (the use of a pure-tone audiogram for all WLFF screening hearing tests) will not be provided under the WLFF MSP for Annual exams, the following represents the recommendations of this consultant in the above situations:

- 1) Since both tests are considered only as screens, and the pure-tone audiogram provides more reproducible and accurate information, the results of the audiogram should be used in lieu of the whisper test results, despite having passed the subsequent the whisper test, and consideration of a renewal of the waiver should still be carried out; a firefighter who has passed a whisper test (after previously having failed an audiogram) could elect to obtain a pure-tone audiogram (at his own expense) to determine whether or not his more current results were better than originally documented (e.g., the previous audiometric

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<sup>8</sup> Hearing Disorders and Commercial Motor Vehicle Drivers: <http://www.fmcsa.dot.gov/rulesregs/medreports.htm>, and FMCSA Medical Reports: <http://www.fmcsa.dot.gov/facts-research/research-technology/publications/medreports.htm>

findings may have demonstrated a temporary hearing loss that did not persist upon retesting), and whether or not a waiver still is required

- 2) Because both testing methods (the WLFF and the DOT whisper tests) provide limited screening information only, so method required by regulation (DOT) for the CDL should be used when both clearances are required
- 3) The scenario of a firefighter needing both a WLFF clearance and a CDL represents an extension of the WLFF program beyond its intended role; the whisper test (prescribed by DOT should be used, as discussed above) and, if the firefighter does not pass this screen, the employing agency will need to pursue obtaining a follow-up audiogram related to the CDL clearance as a separate matter; the WLFF MSP can proceed with its clearance decision making process based on the results of the whisper test

# *When an Employee Doesn't Meet the Agency's Vision Standard* *-- Far Vision --*

## **An Overview for Federal Supervisors and Medical Standards Program Managers**

*August 2009*

### **Introduction**

Agency managers frequently are faced with a need to make decisions regarding such things as granting waivers, approving mitigations or accommodations, or taking personnel action when employees are unable to meet medical standards. A medical standard issue frequently encountered is related to visual acuity, which generally refers to how clearly a person can see<sup>1</sup>. Reported problems with visual acuity may be due to a variety of causes, including the loss of an eye, damage to or disease of the cornea or lens of one or both eyes, retinal problems, or problems with the processing of visual information by the brain, which may be due to such conditions as strabismus or amblyopia. Strabismus is a condition where the eyes do not point in the same direction. They may be divergent, where the direction of sight in each eye diverges from the other eye, or convergent, where the direction of sight converges. A risk of this condition is that the brain may utilize and depend more on one eye than the other so that the brain's neurologic connections don't develop normally, which can lead to amblyopia. In amblyopia, there is complete or partial blindness in one eye as a result of problems in the development of normal vision. This condition may be due to strabismus, or to significant differences in the refractive (light bending) ability of one eye relative to the other, leading to significant nearsightedness, farsightedness, or astigmatism in the affected eye. Sometimes amblyopia is due to a drooping of the eyelid (blocking light from reaching the eye), problems with the cornea from injury or disease, cataracts (a clouding of the lens), or other types of injury. As a result of any of these causes, the visual functioning of one eye may not develop normally, resulting either in blindness or a lack of normal acuity in that eye.

In many cases, visual acuity may be corrected by the use of corrective lenses (e.g., glasses or contacts) or by one of several forms of eye surgery, such as Lasik (laser-assisted in situ keratomileusis). While Lasik and other forms of vision-correcting surgery may improve a person's vision to normal, or at least to otherwise acceptable levels, it is important to confirm that recovery from surgery is complete and that complications or side effects of surgery have not caused other problems that may interfere with an individual's ability engage in arduous exertion, or to work in the environments required by the job, or to see well enough to safely and efficiently carry out the functional requirements of their job. If an individual has had Lasik or other refractive surgery, the following recommendations have been made in addition to meeting the specified vision requirements in the agency's standards:

- 1) if LASIK or other refractive surgery has been done **90 days or less** prior to the date of the medical clearance screening exam, a clearance from the individual's treating ophthalmologist should be required; such a clearance must make clear that the

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<sup>1</sup> "Visual acuity" is defined as "the spatial resolving capacity of the visual system," expressing "the angular size of detail that can just be resolved by the observer," according to Borish's Clinical Refraction, Wm. J. Benjamin, ed., W.B. Saunders Company, Philadelphia; 1998, p. 179.

ophthalmologist has reviewed and is aware of the functional requirements of the employee's job, and is of the opinion that the individual is capable of safely carrying out the requirements of the job under the conditions of employment that may be encountered; and

- 2) if LASIK or other refractive surgery has been done **more than 90 days** prior to the date of the medical clearance screening exam, the basic findings of the medical history portions of the screening exam forms will be used to assess symptoms and possible complications that may have occurred, and which may have an impact on a clearance decision. In some positions that involve arduous exertion, a longer period of recovery may be recommended by the ophthalmologist.

This brief guide is intended to assist supervisors and program managers to evaluate the possible significance of a person's lack of normal visual acuity, and things to consider when an employee is unable to meet an agency's vision standard.

*Please Note: This guide is intended for general informational purposes only. It reflects the views of the authors, but is not intended to replace or supersede more comprehensive, authoritative, or official agency or professional standards, guidelines, or policies.*

### **Basis for Vision Standards**

A vision standard that relates to visual acuity may be established for a group or classification of employees when the ability to see well has been identified as pertinent to the safety of employees and the efficient performance of their job duties. The specific standards that relate to all aspects of vision are identified and established through processes that involve making worksite observations and gathering information from employees, supervisors, and medical and safety professionals, then giving careful consideration to the vision factors that are considered to be necessary in order for an individual to carry out the essential functions of the job safely and efficiently, including early visual warning of hazards or threats, vision redundancy (i.e., two functioning eyes, in case one becomes injured while the employee is in a hazardous situation), and accurate assessment of visual cues that relate to the work to be done. In addition, it is recognized that some work tasks that require healthy vision may have to be carried out under particular circumstances and environmental conditions that may not be present when an individual's vision is being tested in the controlled environment of a medical clinic. This includes highly variable lighting conditions, work tasks that require close attention or rapid identification, distractions or hazards in the environment, wind and blown dust, and the presence of irritants or fumes.

### **Legal Requirements**

While this brief guide is not intended as a substitute for the expertise of professional human resources personnel, or the more complete manuals and guidelines available from other agencies, such as the Office of Personnel Management, the manager should be aware of some pertinent regulations as they consider appropriate actions to take when an employee or applicant does not meet a vision standard. According to Federal law (5 CFR 339.102(c)), "*failure to meet a properly established medical standard or physical requirement ... means that the individual is not qualified for the position unless a waiver or reasonable accommodation is indicated...*" As a result, if an individual's vision deficit is so severe that they cannot meet the agency's

established vision standard, some type of response is necessary, either by the employee or by management. This may include such actions as: waiving the standard if the individual can demonstrate that they can perform the essential functions of their job safely and efficiently despite their lack of normal visual acuity; providing a waiver accompanied by agency-mandated mitigations in order to minimize the risks related to the vision deficit; providing a reasonable accommodation if the employee is found to be a qualified disabled individual; arranging for a transfer to another position where an individual's vision is less critical; or termination of employment.

### **Waivers**

Federal law (5 CFR 339.204) requires an agency to “*waive a medical standard or physical requirement... when there is sufficient evidence that an applicant or employee... can perform the essential duties of the position without endangering the health and safety of the individual or others.*” As a result, if an individual demonstrates a current and true ability to safely and efficiently perform the requirements of a job, and to do so despite a vision deficit (such as a lack of normal visual acuity in both eyes) and under all of the likely conditions and circumstances that may be encountered during the course of carrying out that job, the standard must be waived at that time and for that individual. A waiver may be time limited (e.g., reevaluated every time a clearance examination and/or review is done), and is subject to reevaluation if the individual's health or the nature of the job changes. In some cases, a waiver may be accompanied by agency-mandated mitigations that are intended to minimize potential risks related to the vision deficit (see page 8).

### **Accommodations**

Federal law (29 CFR 1614.203, the “Rehabilitation Act”) requires managers to “*make reasonable accommodation to the known physical or mental limitations of an applicant or employee who is a qualified individual with handicaps unless the agency can demonstrate that the accommodation would impose an undue hardship on the operations of its program.*” A qualified individual means “*an individual with handicaps who, with or without reasonable accommodation, can perform the essential functions of the position in question without endangering the health and safety of the individual or others,*” and meets the other requirements for the position.

The granting of waivers, accommodations, and mitigations should never be considered as an automatic response when a lack of normal visual acuity is encountered. Each case must be considered on a strict case-by-case basis to ensure that the most appropriate course of action is taken, for the safety of the individual and for benefit of the agency.

### **Agency Response to a Finding of Abnormal Visual Acuity**

How is an employee's vision recorded, and what do the results mean? How does a manager know if an employee's vision condition poses a safety risk or may be undermining the efficiency of the program? What are the safety risks associated with a lack of normal visual acuity? When can (or should) management grant a waiver (with or without mitigations), a step that means, for that particular employee, management is going to allow the employee to continue to work despite the failure to meet an established standard? What types of accommodations are possible, and reasonable, in response to an employee's lack of normal visual acuity? This overview will address these questions to help guide the manager to respond in a fair and responsible way when an employee is unable to meet this aspect of a vision standard.



How vision screening tests may be done

For general medical clearance screening purposes, there are several measures of vision that commonly are conducted. These specific tests are carried out because they provide pertinent information about an individual's functional vision capabilities, and because they can be done in most clinics and physicians' offices, with commonly available equipment. The results of these tests may be recorded on an exam form using one of several formats, such as the following:

|  |   |
|--|---|
| <p><b><u>Visual Acuity</u></b></p> <p><u>Uncorrected vision (Snellen Units)</u></p> <p>Both Near 20/____ Right Near 20/____ Left Near 20/____</p> <p>Both Far 20/____ Right Far 20/____ Left Far 20/____</p> <p><u>Corrected vision (Snellen Units)</u></p> <p>Both Near 20/____ Right Near 20/____ Left Near 20/____</p> <p>Both Far 20/____ Right Far 20/____ Left Far 20/____</p> | <p><b><u>Color Vision</u></b></p> <p><u>Type of test</u></p> <p><input type="checkbox"/> Ishihara plate <input type="checkbox"/> Function test (Yarn, wire, etc.)</p> <p><input type="checkbox"/> Other (specify _____)</p> <p>Normal <input type="checkbox"/> Abnormal <input type="checkbox"/> Number Correct: _____ of _____ tested</p> <p>Can see Red/Green/Blue/Yellow? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> |
| <p><b><u>Peripheral Vision</u></b></p> <p>Right Nasal _____ degrees Temporal _____ degrees</p> <p>Left Nasal _____ degrees Temporal _____ degrees</p>  | <p><b><u>Depth Perception</u></b></p> <p>Type of test: _____</p> <p>Number Correct: _____ of _____ tested</p> <p>_____ Seconds of Arc</p> <p>Interpretation:</p> <p><input type="checkbox"/> Normal <input type="checkbox"/> Abnormal</p>   |

Vision testing may be conducted using one of several types of office-based machines, with standard color plate books or wall-mounted or hand-held charts, or with non-standardized manual assessments carried out by medical services providers. Some vision testing machines may be used to gather information for all of the factors in the above table, while others are more specialized or limited in scope. The wall-mounted and hand-held methods include such standard tools as the Snellen eye chart (for far and, sometimes, near visual acuity) and the Jaeger eye chart or card (for near visual acuity). Books or sets of Ishihara colored plates (which require the identification of numbers or letters made up of specifically-colored circles embedded within a field of other colored circles) are used for standardized color vision testing, and may be used if a vision testing machine does not include the ability to test for color vision or if the patient has difficulty using the machine. The Farnsworth D-15 test assesses the ability of an individual to arrange colored test objects in the correct order based on their hue. Except for the Farnsworth D-15 test, the results of color testing generally are recorded as the number correct out of the number tested, and may be interpreted then as normal or abnormal, depending on the particular scale or scoring method for the test. However, the results for specific plates of the Ishihara test are pertinent regarding the nature of any color vision deficit that may be found, and the scoring of the Farnsworth D-15 involves a more complicated assessment based on the order of the colored objects as selected by the patient (this is discussed in greater detail in a companion guide within this series).

All of these simple but standardized tools can be used easily in most clinical settings. In addition, if a vision testing machine is not available, or if the patient has difficulty using the machine, a non-standardized manual assessment of peripheral vision and depth perception can be carried out using what are referred to as “challenge” tests in which the examiner asks the patient to indicate when, for example, a wiggled finger is first seen as it is moved from off to the side and into the patient’s field of vision while the patient looks straight ahead, or the patient is asked to reach out with an index finger and repeatedly touch the examiner’s finger as it is moved about in front of the patient. A non-standardized functional color vision test also may be used when a vision testing machine is not available, or the patient has difficulty using the machine. This alternative test also may be used when the agency needs to confirm an individual’s ability to identify basic colors, such as red/green/blue/yellow, but the individual has not been able to pass a standardized test. For the alternative color vision test, the colors of various non-color-associated objects (e.g., sheets of paper, or short lengths or yarn) are to be identified by the patient for the examiner. The results of all of these tests may be affected by alterations in visual acuity.

### What is being tested, and why

**Uncorrected vision** testing is a measure of an individual’s visual acuity without the use of corrective lenses, and is recorded either in Snellen units<sup>2</sup> (e.g., 20/20) or Jaeger units<sup>3</sup> (e.g., Jaeger #1), which may be converted into Snellen units for simplicity. The test results generally are recorded for each eye individually, and then with both eyes open at the same time. Normal vision is considered to be 20/20 or better (e.g., 20/15), though less acuity (e.g., 20/40) may be allowed in some situations, such as for drivers licenses in most states. The measurement of uncorrected vision is important for employment situations where corrective lenses may not be permissible or practical, and the ability to see accurately is important for safety or performance reasons. It also may be important in the early detection of harm to the eyes, when potential hazards to the eyes may be present in the environment or as a result of work tasks.

**Corrected vision** testing is a measure of an individual’s visual acuity while using corrective lenses, such as glasses or contacts. As for uncorrected vision testing, the results are recorded either in Snellen or Jaeger units for each eye individually and then with both eyes open at the same time. Vision generally can be correctable to 20/20, unless there are factors that interfere with this degree of correction, such as scarring of the cornea, cataracts of the lens (which have not been corrected), or damage to the retina. The measurement of corrected far vision is important for employment situations where corrective lenses are permissible and the

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<sup>2</sup> Snellen units represent what an individual is able to see at a given distance (i.e., 20 feet) compared to what an individual with normal, healthy eyes would be able to see. A measurement of 20/20 is considered normal, though individuals with very good vision may be found to have results of 20/15 or even better. A measurement of 20/40 means that, at a distance of 20 feet, the individual only is able to see objects clearly that a person with normal vision could see at a distance of 40 feet. Most states consider corrected visual acuity of 20/200 or worse to represent legal blindness, even though such an individual may have the ability to identify most large objects and may be able to see movement and colors.

<sup>3</sup> Jaeger units represent the numbered, standardized print sizes used to present sets of text for the patient to attempt to read. Each successive set of text is larger than that which precedes it, and the patient reads to the examiner the set with the smallest text that can be read with the chart held at a distance of 14 inches. A Jaeger #2 corresponds to a Snellen result of 20/25; a Jaeger #1 corresponds to a Snellen of 20/20. Standard tables are available to facilitate the conversion of results from one method to the other.

ability to see objects accurately is important. It also may be important in the early detection of harm, when potential hazards to the eyes may be present in the environment or as a result of work tasks.

**Near vision** testing is a measure of an individual's ability to see objects well at close distances (e.g., an arm's length or less; the test itself usually is conducted with the test card held at 14 inches from the eyes). Near vision may be tested with or without the use of corrective lenses. Near vision may be of importance in the conduct of certain work tasks, such as reading fine text or detail in maps or manuals, or in mechanical tasks, such as threading a needle or using a fine screw driver.

**Far vision** testing is a measure of an individual's ability to see objects clearly when they are at a distance, with or without the use of corrective lenses. Such distances may range from many feet away to several miles or more.

**Color vision** testing is an assessment of an individual's ability to identify colors or hues accurately. Vision depends on two primary types of light receptor cells in the retina of the eye: rods, which contain a single type of photopigment and only respond to light of a limited frequency range; and cones, which have one of three different photopigments which respond to light of three different ranges of wavelengths, which are perceived as blue, green, and red. For some agencies, the primary question regarding color vision simply is whether or not the individual can distinguish the colors red, green, blue, and yellow; for other agencies, a more precise color vision capability is necessary. The measurement of color vision may be important for employees whose job requires that they be able to distinguish colors accurately, such as may be the case for electricians (who may need to identify specific wires based on colors and patterns), drivers (who must identify traffic lights, particularly when they appear in a non-traditional order), law enforcement officers (who must be able to identify colors of clothing, or hair, or automobiles, for example), or inspectors (who must identify and trace the path of color-coded pipes and valves). Testing for color vision also may be important in the detection of the effects of certain metal, chemical, or infectious agent exposures. Visual acuity contributes to color vision by providing for the clear presentation of colored light information for the eye and brain to process as colors.

**Depth perception**, for purposes of this Guide, incorporates two distinct aspects of vision and the location of objects in a 3-dimensional world. First, there is "distance perception" (or absolute depth perception), which involves an assessment of how far an object is from the viewer or from another object, in measureable units (e.g., inches, feet, football field lengths). Actual "depth perception" (or relative depth perception) involves an assessment of the location of an object relative to another. Being able to estimate with some accuracy how many feet a boat is from the dock is distance perception; recognizing that the boat is closer to you than to the opposite shore is depth perception. Both factors are considered to be important for the safe and efficient performance of many federal jobs.

Normal depth perception involves cues that are both stereoscopic (requiring two eyes) and monocular (possible with only one eye). Depth perception test results generally are reported as the number correct out of the number tested, or in seconds of arc, and are then interpreted by the examiner as demonstrating normal or abnormal findings. Depth perception may be an important factor for purposes of safety (e.g., driving a vehicle and correctly judging safe

following and stopping distances; avoiding tripping over objects within the work zone; judging the distance to a platform onto which an employee must step or drop) or performance (e.g., reaching out to place equipment in the bed of a truck or onto a shelf; judging the distance that will be reached by a tree being taken down; or acquiring a target when using a firearm). Visual acuity contributes to the clear presentation of visual information that may be interpreted as indicating depth or distance.

**Peripheral vision** is the function of visually detecting light, movement, or the presence of objects at the periphery of our visual field, rather than in front of us where we generally focus our attention. In general, a maximum peripheral vision screening test result in the direction of the nose (nasal) is about 60°, and a maximum result off to the side (the temporal direction) is 85° to 90°, or sometimes greater, for a total of approximately 150°. Peripheral vision is important for situational awareness during normal light conditions where the detection and timely and appropriate response to potential physical hazards may be necessary (such as moving machinery or the presence of persons or animals that may pose a threat to the employee). It also is important simply for the receipt of visual information about an individual's surroundings in low light or near-dark situations.

Does a lack of normal visual acuity pose a safety risk or undermine the efficiency of the job?

It may. Depending on the workplace hazards and the functional requirements of a particular job, the lack of normal visual acuity may present important challenges to safe and efficient job performance. Work settings that include trip hazards (e.g., tree roots, raised door sills, electrical wiring or cables) require good visual acuity in support of the ability to determine both distance and depth (i.e., "depth perception") of objects in our environment, and to identify the nature of those objects, in order to reduce the risk of falls or other injuries. Driving a motor vehicle requires the ability to read road signs and identify road hazards accurately and at a sufficient distance to make steering, direction, or speed changes in a safe manner. Similarly, the identification of other hazards in the environment, from dangerous persons with (or without) a weapon, to the presence of unstable platforms or hillsides, may depend on the ability to see clearly.

Good visual acuity in both eyes is important for several reasons. Without good visual acuity in each eye, normal stereoscopic vision is diminished, which undermines depth perception. A lack of good visual acuity also may reduce peripheral vision on the affected side, though sometimes a person's central vision is poor (such as due to scarring of the central portion of the cornea, leading to poor visual acuity) but their peripheral vision (which uses the margins of the field of vision) may be unaffected. A lack of good visual acuity in one eye may render the person essentially monocular, which reduces the richness of the visual input available to the brain for processing, which can be a significant issue in low-light or low-contrast situations where visual cues may be reduced to begin with.

It must be remembered, however, that the vision testing described in this guide is for screening purposes, to identify possible problems for which further evaluation may be necessary. The most important factor in assessing safety risk or performance efficiency is observation of that performance in safe but realistic situations, where the effects of a possible vision defect can be evaluated for the kind of impact it may have on the individual's abilities.

### Granting a waiver despite a lack of normal visual acuity

A waiver despite a lack of normal visual acuity may be granted when, in the judgment of a deciding official, an individual with such a vision deficit has demonstrated that they have sufficient experience, skills, knowledge, and coping methods to be able to carry out all of the functional requirements of their job, and to do so safely and efficiently, despite their vision deficit. In this situation, despite the individual's inability to fulfill one or more of the factors described in the agency's medical standards as demonstrating compliance with those standards (e.g., normal visual acuity), the vision standard related to visual acuity is waived for that individual for the current evaluation cycle. However, the issue should be re-evaluated every time an examination or clearance evaluation normally would be conducted for that individual, and every time there is a significant change in job duties, the work environment, or the individual's vision or other health factors. This is intended to ensure that the individual continues to be able to perform the duties safely and efficiently. The factors discussed in the preceding sections should be considered when making this sort of decision.

### Granting a waiver with mitigations for a lack of normal visual acuity

Similar to a waiver without mitigations, a waiver with mitigations may be granted when, in the judgment of a deciding official, an individual who does not meet a medical standard has demonstrated that they have sufficient experience, skills, or knowledge to be able to carry out a job or function safely and efficiently despite their lack of normal visual acuity if certain steps or actions are taken that are intended to minimize the risks presented by that deficit. As developed by the Interagency Wildland Firefighter Medical Standards Program, and modified for purposes of this more generic guide, mitigations related to visual acuity may involve such measures as:

1. Notifying subordinates, coworkers, and supervisors who work with you about your lack of normal visual acuity so you can mitigate the safety risk to yourself or others,
2. Ensuring that you and your line supervisor assess your duties for potential hazards that may be encountered during field work operations to include mitigation steps for visual hazards,
3. Wearing ANSI approved personal protective eyewear equipment during field operations,
4. Carrying sufficient pairs of corrective lenses (glasses) in protective case(s) to correct your vision to 20/40 or better in each eye at all times,
5. Utilizing a spotter when backing a vehicle or trailer,
6. Operating motor vehicles during daylight hours only, unless evaluation by the government license examiner determines that night time operations can safely be allowed,
7. Operating chainsaws only after thorough testing and evaluation by a certified chainsaw instructor, and
8. Utilizing and carrying a spare high intensity beam headlamp at all times for use at night to improve your vision.

Specific mitigations should be based on unique aspects of the individual's vision condition, the circumstances of the job, and the environment in which it is to be carried out.

### Reasonable accommodations for an employee with a lack of normal visual acuity

As noted on page 1, the Rehabilitation Act requires the accommodation of disabled individuals if the individual is qualified and the accommodation is reasonable. In other words, granting the accommodation would not impose an undue hardship on the operations of the agency. Determining if an accommodation would pose such hardship depends on:

- “(i) The overall size of the agency's program with respect to the number of employees, number and type of facilities and size of budget;*
- (ii) The type of agency operation, including the composition and structure of the agency's work force; and*
- (iii) The nature and the cost of the accommodation.”*

According to the Act, reasonable accommodation “*may include, but shall not be limited to:*

- (i) Making facilities readily accessible to and usable by individuals with handicaps; and*
- (ii) Job restructuring, part-time or modified work schedules, acquisition or modification of equipment or devices, appropriate adjustment or modification of examinations, the provision of readers and interpreters, and other similar actions.”*

These factors, among others that may be applicable to the individual and local circumstances of the job, must be considered when a determination is to be made regarding whether or not an accommodation can or should be granted. Any accommodation that is to be considered for an employee must have an established, direct, risk-avoidance or task-accomplishment value related to the specific medical condition(s). Most medical standards have associated with them some form of narrative or description of the “basis” for the standard, and it may be helpful to review this information when considering whether an accommodation is appropriate.

### If a waiver, waiver with mitigations, or accommodation are not considered reasonable

After a careful consideration of the functional requirements of the individual's specific job, and the impact of the vision impairment on their ability to perform the job safely and efficiently, it may be determined that the standard cannot be waived, with or without mitigations, and no accommodation would be both reasonable and effective in overcoming the limitations or risks presented by the condition. In such situations, personnel action may be necessary to separate the individual from their current job, either by reassignment, separation, or retirement.

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# ***When an Employee Doesn't Meet the Agency's Immune System Standard***

## ***-- Stinging Insect Allergy – With an EpiPen<sup>®</sup> Prescribed --***

### **An Overview for Federal Supervisors and Medical Standards Program Managers**

*September 2009*

#### **Introduction**

Agency managers frequently are faced with a need to make decisions regarding such things as granting waivers, approving mitigations or accommodations, or taking personnel action when employees are unable to meet medical standards. A medical standard issue commonly encountered among employees who work in outdoor settings involves having a history of severe allergic reactions to stinging insects, for which the employee has been prescribed the medication epinephrine, generally in the form of an EpiPen<sup>®</sup>. This brief guide is intended to assist supervisors and program managers to evaluate the possible significance of such an allergy and this method of treatment, and things to consider when an employee is unable to meet an agency medical standard regarding the immune system.

*Please Note: This guide is intended for general informational purposes only. It reflects the views of the author, but is not intended to replace or supersede more comprehensive, authoritative, or official agency or professional standards, guidelines, or policies.*

#### **Basis for Immune System Standards**

A medical standard related to the immune system may be established for a group or classification of employees when a healthy immune system has been identified as pertinent to the safety of employees and the efficient performance of their job duties. The specific standard required for an individual job is identified and established through a process that involves making worksite observations and gathering information from employees, supervisors, and medical and safety professionals, then giving careful consideration to those factors that may impact safe and efficient job performance. It is recognized that these factors vary considerably between work settings and the risks those settings and the functional requirements of the job may present to a person who has experienced a severe allergic reaction.

#### **Legal Requirements**

While this brief guide is not intended as a substitute for the expertise of professional human resources personnel, or the more complete manuals and guidelines available from other agencies, such as the Office of Personnel Management, the manager should be aware of some pertinent regulations as they consider appropriate actions to take when an employee or applicant does not meet a medical standard. According to Federal law (5 CFR 339.102(c)), “*failure to meet a properly established medical standard or physical requirement ... means that the individual is not qualified for the position unless a waiver or reasonable accommodation is indicated... .*” As a result, if an individual has a history of allergic reactions that may be so severe that they face a possibly-unacceptable risk of incapacitation or physical harm in the event of an envenomation, some type of response is necessary, either by the employee or by management. This may include such actions as: waiving the standard if the individual can demonstrate that they can perform the

essential functions of their job safely and efficiently despite the history of severe allergic reactions; providing a waiver accompanied by agency-mandated mitigations in order to minimize the risks related to allergic reactions; providing a reasonable accommodation if the employee is found to be a qualified disabled individual; arranging for a transfer to another position where a history of severe allergic reactions may be less risky; or termination of employment.

### **Waivers**

Federal law (5 CFR 339.204) requires an agency to “*waive a medical standard or physical requirement... when there is sufficient evidence that an applicant or employee... can perform the essential duties of the position without endangering the health and safety of the individual or others.*” So, despite a history of severe allergic reactions, if an individual demonstrates a current and true ability to safely and efficiently perform the requirements of a job under all of the likely conditions and circumstances that may be encountered during the course of carrying out that job, the standard must be waived. In some cases, a waiver may be accompanied by agency-mandated mitigations that are intended to minimize potential risks related to the medical condition.

### **Accommodations**

Federal law (29 CFR 1614.203, the “Rehabilitation Act”) requires managers to “*make reasonable accommodation to the known physical or mental limitations of an applicant or employee who is a qualified individual with handicaps unless the agency can demonstrate that the accommodation would impose an undue hardship on the operations of its program.*” A qualified individual means “*an individual with handicaps who, with or without reasonable accommodation, can perform the essential functions of the position in question without endangering the health and safety of the individual or others,*” and meets the other requirements for the position.

The granting of waivers, accommodations, and mitigations should never be considered as an automatic response when a significant medical condition is encountered. Each case must be considered on a strict case-by-case basis to ensure that the most appropriate course of action is taken, for the safety of the individual and for benefit of the agency.

### **Background Information on Stinging Insects and the Use of the EpiPen®**

How common are stinging insect allergies? What stinging insects are people allergic to? What happens when someone is “stung” by an insect? How can allergic reactions be prevented, or treated? How is an employee’s history of allergies assessed? What are the safety risks associated with a stinging insect allergy? This overview will address these questions to help managers understand the significance of stinging insect allergies, and important factors related to their treatment.

#### How common are stinging insect allergies?

According to the American College of Allergy, Asthma & Immunology (ACAAI)<sup>1</sup>, between 0.5% and 5 percent of the population in this country are subject to anaphylaxis (a type of

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<sup>1</sup> [http://www.medem.com/medlb/article\\_detailb.cfm?article\\_ID=ZZZMO0FIA9C&sub\\_cat=530](http://www.medem.com/medlb/article_detailb.cfm?article_ID=ZZZMO0FIA9C&sub_cat=530)



severe, systemic allergic reaction) as a result of insect stings, which result in over 40 deaths and send more than ½ million people to emergency rooms every year.

What stinging insects are people allergic to?

Most stings are from wasps, yellow jackets, and hornets (Family Vespidae), bees (Family Apidae), or fire ants (Family Formicidae). The following provides examples of the primary stinging insect varieties:



Wasp



Hornet



Bee



Yellow Jacket



Fire Ant

What happens when someone is “stung” by an insect?

Most stings from insects such as these result in at least a local reaction, which is due to the injection of venom into the victim's skin. Venom is a water-based solution that includes a variety of proteins, peptides, and vasoactive amines, which are substances that cause immunoglobulin E (IgE) to be released within the skin and other tissues; IgE causes the release of the chemical histamine by cells in the skin and other tissues. As a result, and due both to the venom itself and to the IgE and histamine, the envenomation generally causes pain, itching, redness, and swelling at the site of the sting. The reaction can be mild and limited to the immediate vicinity of the sting, or it can extend to involve a much larger area and can even occlude blood flow to the distal parts of a limb, for example, if a sting is on an arm or leg.

One or more stings at some point in the past are thought to be necessary for immunologic sensitization to the venom to occur, though an individual may or may not be aware of that exposure, and sensitization does not occur in all individuals or following every envenomation. Once sensitization has occurred, however, further stings are more likely to

cause a large scale release of histamine and other immune system agents that may result in either a systemic reaction (anaphylaxis) or major, localized reactions.

While about half of all deaths due to insect stings occur in people who have no known prior reactions to such stings, about 60% of people who have had a systemic reaction due to an insect sting will have another systemic reaction with subsequent stings. Preparation and prevention are key considerations for the health and safety of all people with a risk of exposure, but particularly for those who have had a previous systemic reaction.

#### How can allergic reactions be prevented, or treated?

Once an individual has been identified as being sensitive to stinging insects, it is important for them to take steps to protect themselves from subsequent exposure to venom (i.e., they should avoid getting stung) and to be prepared to treat the allergic reactions that are at greater risk of occurring. Epinephrine is the most effective medication for preventing and treating anaphylaxis, though it may be combined with (or preceded by) the use of antihistamines (e.g., diphenhydramine, or Benadryl<sup>®</sup>) or, in a medical facility, followed by injectable steroids. The easiest form of epinephrine for use by individuals may be the EpiPen<sup>®</sup>, an autoinjector device that delivers a single dose of 0.3 mg of epinephrine by “stabbing” the unit into the lateral aspect of the thigh, exposing the needle and injecting the medication into the large lateral quadriceps muscle, well away from the large blood vessels or nerve bundles that otherwise may be hit by the injection. Intravascular injections may cause stroke (due to the sudden and significant rise in blood pressure from such a dose) or loss of limbs (due to the occlusion of major blood vessels by the action of the drug, a particularly problem for the hands, feet, or digits). Repeat doses may be necessary in severe cases, and carrying extra EpiPen<sup>®</sup> injectors is recommended, but the medication generally is highly effective in preventing and treating allergic reactions.

A draw back to the EpiPen<sup>®</sup> and other forms of epinephrine, however, is the fact that the medication must be protected from extremes of temperature. The manufacturer (Dey<sup>®</sup>, an affiliate of Merck KGaA) specifies that the EpiPen<sup>®</sup> is to be stored at 77°F, with temperature variations only allowed from 59°F to 85°F.<sup>2</sup> This is a narrow temperature range for a medication that may be required for use in the sort of environmental situations that may be encountered by some federal employees who work in field or remote locations. Also, the medication specifically is not to be refrigerated, due to the risk of precipitation of the drug, so this is not an option for maintaining a stable storage environment.

#### How is an employee's history of allergies assessed?

Individuals who have had allergic reactions to stinging insects commonly have been seen by health care providers who have provided treatment for those reactions, and who also may have reviewed the individual's history to determine whether or not similar reactions have occurred in the past. Because of the risk of sensitization, knowledge of any past history of allergic reactions is important, and includes: the type of reaction a person has had, since this can give important information about the risk of similar or worse reactions in the future; the

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<sup>2</sup> [http://www.epipen.com/epipen\\_prescribing.aspx](http://www.epipen.com/epipen_prescribing.aspx)

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type of exposure (i.e., what insect), since this is important related to the specific type of hazard the individual may face in the future; and the response of the individual to different modes of treatment, since this gives important information about how they might respond in the future.

Most medical history forms include questions about allergic reactions, since this is such an important topic. For example, the wildland firefighter baseline medical history form addresses the issue as follows:

|   |                                    |  |
|---|------------------------------------|--|
| <p>2. Are you allergic to bee/wasp/hornet/ fire ant/yellow jacket stings?</p> | <p><input type="checkbox"/> No</p> | <p><input type="checkbox"/> Yes</p> <p>Check any of the reactions you have had:</p> <p><input type="checkbox"/> swelling or itching at site of sting only</p> <p><input type="checkbox"/> swelling or itching at site(s) other than site of sting, i.e. if stung on arm, swelling or itching has occurred somewhere other than on arm</p> <p><input type="checkbox"/> hives</p> <p><input type="checkbox"/> anaphylactic shock</p> <p><input type="checkbox"/> blood pressure problems</p> <p><input type="checkbox"/> difficulty breathing</p> <p>Please explain <u>in detail</u> any positive responses marked above:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Have you ever been advised by a physician to carry an EpiPen for yourself? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Do you carry an EpiPen for yourself? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> |
|---|------------------------------------|--|

Positive responses to questions such as these may prompt requests for further, clarifying information to be sure the medical reviewing officer sufficiently understands the nature of the allergy and the ability of the individual to treat and respond to exposures successfully.

What are the medical-safety risks associated with a stinging insect allergy?

A reaction to a stinging insect envenomation can vary from a simple, sudden response to the pain of the envenomation (e.g., causing a sudden distraction from current activities, such as driving); to a phobic reaction (e.g., severe, disabling fear); to a local reaction that may cause pain, swelling, redness, and stiffness; to anaphylaxis, a severe allergic reaction that can lead to respiratory arrest and death.

**Agency Response to a History of Severe Allergic Reaction**

Does a history of an allergic reaction to stinging insects pose a safety risk or undermine the efficiency of the job? When can (or should) management grant a waiver (with or without mitigations), a step that means, for that particular employee, management is going to allow the employee to continue to work despite the failure to meet an established standard? What types of accommodations are possible, and reasonable, in response to an employee's history of stinging insect allergy that is treated with an EpiPen®? This overview will address these questions to help guide the manager to respond in a fair and responsible way when an employee is unable to meet an immune system standard.

Does a history of an allergic reaction to stinging insects pose a safety risk or undermine the efficiency of the job?

It may. Depending on the workplace hazards, or the functional requirements of the particular job, a reaction to a stinging insect could pose a safety risk or undermine efforts to accomplish the agency's mission. As noted above, stinging insects can cause a reaction that can vary from a sudden distraction from current activities, such as driving, to that of phobia, or to localized pain, swelling, redness, and stiffness, or to full-scale anaphylaxis, with loss of consciousness and even respiratory arrest and death. An analysis of the types of work place hazards, should an employee suddenly lose attention or consciousness, is necessary in order to determine the risk of such reactions in the individual work settings. The availability of an EpiPen®, the individual's knowledge and skill at using the device, and their therapeutic response to epinephrine all contribute to the level of risk of harm or death the individual may face, but the employee's loss of effectiveness, attention, and responsiveness while they deal with the envenomation and administer their medications should be taken into consideration by safety and management personnel as well.

Granting a waiver for an employee with a stinging insect allergy when an EpiPen® has been prescribed

A waiver may be granted when, in the judgment of a deciding official, an individual who does not meet a medical standard has demonstrated that they have sufficient experience, skills, or knowledge that they are able to carry out a job or function safely and efficiently despite their medical condition, or the nature of its treatment. In this situation, the requirement to meet the standard is waived for that individual for the current evaluation cycle, but the issue should be re-evaluated every time an examination or evaluation normally would be conducted for that individual, and every time there is a significant change in job duties or the work environment. This is intended to ensure that the individual continues to be able to perform the duties safely and efficiently. The factors discussed in the preceding sections should be considered when making this sort of decision.

Granting a waiver with mitigations for an employee with a stinging insect allergy when an EpiPen® has been prescribed

A waiver with mitigations may be granted when, in the judgment of a deciding official, an individual who does not meet a medical standard has demonstrated that they have sufficient experience, skills, or knowledge that they are considered to be able to carry out a job or function safely and efficiently despite their medical condition if certain steps or actions are taken that are intended to minimize the risks presented by that condition. As an example, and based on information from the wildland firefighter medical standards program, the following mitigations may be applicable in certain agency-determined situations, in which the employee would be required to:

- 1) Notify subordinates, supervisors, co-workers, and the medic (when applicable) of the potential for an allergic reaction;
- 2) Carry prescribed epinephrine kit(s), complying with the manufacturer's recommendations for temperature exposure, to ensure drug efficacy;

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- 3) Ensure the epinephrine kits' expiration dates will not be exceeded during field assignments;
- 4) Confirm with the supervisor that the employee has been trained in the correct manner for self-administration of epinephrine;
- 5) Notify his/her supervisor and co-workers of the location and use of the epinephrine kit in the event the employee is unable to self-administer; and
- 6) Whenever and wherever possible, avoid working in the immediate vicinity of any known nests of stinging insects.

As part of item #2, above, it is recommended that documentation from the employee's physician be provided to agency management that:

- (a) confirms that the individual holds a current valid prescription for epinephrine (generally in the form of at least one dose [and preferably more] of epinephrine or EpiPen® autoinjectors);
- (b) confirms that the prescription will remain valid (including approved refills) through the period that is to be covered by the employee's medical clearance;
- (c) confirms that the individual has been fully informed of the manner in which the epinephrine is to be administered, should a sting occur;
- (d) confirms that the physician is aware of the nature of the work and the potential types of assignments, temperature extremes, environmental conditions, and geographic locations in which the employee may be assigned for duty, and in which the epinephrine may have to be stored and administered;
- (e) confirms the manner in which the employee intends to maintain the epinephrine in a temperature stable condition at all times during the period of deployment; and
- (f) concurs that, in the opinion of the physician, the medication can be used safely and effectively by the individual.

Reasonable accommodations for an employee with a stinging insect allergy when an EpiPen® has been prescribed

As noted on page 1, the Rehabilitation Act requires the accommodation of disabled individuals if the individual is qualified and the accommodation is reasonable. In other words, it would not impose an undue hardship on the operations of the agency. Determining if an accommodation would pose such hardship depends on:

- “(i) The overall size of the agency's program with respect to the number of employees, number and type of facilities and size of budget;*
- (ii) The type of agency operation, including the composition and structure of the agency's work force; and*
- (iii) The nature and the cost of the accommodation.”*

According to the Act, reasonable accommodation “*may include, but shall not be limited to:*

- (i) Making facilities readily accessible to and usable by individuals with handicaps; and*
- (ii) Job restructuring, part-time or modified work schedules, acquisition or modification of equipment or devices, appropriate adjustment or modification of examinations, the provision of readers and interpreters, and other similar actions.”*

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Specific accommodations are beyond the scope of this guide, and should be pursued by the employee and his/her physician if a determination of disability has been made. The factors noted in the regulations, among others that may be applicable to the individual and local circumstances of the job, must be considered when a determination is to be made regarding whether or not an accommodation can or should be granted. Any accommodation that is to be considered for an employee must have an established, direct, risk-avoidance or task-accomplishment value related to the specific medical condition(s). Most medical standards have associated with them some form of narrative or description of the “basis” for the standard, and it may be helpful to review this information when considering whether an accommodation is appropriate.

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# ***When an Employee Doesn't Meet the Agency's Immune System Standard***

## ***-- Stinging Insect Allergy – Without a Prescribed EpiPen<sup>®</sup> --***

### **An Overview for Federal Supervisors and Medical Standards Program Managers**

*September 2009*

#### **Introduction**

Agency managers frequently are faced with a need to make decisions regarding such things as granting waivers, approving mitigations or accommodations, or taking personnel action when employees are unable to meet medical standards. A medical standard issue occasionally encountered among employees who work in outdoor settings involves having a history of severe allergic reactions to stinging insects, but for which no standing treatment has been prescribed. A companion guide on a similar subject is available<sup>1</sup> that addresses situations where a medication for allergic reactions has been prescribed. The present, brief guide is intended to assist supervisors and program managers to evaluate the possible significance of a stinging insect allergy in an individual who does not have a prescribed method for treating it, and things to consider when an employee is unable to meet an agency medical standard regarding the immune system.

*Please Note: This guide is intended for general informational purposes only. It reflects the views of the author, but is not intended to replace or supersede more comprehensive, authoritative, or official agency or professional standards, guidelines, or policies.*

#### **Basis for Immune System Standards**

A medical standard related to the immune system may be established for a group or classification of employees when a healthy immune system has been identified as pertinent to the safety of employees and the efficient performance of their job duties. The specific standard required for an individual job is identified and established through a process that involves making worksite observations and gathering information from employees, supervisors, and medical and safety professionals, then giving careful consideration to those factors that may impact safe and efficient job performance. It is recognized that these factors vary considerably between work settings and the risks those settings and the functional requirements of the job may present to a person who has experienced a severe allergic reaction.

#### **Legal Requirements**

While this brief guide is not intended as a substitute for the expertise of professional human resources personnel, or the more complete manuals and guidelines available from other agencies, such as the Office of Personnel Management, the manager should be aware of some pertinent regulations as they consider appropriate actions to take when an employee or applicant does not

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<sup>1</sup> When an Employee Doesn't Meet the Agency's Immune System Standard: Stinging Insect Allergy – With an EpiPen<sup>®</sup> Prescribed; An Overview for Federal Supervisors and Medical Standards Program Managers; September 2009

meet a medical standard. According to Federal law (5 CFR 339.102(c)), *“failure to meet a properly established medical standard or physical requirement ... means that the individual is not qualified for the position unless a waiver or reasonable accommodation is indicated... .”* As a result, if an individual has a history of allergic reactions that may be so severe that they face a possibly-unacceptable risk of incapacitation or physical harm in the event of an envenomation, some type of response is necessary, either by the employee or by management. This may include such actions as: waiving the standard if the individual can demonstrate that they can perform the essential functions of their job safely and efficiently despite their history of severe allergic reactions; providing a waiver accompanied by agency-mandated mitigations in order to minimize the risks related to allergic reactions; providing a reasonable accommodation if the employee is found to be a qualified disabled individual; arranging for a transfer to another position where a history of severe allergic reactions may be less risky; or termination of employment.

### **Waivers**

Federal law (5 CFR 339.204) requires an agency to *“waive a medical standard or physical requirement... when there is sufficient evidence that an applicant or employee... can perform the essential duties of the position without endangering the health and safety of the individual or others.”* So, despite a history of severe allergic reactions, if an individual demonstrates a current and true ability to safely and efficiently perform the requirements of a job under all of the likely conditions and circumstances that may be encountered during the course of carrying out that job, the standard must be waived. In some cases, a waiver may be accompanied by agency-mandated mitigations that are intended to minimize potential risks related to the medical condition.

### **Accommodations**

Federal law (29 CFR 1614.203, the “Rehabilitation Act”) requires managers to *“make reasonable accommodation to the known physical or mental limitations of an applicant or employee who is a qualified individual with handicaps unless the agency can demonstrate that the accommodation would impose an undue hardship on the operations of its program.”* A qualified individual means *“an individual with handicaps who, with or without reasonable accommodation, can perform the essential functions of the position in question without endangering the health and safety of the individual or others,”* and meets the other requirements for the position.

The granting of waivers, accommodations, and mitigations should never be considered as an automatic response when a significant medical condition is encountered. Each case must be considered on a strict case-by-case basis to ensure that the most appropriate course of action is taken, for the safety of the individual and for benefit of the agency.

### **Background Information on Stinging Insects**

How common are stinging insect allergies? What stinging insects are people allergic to? What happens when someone is “stung” by an insect? How can allergic reactions be prevented, or treated? How is an employee’s history of allergies assessed? What are the safety risks associated with a stinging insect allergy? This overview will address these questions to help managers understand the significance of stinging insect allergies, and important factors related to their treatment.



How common are stinging insect allergies?

According to the American College of Allergy, Asthma & Immunology (ACAAI)<sup>2</sup>, between 0.5 and 5.0 percent of the population in this country are subject to anaphylaxis (a type of severe, systemic allergic reaction) as a result of insect stings, which result in over 40 deaths and send more than ½ million people to emergency rooms every year.

What stinging insects are people allergic to?

Most stings are from wasps, yellow jackets, and hornets (Family Vespidae), bees (Family Apidae), or fire ants (Family Formicidae). The following provides examples of the primary stinging insect varieties:



Wasp



Bee



Hornet



Yellow Jacket



Fire Ant

What happens when someone is “stung” by an insect?

Most stings from insects such as these result in at least a local reaction, which is due to the injection of venom into the victim's skin. Venom is a water-based solution that includes a variety of proteins, peptides, and vasoactive amines, which are substances that cause immunoglobulin E (IgE) to be released within the skin and other tissues; IgE then causes the

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<sup>2</sup> [http://www.medem.com/medlb/article\\_detailb.cfm?article\\_ID=ZZZMO0FIA9C&sub\\_cat=530](http://www.medem.com/medlb/article_detailb.cfm?article_ID=ZZZMO0FIA9C&sub_cat=530)

release of the chemical histamine by cells in the skin and other tissues. As a result, and due both to the venom itself and to the IgE and histamine, the envenomation generally causes pain, itching, redness, and swelling at the site of the sting. A local reaction can be mild and limited to the immediate vicinity of the sting, or it can extend to involve a much larger area and can even occlude blood flow to the distal parts of a limb, for example, if a sting is on a finger, or an arm or leg.

One or more stings at some point in the past are thought to be necessary for immunologic sensitization to the venom to occur, though an individual may or may not be aware of that exposure, and sensitization does not occur in all individuals or following every envenomation. Once sensitization has occurred, however, further stings are more likely to cause a large scale release of histamine and other immune system agents that may result in either a systemic reaction (anaphylaxis) or major, localized reactions.

While about half of all deaths due to insect stings occur in people who have no known prior reactions to such stings, about 60% of people who have had a systemic reaction due to an insect sting will have another systemic reaction with subsequent stings. Preparation and prevention are key considerations for the health and safety of all people with a risk of exposure, but particularly for those who have had a previous systemic reaction.

#### How can allergic reactions be prevented, or treated?

Once an individual has been identified as being sensitive to stinging insects, it is important for them to take steps to protect themselves from subsequent exposure to venom (i.e., they should avoid getting stung) and to be prepared to treat the allergic reactions that are at greater risk of occurring. Epinephrine is the most effective medication for preventing and treating anaphylaxis, though it may be combined with (or preceded by) the use of antihistamines (e.g., diphenhydramine, or Benadryl®) or, in a medical facility, epinephrine may be followed by injectable steroids. The easiest form of epinephrine for use by individuals may be the EpiPen®, an autoinjector device that delivers a single dose of 0.3 mg of epinephrine by “stabbing” the unit into the lateral aspect of the thigh, exposing the needle and injecting the medication into the large lateral quadriceps muscle, well away from the large blood vessels or nerve bundles that otherwise may be hit by the injection. Intravascular injections may cause stroke (due to the sudden and significant rise in blood pressure from such a dose) or loss of limbs (due to the occlusion of major blood vessels by the action of the drug, a particular problem for the hands, feet, or fingers). Repeat doses may be necessary in severe cases, and carrying extra EpiPen® injectors is recommended, but the medication generally is highly effective in preventing and treating allergic reactions.

A draw back to the EpiPen® and other forms of epinephrine, however, is the fact that the medication must be protected from extremes of temperature. The manufacturer (Dey®, an affiliate of Merck KGaA) specifies that the EpiPen® is to be stored at 77°F, with temperature variations only allowed from 59°F to 85°F.<sup>3</sup> This is a narrow temperature range for a medication that may be required for use in the sort of environmental situations that may be encountered by some federal employees who work in field or remote locations. Also, the

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<sup>3</sup> [http://www.epipen.com/epipen\\_prescribing.aspx](http://www.epipen.com/epipen_prescribing.aspx)

medication specifically is not to be refrigerated, due to the risk of precipitation of the drug, so this is not an option for maintaining a stable storage environment.

While treatment with an EpiPen® generally is quite safe and effective, some individuals either have not had the device prescribed for them or have not chosen to keep the medication available for use in case of an envenomation incident. They are then at risk for a severe allergic reaction if they are stung.

How is an employee's history of allergies assessed?

Individuals who have had allergic reactions to stinging insects commonly have been seen by health care providers who have provided treatment for those reactions, and who also may have reviewed the individual's history to determine whether or not similar reactions have occurred in the past. Because of the risk of sensitization, knowledge of any past history of allergic reactions is important, and includes: the type of reaction a person has had, since this can give important information about the risk of similar or worse reactions in the future; the type of exposure (i.e., what insect), since this is important related to the specific type of hazard the individual may face in the future; and the response of the individual to different modes of treatment, since this gives important information about how they might respond in the future.

Most medical history forms include questions about allergic reactions, since this is such an important topic. For example, the wildland firefighter baseline medical history form addresses the issue as follows:

|   |                                    |  |
|---|------------------------------------|--|
| <p>2. Are you allergic to<br/>bee/wasp/hornet/ fire<br/>ant/yellow jacket stings?</p> | <p><input type="checkbox"/> No</p> | <p><input type="checkbox"/> Yes</p> <p>Check any of the reactions you have had:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> swelling or itching at site of sting only</li> <li><input type="checkbox"/> swelling or itching at site(s) other than site of sting, i.e. if stung on arm, swelling or itching has occurred somewhere other than on arm</li> <li><input type="checkbox"/> hives</li> <li><input type="checkbox"/> anaphylactic shock</li> <li><input type="checkbox"/> blood pressure problems</li> <li><input type="checkbox"/> difficulty breathing</li> </ul> <p>Please explain <u>in detail</u> any positive responses marked above:</p> <p>_____</p> <p>_____</p> <p>Have you ever been advised by a physician to carry an EpiPen for yourself? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Do you carry an EpiPen for yourself? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> |
|---|------------------------------------|--|

Positive responses to questions such as these may prompt requests for further, clarifying information to be sure the medical reviewing officer sufficiently understands the nature of the allergy and the ability of the individual to treat and respond to exposures successfully. If the individual reports that they have not been prescribed or advised to carry an EpiPen®, or that they do not carry an EpiPen® with them, follow up correspondence with the reviewing medical officer is likely, since the individual would be at risk of becoming incapacitated or losing their life if they are stung by a venomous insect.

What are the medical-safety risks associated with a stinging insect allergy?

A reaction to a stinging insect envenomation can vary from a simple, sudden response to the sensations due to the envenomation (e.g., causing a sudden distraction from current activities, such as driving); to a phobic reaction (e.g., severe, disabling fear); to a local reaction that may cause pain, swelling, redness, and stiffness; to anaphylaxis, the severe type of allergic reaction that can lead to respiratory arrest and death.

**Agency Response to a History of Severe Allergic Reaction**

Does a history of an allergic reaction to stinging insects pose a safety risk or undermine the efficiency of the job? When can (or should) management grant a waiver (with or without mitigations), a step that means, for that particular employee, management is going to allow the employee to continue to work despite the failure to meet an established standard? What types of accommodations are possible, and reasonable, in response to an employee's history of a stinging insect allergy for which an appropriate medical treatment has not been prescribed? This overview will address these questions to help guide the manager to respond in a fair and responsible way when an employee is unable to meet an immune system standard.

Does a history of an allergic reaction to stinging insects pose a safety risk or undermine the efficiency of the job?

It may. Depending on the workplace hazards, or the functional requirements of the particular job, a reaction to a stinging insect could pose a safety risk or undermine efforts to accomplish the agency's mission. As noted above, stinging insects can cause a reaction that can vary from a sudden distraction from current activities, such as driving, to that of phobia, or to localized pain, swelling, redness, and stiffness, or to full-scale anaphylaxis, with loss of consciousness and even respiratory arrest and death. An analysis of the types of work place hazards, should an employee suddenly lose attention or consciousness, is necessary in order to determine the risk of such reactions in the individual work settings. The lack of a prescribed medication being available to treat an allergic reaction increases the risk that the individual will become incapacitated if they are stung. This increases the threat to the individual's safety, and possibly to their co-workers as well. It also may interfere with the successful completion of the agency mission. The potential for a loss of an effective employee as a result of a sting incident, without a readily available and effective method of treatment, should be taken into careful consideration by safety and management personnel.

Granting a waiver for an employee with a stinging insect allergy when an EpiPen® has not been prescribed

A waiver may be granted when, in the judgment of a deciding official, an individual who does not meet a medical standard has demonstrated that they have sufficient experience, skills, or knowledge that they are able to carry out a job or function safely and efficiently despite their medical condition. In this situation, the requirement to meet the standard is waived for that individual for the current evaluation cycle, but the issue should be re-evaluated every time an examination or evaluation normally would be conducted for that individual, and every time there is a significant change in job duties or the work environment. This is intended to ensure that the individual continues to be able to perform

the duties safely and efficiently. The factors discussed in the preceding sections should be considered when making this sort of decision.

Granting a waiver with mitigations for an employee with a stinging insect allergy when an EpiPen® has not been prescribed

A waiver with mitigations may be granted when, in the judgment of a deciding official, an individual who does not meet a medical standard has demonstrated that they have sufficient experience, skills, or knowledge that they are considered to be able to carry out a job or function safely and efficiently despite their medical condition. A careful assessment of the risks of a particular assignment, including the remoteness of the work to be done, the availability of emergency medical care, the likelihood of encountering stinging insects, and the impact of the loss of three or more workers in case of an allergic reaction (i.e., the victim, a person to care for the victim, and a person to go for help). In addition, and as an example based on information from the wildland firefighter medical standards program, the following mitigations may be applicable in certain agency-determined situations, in which the employee would be required to:

- 1) Notify subordinates, supervisors, co-workers, and the medic (when applicable) of the potential for an allergic reaction;
- 2) Notify subordinates, supervisors, co-workers, and the medic (when applicable) of the lack of a readily available treatment option, in the case of an insect sting; and
- 3) Whenever and wherever possible, avoid working in the immediate vicinity of any known nests of stinging insects.

Reasonable accommodations for an employee with a stinging insect allergy when an EpiPen® has not been prescribed

As noted on page 1, the Rehabilitation Act requires the accommodation of disabled individuals if the individual is qualified and the accommodation is reasonable. In other words, it would not impose an undue hardship on the operations of the agency. Determining if an accommodation would pose such hardship depends on:

- “(i) The overall size of the agency's program with respect to the number of employees, number and type of facilities and size of budget;*
- (ii) The type of agency operation, including the composition and structure of the agency's work force; and*
- (iii) The nature and the cost of the accommodation.”*

According to the Act, reasonable accommodation *“may include, but shall not be limited to:*

- (i) Making facilities readily accessible to and usable by individuals with handicaps; and*
- (ii) Job restructuring, part-time or modified work schedules, acquisition or modification of equipment or devices, appropriate adjustment or modification of examinations, the provision of readers and interpreters, and other similar actions.”*

Specific accommodations are beyond the scope of this guide, and should be pursued by the employee and his/her physician if a determination of disability has been made. The factors noted in the regulations, among others that may be applicable to the individual and local

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circumstances of the job, must be considered when a determination is to be made regarding whether or not an accommodation can or should be granted. Any accommodation that is to be considered for an employee must have an established, direct, risk-avoidance or task-accomplishment value related to the specific medical condition(s). Most medical standards have associated with them some form of narrative or description of the “basis” for the standard, and it may be helpful to review this information when considering whether an accommodation is appropriate.

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