REPORT NO. DOT-TSC-RR628-PM-76-1
MARCH 1976

RECOMMENDATIONS TO THE FEDERAL RAILROAD ADMINISTRATION CONCERNING CRITICAL FACTORS IN RAILROAD EMPLOYEE MEDICAL STANDARDS

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Project Memorandum

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PREFACE

This report discusses critical factors which should be considered in the preparation of medical standards for locomotive engineers or other individuals who operate moving equipment. In many instances, a guideline is not proposed because case by case consideration is required. In other instances, a guideline can be proposed because the implications for each case are obvious.

The work described in this report was performed at the Transportation Systems Center as part of an overall program concerned with Human Factors in Railroad Operations. This program was sponsored by the Department of Transportation through the Federal Railroad Administration.

As part of this program, these preliminary suggestions for railroad employees' physical fitness are submitted to the Federal Railroad Administration for the FRA's use in the development of medical standards.

Also included as an appendix is a comparative listing of standards as proposed by the Association of American Railroads, the Bureau of Motor Carrier Safety, the Federal Aviation Administration, and the U.S. Coast Guard. This contrast of standards reveals the variation of problems and solutions already considered, or in practice, and serves better to place in perspective the content material of this report.

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DEFINITIONS

Arrythmia	Pathological variations in normal heart beat rhythm.
Ascites	A form of Edema.
Bell's Palsy	A distortion of the face from a lesion or degeneration of the facial nerves characterized by pain, weakness, and paresthesias sometimes affecting speech.
Hemianopsia	Blindness in one half of the visual field affecting one or both eyes.
Hodgkin's Disease	A usually chronic, degenerative, fatal disease involving progressive enlargement of the lymph nodes and frequently of the spleen and liver, with later invasion of other organs or tissues.
ISO	International Standards Organization.
Meniere's Syndrome	Disorder of the ear's fluid labyrinth leading to dizziness, tinnitus, deafness, accompanied by nausea and vomiting.
Myasthenia Gravis	A sporadic muscular disease characterized by fluctuating muscular weakness, with a predilection for cranial muscles. Symptoms fluctuate from day to day and are often more marked at the end of the day.
Pancarditis	Inflammation of the heart, specifically at the pericardium, myocardium, and heart valves.
Parkinson's Disease	A chronic disorder of the central nervous system characterized by

	slowness and poverty of purposeful movement, weakness, muscular rigidity, and tremor.
Pericarditis	Inflammation of the pericardium (membrane enclosing the heart).
Polycythemia Vera	A chronic, slowly progressive disease characterized by an increase in the total red blood cell mass possibly resulting in cerebral or coronary thrombosis and sudden death.
Pyelogram	Visualization of the kidney pelvis area after injection of a radio opaque substance.
Scotoma	A blind spot in the field of vision.
Sequelae	After effects of a disease of injury.
Vergencephoria	Tendency of the eyeball to deviate from the needed line of sight.
Vertigo	Dizziness caused by a disturbance to the equilibratory apparatus, as opposed to simple faintness or lightheadedness.
Spina Bifida	A congential cleft of the spinal column with protrusion.
Thrombocytopenia	Persistent decrease in the number of blood platelets, usually associated with hemorrhagic conditions.

1. INTRODUCTION

The purpose of this report is to present discussions of physical fitness requirements and recommended guidelines for the preparation of medical standards for locomotive engineers and other individuals who operate moving equipment.

A major problem in the development of this material was the absence of clear decision criteria to be used in setting standards because of differing expert opinions on diagnosis, degree of impact on safety, implementation, or interpretation within the framework of an official standard. In many instances, medical qualification for employment is a matter of judgment. Three of the decision criteria which should enter into such a judgment are:

- Will this condition or its treatment limit or degrade performance to a level below that necessary for the safe operation of moving equipment?
- Can this condition lead to sudden, catastrophic incapacitation?
- Is this condition so severe as to be distracting to the individual, affecting his concentration and responsiveness to the task and thus making him an unsafe operator?

Clearly these criteria are increasingly more open to differences in opinion as to both the diagnosis of the physical condition and its impact on safe operation. Consequently, the examiner's decision as to whether an employee meets a standard becomes progressively more difficult.

Considering the first criterion, the examiner needs only to make certain objective measures of performance. The measurement of sensory processes is the best illustration of this criterion.

Satisfaction of the second may well require the examiner to use his discretion in taking clinical clues and performing non-routine tests, within reason, to aid him in determining eligibility.

Such tests will increase the costs involved in the examination system and may still be inconclusive. In short, some judgment on the part of the examiner will be required for some conditions. Such conditions most often appear in the discussions of internal medicine.

Even more judgment will be required to satisfy the third criterion. Such conditions are most often discussed in the section on responsive ability. In a number of cases, especially in this third area, the summary suggestions are conservative from the point of view of safety but with a strong admonition in the discussion for provision for a waiver system. Such a waiver system should provide checks and balances as increasing judgment is required of the examiner. Finally, because of appeals made by those regulated or with consideration of new findings through research and advances in medical practice, any such set of physical-fitness requirements must allow, administratively, for evolutionary changes in interpretation and implementation.

In the discussion of the medical problem in Section 3 the material is organized into three major sections - sensory processes, internal medicine, and responsive ability - reflecting the increasing need for examiner judgment required by the three successive criteria. Each area is broken down into discussions of its relevance to railroad safety, the medical or administrative problems which might arise, and suggestions for actions which could be taken by FRA concerning specific conditions or tests to be made.

2. PROCEDURE

Preparation of material concerning medical qualifications for employment requires information about medical qualifications or standards and knowledge of the specific tasks that the employee must perform. As a beginning two memoranda were prepared: "Medical Standards as Proposed by the Association of American Railroads, the Bureau of Motor Carrier Safety, the Federal Aviation Administration, and the U.S. Coast Guard,"[1] and "A Task Analysis of Seleted Railroad Operating Positions for the Purpose of Applying Standard Employee Medical Qualifications."[2] The first compared and contrasted several sets of medical standards for transportation workers; the second detailed the formal requirements for the performance of certain operating positions including a rating of the safety hazard potential, the physical demands, and the exposure to the elements of jobs involving the control of, or working in the vicinity of, moving equipment.

These two memoranda, together with information resulting from consultation with members of the Lahey Clinic Foundation of Boston, formed the basis for a set of preliminary material concerning physical-fitness standards for railroad employees. This material was then revised with aid from several sources to prepare this report.

The following medical specialists from the Lahey Clinic Foundation of Boston, Massachusetts, were consulted (under contract) in various medical problem areas:

L. L. Haynes, M.D.	General Medicine
W.R. Torgenson, Jr., M.D.	Orthopedic Surgery
P. Cliver, M.D.	Otolaryngology
D. Steinberg, M.D.	Hematology
L.D. Flint, M.D.	Urology
S.L. Wanger, M.D.	Neurology

G.F. Bigwood, M.D.	Psychiatry
J.R. Schwaber, M.D.	Internal Medicine
S.P. Gibb, M.D.	Gastroenterology
E.B. Connolly, M.D.	Ophthalmology
R.J. McNulty, M.D.	Ophthalmology.

Each specialist was interviewed in depth. These interviews were tape-recorded and later transcribed.[3] Several of these physicians also reviewed the contents of this report.

G.K. Norwood, M.D., Chief of the Aeromedical Standards Division of the FAA Office of Aviation Medicine, reviewed the material and responded with information concerning both the medical and administrative aspects of a set of standards.[4] The FAA has a long history of experience in the development and use of medical qualifications for transportation workers.

In a meeting with the Committee on Medical Standards of the Association of American Railroads, contact was established with the following operating railroad physicians who offered the benefit of their practical, on-the-job, experience:

M.P. Rogers, M.D.	Chief Surgeon, Southern Railway
W.J. Longeway, M.D.	Chief Surgeon, Colorado and Southern Railway
P. Vaughn, M.D.	Chief Medical Officer, Canadian National Railways
B.W. Stockwell, M.D.	Chief Medical Officer, Grand Trunk Western Railroad
R.W. Edmonds, M.D.	Medical Director, Norfolk and Western Railway
W.E. Mishler, M.D.	Chief Surgeon, Erie Lackawanna Railway
V.M. Strange, M.D.	Chief Medical Officer, Southern Pacific Transportation Company

The participation of the Brotherhood of Locomotive Engineers was invited in a meeting with Mr. E.L. McCulloch, Vice-President and National Legislative Representative of the Brotherhood. They responded directly to the FRA.

3. MEDICAL PROBLEM AREAS

3.1 SENSORY PROBLEMS

3.1.1 Vision

An important part of an engineer's examination is the test of his vision. Recommendations for quantitative criteria to be met are given below. Locomotive engineers who do not meet these these criteria because of problems which may be correctable through medical treatment should not be selected for, or temporarily suspended from, duties which include the operation of moving equipment.

3.1.1.1 Visual Acuity - The recommended minimum standards for distant vision are: with or without correction, 20/30 Snellen for one eye, and 20/40 Snellen for the other; without correction, 20/200 in each eye. They allow for the level of visual acuity required adequately to identify and react to signals and hazards occurring far down a set of apparently converging tracks, often only slightly separated from other tracks, and in various weather conditions. The "without-correction" limits are the minimum necessary for finding spare, dropped, or lost glasses. (The carrying of spare glasses on duty should be required.)

Objective requirements for near-visual acuity must be based on the sizes and widths of letters, markers, pointers, and so on, used in cab controls and displays. In general, the engineer sits with his eyes placed about 30 inches from the cab display and reads 3/8-inch lettering. This requires a visual acuity of 20/150 Snellen. Therefore, the recommended standards for near-visual acuity are 20/150 Snellen uncorrected, correctable to at least 20/30 Snellen since failure to correct usually indicates the presence of an eye problem requiring further examination.

It should be noted that eyeglasses, including bifocals and trifocals, are at present the only acceptable visual-correction device for railroad operations without goggles; the railroad

environment is too dirty and dusty to permit the use of contact lenses, either hard or soft, even by cataract patients, unless some auxiliary form of eye protection such as goggles is used.

3.1.1.2 Visual Field - The recommended minimum standard for field of vision is 70° temporal vision and 50° nasal vision in each eye. This field of vision is recommended for all duties requiring movement of locomotives, and especially for yard-switching and other operations involving visual search. For types of operation for which it can be demonstrated that visual search is not critical, appeals from employees with a monocular field of 140° might be considered. Scotomas no larger than the physiological blind spot and not overlapping any scotoma of the other eye might be permissible on a waiver basis for binocular applicants.

3.1.1.3 Color Vision - It is recommended that new employees shall be required to obtain passing scores (missing no more than two plates) on either the Dvorine or Ishihara pseudo-isochromatic color-vision test. These tests must be administered under proper lighting conditions as specified in the test procedure (such as the use of a MacBeth Daylight Easel Lamp).

It has been the practice on some railroads to allow locomotive engineers with certain levels or types of color deficiency to continue to operate. This practice has arisen because there are various levels or degrees of color deficiency. Those who can discriminate the railroad signal colors of red, green, yellow and blue, in rudimentary tests, have generally been permitted to continue to operate. However, the ability required for safe operation is not so much recognizing the signal code from its color and position, but rather being able to locate the signal itself and then read it. This searching activity must sometimes be performed in adverse visibility conditions because of weather, or amid a great deal of visual clutter, especially in multitrack and urban areas. Thus, any degraded color vision may constitute a safety hazard. Consequently, it is recommended that new employees with any degree of color deficiency not be accepted for train-operator service. Many train men entered service before adequate color-

vision testing was available, they should be retained if they can discriminate the standard signal colors using one of the two tests specified above; i.e., Dvorine or Ishihara.

3.1.1.4 Glare Recovery - Glare recovery becomes a problem as age increases. Although there are some testing devices presently available (Scientific Prototype, Inc.), none have been adequately standardized for regulatory use. While glare recovery is an important consideration, further research into the establishment and standardization of criteria is necessary. When such criteria become available, a glare-recovery test should be made part of any visual test.

3.1.1.5 Glaucoma - An applicant or employee diagnosed as having congestive (narrow-angle) glaucoma is subject to sudden onset of acute, incapacitating pain and loss of vision and should be disqualified. However, when this condition is treated by surgery, the chances for recovery of normal functioning are good. The applicant or engineer so treated should then be handled as though having wide- or open-angle glaucoma.

An applicant or employee identified as having wide- or open-angle glaucoma which does not yet require chemical therapy should be re-tested every six months. When he can no longer pass the visual test requirements noted under Sections 3.1.1.1 and 3.1.1.2, he must be disqualified until he is able again to pass the vision tests. Since the chemical therapy used in treating glaucoma sometimes produces extreme contraction of the pupils or spasms of the accommodative reflex or both, an examinee should be disqualified during the time drug therapy is required. He may be permitted to operate moving equipment on a waiver basis only after demonstrating a sufficient history of absence of adverse effects caused by drug treatment.

3.1.1.6 Summary - Vision standards should incorporate the following concepts:

- Distant visual acuity not correctable to at least 20/30 Snellen for one eye and 20/40 for the other should be disqualifying. Without correction distant visual acuity of less than 20/200 in each eye should be disqualifying.
- Use of hard- or soft-contact lenses cannot be recommended at this time unless protective goggles are mandatory.
- A visual field of less than 70° temporal and 50° nasal in each eye should be disqualifying.
- Inability to pass (missing more than two plates) either the Dvorine or the Ishihara color-vision tests should be disqualifying for new applicants.
- Presence of wide- or open-angle glaucoma requiring use of eyedrops or drugs for control or treatment should be disqualifying.

3.1.2 Audition

3.1.2.1 Tone and Speech Perception - In the operating environment, the engineer must perceive and interpret not only tone frequencies (the signal and mechanical sounds of the train) but also speech, which is perceived as an envelope of frequencies.

Presently, if the individual passes pure-tone tests, speech interpretation is assumed and the speech test is not performed.

The tone test (which should be conducted with an audiometric tone device) should show a hearing loss of not more than 35 dB (ISO) across the speech range, 500 to 3000 Hz. A greater loss warrants further investigation, particularly of tone sensitivity in the speech range. Many hearing-loss problems are amenable to correction, through surgery or other treatment. Following such treatment, requalification should be contingent upon the prosthesis used (e.g., wire is reliable; plastic tubing has been known to slip causing extreme vertigo) and successful retesting.

Adequate speech perception is very important for all persons in operations. A two-part speech test is now available which while imperfect is still valuable. The first part of the test measures the speech-perception threshold, which is the threshold intensity (in decibels) at which the subject perceives 50 percent of the test words. The test words are disyllables with equal stress on each syllable, called "spondee" words. The second part (Harvard PAL Auditory Test No. 9) scores ability to detect whether pairs of phonetically balanced (PB) words are the same or different at various sound-pressure levels. Responses which are 75 percent correct at 50 dB are considered socially adequate; 92 percent correct is considered normal.

The corrective measures for both tone and speech deafness commonly include the use of hearing aids. It should be noted, however, that in their present stage of development electrical and mechanical failures are not uncommon. Batteries die, equipment degrades, and people just leave them turned off. More significantly, they do not provide the user with the same ability to distinguish sounds and speech in a noisy background as compared to an individual with normal hearing. Therefore both tone and speech tests should be performed on each ear with random noise in the other ear. At this time specification of the noise level should be governed by the ambient noise level of the locomotive cab, 65-85 dB.[5.] An employee with a hearing aid who can pass these tests can probably function adequately and may be qualified to operate at the examiner's discretion.

3.1.2.2 Binaural Hearing - Binaural hearing is considered essential for spatial localization and for extracting a signal from background noise. Disparate hearing levels in the two ears can also impair spatial localization; it is recommended that the measured differences between ears on pure tone tests not exceed 25 dB for qualification.[6.]

3.1.2.3 Other Ear Disorders - Acute or chronic disease of the middle or inner ear, mastoiditis, perforated eardrum, or abnormal discharges are all grounds for at least temporary disqualification. However, these conditions can usually be corrected enough for the engineer to pass the hearing tests. A history of persistent or recurrent vertigo (loss of balance) due to such conditions should also be disqualifying.

3.1.2.4 Summary - Audition standards should incorporate statements to the effect that:

- Tone-perception tests showing a loss equal to or greater than 35 dB (ISO) across the speech range (500 to 3,000 Hz) should be disqualifying.
- Speech perception test results should be at least 75 percent correct at 50 dB (ISO) on the Harvard PAL Auditory Test No. 9.
- An employee using a hearing aid in one or both ears must meet the requirements of not only the tone-perception test for each ear separately but also the speech perception test in the presence of 65-85 dB (ISO) random noise for each ear separately. He may then be certified to operate at the examiner's discretion.
- A disparity in hearing levels between the two ears exceeding 25 dB on pure-tone tests should be disqualifying.
- Any acute or chronic disease of the middle or inner ear, mastoiditis, perforated eardrum, or abnormal discharges should be grounds for disqualification until corrected.
- Any acute or chronic disease of the middle ear resulting in vertigo (dizziness or loss of balance) should be disqualifying until corrected.

3.2 INTERNAL MEDICINE

3.2.1 Cardiology

3.2.1.1 Electrocardiograms (EKG's) - EKG recordings should be made biannually (or more frequently where warranted) for those under 50, and annually for those 50 and over. The resulting graphic records should be retained for further evaluation in cases of disputed diagnosis.

Consideration should be given to the use of a system by which the EKG is automatically relayed from the examining physician's office via a telephone link to a central computer facility. This system would insure uniformity of recording technique, uniformity of analysis, and readily retrievable storage.[7].

For cases in which the diagnosis does not provide unequivocal results, an exercise-tolerance EKG might well be administered in addition to the static EKG, to test dynamic cardiac functioning. Such a test should be administered triennially, or whenever coronary insufficiency is suspected (e.g., because of mild angina, arrythmia, or conduction defects). However, at present, exercise-tolerance EKG records must be interpreted manually, not by automated systems.

3.2.1.2 Disqualifying Conditions - The recommended overall statement of disqualifying conditions is the one used by the Bureau of Motor Carrier Safety: "A history or clinical diagnosis of myocardial infarction, angina pectoris, insufficiency, thrombosis, or any other of a variety of conditions or diseases known to (lead to) syncope, dyspnea, collapse or congestive cardiac failure."[8].

Other conditions are more difficult to specify, but may include actue or chronic bacterial involvement of the valves without evidence of recovery, systolic or diastolic murmurs (indicating a significant cardiac pathology), and aortic or other aneurysms (especially in the thorax and cranium). In general,

all people with uncorrected aneurysms should be disqualified. Conduction defects or sustained arrythmia may also be considered disqualifying, but these conditions are highly controversial, and thus, should be left to the judgment of the examining physician and any supervisory physicians employed by the FRA. A clinical diagnosis of pericarditis or pancarditis with sequelae which does not respond to treatment should be disqualifying.

Arteriosclerosis generally occurs to some degree in all people, and should not in itself be a cause for disqualification. In some cases, however, it is symptomatic of, and contributes to, consistently high blood pressure. Obesity and a number of other causes can also contribute to high blood pressure. The FAA table reproduced herein is recommended as a set of age-corrected blood-pressure standards acceptable to all of those consulted:

MAXIMUM AGE-CORRECTED BLOOD PRESSURE READINGS[9].
(See Footnote Below Explaining Adjusted Maximum Readings)
Readings)

Age Group	Maximum readings (reclining blood pressure in mm)		Adjusted maximum readings (reclining blood pressure in mm)[1]	
	Systolic	Diastolic	Systolic	Diastolic
20-29	140	88	-	-
30-39	145	92	155	98
40-49	155	96	165	100
50 and over	160	98	170	100

[1]For an applicant at least 30 years of age whose reclining blood pressure is more than the maximum reading for his age group and whose cardiac and kidney conditions, after complete cardiovascular examination, are found to be normal.

3.2.1.3 Corrective Measures - The number of available treatments for various cardiovascular disorders is increasing. The effectiveness of these treatments is not universally agreed upon at present, so periodic review of the situation is warranted.

There is little argument that arterial grafts, aortic or peripheral, should be grounds for disqualification, if the disease process requires drugs for control. However, there has been considerable controversy concerning disqualification before grafts become necessary. The presence of this controversy implies the need for waiver provisions for those who can control the predisposing conditions through weight control, salt restriction, and perhaps with diuretic drugs, and for whom there are no other signs or symptoms of vascular pathology.

Further, in some cases medication for the control of blood pressure can affect reaction time; therefore, the patient should be disqualified until the condition has been stabilized.

Employees should also be disqualified during the period they are undergoing anticoagulant therapy.

The use of the present-day heart pacemakers should be grounds for disqualification, mainly because of the danger of battery failure; the situation should be re-evaluated when safer devices, such as the new nuclear-powered ones, become the standard.

Heart surgery, such as replacement of a valve, repairs to cardiac muscle tissue or operations on the pericardium, and heart replacement are still considered experimental operations. Thus, a conservative approach would be that such operations should disqualify an employee from operating moving equipment pending further clarification of his case.

3.2.1.4 Summary - Cardiology standards should incorporate statements to the effect that:

- EKG records should be taken biannually for those under 50 and annually thereafter.
- A history or clinical diagnosis of myocardial infarction, angina pectoris, coronary insufficiency or thrombosis, or

any other of a variety of conditions or diseases known to be accompanied by syncope, dyspnea, collapse, or congestive heart failure should be disqualifying.

- Acute or chronic bacterial involvement of the valves without evidence of recovery should be disqualifying.
- Systolic or diastolic murmurs indicating presence of cardiac pathology should be disqualifying.
- Aortic, thoracic, or cerebral, or uncorrected aneurysms should be disqualifying.
- Pericarditis or pancarditis with sequelae not responding to treatment should be disqualifying.
- High blood pressure outside the ranges established in Table 1 should be disqualifying.
- Arterial grafts, aortic or peripheral, should be disqualifying pending further clarification.
- Anticoagulant therapy should be disqualifying during the period of use.
- Use of present-day heart pacemakers should be disqualifying.
- Heart surgery, such as replacement of a valve, repairs to cardiac muscle tissue, or operations involving breaching the pericardium should be disqualifying pending further clarification.

3.2.2 Hematology

3.2.2.1 Discussion - Severe anemia should be disqualifying. However, anyone with a hemoglobin count less than 14-16 g./100 ml (12-14 g./ml for females)[10.] should be examined to determine the cause and if the condition is under control. Some individuals have low hemoglobin or red-blood-cell levels since birth and have adapted quite well. Screening should be performed for hemolytic, sickle cell, and Mediterranean anemias. While the

trait is bothersome only in low-pressure environments, the disease can produce joint pains, leg ulcers, and severe complications. The disease then, not the trait, should be disqualifying.

A number of other blood conditions, while incapacitating only when they have reached a crucial stage, involve the danger of sudden, catastrophic cardiovascular degeneration. Until improved control techniques or cures have been developed a diagnosis of any kind of the following diseases should generally be disqualifying: leukemia, lymphoma, Hodgkin's disease, multiple myeloma, thrombocytopenia, and polycythemia vera which requires treatment. Consideration must be given, however, to the implementation of waivers for specific cases depending on criteria which must be developed by qualified medical personnel.

Severe hemophilia would probably prevent a person from ever entering rail service. However, this condition exists in varying degrees, and some recent therapies have been able to mitigate its effects. Nonetheless, even with a waiver system these cases should be considered grounds for disqualification from the operation of moving equipment, because of the possibility of sudden cardiovascular degeneration. A history of bleeding in the joints would be symptomatic of mild hemophilia.

3.2.2.2 Summary - Hematology standards should incorporate statements to the effect that:

- At present, severe anemia should be disqualifying.
- At present, hemolytic, sickle cell and Mediterranean anemia (not traits) should be disqualifying.
- A diagnosis of leukemia, lymphoma, Hodgkin's disease, multiple myeloma, thrombocytopenia and polycythemia vera (which requires treatment) should be disqualifying.
- Hemophilia is disqualifying.

3.2.3 Respiration

3.2.3.1 Asthma - Asthma is a special problem because a sudden attack can be so debilitating. A person may be perfectly fit most of the time, but seasonally (due to allergy) or under emotional stress in emergencies or under other unusual conditions suffer from asthmatic attacks. Medications exist which prevent these attacks, but often they have adverse side effects which lead to increased safety hazards for the employee. The majority of the opinions received have been against permitting a person with a current history of asthma from operating moving equipment, but there are so many extenuating circumstances that more specific guidelines or an appeals panel should be considered. Unless such a panel is established, a current history of asthma should be disqualified temporarily.

3.2.3.2 Other Lung Diseases and Conditions - A chest X-ray should be taken annually for the detection of such lung diseases as tuberculosis, emphysema, and lung cancer.

Tuberculosis, like most active lung diseases with cavitation, can often be successfully treated. Until the patient has been cured, however, such a dysfunction should be disqualifying.

The incidence of either emphysema or dyspnea (labored breathing) is increasing, especially among railroad engineers. A timed vital-capacity measurement should be made upon any suspicion of breathing impairment; operating norms should be specified by a Railroad Surgeon-General. Individuals with breathing impairments should also undergo clinical tests for breathing pressure, volume, oxygen consumption, and other indicators judged appropriate by the examining physician. These will generally permit a detailed diagnosis to be made. In milder cases, treatment might be as simple as to require the individual to stop smoking and to start breathing exercises. Upon successful re-examination, employment may be resumed. However, sometimes the extent of recovery from pulmonary dysfunction is not determinable, even with extensive

testing. Whether this "indefinite recovery" is grounds for re-qualification is something which might be determined by appeal to a Railroad Surgeon-General.

3.2.3.3 Summary - Respiratory standards should incorporate statements to the effect that:

- A current history of asthma should be disqualifying.
- Annual X-ray should be taken to screen for tuberculosis or other potentially debilitating respiratory conditions.
- Severe emphysema should be disqualifying.

3.2.4 Gastroenterology

3.2.4.1 Gallstones - Most gastrointestinal diseases are chronic, not acute conditions which could cause sudden incapacitation. A major exception is the occurrence of biliary colic caused by gallstones. About 20 percent of the population have gallstones; about a quarter of these at some time in their lives have an unexpected attack of biliary colic (trying to pass a stone). The pain is sudden and fairly severe, but a stricken engineer could maintain control of his train long enough to get help. The condition is corrected by surgery or successful passing of the stone. The risks are acceptable, so it is recommended that patients with gallstones be allowed to work. However, if the occurrence of biliary colic is frequent, surgical correction should be required for qualification.

3.2.4.2 Other Gastrointestinal Conditions - Certain gastrointestinal conditions, though they do not cause sudden incapacitation, are dangerously distracting to a person's responsiveness to his task. Intra-abdominal pathology caused by various factors is likely to cause frequent or prolonged episodes of severe pain, abdominal distension, nausea, or vomiting. Judgment as to the degree of functional impairment must be left to the examining physician, and be subject to appeal.

Active ulcers -- gastric, peptic, duodenal, or jejunal -- fall into this category. However, they should not be disqualifying unless complicated by continuous anemia, malnutrition, loss of weight, hemorrhages, partial obstruction, or prolonged episodes of vomiting, any of which are under active treatment or which are not amenable to treatment. A partial gastric resection, used in treating peptic ulcers, should not be cause for disqualification unless the "dumping syndrome" (paleness, sweating, and nausea) results. Cirrhosis of the liver should be disqualifying if it is complicated by jaundice, ascites, or portal hypertension with esophageal varices, since then such a condition will have a 50 percent chance of sudden massive bleeding within a year. Ulcerative colitis and regional enteritis can also be distracting or incapaciting; qualification should be at the examiner's discretion. Because of the varying degrees of severity and chronicity of these disorders, biennual examinations should be required.

Hernia should not be considered grounds for disqualification if corrected by surgery or managed by trusses.

3.2.4.3 Genitourinary Ailments - Most ailments in the genitourinary area are chronic and controllable. In general, they do not lead to sudden, acute incapacitation. Some of them may be considered disqualifying, however, because they impair operating efficiency at safety critical tasks. This judgment should be made by the examining physician.

In examining kidney function, either a serum-creatinine or a blood-urea-nitrogen test should be made on the urine, as well as a microscopic examination. A blood-urea-nitrogen level exceeding 30 mg/100 ml, or a rise in the level accompanied by a family history of renal difficulty, indicates the advisability of further testing. Since kidney function can be as low as 25 percent of normal before the results show up in such tests, an intravenous pyelogram should be made if renal function is in any way questionable. The danger in renal malfunction is the resulting buildup of waste in the blood which eventually leads to impaired

mental functioning and coma. Some people chronically carry excess waste in their blood however, and buildup to the danger point may take years.

Removal of a kidney (or the absence of one) should not be disqualifying provided the results of the intraveneous pyelogram are satisfactory. Advanced glomerulonephritis should be grounds for disqualification however. Kidney stones and uric-acid stones are not dangerous except while they are being passed. This process takes a month at most. The uric-acid stones cannot be detected by X-ray, but a history of gout or a high level of uric acid in the urine are suggestive of the condition. Stones, then, should be considered as grounds for disqualification only if they are frequent or associated with severe pain (many are not) or if an intravenous pyelogram shows residual, possible stones.

Fistulas, whether caused by tuberculosis or surgically created to bypass the bladder, should not be considered disqualifying once the acute condition has been treated. Wearing an appliance solves the problem, and even if the appliance is dislodged the results are hardly catastrophic.

The size of the prostate should be checked, but only obstructions causing acute urine retention (which is painful and requires catheterization) should be disqualifying. Prostatectomy should not be disqualifying once normal urinary functioning has been restored.

An applicant or employee should be disqualified if he has an established history or clinical diagnosis or diabetes mellitus requiring insulin or any other hypoglycemic drug for control. The hazards of both the condition and the drugs used for its control are too great to permit the safe operation of moving equipment.

3.2.4.4 Summary - Gastroenterology standards should incorporate statements to the effect that:

- Asymptomatic gallstones should not be grounds for disqualification.

- Active ulcers (gastric, peptic, duodenal or jejunal) should not be disqualifying unless complicated by continuous anemia, malnutrition, loss of weight, hemorrhages, partial obstruction, or prolonged episodes of vomiting, none of them amenable to treatment.
- Cirrhosis of the liver with jaundice, ascites, or portal hypertension with esophageal varices should be disqualifying.
- Hernia should not be disqualifying if corrected by surgery or managed by use of trusses.
- Either a serum-creatine or a blood-urea-nitrogen test should be performed on the blood as well as a microscopic examination of the urine on the first examination; thereafter, only urine tests are required.
- Removal of a kidney should not be disqualifying provided the results of an intravenous pyelogram are satisfactory.
- A diagnosis of glomerulonephritis should be disqualifying.
- Intestinal fistulas should not be disqualifying once the acute condition has been treated.
- Prostatectomy should not be disqualifying once normal functioning has been restored.
- An applicant or employee should be disqualified if he has an established history or clinical diagnosis of diabetes mellitus requiring insulin or any other hypoglycemic drug for control.

3.3 RESPONSIVE ABILITY

3.3.1 Orthopedics

3.3.1.1 Discussion - Three problem areas may be considered: (a) loss of a foot or leg, or hand or arm; (b) impairment of the use of, loss of sensation in, or loss of coordination of any of those

parts; (c) any other structural defects which are likely to interfere with the safe performance of the employee's duties.

Although at present there is no definition of what constitutes interference, the results of the human-factors task analysis performed elsewhere[11] may be used to estimate the degree of movement, coordination, or feedback sensation required for the successful or safe operation of the various types of equipment used by the railroads. (Similar studies have been made for aircraft operation.) The safety records of current railroad employees with orthopedic defects should further clarify the capacities required for safe performance of duties.

Arthritis, or any other disease, injury, or congenital defect of the cervical, dorsal, or lumbar spine which is likely to interfere with safe performance of duties should be disqualifying. Conditions such as healed or simple compression fractures, congenital defects such as spina bifida, and diseases such as rheumatoid arthritis which have not caused extensive damage will not interfere with performance.

Bone tumors, whether benign or malignant, and tumor-like conditions of the long bones or spine, should be disqualifying. Those employees with a controlled condition should be permitted to work under a special certificate, provided that the bone tissue is strong enough to withstand minor stress.

3.3.1.2 Summary - Orthopedics standards should incorporate statements to the effect that:

- Loss of a foot, leg, hand, or arm; impairment of the use of, loss of sensation in, or loss of coordination of any of these parts; or any other structural defects preventing an applicant from fulfilling a defined set of requirements for degree of movement, coordination, or feedback sensation required for the safe performance of duties should be disqualifying.

- Arthritis, or any other disease, injury, or congenital defect of the cervical, dorsal, or lumbar spine which is likely to interfere with the safe performance of duties should be disqualifying.
- Bone tumors, whether benign or malignant, and tumor-like conditions of the long bones or spine which leave the bone tissue unable to withstand stress should be disqualifying.
- Healed or simple compression fractures, congential defects such as spina bifida, and diseases such as rheumatoid arthritis which have not caused excessive damage should not be disqualifying.

3.3.2 Neurology

3.3.2.1 Discussion - The application of neurological criteria often requires subtle, qualitative judgment. For instance, a good sense of smell is important for sensing fires or burning waste in hotboxes, but, at present, there is no way easily to quantify smelling performance. In most cases, degree of severity of a neuromuscular problem, and its potential for interfering with safe operation, must be left to the judgment of the examining physician, or to an appeals board. Items of particular concern include circulatory impairment in the brain, heart, or hands, restrictions in the range of eye movements (preventing a full visual search pattern), the presence of Bell's palsy severe enough to interfere with speech, and torticollis or inability fully to turn the head.

3.3.2.2 Epilepsy - Epilepsy and the other convulsive disorders should be disqualifying, not only because of the effects of the condition itself, but because of the side effects of the drugs used to control it. A history of loss of consciousness without a satisfactory medical explanation should also be grounds for disqualification.

3.3.2.3 Parkinson's Disease, Myasthenia Gravis, Multiple Sclerosis, Paralysis - Parkinson's disease controlled with L-Dopa should not be grounds for automatic disqualification; a patient may have years of useful function during the disease's progress. Once a diagnosis has been established, a functional examination should be required every six months. Conditions such as myasthenia gravis, multiple sclerosis, and periodic paralysis should be grounds foe disqualification even if medically controlled since the side effects of medication for these conditions often effect the mental skills necessary for safe operation. Some waiver or review provisions should apply for the conditions discussed in this paragraph in consideration of adequate functioning early in the disease process and the adverse effects of drugs.

3.3.2.4 Ataxia - Ataxia or other malfunction of the cerebellum should be grounds for disqualification. In view of the variations in the job requirements, the location of the affected neuromuscular system, and the severity of the condition, an appeals procedure should be available.

3.3.2.2 Summary - Neurology standards should incorporate statements to the effect that:

- History of loss of consciousness without satisfactory medical explanation should be disqualifying.
- Epilepsy and other convulsive disorders should be disqualifying.
- Parkinson's disease controlled with L-Dopa should not be disqualifying provided an examination is required semi-annually.
- Myasthenia gravis, multiple sclerosis, or other periodic paralysis should be disqualifying.
- Ataxia or other malfunctions of the cerebellum should be disqualifying.

3.3.3 Psychiatry

3.3.3.1 Discussion - Psychiatric diagnosis is obviously another area in which judgments are required. Diagnosis of severe personality disorders, senility, or non-toxic psychosis are functions of the examining physician or psychologist. The anticipation of acute attacks of psychosis (including schizophrenia), depression, or other personality disorder severe enough to interfere with safe performance of duties is often impossible. The frequency and extent of psychiatric problems in the railroad industry is indeterminate at present. There is little literature on the prevalence of such problems in railroad operations beyond a discussion in an article by D. R. Davis.[12] This subject requires further study.

Little exists in the way of predictive testing. It is often expensive, time-consuming, not definitive in its results, and thus impractical for routine use. Computer-scored scales such as the Minnesota Multiphasic Personality Inventory[13] are now available and could be administered along with a personality history questionnaire. Such tests require a long time to fill out and require reading skills. They must be demonstrated to be related to job performance through a validation program if they are to be used with new employees. Nonetheless, the use of such screening techniques should be considered, both at the time of hiring and within every five years thereafter for jobs in which mental stability is critical to safety.

A reporting system, requiring inputs from someone in a position to observe the employee (such as his supervisor), might prove useful in evaluating suspected neurotic, psychotic, or other nervous conditions. How well the employee works, what difficulties or troubles he has, what kind of interpersonal relations he has, and similar descriptions would be involved. Such reports could be used by a clinical psychologist or psychiatrist for purposes of diagnosis. The person in question should be interviewed before an opinion as to his fitness is reached since such a system has a definite potential for harassment of the employee under examination.

If psychiatric difficulties do play an important role in unsafe operation, a careful look at the techniques available for identifying and controlling such problems is merited. For example, the use of psychological screening tests, an employee-observation system, and structural psychiatric interviews should be examined. The development of such a program and the administration and interpretation of written tests, behavioral tests, and any necessary clinical investigations should be performed only by competent psychiatrists or clinical psychologists.

3.3.3.2 Summary - No further specific grounds for disqualification beyond these items can be included:

- A personality disorder severe enough to have repeatedly manifested itself by overt acts should be disqualifying.
- A clinical diagnosis of psychosis should be disqualifying.

3.4 SPECIAL CONSIDERATIONS

3.4.1 Discussion

Three conditions require special consideration: malignant tumors, bleeding, and pregnancy.

Malignanacies are tragic occurrences. In general, afflicted individuals should be allowed to continue working for as long as they are able to function safely, provided that they are examined every three months. One exception to this rule involves the detection of a brain tumor. This condition should be disqualifying until it has been treated or surgically removed and the patient can again pass tests of mental and neurological function without use of supportive drugs or risk of seizure. Postoperative qualification should be assessed every six months for a five-year period and annually thereafter.

A history of severe bleeding anywhere in the body with the possible exception of nasal bleeding should be considered grounds for disqualification.

As women are currently employed as train operators on rail and rapid-transit systems, operation during pregnancy must be considered. Personnel should be disqualified from operating moving equipment from the beginning of the third trimester of pregnancy until six weeks after delivery. Any complications should be made known to the examining physician for the railroad so that determination of their effects on safe operation may be made.

3.4.2 Summary

Standards concerning malignancy, bleeding, and pregnancy should incorporate statements to the effect that:

- Controlled malignancy should not necessarily be disqualifying provided an examination is required quarterly.
- Brain tumors should be disqualifying until controlled or removed and the patient can pass neurological function and mental standards tests, and subsequent examinations should be required semiannually for five years.
- A history of severe bleeding anywhere in the body should be disqualifying.
- Personnel should be disqualified from operating moving equipment from the beginning of the third trimester of pregnancy until six weeks after delivery provided there are no complications.

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17. United States Coast Guard, Title 46 - SHIPPING, Chapter 1 - Coast Guard, Department of Transportation, Subchapter B - Merchant Marine Officers and Seamen, Part 10 - LICENSING OF OFFICERS AND MOTOR BOAT OPERATORS AND REGISTRATION OF STAFF OFFICERS (revised as of 1 October 1972), Subpart 10.02 - General Requirements for all Deck and Engineer Officer's Licenses, Section 10.02-5. Requirements for original license, Section 10.02-7, Requirements for raise of grade of license, Section 10.02-9. Requirements for renewal of license, 1 January 1971.

APPENDIX

MEDICAL STANDARDS AS PROPOSED BY THE ASSOCIATION OF AMERICAN RAILROADS, THE BUREAU OF MOTOR CARRIER SAFETY, THE FEDERAL AVIATION ADMINISTRATION, AND THE U.S. COAST GUARD

A-1. INTRODUCTION

A-1.1 PURPOSE

The preparation of material concerning medical qualifications for employment requires specific information as to the present status of medical qualifications or standards within the transportation industry. The purpose of preparing this appendix was to contrast several sets of medical standards, either proposed or in use, for transportation workers.

A-1.2 SCOPE

The medical standards in use are compared to those proposed by the Association of American Railroads.[14] The medical standards in use in transprotation systems were taken from and limited to those stated in the Code of Federal Regulations for the Bureau of Motor Carrier Safety,[15] the Federal Aviation Administration,[16] and for the U.S. Coast Guard.[17]

A-1.3 APPROACH

The material, whether administrative or medical in nature, is presented by listing the closest comparison possible among the sources in the order: (a) Association of American Railroads (AAR), (b) Bureau of Motor Carrier Safety (BMCS), (c) Federal Aviation Administration (FAA), and (d) U.S. Coast Guard (USCG). In most cases, a direct quote was made and referenced to the sources noted in the previous subsection, SCOPE. However, in many cases no data existed for one or more sources. Where this occurs, the word "None" is inserted. In a few cases the words "None specifically" with a reference is used. Those few cases arose because the Bureau of Motor Carrier Safety source included instructions for the medical examiner requesting him to search for or note the presence of a condition, but it did not state whether said condition was, in fact, disqualifying; although the implication is that it should be.

A-2. GENERAL ADMINISTRATIVE COMPARISONS

A-2.1 EMPLOYEES COVERED

a. AAR

"Locomotive Engineer or Motorman; Locomotive Fireman (Diesel Helper) or Outside Hostler; Conductor, Assistant Conductor, Yard Conductor (including Engine Foreman and Footboard Yardmaster); Flagman, Brakeman, Baggageman (on train), Ticket Collector (on train), Yard Brakeman (including Yard Helper and Switchman); Tower Operator or Leverman; Train Dispatcher, Telegrapher; Drawbridge Tender. The foregoing shall include any position, composite, or otherwsie, combining or including responsibilities of any of the job classifications identified above." (SUBPART A - GENERAL, Sec. 3 (Employees Covered).

b. BMCS

". . . driver of a commercial motor vehicle."(391.43 (C)).

c. FAA

Airmen applicants for first-class medical certificate (67.13).

d. USCG

All deck, master, mate, or pilot and engineer officers (10.02).

A-2.2 ADMINISTRATOR OF EXAMINATION

a. AAR

"The railroad shall designate the medical examiner to conduct the examination. The examiner selected shall be licensed in the practice of medicine and shall have knowledge of the particular duties and responsibilities of the employee's occupation." (Sec. 1 (c)).

b. BMCS

" . . . the medical examination shall be performed by a licensed doctor of medicine or osteopathy." (391.43 (a). "A licensed optometrist may perform so much of the medical examination as pertains to visual acuity, field of vision, and the ability to recognize colors . . ." (391.43 (b)).

c. FAA

"Any aviation medical examiner (including senior flight surgeons of the Armed Forces) who is specifically designated for the purpose may give the examination for the first class certificate." (67.23 (a)).

d. USCG

Medical Officer of U.S. Department of Public Health, ophthalmic surgeon, possibly by a reputable physician. (19.02-5 (3) (1) and (6)).

A-2.3 FREQUENCY OF EXAMINATION

a. AAR

"Each employee shall be given a medical examination by his employer at least once every three years until he reaches age 65, and at least once every year thereafter." (Sec. 1 (a)).

b. BMCS

"Any driver who has not been medically examined and certified as qualified to drive a motor vehicle during the preceding 24 months," (391.45 (b)) "any driver whose ability to perform his normal duties has been impaired by a physical or mental injury or disease." (391.45 (c)).

c. FAA

Every two years until age 40 years, then annually thereafter. (67.13 (e) (3)).

d. USCG

License valid for five years.

A-2.4 EXEMPTIONS FOR EMPLOYEES IN SERVICE ON BEGINNING DATE OF REGULATIONS

a. AAR

"All such persons who are in the railroad service at the time these regulations become effective shall continue in such service as though medically qualified . . . until the medical examinations required by these regulations have been administered." (Sec. 1. (a)).

b. BMCS

"Any driver who has not been medically examined and certified as qualified to drive a motor vehicle during the preceding 24 months." (391.45 (b)).

c. FAA

None

d. USCG

None

A-2.5 STATEMENT OF EMPLOYABILITY

a. AAR

". . . No person shall be employed by or permitted to remain in the employment of any railroad. . . who has an established medical history or clinical diagnosis of any of the following." (Sec. 2).

b. BMCS

"A person is physically qualified to drive a motor vehicle if he . . . " (391.41 (b)).

c. FAA

"To be eligible for a first-class medical certificate, an applicant must meet the requirements of . . ." (67.13 (a)).

d. USCG

"All applicants for an original license shall be required to pass a physical examination given by a medical officer at the United States Public Health Service. . . [and this] shall attest to the applicants acuity of vision, color sense, and general physical condition." (10.02-5 (e) (1)).

A-3. COMPARISON OF MEDICAL STANDARDS

A-3.1 CARDIOVASCULAR SYSTEM

a. AAR

"Decompensation not easily controlled as shown by dyspnea (difficulty in breathing), orthopnea (ability to breathe only in upright position), or chronic passive congestion." (1).

b. BMCS

". . . has no current clinical diagnosis of mycardial infarction, angina pectoris (sudden, uncontrollable chest pain with suffocation and drop in consciousness due to vasomotor spasm), coronary insufficiency, thrombosis (formation of blood clot within heart or vessel) or any accompanied by syncope, dyspnea, collapse or congestive cardiac failure." (391.41 (b) (4)).

c. FAA

No established medical history or clinical diagnosis of "angina pectoris or other evidence of coronary heart disease that the Federal Air Surgeon finds may reasonably be expected to lead to myocardial infarction."

d. USCG

None.

A-3.1.1 Bacterial Involvement

a. AAR

"Bacterial involvement, acute or chronic, of valves." (2).

b. BMCS

None specifically (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.1.2 Syncope

"Syncope (drop in consciousness due to diminution of cerebral blood supply), recurring." (3).

b. BMCS

Same (391.41 (b) (4)).

c. FAA

None

d. USCG

None

A-3.1.3 Myocardial Infarction

a. AAR

"Myocardial infarction (the development of acute ischemic necrosis [cellular death due to cut off of blood supply] in the cardiac muscle, usually involving the left ventricle)." (4).

b. BMCS

Same (391.41 (b) (4)).

c. FAA

"No established medical history or clinical diagnosis or myocardial infarction." (67.13 (e) (1) (i)).

d. USCG

None

A-3.1.4 Murmurs

a. AAR

"Systolic and diastolic murmurs indicating significant cardiac pathology." (5).

b. BMCS

None specifically (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.1.5 Coronary Insufficiency

a. AAR

"Coronary insufficiency with signs or symptoms." (6)

b. BMCS

Same (391.41 (b) (4)).

c. FAA

None

d. USCG

None

A-3.1.6 Blood Pressure

a. AAR

"Consistently high blood pressures of 190/110." (8)

b. BMCS

"Has no current clinical diagnosis of high blood pressure likely to interfere with his ability to operate a motor vehicle safely." (b(6)). "If the blood pressure is consistently above 160/90 mm Hg, further tests may be necessary to determine whether the driver is qualified to operate a motor vehicle." (391.43 (c)).

c. FAA

Unless the adjusted maximum readings apply, the applicant's reclining blood pressure may not be more than the maximum reading for his age group in the following table." (67.13 (e) (4)).

Age Group	Maximum readings (reclining blood pressure in mm)		Adjusted maximum readings (reclining blood pressure in mm)[1]	
	Systolic	Diastolic	Systolic	Diastolic
20-29	140	88	-	-
30-39	145	92	155	98
40-49	155	96	165	100
50 and over	160	98	170	100

[1]For an applicant at least 30 years of age whose reclining blood pressure is more than the maximum reading for his age group and whose cardiac and kidney conditions, after complete cardiovascular examination, are found to be normal

d. USCG

None

A-3.1.7 Carditis

a. AAR

"Pericarditis (inflammation of the pericardium (membrane enclosing the heart)) and pancarditis (general inflammation of the heart) with sequelae (lesion or affection following and resulting from attack of disease)." (7).

b. BMCS

None specifically (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.1.8 Circulation

a. AAR

"Significant impairment of circulation in extremities." (9).

b. BMCS

None specifically (391 (c)).

c. FAA

"If applicant is at least 40 years, he must show a degree of circulatory efficiency that is compatible with safe operation of aircraft at high altitudes." (67.13 (e) (5)).

d. USCG

None

A-3.1.9 Aneurysms

a. AAR

"Aortic aneurysms (a blood filled sac formed by dilation of part of an artery) and other aneurysms, depending on locality." (10).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.1.10 Arrythmias

a. AAR

"Conduction defects or arrythmias (variation in normal heart beat rhythm), which are likely to cause sudden incapacity." (11).

b. BMCS

None specifically (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.1.11 Arterial Grafts

a. AAR

"Arterial grafts, aortic or peripheral." (12).

b. BMCS

None

c. FAA

None

c. USCG

None

A-3.1.12 Heart Surgery

a. AAR

"Heart surgery." (13).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.1.13 Arteriosclerosis

a. AAR

"Severe arteriosclerosis (thickening of the walls of the arteries with the inflammatory changes) or other systemic vascular disease with symptoms." (14).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.1.14 Anticoagulant therapy

a. AAR

"Anticoagulant therapy." (15).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.3.15 Pacemaker

a. AAR

"The use of pacemaker or heart prosthetic device shall constitute a disqualifying condition." (16).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.1.16 Electrocardiogram

a. AAR

None

b. BMCS

"Electrocardiogram is required when findings so indicate... any past or present cardiovascular disease, of a variety known to be accompanied by syncope, dyspnea, collapse, enlarged heart, or congestive heart failures." (391.43 (c)).

c. FAA

"If the applicant has passed his thirty-fifth birthday but not his fortieth, he must, on the first examination after his thirty-fifth birthday, show an absence of myocardial infarction on electrocardiographic examination." (63.13 (e) (2)).

"If the applicant has passed his fortieth birthday, he must annually show an absence of myocardial infarction on electrocardiographic examination." (67.13 (e) (3)).

d. USCG

None

A-3.2 RESPIRATORY SYSTEM

A-3.2.1 Hemorrhage

a. AAR

"Recurrent pulmonary hemorrhage." (1).

b. BMCS

"Has no established history or clinical diagnosis of a respiratory dysfunction likely to interfere with his ability to control and drive a motor vehicle safely." (391.41 (b)(5)).

c. FAA

None

d. USCG

None

A-3.2.2 Lung Diseases

a. AAR

"Active disease of lung with cavitation (formation of cavity or hollowed out place)." (2).

b. BMCS

"If any lung disease is detected, state whether active or arrested; if arrested, your opinion as to how long it has been quiescent." (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.2.3 Asthma

a. AAR

"Attacks of asthma, not responding to treatment." (3).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.2.4 Dyspnea

a. AAR

"Frequent attacks of dyspnea (labored breathing), regardless of cause, not responding to treatment." (4).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.3 VISION

A-3.3.1 Glasses

a. AAR

"Glasses required to meet these standards must be worn while on duty; the use of contact lenses is not permitted while on duty." (Sec. 2).

b. BMCS

Spectacles or contact lenses (including carrying a spare set) at all times. (391.43 (c)).

c. FAA

Glasses or lenses with permission. (67.13 (b) (1)).

d. USCG

Glasses, contact lenses not mentioned. (10.02-5 (e)(3)).

A-3.3.2 Visual Activity

a. AAR

"Vision not correctable to at least 20/40 in each eye with glasses." (1).

b. BMCS

"Has distant visual acuity of at least 20/40 (Snellen) in each eye without corrective lenses or visual acuity separately corrected to 20/40 (Snellen) or better with corrective lenses, distance binocular acuity of at least 20/40 (Snellen) in both eyes with or without corrective lenses..." (391.41 (b) (10)). "Monocular drivers are not qualified to operate commercial motor vehicles under existing Motor Carrier Safety Regulations." (391.43 (c)).

c. FAA

"Distant visual acuity of 20/20 or better in each eye separately, without correction; or of at least [20/100] in each eye separately corrected to 20/20 or better with corrective glasses, in which case the applicant may be qualified only on the condition that he wears those glasses while exercising the privileges of his airman certificate." (67.13 (b)(2)).

"Near vision of at least v=1.00 at 18 inches with each eye separately, with or without corrective glasses." (67.13 (b) (2)).

d. USCG

"For an original license as master, mate or pilot, the applicant must have, either with or without glasses, at least 20/20 vision in one eye and at least 20/40 in the other. The applicant who wears glasses, however, must also be able to pass a test without glasses of at least 20/40 in one eye and at least 20/70 in the other." (10.02-5 (e) (3)).

"For original license as engineer the applicant must have, either with or without glasses, at least 20/30 vision in one eye and at least 20/50 in the other. The applicant who wears glasses, however, must also be able to pass a test without glasses of at least 20/50 in one eye and at least 20/70 in the other." (10.02-5 (e) (5)).

"Nothing contained in this section shall debar an applicant who has lost the sight of one eye from securing of his license, provided he is qualified in all other respects, and the vision in his one eye passes the test required for the better eye of an applicant possessed of both eyes." (10.02-9 (f) (5)).

A-3.3.3 Visual Field

a. AAR

"A form field of 140° in the horizontal meridian in each eye or a full visual field of at least 140° in both eyes if one eye is less than 140°." (2).

b. BMCS

"...field of vision of at least 70° in the horizontal meridian in each eye..." (391.41 (b)(10)).

c. FAA

"Normal fields of vision." (67.13 (b) (4)).

d. USCG

None

A-3.3.4 Field Defects

a. AAR

"Hemianopsia and other severe field defects." (3).

b. BMCS

None

c. FAA

"No acute or pathological condition of either eye or adenexae that might interfere with its proper function, might progress to that degree, or might be aggravated by flying." (67.13 (b)(5)).

d. USCG

None

A-3.3.5 Loss of Accommodation

a. AAR

"Loss of accommodation, which is not physiological." (4).

b. BMCS

None

c. FAA

"No acute or pathological condition of either eye or adenexae that might interfere with its proper function, might progress to that degree, or might be aggravated by flying." (67.13 (b)(5)).

d. USCG

None

A-3.3.6 Color Vision

a. AAR

"Defective color perception, determined to be unsafe." (5).

b. BMCS

"...ability to recognize colors of traffic signals and devices showing standard red, green and amber..." (391.41 (b) (10)).

c. FAA

"Normal color vision." (67.13 (b) (3)).

d. USCG

"For an original license as a master, mate, or pilot...

The color sense will be tested by means of a pseudo-isochromatic plate test, but any applicant who fails this test will be eligible if he can pass the "Williams" lantern test or equivalent." (10.02-5 (e) (3)).

"In the event an applicant for renewal of license as master, mate, or pilot is pronounced color blind, the Officer in Charge, Marine Inspection may grant him a license limited to service during daylight only." (10.02-9 (f) (3)).

"Applicants for original engineers' licenses shall be examined only as to their ability to distinguish the colors red, blue, green, and yellow. No applicant for original license as engineer shall be disqualified for failure to distinguish colors if any of his required experience is served prior to May 1, 1947." (10.05-5 (e) (4)).

A.3.3.7 Cataracts

a. AAR

"Cataract extraction." (6).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.3.8 Binocular Fusion

a. AAR

None

b. BMCS

None

c. FAA

"Bifoveal fixation and vergencephoria relationship sufficient to prevent a break in fusion under conditions that may reasonably occur in performing airman duties.

Tests for the factors named in this paragraph are not required except for applicants found to have more than one prism diopter of hyperphoria, six prism diopters of esophoria, or six prism diopters of exophoria. If these values are exceeded, the Federal Air Surgeon may require the applicant to be examined by a qualified eye specialist to determine if there is bifoveal fixation and adequate vergencephoria relationship. However, if the applicant is otherwise qualified, he is entitled to a medical certificate pending the results of the examination." (67.13 (b) (6)).

d. USCG

None

A-3.4 HEARING

A-3.4.1 Hearing Aid

a. AAR

"The use of a hearing aid shall constitute a disqualifying condition." (3).

b. BMCS

Hearing aid permitted. (391.41 (b) (11)).

c. FAA

None

d. USCG

None

A-3.4.2 Hearing Activity

a. AAR

"Loss of over 50 percent in each ear, determined by an audiometer in the range of 500 to 2,000 Hertz." (1).

b. BMCS

"First perceives a forced whispered voice in the better ear at not less than 5 feet with or without the use of a hearing aid or, if tested by use of 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 advice is calibrated to American National Standard (formerly ASA Standard) Z 24.5-1951." (391.41 (b)(11)).

c. FAA

"Hear the whispered voice at a distance of at least 20 feet with each ear separately; or
Demonstrate a hearing acuity of at least 50 percent of

normal in each ear throughout the effective speech and radio range as shown by a standard audiometer." (67.13 (c) (1) (i) and (ii)).

d. USCG

"...badly impaired hearing..." (10.02-5 (e) (2)).

A-3.4.3 Vertigo

a. AAR

"Persistent and/or recurrent vertigo." (2).

b. BMCS

"Note evidence of ... symptoms of aural vertigo, or Meniere's Syndrome." (391.43 (c)).

c. FAA

"No disturbance in equilibrium." (67.13 (c) (6)).

d. USCG

None

A-3.4.4 Middle Ear Disease

a. AAR

None

b. BMCS

"Note evidence of middle ear disease, discharge..." (391.43 (c)).

c. FAA

"No acute or chronic diseases of middle or internal ear." (67.13 (c) (2)).

d. USCG

None

A-3.4.5 Mastoid

a. AAR

None

b. BMCS

"Note evidence of mastoid disease..." (391.43(c)).

c. FAA

"No disease of mastoid." (67.13 (c) (3)).

d. USCG

None

A-3.4.6 Eardrum Perforation

a. AAR

None

b. BMCS

None

c. FAA

"No unhealed (unclosed) perforation of eardrum." (67.13 (c) (4)).

d. USCG

None

A-3.4.7 Nose or Throat

a. AAR

None

b. BMCS

None

c. FAA

"No disease or malformation of the nose or throat that might interfere with, or be aggravated by, flying." (67.13 (c) (5)).

A-3.5 BONES AND JOINTS

A-3.5.1 Loss or Impairment

a. AAR

"Loss of the foot, leg, hand or arm, or impairment of the use of the foot, leg, fingers or arm, or other structural defect which is likely to interfere with the safe performance of the employee's duties." (1).

b. BMCS

"Has no loss of a foot, a leg, a hand or an arm...." (b(1)). "Has no impairment of the use of a foot, a leg, a hand, fingers, or an arm, and no other structural defect or limitation, which is likely to interfere with his ability to control and safely drive a motor vehicle ..." (391.41 (b)(2)).

c. FAA

None

d. USCG

None

A-3.5.2 Arthritis

a. AAR

"Arthritis, or other disease or injury or congenital defect of the cervical, dorsal, or lumbar spine, which is likely to interfere with the safe performance of the employee's duties." (2).

b. BMCS

"No established history or clinical diagnosis of rheumatic, arthritic, orthopedic, muscular, neuromuscular, or vascular disease which interferes with his ability to control and operate a motor vehicle safely." (391.41 (6)(7)).

c. FAA

None

d. USCG

None

A-3.5.3 Tumors

a. AAR

"Bone tumors, malignant." (3).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.6 DISEASES OF THE BLOOD AND BLOOD-FORMING ORGANS

A-3.6.1 Anemias

a. AAR

"Anemias (a decrease in erythrocyte (container for hemoglobin) or hemoglobin content of the blood), with frequent relapses and/or neurological changes." (1).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.6.2 Lymphomas and Leukemias

a. AAR

"Lymphomas (a primary tumor of the lymphoid tissue) and leukemias (blood disease) not responding to treatment." (2).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.6.3 Hemorrhages

a. AAR

"Chronic hemorrhagic diseases (any which lead to bleeding), recurrent." (3).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7. GASTROINTESTINAL AND GENITOURINARY CONDITIONS

A-3.7.1 Throat Pathology

a. AAR

"Lesions of the esophagus, permitting passage of liquids only." (1).

b. BMCS

"...irremediable deformities of the throat likely to interfere with eating or breathing..." (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.7.2 Intra-abdominal Pathology

a. AAR

"Intra-abdominal pathology, severe, causing frequent and prolonged episodes of severe colic (pertaining to the colon), distension, nausea and vomiting." (2).

b. BMCS

"Note any diseases of the gastrointestinal system." (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.7.3 Ulcers

a. AAR

"Gastric, duodenal, or jejunal (between duodenum and the ileum) ulcer, active, causing continuous manifestation of anemia, malnutrition, impairment of health, frequently recurring hemorrhages, loss of weight, partial obstruction, or prolonged episodes of vomiting; not amenable to treatment." (3).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7.4 Gastritis

a. AAR

"Hypertrophic gastritis (inflammation of the stomach with infiltration and enlargement of the glands), with severe and repeated hemorrhages." (4).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7.5 Gastric Resection

a. AAR

"Gastric resection, followed by inability to regain body weight and vitality." (5).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7.6 Cirrhosis

a. AAR

"Cirrhosis (inflammation) of liver, with portal (entry opening) hypertension." (6).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7.7 Gallbladder

a. AAR

"Gallbladder and bile duct diseases, causing continued jaundice, anemia, or loss of weight." (7).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7.8 Colitis

a. AAR

"Ulcerative colitis (inflammation of the colon) or enteritis (inflammation of the intestine), resulting in a marked malnutrition, anemia, and general debility." (8).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7.9 Hernia

a. AAR

"Hernia (protrusion of an organ or part through structures normally containing it), inguinal (hernia into the groin canal) or femoral (into the thigh canal), inoperative." (9).

b. BMCS

"Note wounds, injuries, scars, or weakness of muscles of abdominal walls sufficient to interfere with normal function. Any hernia should be noted if present. State how long and if adequately contained by truss." (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.7.10 Hernia, Postoperative

a. AAR

"Hernia ventral (through the abdominal wall), post-operative, massive, inoperable." (10).

b. BMCS

"Note wounds, injuries, scars, or weakness of muscles of abdominal walls sufficient to interfere with normal function. Any hernia should be noted if present. State how long and if adequately contained by truss." (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.7.11 Kidneys

a. AAR

"Loss of one kidney with impaired function of the other." (11).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7.12 Nephritides

a. AAR

"Chronic nephritides (inflammation of the kidney), severe, unresponsive to treatment, with systemic symptoms." (12).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7.13 Kidney Stones

a. AAR

"Chronic nephrolithiasis (presence of renal calculi (kidney stones)), with pathological conditions in remaining kidney." (13).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7.14 Urinary Fistula

a. AAR

"Urinary fistula (deep ulcer) with continuous drainage and incontinence (inability to avoid voiding urine)" (14).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.7.15 Malignancy

a. AAR

"Malignancy causing incapacity." (15).

b. BMCS

"If the diagnosis suggests that the condition might interfere with the control and safe operation of a motor vehicle, more stringent tests must be made..." (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.7.16 Infections

a. AAR

None

b. BMCS

"Acute infections of the genito-urinary tract, as defined by local and state public health laws, indications from urinalysis (required) of uncontrolled diabetes, symptomatic albumin-urea in the urine, or other findings indicative of health conditions likely to interfere with the control and safe operation of a motor vehicle, will disqualify an applicant from operating a motor vehicle." (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.7.17 Rectogenital Discomfort

a. AAR

None

b. BMCS

"Diseases or conditions (of the rectogenital regions) causing discomfort should be evaluated carefully to determine the extent to which the condition might be handicapping while lifting, pulling or during periods of prolonged driving that might be necessary as part of the driver's duties." (391.43 (c)).

c. FAA

None

d. USCG

None

A-3.8 BRAIN AND NERVOUS DISORDERS

a. AAR

"A personality disorder severe enough to have repeatedly manifested itself by overt acts." (1).

b. BMCS

"Has no mental, nervous, organic, or functional disease or psychiatric disorder likely to interfere with his ability to drive a motor vehicle safely." (b(9)).

c. FAA

Same (67.13 (d)(1)(a)(i)).

d. USCG

None

A-3.8.1 Psychosis

a. AAR

"A psychosis other than an acute toxic (pertaining to poison) psychosis." (2).

b. BMCS

None

c. FAA

"A psychosis" (67.13 (d)(1)(i)(b)).

d. USCG

None

A-3.8.2 Alcoholism

a. AAR

"Alcoholism, disabling." (3).

b. BMCS

"Has current clinical diagnosis of alcoholism." (391.41 (b) (13)).

c. FAA

"Alcoholism. As used in this section, "alcoholism" means a condition in which a person's intake of alcohol is great enough to damage his physical health or personal or social functioning, or when alcohol has become a prerequisite to his normal functioning." (67.13 (d)(1)(i)(c)).

d. USCG

None

A-3.8.3 Drugs

a. AAR

"Drug dependence." (4).

b. BMCS

"Does not use an amphetamine, narcotic or any habit-forming drugs." (391.41 (b) (12)).

c. FAA

"Drug dependence. As used in this section, "drug dependence" means a condition in which a person is addicted to or dependent on drugs other than alcohol, tobacco, or ordinary caffeine-containing beverages, as evidenced by habitual use or a clear sense of need for the drug." (67.13 (d) (1) (1)).

d. USCG

None

A-3.8.4 Other Abnormalities

a. AAR

"A mental abnormality, personality disorder, or neurosis which is likely to interfere with the safe performance of his duties." (5).

b. BMCS

"Has no mental, nervous, organic, or functional disease or psychiatric disorder likely to interfere with his ability to drive a motor vehicle safely." (391.41 (b)(9)).

c. FAA

"No other personality disorder, neurosis, or mental condition that the Federal Air Surgeon finds --

(a) Makes the applicant unable safely to perform the duties or exercise the privileges of the airman certificate that he holds or for which he is applying: or

(b) May reasonably be expected, within 2 years after the finding, to make him unable to perform those duties or exercise those privileges;

and the findings are based on the case history and appropriate, qualified, medical judgment relating to the condition involved." (67.13 (d) (1) (ii)).

d. USCG

None

A-3.8.5 Epilepsy

a. AAR

"Epilepsy or any other convulsive disorder." (7).

b. BMCS

"Has no established medical history or clinical diagnosis of epilepsy or any other condition which is likely to cause loss of consciousness or any loss of ability to control a motor vehicle." (391.41 (b)(8)).

c. FAA

"No established medical history or clinical diagnosis of ... epilepsy." (67.13 (2)(1)(a)).

d. USCG

"Epilepsy" (10.02-5 (e)(2)).

A-3.8.6 Nervous Disease

a. AAR

"A progressive or non-progressive disease of the nervous system which is likely to interfere with the safe performance of his duties." (6).

b. BMCS

None

c. FAA

"No other convulsive disorder, disturbance of consciousness, or neurologic condition that the Federal Air Surgeon finds --

(a) Makes the applicant unable safely to perform the duties or exercise the privileges of the airman certificate that he holds or for which he is applying; or

c. FAA

None

d. USCG

"Insanity" (10.02-5 (e)(2)).

A-3.8.9 Senility

a. AAR

None

b. BMCS

None

c. FAA

None

d. USCG

"Senility" (10.02-5 (e)(2)).

A-3.8.10 Venereal Disease

a. AAR

None

b. BMCS

"A serological test is required if the applicant has a history of leutic infection or present physical findings indicate the possibility of latent syphilis." (391.43 (c)).

c. FAA

None

d. USCG

"Acute venereal disease or neurosyphilis." (10.02-5 (e) (2)).

A-3.9 GENERAL MEDICAL CONDITIONS - NOT OTHERWISE CLASSIFIED

A-3.9.1 Diabetes

a. AAR

"Cases of significant metabolic, nutritional or endocrine disorders shall be assessed as unfit. Proven cases of diabetes mellitus (inability to oxidize carbohydrates) requiring the use of insulin shall be assessed as unfit. Cases requiring oral antidiabetic medication may be considered on an individual basis after thorough review of job demands, responsibilities and employee's physical status." (1).

b. BMCS

"Has no established medical history or clinical diagnosis or diabetes mellitus currently requiring insulin for control." (391.41 (b)(3)).

c. FAA

"No established medical history of clinical diagnosis of diabetes mellitus that requires insulin or any other hypoglycemic drug for control." (67.13 (f)(1)).

d. USCG

None

A-3.9.2 Skin Diseases

a. AAR

"Skin diseases with chronic systemic symptoms, disabling." (2).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.9.3 Malnutrition

a. AAR

"Severe malnutrition, from any cause, with systemic changes refractory (not responding to treatment) to treatment." (3).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.9.4 Hyperthyroidism

a. AAR

"Severe hyperthyroidism uncontrolled by surgery or medication." (4).

b. BMCS

None

c. FAA

None

d. USCG

None

A-3.9.5 Other

a. AAR

None

b. BMCS

None

c. FAA

"No other organic, functional, or structural disease, defect, or limitation that the Federal Air Surgeon finds --

(i) Makes the applicant unable safely to perform the duties or exercise the privileges of the airman certificate that he holds or for which he is applying; or

(ii) May reasonably be expected, within two years after the finding, to make him unable to perform those duties or exercise those privileges;

and the findings are based on case history and appropriate, qualified, medical judgment relating to the condition involved." (67.13 (f)(2)).

d. USCG

"... or other defect that would render the applicant incompetent to perform the ordinary duties of an officer at sea are causes for certification as incompetent" (10.02-5 (e) (2)).

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