



**Pilot Fitness Study for the  
Board of Pilot Commissioners for the  
Bays of San Francisco, San Pablo, and Suisun**

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**May 26, 2011**

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## **ABBREVIATIONS - ACROYMNS**

CCR	- California Code of Regulations
7 CCR 217	- Title 7 California Code of Regulations Section 217 (Medical Examination) <a href="http://ftp.resource.org/codes.gov/ccr/ca.ccr.07.pdf">http://ftp.resource.org/codes.gov/ccr/ca.ccr.07.pdf</a>
BAP	- Board of Pilot Commissioners appointed physician
BOPC	- Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun
CFR	- Code of Federal Regulations
CG-719K	- Coast Guard, Merchant Mariner Credential, Medical Evaluation Report
DOT	- Department of Transportation
FAA	- Federal Aviation Administration
FFD	- Fit for Duty
FMCSA	- Federal Motor Carrier Safety Administration
FRA	- Federal Railway Administration
GRT	- Gross Registered Tonnage
HNC	- Harbors and Navigation Code
HNC 1176	- Harbors and Navigation Code Section 1176 <a href="http://law.onecle.com/california/2010/harbors/1176.html">http://law.onecle.com/california/2010/harbors/1176.html</a>
ILO	- International Labour Organization
IMO	- International Maritime Organization
MARPOL	- International Convention for the Prevention of Pollution from Ships, 1973
MRO	- Medical Review Officer
MSN	- Merchant Shipping Notices (system for issuing notices in UK)
NFFD	- Not Fit for Duty
NMC	- National Maritime Center
NVIC	- Navigation and Vessel Inspection Circular (system for issuing notices in US)
NVIC 04-08	- Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials, <a href="http://www.uscg.mil/nmc/medical/NVIC/NVIC_4_08_with_enclosures.pdf">http://www.uscg.mil/nmc/medical/NVIC/NVIC_4_08_with_enclosures.pdf</a>
PNFFD	- Permanently Not Fit For Duty
SFBP	- San Francisco Bar Pilots Association
SHIP	- Seafarers Health Improvement Program
SOLAS	- International Convention for the Safety of Life at Sea, 1974
STCW	- International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978

## EXECUTIVE SUMMARY

### Overview

This study on Pilot Fitness was conducted under contract by Dr. Robert Kosnik of the University of California, San Francisco for the Board of Pilot Commissioners (BOPC) for the Bays of San Francisco, San Pablo, and Suisun. The study was conducted to meet the following outcomes with a view to changing their current rules and regulations on Pilot Fitness where needed:

- A. Develop recommendations for standards to be adopted which meet or exceed the Coast Guard standards to ensure that pilots are fit to perform their duties and as required by Harbors and Navigation Code (HNC) section 1176.
- B. Assist the Pilot Fitness Committee in developing standards for the qualifications of physicians for performing examinations of pilots and pilot trainees to determine their fitness for duty.
- C. Conduct a comprehensive review of the current physical and medical fitness standards for pilots licensed by the BOPC to meet the licensing requirements set forth in Title 7 California Code of Regulations (CCR) section 217 (Medical Examination) and as defined in the HNC section 1176.
- D. Review generally accepted techniques and diagnostic tools for the assessment of the mental acuity and physical fitness of the pilots, including those used to identify degradation of the performance of pilots due to gradual loss of situational awareness or judgment.
- E. Assist the Pilot Fitness Committee in developing recommendations for the duties and qualifications of a Medical Review Officer (MRO) to review pilot physicals, act as a resource for information on the effect of medical conditions and medications on fitness for duty, provide quality assurance and peer review for the services of examining physicians performing pilot physicals, act as member of the appeal board to review appeals of fitness determinations and other duties as may be designated.
- F. Develop recommendations to improve the BOPC current examination procedures to determine whether a pilot meets the standards recommended.

The study was designed to meet these outcomes by gathering and organizing information along the following aspects.

1. Review of the history of pilot fitness regulations.
2. Review of the current BOPC, national, and international pilot fitness regulations.
3. Review of the assessment of fitness in other national regulated transportation.
4. Detailed review of the physical and cognitive demands of the tasks performed by a pilot or pilot trainee.

These aspects allowed the study to consider questions such as:

- How have pilot fitness regulations evolved?
- What are the national and international regulations?
- Do these regulations have local application for the BOPC pilot fitness regulations?
- Are there gaps in the regulations?

- Do other national regulated transportation sectors have regulations that can assist in improving the pilot fitness regulations?
- What are the next logical steps in pilot fitness regulations?

The study used the occupational medicine framework for conducting medical surveillance programs in which the goal is to review the fitness for work of an identified group of individuals. The framework for such programs have a common set of features: A qualified medical examiner who understands the demands of the job is provided with a relevant list of current medical conditions and medications. A medical examination is performed focusing on and paying particular attention to the required functional capacities of the individual. The initial examination is repeated periodically and / or as needed. The medical evaluation is reviewable by another physician(s) on behalf of the examiner or the examinee.

This framework leads to the use of the following characteristics in the development of the medical surveillance for pilot fitness.

### **Characteristics of a Fitness for Duty, Medical Surveillance Program:**

1. Performed by a qualified medical examiner (education, training, experience)
2. Understand the demands of the job (physical and cognitive demands)
3. Review the relevant information on current medical conditions and medications
4. Perform an examination focusing on the required functional capacities
5. Evaluate the individual periodically and post health event
6. Provide a review process (to support both the pilot and the examiner)

The BOPC appointed a Pilot Fitness Committee consisting of Captain Steve Roberts as Chair with Barbara Price, CEO, PK Consultants, Inc., Vice President, Board of Trustees, Alameda County Medical Center and General Chester L. Ward, MD, MPH; Brigadier General, Master Flight Surgeon, Medical Corps, U.S. Army, Retired as members. A series of workshops was held to assist in expanding the research outcomes from management level recommendations to detailed statements. This approach will allow for the straightforward development of rules and regulations, contract language, internal processes, and forms. These workshops provided the opportunity to remove ambiguity from the recommendations. For each section in this report, the subsection titled, “Review”, describes the intent of the recommendation for that section. The following subsections are the detailed recommendations.

## **A. REVIEW OF PILOT FITNESS STANDARDS**

By the end of the 19<sup>th</sup> century, countries were considering the health needs of seamen and the need of the public for minimum fitness standards in seamen to avoid collisions. The discussions included who should perform these assessments and to what extent should accommodations be available to seamen. The values underpinning these actions have continued to the present. The steps taken in the 19<sup>th</sup> century were not unified among countries or within the various medical communities.

The International Maritime Organization and the International Labour Organization are the two bodies that provide international guidelines on medical fitness examinations for seafarers. These guidelines are a common basis for the government authorities in member countries. It is noteworthy that these instruments are applicable to seafarers, not ships' pilots. A review of the regulations developed by other member countries provides a glimpse at alternate approaches to implementing these international guidelines.

## **United States**

For over a century, there have been US vision and hearing standards for mariners. These standards were formalized internationally through the agreement on Conventions at the International Maritime Organization and the International Labour Organization. In 1981, the oversight for the vision and hearing standards was removed from the US Public Health Service. This was initially replaced by a voluntary set of standards by the Seafarers Health Improvement Program (SHIP). Later, the Coast Guard developed a systematic approach to the evaluation of everyone employed in the merchant marine through its guidelines in the Coast Guard, Navigational and Vessel Information Circular (NVIC) 04-08 and its medical evaluation report form, Coast Guard form CG-719K. The SHIP and NVIC guidelines have always contained intent statements embracing the desire to have mariners who could perform their jobs safely without endangering themselves or others for extended periods at sea. These guidelines initially approached the issue by developing lists of medical conditions which were either absolute exclusions or temporary exclusions, pending a review of further information by the National Maritime Center. The examiners used their best efforts to get additional information on an issue of concern and then applied their best judgment. In recent years, a greater emphasis has been placed on the process within the medical examination report. The process now requires that the mariner attest to the completion of the list of medical conditions and medications, the physician attests to the abilities of the mariner to undertake the physical demands of their job, and many of these examination tasks must be directly performed or reviewed by the verifying physician. It still remains that these examinations are performed at a point in time (annually for pilots). The next logical step is to require updates when the medication changes, when there is a new medical condition, or when there is reason for the supervisor to require a new examination. Then, the process would be operating effectively in "real time".

## **Other National Standards for Mariner Medical Examinations**

The national standards for Australia, Canada, and the United Kingdom were reviewed. The examinations in these jurisdictions are performed by an identified group of medical doctors with additional training. Vision and hearing standards are in place. These standards have a list of job specific tasks for the seafarer jobs, a list of designated medical conditions for greater review, a defined frequency of examinations, and an appeal process for those declined. These jurisdictions do not have additional requirements for pilots, but their standards all provide seafarers with a certificate of medical fitness.

## **Regulated Transportation Medical Standards**

The regulated transportation medical standards are quite different on a number of aspects. The Federal Aviation Administration (FAA) medical standards specifically work with the physical demands of an airline pilot rather than all workers employed in the air. The national standards place a premium on fitness to undertake flying with no loss of consciousness and without



medication which affects cognition. There are longstanding regulations for the designation of examiners and rules for the examination. The Federal Railway Administration (FRA) does place a premium on the medical standards for an engineer compared to other railway workers. The Federal Motor Carrier Safety Administration (FMCSA) considers all drivers of commercial vehicles in one category. The consistent theme in these regulated medical standards is the focus on a high level of functioning (no loss of consciousness and no medication or drugs which affect cognition) for the individual directing the operation of the transportation vehicle. In contrast, the Coast Guard standards apply to anyone who works at sea. While the intent of personal and public safety is equally at the forefront in both medical standards, the Coast Guard standards do not place a premium on the medical standards for a pilot. The BOPC needs a medical standard with a premium for pilots and pilot trainees above the basic Coast Guard medical standard.

## **Review – Pilot Fitness Standards**

It is intended that the Board of Pilot Commissioners update its medical standard for pilot fitness. Section 1176(b) of the Harbors and Navigation Code (HNC) indicates that the Board needs to prescribe medical standards, and the California Code of Regulations (CCR) Title 7 Regulation section 217(a)(1) (Medical Examination) identifies the Seafarers Health Improvement Program (SHIP) Committee guidelines of April 26, 1985 as the reference guide for the Board appointed physicians. This review of pilot fitness medical standards identifies the current national medical standard as the NVIC 04-08 with the exception of Enclosure (1) Section 12 which applies to Great Lake Pilots. The NVIC 04-08 guidelines are comparable to international jurisdictions and are consistent with the regulated transportation medical standards in the United States.

## **Recommendation – Medical Standards**

*Recommendation #1 – The Board of Pilot Commissioners replace the Seafarers Health Improvement Program (SHIP) Committee guidelines with the NVIC 04-08 “Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials”, or any successor thereto, as guidance to the Board appointed physician conducting the physical examination and the fitness for duty determination as a pilot or pilot trainee in Harbors and Navigation Code section 1176(b) and (c).*

*Portions of NVIC 04-08, or any successor thereto, specifically applicable to “First Class Pilots and those individuals ‘Serving As’ Pilots” should be highlighted and portions dealing with Great Lake Pilots should be excluded. The Physical Abilities Guidelines in Enclosure (2) are not specific to pilots. These guidelines should be met for routine movement and emergency routines. The agility required for embarking and disembarking on a pilot ladder is addressed later in this study.*

## **B. QUALIFICATIONS OF BOARD APPOINTED PHYSICIANS (Medical Surveillance Program Characteristic #1)**

The bar pilot leads the navigation of large shipping vessels in local waters. The job as a bar pilot should be considered a safety-sensitive position. The medical evaluations of a bar pilot should be performed by a physician trained in understanding the work environment, the demands of jobs, and the possible impact of medical conditions on accidents. The NVIC 04-08 does not

designate a group of examining physicians and does not specify that the physician performing the medical evaluation should have experience in Occupational Medicine. The ILO Guidelines for Worker Surveillance states that the examining physician should be experienced in General Occupational Medicine or Maritime Occupational Medicine.

## **Review – Qualifications of Board Appointed Physicians**

It is intended that the Board of Pilot Commissioners appoint physicians to conduct a physical examination and provide the physician with the prescribed medical standards. HNC section 1176(a) does not establish specific qualifications for the appointed medical examiners. NVIC 04-08 does not establish qualifications for its verifying physician completing CG719-K. The work of a bar pilot is a more physically and cognitively demanding job than that of the merchant mariner. The physicians who are appointed for evaluating the fitness for duty of the San Francisco Bar Pilots should be experienced and knowledgeable about the job tasks. The Board of Pilot Commissioners should ensure that the medical examiners have a copy of the NVIC 04-08 guidelines, the CG-719K form, and the opportunity to accompany a pilot on a familiarization trip or obtain equivalent experience.

## **Recommendations – Qualifications of Board Appointed Physicians**

*Recommendation #2 – The Board of Pilot Commissioners establishes the following qualifications for the appointed physician through the contracting process in support of Harbors and Navigation Code section 1176(a):*

- 1. licensed by the Medical Board of California*
- 2. at least five years of experience in general occupational medicine or maritime occupational medicine*
- 3. preferably has accompanied a Board licensed pilot on at least one familiarization trip, or if he or she is physically unable to do so, has obtained equivalent experience acceptable to the Medical Review Officer (MRO) once per contract period. The equivalent experience is intended to focus on increasing the understanding of the physical and cognitive demands on the pilot. It includes witnessing an agility test of a pilot, reviewing the San Francisco Bar Pilots (SFBP) video showing the job of a pilot (including pilot ladder), and undertaking an interview with the MRO. The review of the SFBP video should be in the company of a Board licensed pilot, the Executive Director of the BOPC, or the MRO in order to provide additional commentary and answer questions.*

*Recommendation #3 – The Board of Pilot Commissioners adds a requirement to the contract for Board appointed physicians to review and maintain a copy of the following:*

- 1. the NVIC 04-08 or its successor “Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials”*
- 2. the National Maritime Center form CG-719K, “Medical Evaluation Report”*
- 3. the Board of Pilot Commissioners, Statement of Fitness for Duty form*

4. *state statutes and regulations relevant to the determination of a pilot's fitness for duty, including the Harbors and Navigation Code section 1176 and Title 7 California Code of Regulations section 217 (Medical Examination).*

*Annually, the MRO and / or the Executive Director meets with each Board appointed physician to ensure that he / she remains current on the above references and forms, and that the forms are filled out properly and consistent with the guidelines.*

*Recommendation #4 – The Board of Pilot Commissioners amend 7 CCR section 217 (Medical Examination) to conform to Harbors and Navigation Code section 1176, including a complete review of statutory and regulatory language to ensure consistency in terminology (e.g. “Board appointed physician” in the statutory language and “a physician designated by the Board” in the regulatory language).*

## **C. PHYSICAL AND COGNITIVE DEMANDS FOR SAN FRANCISCO BAR PILOTS**

### **(Medical Surveillance Program Characteristic #2)**

Previously, the San Francisco Bar Pilots Association developed a detailed description of a bar pilot's job. This description is provided in Appendix C.1. This description of the job as San Francisco bar pilot does extend the standard description into physical tasks and environmental conditions encountered in the course of the job. It advances the description of the physical demands of the job listing the tasks as agreed upon. This study further organized the list of tasks for one complete pilot trip.

The San Francisco bar pilot performs a number of trips within one work day. Consider each run to be one cycle of work. The pilot begins at the home base, proceeds through a trip (or series of trips) and returns to base. There are a series of linear steps (tasks) that the pilot undertakes before completing one cycle or trip. The following list is a logical division of the cycle into a series of tasks.

### **List of Tasks for a San Francisco Bar Pilot**

1. Pilot Boat Ride Out – Embark and Ride Outbound
2. Embarkation of the Vessel
3. Transit to the Bridge
4. Navigation
5. Docking / Undocking
6. Disembarkation
7. Pilot Boat Ride In – Ride Inbound and Disembark
8. Participate in Emergencies – Exiting, Lifeboat

A trip can begin at sea with the pilot navigating the vessel to a berth or a trip can begin at a berth navigating to sea. From a berth, the embarkation will likely be by gangway and the disembarkation will be onto the pilot boat requiring the use of a hand rope.

This analysis of the San Francisco Bar Pilots Association does provide a few key points for the medical assessors. These are as follows:

- The embarkation task can easily be visualized as hazardous due to the drama inherent in the transfer at sea. It requires not only agility and strength, but also, the cognitive demand of relative motion.
- The disembarkation task has the additional task of grabbing the hand rope and judging the relative motion “over the shoulder”. This increases the movement requirement for the neck and shoulder.
- The embarkation and disembarkation tasks are dramatic, but only represent about 5% of the job cycle. Both are essential tasks.
- The navigation and docking tasks are filled with cognitive requirements. These requirements include reading, writing, decision making, working as a leader, dynamic reasoning, arithmetic calculations, relative motion, situational awareness and memory.
- The navigation and docking tasks have great cognitive demands, but few physical demands. These tasks represent about 80% of the job cycle.

## **Review – Physical and Cognitive Demands of San Francisco Bar Pilots**

It is intended that the pilots and pilot trainees are mentally and physically fit for their job. Some aspects of their job have particular physical agility demands; other aspects have particular cognitive demands. Both sets of demands are difficult to test in a medical examination. The documentation outlining the process to complete the CG-719K form suggests that the verifying physician obtain additional testing when needed. It would be better to require agility testing and to repeat the testing regularly. There currently are no objective and quantifiable cognitive tests which can be used to evaluate the particular cognitive demands for a San Francisco bar pilot, including loss of situational awareness.

## **Recommendations – Demands of the Job**

*Recommendation #5 – The Board of Pilot Commissioners amend 7 CCR section 217 (Medical Examination) to require pilots and pilot trainees to undertake an agility test which simulates the physical demands of the job as follows:*

- 1. prior to entry into the training program, issuance of the original license, return to work after a medical condition affecting physical abilities tested in this test;*
- 2. biannually thereafter; and*
- 3. as directed by a Board appointed physician or the Medical Review Officer.*

*The agility test will be administered by a qualified personal trainer, physiotherapist, occupational therapist, or kinesiologist. The content of the agility test is designed to reflect balance, a pilot ladder circuit climb, stair climbing, floor to waist lifts, a single rope slide and heart rate recovery after activity.*

*The Board appointed physician shall review the agility test results as part of the review to determine pilot fitness. The MRO reviews the agility test results as part of the second review to determine concurrence with the statement of pilot fitness for duty. The MRO routinely reviews the test itself and compares with the track record of pilots or pilot trainees who become not fit for duty as a result of a physical limitation that should have been identified by the agility test. The MRO will periodically report to the Board on his or her observations and recommend adjustments to the test itself.*

*Recommendation #6 – The Board of Pilot Commissioners includes in the duties of the Medical Review Officer a requirement to stay apprised of the developments in cognitive function testing and to report those developments periodically to the Board.*

## **D. FIT FOR DUTY STATUS REQUIREMENTS**

### **(Medical Surveillance Program Characteristic #3, #4, and #5)**

The NVIC 04-08 provides strong guidance on medical standards for the review of medical conditions and medications, vision and hearing standards, and the extent of the physical examination. It has strengthened the medical standards originally presented in the 1998 guidelines. There is more detail on the job tasks, a broader list of medications, and more guidance on evaluation data for medical conditions. The process for completing the associated “Medical Evaluation Report”, Form CG-719K, is more robust. It has added the need for physician involvement as the verifying medical practitioner. This has the advantage of unifying the oversight of the distinct parts of the evaluation – vision and hearing, review of medical conditions and medications, and physical examination. It requires the applicant to attest to the completeness of the information and the verifying physician to attest to the review of medication, the review of medical conditions, and the physical examination. The completed form and any evaluation data are reviewed by the National Maritime Center (NMC) in support of the credentials. The waivers are issued to the applicant and the verifying medical practitioner.

The BOPC needs a statement of fitness for duty before it can issue a license to a pilot or pilot trainee. The CG-719K form is the starting point and the information provided forms a foundation, but it has three drawbacks. First, the physical and cognitive demands of the job as bar pilot are not specifically evaluated. There is no routine testing of physical abilities. Only when the verifying medical practitioner doubts the ability of the applicant to perform the job tasks will the applicants be required to demonstrate their physical ability. Secondly, the CG-719K and any evaluation data are protected health information which is not directly available to the BOPC. Thirdly, the CG-719K and any waivers are not reviewed on behalf of the BOPC. It is possible that a pilot has a medical condition which is certified as competent by the Coast Guard, but the medical condition precludes work as a San Francisco bar pilot or pilot trainee.

The Coast Guard process is a “point in time” review of medical status performed each year. The BOPC needs to be confident that the pilots or pilot trainees are fit every day they are on duty throughout the year. Ideally, the medical surveillance process would more closely approach a continuous review. One approach to achieving this goal would be to adopt an event driven

process whereby, following any change in medication, the onset of any diagnosed medical condition or the completion of a leave for medical disability the fitness for duty statement would be reviewed.

### **Review – Current Medication and Medical Conditions**

Medical surveillance program characteristic #3 includes a review of relevant information on current medications. It is intended that the pilots or pilot trainees perform their duties without their physical or cognitive function being impaired by drugs including prescribed medication, over-the-counter medication, prohibited intoxicants or illegal substances (as defined in 46 CFR 16.105). NVIC 04-08 Enclosure (4) provides a description on these classes of drugs and on categories of medication which may need further review. The waivable categories of drugs include the following: anti-depressants, anti-psychotics, anti-convulsants, barbiturates, amphetamines, benzodiazepines, sedative hypnotics, and codeine.

The pilots or pilot trainees participate in three current programs with this intention. First, the pilots participate in a randomized drug testing for illegal substances as a requirement of their federal license. The pilot trainees are tested for illegal substances as directed by BOPC policy. It is noted that due to the randomization of the drug testing, the gap between the drug tests might be large, even over one year. Secondly, when completing the current CG-719K, the pilot or pilot trainee reports all prescription medications prescribed, filled or refilled, and / or taken within 30 calendar days prior to the date the applicants signs the CG-719K. Thirdly, a pilot or pilot trainee must submit within ten days any new or changing medication to the Board Appointed Physician (BAP). The latter two programs require personal reporting by the pilot or pilot trainee. Because of the potential for high value losses and an adverse environmental impact, it would be ideal if these later programs could be objectively confirmed.

Toxicological testing for categories of medication in NVIC 04-08 where a waiver is required (listed above) would provide the objective information to support the attestation in the CG-719K. This confirmation with objective testing would be done annually. Further, it would be particularly helpful after an incident.

The proposed toxicological testing could be carried out in a fashion similar to the current testing which includes a point of collection, a chain of custody for the collected samples, and standardized analysis. The results of the toxicological testing would be reviewed by the BOPC appointed MRO. A pilot or pilot trainee with a positive test would be asked about the presence of a medication which required a waiver. If the testing identified a previously unreported medication, then the BOPC would place the application of the pilot or pilot trainee on Not Fit for Duty pending the waiver review by the NMC.

### **Recommendations – Current Medications**

*Recommendation #7 – The Board of Pilot Commissioners includes in the duties of the Medical Review Officer a requirement to stay apprised of the developments in the federal drug testing program and to report those developments periodically to the Board.*

*Recommendation #8 – The Board of Pilot Commissioners includes in the duties of the Medical Review Officer a requirement to stay apprised of changes in the pilot attestation to the list of medications in the CG-719K, or its successor thereto, and to report those developments periodically to the Board.*

*Recommendation #9 – The Board of Pilot Commissioners will continue to follow Harbors and Navigation Code section 1176(e) which requires the following actions:*

- *a pilot or a pilot trainee who is prescribed either a new dosage of a medication or a new medication, or suspends the use of a prescribed medication must submit that information within ten days to the Board appointed physician who conducted the last fitness for duty examination.*
- *“if the physician determines that the medication change results in the pilot or pilot trainee being unfit for duty, the physician shall inform the board”<sup>1</sup>.*

*Recommendation #10 – The Board of Pilot Commissioners amend 7 CCR section 217 (Medical Examination) to require pilots and pilot trainees to undertake with their initial and / or annual application for their state license, and post-incident, the following toxicological tests: anti-depressants, anti-psychotics, anti-convulsants, barbiturates, amphetamines, benzodiazepines, sedative hypnotics, opiates and other pain medication.*

## **Review – Vision and Hearing Testing, and Medical Examinations**

Medical surveillance program characteristic #3 includes performing vision and hearing tests. It is intended that the Board appointed physician perform these vision and hearing tests. It is intended that the pilot or pilot trainee meet the hearing and vision standards in NVIC 04-08. The current CG-719K report requires the recording of the performance on the vision and hearing tests. There is no need to recommend any changes to the examination process at this time.

## **Recommendation – Vision and Hearing Testing**

*Recommendation #11 – The Board of Pilot Commissioners includes in the duties of the Medical Review Officer a requirement to stay apprised of changes in the vision or hearing standards within the NVIC 04-08 or its successor and to report those developments periodically to the Board.*

## **Review – Fitness for Duty**

It is intended that the Board of Pilot Commissioners obtain a statement on fitness for duty as a pilot or pilot trainee prior to entering into the training program, the issuance of the original license or the renewal of his or her license. The appointed physician currently provides a written statement on one of the following possible findings: Fit for Duty, Not Fit for Duty, and

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<sup>1</sup> Harbors and Navigation Code section 1176(e). <http://law.onecle.com/california/2010/harbors/1176.html>

Permanently Not Fit for Duty as outlined in the proposed revisions to 7 CCR section 217(c)(1) (Medical Examination).

The form CG-719K, “Medical Evaluation Report” in support of the merchant mariner certification as a pilot, has established a systematic approach to collecting and detailing information. The fitness for duty process can be strengthened in two ways – 1) a second review of the CG-719K and information supporting a waiver as a merchant mariner by a Medical Review Officer looking at the physical and cognitive demands of a pilot, and 2) a requirement to review the fitness for duty status following changes in medical conditions or in medication by the Board appointed physician with concurrence by the MRO.

This expansion on the fitness for duty status to include a second review does require that CG-719K and any information supporting a waiver be transferred to the second reviewer, and possibly the Board appointed physician if, in the future, the CG-719K medical evaluation was performed by a physician who was not Board appointed. The process for transferring this information needs to ensure the voluntary disclosure of the pilot’s private personal health information. Form CG-719K does provide a concise overview of the privacy requirements on the first page of the current form.

## **Recommendations – Fitness for Duty**

*Recommendation #12 – The Board of Pilot Commissioners maintain 7 CCR section 217 subsections (a)(1), 217(b)(1) and 217(b)(2) (Medical Examination) to require pilots and pilot trainees to provide a fitness for duty status from a Board appointed physician prior to each of the following:*

- 1. The entry into a training program and annually thereafter while in the program*
- 2. The issuance of the original license*
- 3. The renewal of a license (annually)*

*Recommendation #13 The Board of Pilot Commissioners amend 7 CCR section 217 (Medical Examination) to require pilots and pilot trainees to submit a notification to the Board and to submit a notification along with supporting information to the Board appointed physician who conducted the last examination of fitness for duty requesting a review of their fitness for duty, following:*

*The onset of a new or a change of a current medical condition diagnosed by a physician and listed in CG-719K, or the successor thereto, under circumstances that would require further review or a waiver under NVIC 04-08, or the successor thereto.*

*Supporting information includes a statement from his / her personal physician providing care for the pilot or pilot trainee along with diagnostic tests, consultations, or other information as outlined in the NVIC 04-08, or the successor thereto, for medical conditions subject to further review.*



*Recommendation #14 – The Board of Pilot Commissioners amend 7 CCR section 219(q) (Duties of Pilots) to require of pilots and pilot trainees (who are not covered under section 219(q)) as follows:*

*If the medical disability continues for either 30 consecutive days or a total of 30 days in any 60-day period, to be medically examined in accordance with subsection (d) of section 217 prior to returning to duty.*

*Recommendation #15 – The Board of Pilot Commissioners amend 7 CCR section 217 (Medical Examination) to require the Board appointed physician who conducted the last examination to issue a statement on fitness for duty upon receipt of a notice from a pilot or pilot trainee for the following changes in medication or medical condition:*

- 1. a change in a medication*
- 2. the onset of a new medical condition*
- 3. a change in a medical condition*
- 4. the return to duty after a medical disability*

*Recommendation #16 – The Board of Pilot Commissioners adopts a procedure requiring applicants for the training program, the license or renewal, and pilot trainees undergoing annual physical examination to provide the most recent completed CG-719K, all supporting documentation for medical conditions / medications requiring further review or waiver under NVIC 04-08, or the successor thereto, and results of the review / waiver to the Board appointed physician and the Medical Review Officer.*

*This procedure involves the release of personal health information. The procedure shall require an acknowledgement and a release to ensure the proper authorization and disclosure of the information. The following two steps are recommended:*

- 1. the applicants acknowledge the requirement to disclose personal health information to the Board appointed physician and the Medical Review Officer (concurring physician) similar to the privacy act statement on page 1 of the most recent CG-719K.*
- 2. the pilot or pilot trainee sign a release of information on the statement of fitness for duty. This release could serve as authorization under 7 CCR section 217 (Medical Examination) to provide the information to the reviewing physician(s). It could be similar to the release in Section II of the most recent CG-719K form.*

*Recommendation #17 – The Board of Pilot Commissioners amend 7 CCR section 217(c)(1) (Medical Examination) whereby the Board appointed physician attests to having reviewed the most recent CG-719K, the information supporting a waiver, the list of medications mandated in Harbors and Navigation Code section 1176(b), the most recent toxicological tests, and the information supporting any interim events listed in Recommendation #13 or #14 (that is, any changes in medical condition, or medical disability) since the last annual examination and*

*provides a statement on fitness for duty status. The Medical Review Officer, having reviewed the same information, attests to the review and, the concurrence or non-concurrence of the findings of the Board appointed physician.*

*A suggested application form and a statement of fitness for duty form have been drafted to illustrate this content and process. The details as to the number of forms and details beyond the medical issues will be left to the Board staff. The statement of fitness for duty form should reflect the following:*

- 1. Attestation by the Board appointed physician to what he or she reviewed.*
- 2. Affirmative showing that the physician discussed the status determination (whether FFD, NFFD, or PNFFD) with the pilot or pilot trainee.*
- 3. Authorization by the pilot or pilot trainee to discuss and share all documentation and examination results with the MRO.*
- 4. Attestation by the MRO as to his / her independent determination of the fitness for duty status.*

## **E. MEDICAL REVIEW OFFICER**

### **(Medical Surveillance Program Characteristic #6)**

With the increasing complexity in the medical examination process, the BOPC needs to have more assurance that the medical examination and pilot fitness for duty process are sufficiently robust. One approach is to designate a separate level of physician review and quality assurance. For the purposes of the study, the role of medical expert will be termed Medical Review Officer.

#### **Review – Medical Review Officer**

It is intended that pilots and pilot trainees are fit for duty. The medical evaluation required for the Merchant Mariner Credential issued by the Coast Guard applies to all merchant mariners, not just pilots. The Board appointed physician makes a determination of the mental and physical health, and fitness for duty separate from the NMC medical evaluation report. This determination will consider that the pilot has greater physical demands in his or her job than those working in other merchant mariner jobs. The NMC medical evaluation and waiver system has a different threshold for physical and cognitive abilities than the bar pilots. Ideally, the board appointed physician would have the opportunity to discuss any issues for concern with another physician, or to have a concurrence of the determination by a second experienced specialist physician. This second physician could be more closely associated with Board activities and be involved with the ongoing evolution of the pilot fitness process.

#### **Recommendations – Medical Review Officer**

*Recommendation #18 – The Board of Pilot Commissioners amends 7 CCR section 217 (Medical Examination) to include a separate appointed physician termed a Medical Review Officer. The duties of the Medical Review Officer will include the following:*

- 1. After a review the CG-719K, related medical information, agility test results, changes to medication or medical conditions, toxicological testing results, and the findings of the*

*Board appointed physician, provide a specific statement on fitness for duty and a statement of concurrence or non-concurrence with the statement from the Board appointed physician.*

2. *Maintain a separate set of files with the personal health information on each pilot. The MRO contract includes language to ensure ease of access file for appeals and in the event of a change in MRO.*
3. *Review the agility test itself and compare the track record of pilots or pilot trainees who become not fit for duty as a result of a physical limitation that should have been caught by the agility test, and periodically report to the Board on his or her observations and recommend adjustments to the test itself.*
4. *Stay apprised of any changes in the NVIC 04-08, the CG-719K, or the federal drug testing requirements, and report those to the BOPC.*
5. *Stay apprised of the developments in cognitive function testing and report those developments periodically to the BOPC.*
6. *Undertake annual peer review of the Board appointed physicians.*
7. *Undertake annual quality assurance on the medical examination and the pilot fitness for duty processes.*
8. *Provide advice to the BOPC on matters relating to pilot fitness.*
9. *Participate as a member of the appeals board to review fitness determinations of pilots, including the appointment of an independent medical evaluator. The appeal board to review the fitness determination of a pilot will include the following – the MRO, a physician identified by the pilot, and a third physician jointly identified by the first two.*

*Recommendation #19 – The Board of Pilot Commissioners establishes the following qualifications for the Medical Review Officer which will be used in the contracting process to support the proposed amendments to 7 CCR 217 (Medical Examination) in Recommendation #18:*

1. *licensed by the Medical Board of California*
2. *Board Certified in Occupational Medicine by the American Board of Preventive Medicine*
3. *at least 10 years of experience in occupational medicine*
4. *ideally, experience with the oversight of medical monitoring programs on groups of workers, and*
5. *preferably has accompanied a Board licensed pilot on at least one trip per contract period, or if he or she is physically unable to do so, has obtained equivalent experience acceptable to the Executive Director of the BOPC. The equivalent experience is intended to focus on increasing the understanding of the physical and cognitive demands of the pilot. It includes witnessing an agility test of a pilot, reviewing the San Francisco Bar Pilots video showing the job of a pilot (including pilot ladder), and undertaking an interview with the Executive Director. The review of the SFBP video should be in the company of a Board licensed pilot and the Executive Director in order to provide additional commentary and answer questions.*

## **F. MODELS FOR MEDICAL SERVICES**

### **Review – Medical Service Models**

It is intended that the Board appointed physicians are familiar with the demands of the job as a San Francisco Bar Pilot, with the medical standard guidelines, with the determination of pilot fitness for duty, and with the medical administrative processes of the BOPC. A critical factor in developing and maintaining this familiarity is the frequency of assessments performed by a Board appointed physician. The Board appointed physician should perform at least one or two assessments each month. It is vital that the pilot fitness for duty process develops a timely and efficient administrative protocol. The various service providers (agility tester, the provider of toxicology testing, Board appointed physician, Medical Review Officer) need a collaborative working relationship and administrative processes which support the intent.

It would be ideal from the logistical and medical viewpoints, if all the service providers were located within one medical facility. Logistically, it would be more efficient for the transfer of reports and forms. From the medical viewpoint, the proximity of the service providers assists in the communication between providers, in the transferring of information between providers, and in identifying additional consulting resources. A recommendation on this point would relate to the BOPC internal administrative processes which are beyond the scope of this study.

### **Recommendation – Medical Service Staff Model**

*Recommendation #20 – The Board of Pilot Commissioners contract with a limited number of Board appointed physicians. From a quality perspective, each Board appointed physician should perform at least one assessment of fitness for duty each month.*

## **SUMMARY**

The study reviewed the characteristics of a medical surveillance program in order to establish a framework for making recommendations. These characteristics formed the basis for the separation of the study into different sections. The detailed review of various features about pilot fitness assisted in the identification of a number of actions that the BOPC could develop into detailed recommendations. These actions identified for recommendations included the following:

1. replace the medical and physical examinations guidelines.
2. establish minimum qualifications in occupational medicine for all Board appointed physicians in occupational medicine.
3. provide all Board appointed physicians with opportunities to better understand the physical and cognitive demands of the tasks as a pilot.
4. establish the determination of pilot fitness as a decision which seeks objective information concerning the pilot including physical capacity, medications, medical conditions, vision and hearing, and the physical examination.

5. provide a second level of medical review for pilot fitness and establish agreement between physician reviewers through the appointment of a Medical Review Officer.
6. approximate continuous monitoring of pilot fitness by reviewing this status after any event which causes a change in medication or medical condition.
7. provide the Board a way to keep apprised of matters relating to pilot fitness.

These areas for recommendations are a combination of the current medical practices in medical surveillance programs and suggestions to close gaps which were identified during the research.

End of Executive Summary

## **Pilot Fitness Study for the Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun**

### **INTRODUCTION**

This study on Pilot Fitness was conducted under contract by Dr. Robert Kosnik of the University of California, San Francisco for the Board of Pilot Commissioners (BOPC) for the Bays of San Francisco, San Pablo, and Suisun. The study was conducted to meet the following outcomes with a view to changing its current rules and regulations on pilot fitness where needed:

- A. Develop recommendations for standards to be adopted which meet or exceed the Coast Guard standards to ensure that pilots are fit to perform their duties and as required by Harbors and Navigation Code (HNC) section 1176.
- B. Assist the Pilot Fitness Committee in developing standards for the qualifications of physicians for performing examinations of pilots and pilot trainees to determine their fitness for duty.
- C. Conduct a comprehensive review of the current physical and medical fitness standards for pilots licensed by the BOPC to meet the licensing requirements set forth in Title 7 California Code of Regulations (CCR) section 217 (Medical Examination) and as defined in the HNC section 1176.
- D. Review generally accepted techniques and diagnostic tools for the assessment of the mental acuity and physical fitness of the pilots, including those used to identify degradation of the performance of pilots due to gradual loss of situational awareness or judgment.
- E. Assist the Board's Pilot Fitness Committee in developing recommendations for the duties and qualifications of a Medical Review Officer (MRO) to review pilot physicals, act as a resource for information on the effect of medical conditions and medications on fitness for duty, provide quality assurance and peer review for the services of examining physicians performing pilot physicals, act as member of the appeal board to review appeals of fitness determinations and other duties as may be designated.
- F. Develop recommendations to improve the BOPC current examination procedures to determine whether a pilot meets the standards recommended.

The study was designed to meet these outcomes by gathering and organizing information along the following aspects.

1. Review of the history of pilot fitness regulations.
2. Review of the current BOPC, national, and international pilot fitness regulations.
3. Review of the assessment of fitness in other national regulated transportation.
4. Detailed review of the physical and cognitive demands of the tasks performed by a pilot or pilot trainee.

These aspects allowed the study to consider questions such as:

- How have pilot fitness regulations evolved?

- What are the national and international regulations?
- Do they have local application for the BOPC pilot fitness regulations?
- Are there gaps in the regulations?
- Do other national regulated transportation sectors have regulations that can assist in improving the pilot fitness regulations?
- What are the next logical steps in pilot fitness regulations?

The study used the occupational medicine framework for conducting medical surveillance programs in which the goal is to review the fitness for work of an identified group of individuals. The framework for such programs have a common set of features: A qualified medical examiner who understands the demands of the job is provided with a relevant list of current medical conditions and medications. A medical examination is performed focusing on and paying particular attention to the required functional capacities of the individual. The initial examination is repeated periodically and / or as needed. The medical evaluation is reviewable by another physician(s) on behalf of the examiner or the examinee.

This framework leads to the use of the following characteristics in the development of the medical surveillance for pilot fitness.

**Characteristics of a Fitness for Duty, Medical Surveillance Program:**

1. Performed by a qualified medical examiner (education, training, experience)
2. Understand the demands of the job (physical and cognitive demands)
3. Review the relevant information on current medical conditions and medications
4. Perform an examination focusing on the required functional capacities
5. Evaluate the individual periodically and post health event
6. Provide a review process (to support both the pilot and the examiner)

The BOPC appointed a Pilot Fitness Committee consisting of Captain Steve Roberts as Chair with Barbara Price, CEO, PK Consultants, Inc., Vice President, Board of Trustees, Alameda County Medical Center and General Chester L. Ward, MD, MPH; Brigadier General, Master Flight Surgeon, Medical Corps, U.S. Army, Retired as members. A series of workshops was held to assist in expanding the research outcomes from management level recommendations to detailed statements. These workshops provided the opportunity to remove ambiguity from the recommendations. This approach provides a foundation for the straightforward development of rules and regulations, contract language, internal processes, and forms.

The report is divided into a number of sections organized to reflect the characteristics of a model medical surveillance program. Each section contains the research information and is further divided into subsections. Some sections contain an “Analysis” subsection which helps to provide feedback on the aspects of the study or the characteristics of a fitness for duty medical surveillance program. Each section contains a “Review” subsection which describes the intent of the recommendation for that section. The final subsection is titled “Recommendation” which outlines the detailed recommendations from the section.

## A. REVIEW OF PILOT FITNESS STANDARDS

### Evolution of the US Guidelines for Medical Fitness Examinations in Seafarers

The work of pilots goes back to Ancient Greece and Roman times, when locally experienced harbor captains employed by incoming ships' captains to bring their trading vessels into port safely. Eventually, the role of the pilot became regulated and the harbors themselves licensed pilots.

Since the 19<sup>th</sup> century, there have been minimum standards for the seamen (variously referred to as seafarers, mariners, or mercantile mariners). A brief review of the history of these standards helps to establish a foundation for identifying the next logical changes needed to improve the effectiveness of the standards, regulations and procedures.

### HISTORY OF PILOT FITNESS STANDARDS

This study does not include an exhaustive review on the history of marine pilot fitness. A brief survey of the internet retrievable medical literature was performed to look for broad themes and references on fitness “to serve at sea”. Three relevant reports were identified through a search on “mercantile marine hygiene” from the British Medical Journal in the 19<sup>th</sup> century.

First, the British Medical Journal commented on “Mercantile Marine Hygiene” in 1867. An Act created the position of medical inspector to the Board of Trade and it required the following actions<sup>2</sup>:

1. *the publication and legal adoption of an amended scale of medicines and medical stores suitable for seagoing ships.*
2. *the authorization of a book, or books, containing instructions for dispensing the same.*
3. *the arrangement of a system whereby all lime and lemon juice, required as ship's stores, is to be deposited in a bonded warehouse, examined officially by the Board of Trade medical officer, mixed with a certain amount of spirit, and certified as fit and proper to be used on board ship, and*
4. *a system of surveying of the crews' quarters, by which all seamen shall have the amount of space prescribed by the terms of the Act.*

This act focuses on the personal health needs of seamen and outlines minimum standards for personal space. It provides for the health of seamen by ensuring that the ship contained proper medicines, a means to deliver the medicine, and set minimum space for their quarters. It does not set minimum standards for the fitness of the seamen.

Secondly, the British Medical Journal contained an article about merchant marine testing in the United States states the following:

*“Since 1880, all pilots on harbour vessels and steamboats, on the rivers and lakes of this country, have been required to pass an examination for colour-blindness. This examination is required of the officers and seamen of the Revenue Marine Service*

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<sup>2</sup> British Medical Journal, Correspondence on “Mercantile Marine Hygiene”, November 23, 1867.



*(coastguard), and of the surfmen of the Life Saving Program. ... during the past seven years, 20,742 seamen have been examined for colour-blindness, and 478, or 2.3 percent were rejected as unfit for service, on account of this disability.<sup>3</sup>*

This requirement to pass a color-blindness examination is perhaps the first example of the principle that seamen in the United States with a health problem which could lead to a collision should be excluded from work. Color-blindness was established as a Coast Guard requirement for the officers and surfmen. It excluded those who were color-blind in order to prevent collisions related to the seaman's inability to distinguish the signal lights.

Thirdly, the British Medical Journal included a report from a correspondent, who attended "The International Conference of Railway and Marine Hygiene in September, 1895<sup>4</sup>". It was recorded that "*an expression of opinion was sought as to whether the examinations in sight and hearing and general fitness ought to be entrusted exclusively to medical men, and in conformity to fixed standards*". It was also reported that there was a discussion on "*new applicants for service requiring spectacles to secure normal vision should not be accepted, but that men found to have refractive errors after admission to service should be allowed to wear glasses*". These discussions are early examples of the establishing minimum standards for the fitness of seamen and for the credentials of the reviewer as well as introducing accommodations for the worker with correctable vision problems.

## **Analysis**

By the end of the 19<sup>th</sup> century, some countries were considering the health needs of the seamen and the need of the public for minimum fitness standards for seamen to avoid collisions. The discussions included who should perform these assessments and to what extent should accommodations be available to seamen. The values underpinning these actions have continued to the present. The steps taken in the 19<sup>th</sup> century were not unified between countries or within the various medical communities.

## **INTERNATIONAL SHIPPING STANDARDS**

Shipping is perhaps the most international of the world's industries, serving more than 90 per cent of global trade by carrying huge quantities of cargo cost effectively, cleanly, and safely.

There are a number of international organizations set up to establish common approaches to international issues. Nations become members of these organizations. As nation members, they are bound to the international agreements within these organizations. For Seafarers, the relevant organizations are the International Maritime Organization and the International Labour Organization.

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<sup>3</sup> Armstrong, S.T.; "Colour-Blindness in the Mercantile Marine of the United States"; British Medical Journal, January 23, 1888.

<sup>4</sup> British Medical Journal, Correspondence on "The International Conference on Railway and Marine Hygiene", September 28, 1895.

## **International Maritime Organization<sup>5</sup>**

The Convention establishing the International Maritime Organization (IMO) was adopted in Geneva in 1948 and IMO first met in 1959. The IMO's main task has been to develop and maintain a comprehensive regulatory framework for shipping and its mandate today includes safety, environmental concerns, legal matters, technical co-operation, maritime security, and the efficiency of shipping.

The IMO is a specialized agency of the United Nations with 169 Member States and three Associate Members. It is based in the United Kingdom with around 300 international staff.

IMO's specialized committees are the focus for the technical work to update existing legislation or develop and adopt new regulations, with meetings attended by maritime experts from Member Governments, together with those from interested intergovernmental and non-governmental organizations.

The result is a comprehensive body of international conventions, supported by hundreds of recommendations governing every facet of shipping. There are measures aimed at the prevention of accidents, including standards for ship design, construction, equipment, operation and manning. Key treaties have been adopted including the (SOLAS)<sup>6</sup> convention for life safety at sea, the (MARPOL)<sup>7</sup> convention for the prevention of pollution by ships, and the Standards of Training, Certification and Watchkeeping (STCW)<sup>8</sup> convention on standards of training for seafarers.

## **International Labour Organization<sup>9</sup>**

The International Labour Organization (ILO) is devoted to advancing opportunities for women and men to obtain decent and productive work in conditions of freedom, equity, security and human dignity. Its main aims are to promote rights at work, encourage decent employment opportunities, enhance social protection and strengthen dialogue in handling work-related issues. In promoting social justice and internationally recognized human and labor rights, the organization continues to pursue its founding mission that labor peace is essential to prosperity. Today, the ILO helps advance the creation of decent jobs and the kinds of economic and working conditions that give working people and business people a stake in lasting peace, prosperity and progress.

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<sup>5</sup> International Maritime Organization, <http://www.imo.org/About/Pages/Default.aspx>.

<sup>6</sup> International Maritime Organization, “International Convention for the Safety of Life at Sea (SOLAS)”, Adoption: 1 November 1974; Entry into force: 25 May 1980. [http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-safety-of-life-at-sea-\(solas\)-1974.aspx](http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-safety-of-life-at-sea-(solas)-1974.aspx)

<sup>7</sup> International Maritime Organization, “International Convention for the Prevention of Pollution from Ships (MARPOL)”, Adoption: 1973 (Convention), 1978 (1978 Protocol), 1997 (Protocol - Annex VI); Entry into force: 2 October 1983 (Annexes I and II). [http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-\(marpol\).aspx](http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-(marpol).aspx)

<sup>8</sup> International Maritime Organization, “International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW)”, Adoption: 7 July 1978; Entry into force: 28 April 1984; Major revisions in 1995 and 2010. [http://www.imo.org/about/conventions/listofconventions/pages/international-convention-on-standards-of-training-certification-and-watchkeeping-for-seafarers-\(stcw\).aspx](http://www.imo.org/about/conventions/listofconventions/pages/international-convention-on-standards-of-training-certification-and-watchkeeping-for-seafarers-(stcw).aspx)

<sup>9</sup> International Labour Organization, <http://www.ilo.org/global/about-the-ilo/lang--en/index.htm>

The ILO was founded in 1919, in the wake of a destructive war, to pursue a vision based on the premise that universal, lasting peace can be established only if it is based upon decent treatment of working people. The ILO became the first specialized agency of the UN in 1946.

The ILO's vision of decent work is that work is central to an individual's well-being. In addition to providing income, work can pave the way for broader social and economic advancement, strengthening individuals, their families and communities. Such progress, however, hinges on work that is decent. Decent work sums up the aspirations of people in their working lives.

The ILO is the only 'tripartite' United Nations agency in that it brings together representatives of governments, employers and workers to jointly shape policies and programmes. This unique arrangement gives the ILO an edge in incorporating 'real world' knowledge about employment and work.

The ILO provides guidance to member nations through the use of Conventions, Recommendations, and Codes of Practice. ILO Conventions provide broad guidance on a principle or activity. ILO Recommendations provide greater detail on the intentions related to the convention. An ILO Code of Practice or Guidelines provides the most detail on the topic. Each of these instruments is ratified by the general council of the ILO. It takes years before a specific topic is expanded at all three levels. The signatory countries abide by these instruments.

The governmental authorities within member nations should use the information contained in the instruments from the IMO and ILO as a basis for establishing requirements within their respective jurisdictions. In this way, the international instruments act as a common foundation which is cascaded to various countries. This approach allows for variation between member nations due to the differences in their respective legislative frameworks.

## Relevant International Instruments

The relevant instruments concerning medical examinations and seafarer health from the ILO, and IMO are as follows:

1. The ILO Medical Examination of Young Persons (Sea) Convention, 1921 (No. 16)<sup>10</sup>. This convention sets out the requirement for a compulsory medical examination for any young person under eighteen years of age working at sea, for repeating this examination annually, and for the production of a medical certificate attesting to the fitness to work
2. The ILO Medical Examination (Seafarers) Convention, 1946 (No. 73)<sup>11</sup>. This sets out international standards concerning medical examination of seafarers, including requirements for medical certificates, frequency of medical examinations, scope of medical examination, period of validity of the certificates, exemptions, appeal procedures and delegation by the government authority of work related medical examinations.

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<sup>10</sup> International Labour Organization, "Medical Examination of Young Persons (Sea) Convention", Geneva, 1921. <http://www.ilo.org/ilolex/cgi-lex/convde.pl?C016>

<sup>11</sup> International Labour Organization, "Medical Examination (Seafarers) Convention", Geneva, 1946. <http://www.ilo.org/ilolex/cgi-lex/convde.pl?C073>

3. The ILO Ships' Medicine Chests Recommendation, 1958 (No. 105)<sup>12</sup>, and the Medical Advice at Sea Recommendation, 1958 (No. 106)<sup>13</sup>, while not focusing on medical examination itself, concern the provision of medical care at sea and may be of professional interest to the medical community.
4. The ILO Health Protection and Medical (Seafarers) Convention 1987 (No. 164)<sup>14</sup>, includes requirements for medical report forms for ill and injured seafarers.
5. The IMO International Convention of Standards of Training, Certification and Watchkeeping (STCW Convention), 1978, as amended in 1995, Regulation I/9, Medical Standards. It provides guidance regarding medical standards and the issuance and registration of certificates. At the June 2010 meeting, resolutions were adopted to develop international standards on medical fitness for seafarers<sup>15</sup>.
6. The ILO Occupational Health Services Convention, 1985 (No. 161)<sup>16</sup>, its accompanying Recommendation (No. 171)<sup>17</sup> and the Technical and Ethical Guidelines for Workers' Health Surveillance (1997) are also relevant. These guidelines gave rise to the sectoral activities program for Seafarers mentioned below.

## Analysis

The International Maritime Organization and the International Labour Organization are the two international bodies which provide international guidelines on medical fitness examinations for seafarers. Together, the instruments from these organizations form a common basis for the government authorities in member countries. It is noteworthy that all of these instruments are applicable to seafarers, not ships' pilots. After reviewing the national standards in the United States, a review of the regulations developed by other member countries provides alternate approaches to implementing these international instruments.

## **DEVELOPMENT OF NATIONAL STANDARDS IN THE UNITED STATES**

In 1981, the United States Public Health Service withdrew from all maritime direct health care. The maritime community was encouraged to develop and implement its own voluntary guidelines for physical examination. A collaborative group with membership from seafarers, shipping associations and several federal agencies was formed. This group developed and published recommendations for Entry Level Physical Qualifications. In 1989, the Coast Guard issued a set of guidelines on the contents of the physical examination. Guidelines on the medical

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<sup>12</sup> International Labour Organization, "Ships' Medicine Chests Recommendation", Geneva, 1958.  
<http://www.ilo.org/ilolex/cgi-lex/convde.pl?R105>

<sup>13</sup> International Labour Organization, "Medical Advice at Sea Recommendation", Geneva, 1958.  
<http://www.ilo.org/ilolex/cgi-lex/convde.pl?R106>

<sup>14</sup> International Labour Organization, "Health Protection and Medical (Seafarers) Convention", Geneva, 1987.  
<http://www.ilo.org/ilolex/cgi-lex/convde.pl?C164>

<sup>15</sup> International Maritime Organization, "Revised STCW Convention and Code adopted at the Manila Conference", Briefing 32, June 25, 2010. <http://www.imo.org/MediaCentre/SecretaryGeneral/Secretary-GeneralsSpeechesToMeetings/Pages/Diplomatic-Conference-to-amend-the-STCW-Convention-and-STCW-Code,-Manila,-21--25-June-2010-.aspx>

<sup>16</sup> International Labour Office (ILO). Convention Concerning Occupational Health Services, 1985 (No.161) -  
<http://www.ilo.org/ilolex/english/convdisp1.htm>

<sup>17</sup> International Labour Office (ILO), Recommendation Concerning Occupational Health Services, 1985 (No.171) -  
<http://www.ilo.org/ilolex/cgi-lex/convde.pl?R171>

certification continue to be promulgated through the Coast Guard as Navigational and Vessel Inspection Circulars. The current version is the NVIC 04-08. The process for collection of the medical history, current medications, active medical conditions and the results of the physical examination are outlined in the directions for the completion of the CG-719K. A review of the transition in the intents, contents and processes involved in each of these guidelines is helpful in looking for the gaps in a comprehensive approach.

## **US Merchant Marine Seafarers – Voluntary Guidelines<sup>18</sup>**

In 1985, The Seafarers Health Improvement Program (SHIP) Committee adopted the Guidelines for the Physical Examination for retention of Seafarers in the US Merchant Marine. The SHIP committee acknowledged the changing nature of the jobs in the merchant marine and encouraged that the guidelines not be embodied in federal regulation, but rather the guidelines should be implemented on through voluntary mechanisms.

This Guide for Physicians was developed in a collaborative effort between seafarers and ship owners / operators to provide a reference resource for examining physicians to promote uniformity in evaluating the fitness to work of a seafarer. Prior to this guide, there was little information available to a physician concerning conditions which may render a seafarer not fit for duty.

The Guide does define three types of duty status – fit for duty (FFD), not fit for duty (NFFD), and permanently not fit for duty (PNFFD). The guide provides a listing by body system of the medical conditions which are absolute exclusions from work, those which are disqualifying during treatment, and those which require further in depth evaluation. There was an accompanying set of appendices which outlined standards for vision, hearing, cardiac capacity and respiratory capacity. Additionally, one appendix listed the job descriptions from the US Department of Labor, “Dictionary of Occupation Titles”<sup>19</sup>.

This guide was developed to support greater attention on the health of US merchant marine seafarers and as a means by the maritime community to develop and implement its own voluntary standards for physical examination.

## **Analysis**

The guidelines from the Seafarers Health Improvement Program (SHIP) committee did establish in 1985 a means for physicians to consistently determine fitness to work for those employed at sea. It introduced the concept that the physician should be knowledgeable about the type of work performed by the individual through the provision of a list of job descriptions. It did not establish a standard medical process and a schedule for repeat certification.

## **Navigation and Vessel Inspection (NVIC No. 04-08)**

This NVIC provides guidance for evaluating the physical and medical conditions of applicants for merchant marine documents. It assists medical practitioners in evaluating the mariner’s

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<sup>18</sup> Seafarers Health Improvement Program (SHIP), “Reference Guide for Physicians, Physical Examination for Retention of Seafarers in the U.S. Merchant Marine”, 1988 Edition.

<sup>19</sup> US Department of Labor, Dictionary of Titles (DOT), 2010. <http://www.occupationalinfo.org/>

physical and medical status to meet the requirements. This NVIC replaces the NVIC 2-98 and updates the Coast Guard practices consistent with the ongoing changes in the medical practice.

This NVIC details the specific medical conditions subject to further review, and the recommended data for the evaluation of each condition to determine fitness for service. It is intended to reduce the time required to process credential applications by helping eliminate the first step, obtaining clinical investigations and / consultations to clarify a medical condition.

There are several aspects of the pilot fitness assessment which are addressed in this NVIC. The following is a selected list of the specific aspects:

- Medical Certification Standards (Enclosure 1) – This NVIC outlines the specific standards that apply for each of the various types of credentials. The medical certification standards are set out for demonstration of physical ability, for a general medical examination, for vision and hearing standards, and for the form to be submitted. For pilots, this NVIC outlines that the applicant “shall have a thorough physical examination each year” and shall provide the passing results of their annual chemical test for dangerous drugs.
- Physical Abilities Guidelines (Enclosure 2) - This NVIC outlines that the practitioner should require that the applicant demonstrate the ability to meet the physical abilities guidelines when there is doubt about the applicant’s ability to meet the guidelines.
- Medical Conditions Subject to Further Review (Enclosure 3) – This NVIC requires that all listed active medical conditions and those that cause significant functional impairment are reviewed by the Coast Guard. It provides a detailed listing of medical conditions and the recommended evaluation data which should be forwarded. This list has been expanded from the listing in SHIP and the prior NVIC 2-98.
- Medications (Enclosure 4) – This NVIC outlines that illegal substances and intoxicants which are prohibited, that prescription and over-the-counter medication must be reported and that some categories of medication require a waiver. Applicants are required to report all medications which are used for greater than 30 days within the 90 days prior to the completion of the CG-719K form.
- Vision and Hearing Standards (Enclosure 5) – This NVIC outlines the vision and hearing standards as well as the conditions when a waiver of vision requirements may be granted.
- Medical Review process (Enclosure 6) – This NVIC outlines a review process for applicants who do not meet the physical or medical standards for a credential. The review is performed by medical reviewers at the National Maritime Center.

## **Analysis**

The current NVIC on “Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials” was issued in 2008. This was ten years after the previous version. It provides greater detail about the identified medical conditions of concern, about the use of medication, and about the physical abilities of the job. It does not specify the qualification of the examining physicians. The standards outlined in this NVIC are used by the medical practitioner to establish an assessment routine and later as an aid when the applicant has a medical condition and / or uses a medication of concern. The process for review of medical conditions, any current medication,

any associated documentation, and the content of the medical examination is guided by the completion of the CG-719K form. The examination process is not driven by this NVIC.

## **Merchant Mariner Physical Examination Report (CG-719K)**

This form provides a set of instructions to both the applicant and the licensed physician who conducts the medical examination. It outlines an attestation by the applicant to the truthfulness of the statements, provides the intent of the examination and provides a form for completion by the physician. This report has changed significantly in the past decade. Let's examine the various reports in chronological order.

- Version Reviewed 03/04 – This version of CG-719K instructs the applicant to submit this form completed by the examining physician. It provides an overview of the intent of the examination and a traditional medical examination form which details the vision and hearing along with an overview of the medical conditions which might impact fitness to work according to body systems. The length of the document (4 pages) speaks to a simple straight forward approach that relies on the thoroughness of the examining physician.
- Version Reviewed 01-09 – This version of CG-719K is much more detailed, focused on attesting to the truthfulness of statements, and more focused on a process than the previous versions. Some of the changes include: 1) the applicant must be identified through photo ID, 2) the medications must be “verified by the verifying physician”, 3) the medical conditions of interest are listed, and 4) the physical information section has been expanded to include a physical examination section to be completed by the verifying physician. The CG-719K has been expanded to 9 pages and a form CG-719K/E has been added to obtain the opinion of the licensed physician on the fitness of the applicant to undertake the physical demands of the job.

## **Analysis**

The NVIC on “Medical and Physical Evaluation Guidelines” along with the process for the completion of the CG-719 has evolved. Previously, the forms would have been completed with detailed knowledge about the vision and hearing standards along with a mere outline of the medical conditions of the applicant. The current version requires specific statements on the medications used, on the history of medical conditions, on the ability to undertake the physical demands of the job, and on a complete physical examination. The data collection is now more detailed and likely more consistent between verifying physicians. The transition from the early versions to the present forms is striking.

## **OTHER NATIONAL STANDARDS**

For the purposes of this study, the national standards of Australia, Canada, and the United Kingdom were reviewed. These countries were chosen because they have common origins to the United States in seafaring and share material related to this study on the internet. The extent of the internet content does vary from nation to nation. The amount of information obtained was sufficient to review the pertinent aspects for this study. It was not intended to be an exhaustive review.

## **Australia**

In Australia, the Customs Marine Unit<sup>20</sup> (CMU) within the Maritime Operations Support Branch of the Australian Customs Service is responsible for the efficient and effective conduct of maritime operational activities, including marine qualifications through its Standards section. An assessment is required for any person employed on a ship; it specifically identifies the duties of a “coastal pilot”. The assessment is designed to be consistent with the IMO Code (STCW) and the ILO Conventions.

The assessment process has three parts: a fitness test, psychological tests and a medical examination. First, applicants need to meet fitness standards and pass tests designed to reflect endurance, balance, agility, flexibility, power, strength, co-ordination and speed. Secondly, applicants are also required to undertake a comprehensive range of psychological tests. Thirdly, applicants are required to undertake a medical examination in order to obtain an Australian Maritime Safety Authority (AMSA) Certificate of Medical Fitness in accordance with Marine Orders Part 9: Health – Medical Fitness - Issue 5<sup>21</sup>.

A Medical Inspector of Seamen performs an interview, reviews tests, and conducts an examination to determine whether the applicant is medically fit to perform the intended duties as seafarer or as a coastal pilot on a ship. The stated objectives of the medical examination are “to ensure that individuals are fit to perform the essential tasks of their job at sea effectively, and to anticipate and, where possible, prevent the avoidable occurrence of ill-health offshore which could place individuals, their colleagues and emergency personnel at risk”. The outline for the examination includes a detailed listing of the tasks for various classes of jobs addressing / listing tasks which require vision, hearing / speech, consciousness, physical demands, and other factors. It includes vision and hearing standards as well as a lengthy list of medical conditions which may not be acceptable or present high risk.

The decision expressed on the medical certificate is reviewable by the Administrative Appeals Tribunal. A person declared unfit for duty at sea may apply for further examination by an independent panel of medical practitioners, of whom one must be an occupational physician and one a specialist from the appropriate specialty. A seafarer or coastal pilot who is the holder of a valid Certificate of Medical Fitness may at any time be required to obtain a new certificate where as a result of illness, injury or other cause it is believed the seafarer may no longer meet the standards specified.

## **Canada**

In Canada, Marine Safety within Transport Canada is responsible the regulations pertaining to Marine Personnel Regulations. The authority for the regulations is the obligations which were established under the IMO STCW Convention, the ILO conventions, and the international standards of seafarers from the ILO. The purpose of the seafarer health assessment is to ensure that the individual seafarer is fit for the work for which he is to be employed, taking into account the particular risks associated with working at sea<sup>22</sup>.

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<sup>20</sup> Australian Customs Service, “Customs Marine Unit, Recruitment Information Pack”, 2010.

<sup>21</sup> Australian Maritime Safety Authority, “Marine Orders, Part 9 – Health – Medical Fitness – Issue 5 Compilation No.1”, 2006. <http://www.comlaw.gov.au/Details/F2007C00055>

<sup>22</sup> Transport Canada, “Medical Examination of Seafarers Physician’s Guide, 2007.



The examination is conducted by a “Marine Medical Examiner” who should be satisfied that no disease or defect is present which could either be aggravated by working at sea, or which represents an unacceptable health risk to the individual seafarer, other crew members or the safety of the ship. The Marine Medical Examiner is authorized by the Marine Medical Certification Board. There are many qualifications for the medical examiners, including but not limited to the following: 1) licensed to practice where the examinations are conducted, 2) experienced in general and occupational medicine or maritime occupational medicine, 3) have a knowledge of the living and working conditions aboard ships, 4) attend training seminars initially and at least every 4 years thereafter, and 5) should complete at least 25 examinations annually. After completing the medical examination of a seafarer, the Marine Medical Examiner provides the Minister with a copy of the provisional medical certificate, the original completed medical examination report form, and with any other relevant medical reports; and provides the seafarer with a provisional medical certificate indicating the status as either fit for sea service without limitations, or fit for sea service with limitations which are specified. If the seafarer is considered unfit for sea service, the Marine Medical Examiner provides a provisional letter addressed to the Minister and the seafarer giving the reasons for the determination. The Marine Medical Certification Branch reviews all reports and issues the Marine Medical Certificate.

The guidelines for the Marine Medical examiners are provided in the “Handbook for Marine Medical Examiners”<sup>23</sup>. Part C identifies the abilities that should be tested for each of a series of shipboard tasks, function, event or condition. Part D describes a general framework for identifying potentially disqualifying medical conditions and medications. Part E identifies medical conditions and the suggested evaluation data. Parts F, G and H outline the vision, color vision and hearing requirements. In the Appendix, there is a lengthy list of job tasks arranged according to medical requirements for vision, hearing, consciousness, physical activity, and other difficulty classify activities. Overall, the handbook is similar to the NVIC guidelines.

## United Kingdom

In the United Kingdom, the Merchant Shipping Regulations in the Maritime and Coastguard Agency, Department for Transport is the government authority which directs the Medical Examination regulations enabling the UK to comply with the ILO Medical Examination (Seafarers) Convention 1946 (ILO 73)<sup>24</sup>. The regulations apply to a person employed whose usual place of work is on board a seagoing ship. The regulations make it a legal requirement for any seafarer to hold a valid certificate attesting to their medical fitness for the work for which they are employed. The medical examination system and medical standards are outlined in Merchant Shipping Notices (MSN) 1765(M)<sup>25</sup>, one of a series of notices.

The medical examination is conducted by a physician listed by Maritime and Coastguard Agency (MCA) as an approved doctor. Approved doctors are required to determine a seafarer’s fitness by reference to the statutory medical and eyesight standards. The general principle is that the

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<sup>23</sup> Transport Canada, “Handbook for Marine Medical examiners”, TP111343E, May 2008.

<sup>24</sup> International Labour Organization, “Medical Examination (Seafarers) Convention”, Geneva, 1946. <http://www.ilo.org/ilolex/cgi-lex/convde.pl?C073>.

<sup>25</sup> Maritime and Coastguard Agency, MSN 1765 (M) Seafarer Medical Examination System and Medical and Eyesight Standards, 2010.

approved doctor should be satisfied in each case that no disease or defect is present which could either be aggravated by working at sea, or represent an unacceptable health risk to the individual seafarer, other crew members or the safety of the ship. It would be an unsafe practice to allow a seafarer to go to sea with any known medical condition where there was the possibility of serious exacerbation requiring expert treatment.

The seafarer assessment of fitness to work is identified as one of four categories: 1) fit for sea service, with no restrictions; 2) fit for sea service but with restrictions (e.g. near coastal waters only); 3) temporarily unfit for sea service; and 4) permanently unfit for sea service which may be changed later. The approved doctor issues a medical fitness certificate which has a maximum validity of two years. Any seafarer found to be fit with restrictions or unfit for sea service has a right of review by an independent medical referee appointed by the Secretary of State for the Department for Transport.

The approved doctors use the medical and eyesight standards for seafarers outlined in the Merchant Shipping Notices (MSN) 1822(M)<sup>26</sup> Annex B. Information is provided in a table format for list of medical conditions outlining the risk basis, the clinical aspects of prevention, the fitness category when the condition is identified and absolute fitness category after investigation. Annex B, Appendix 1 outlines the eyesight standards; Annex B, Appendix 2 outlines the physical abilities for the seafarer. These standards are for all seafarers. The physical abilities and medical standards for pilots are not specifically identified.

**Table 1 – Comparison of National Standards for Mariner Medical Examinations**

	<b>Australia</b>	<b>Canada</b>	<b>United Kingdom</b>	<b>United States</b>
<b>Competent Authority</b>	Customs Marine Unit (CMU) within the Maritime Operations Support Branch of the Australian Customs Service	Marine Safety within Transport Canada	Merchant Shipping Regulations in the Department of Transport	United States Coast Guard, National Maritime Center
<b>IMO Convention</b>	Consistent with the IMO Code (STCW)	Consistent with the IMO Code (STCW)	Consistent with the IMO Code (STCW)	Consistent with the IMO Code (STCW)
<b>ILO Guidelines</b>	Consistent with ILO Conventions	Consistent with ILO Conventions	Consistent with ILO Conventions	Does not use ILO examiner qualifications
<b>Medical Certificates</b>	Australian Maritime Safety Authority (AMSA) Certificate of Medical Fitness	Minister's Marine Medical Certificate	Form ENG1 – completed by an approved doctor	Supports the Merchant Mariner's federal license and credentials, there is no specific medical certificate.
<b>Agility Testing</b>	New applicants are required to undertake: 1) fitness standards and tests designed to reflect endurance, balance, agility, flexibility, power, strength, co-ordination and speed, and 2) a comprehensive range of	Physical abilities testing as needed	Physical abilities testing as needed	Physical abilities testing as needed

<sup>26</sup> Maritime and Coastguard Agency, Merchant Shipping Notice (MSN) 1822(M), 2010. [http://www.dft.gov.uk/mca/msn\\_1822.pdf](http://www.dft.gov.uk/mca/msn_1822.pdf)

Pilot Fitness Study for the Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun – by Dr. Robert Kosnik, University of California, San Francisco

	psychological tests			
<b>Medical Examiner</b>	Medical Inspector of Seamen	Marine Medical Examiner	Approved Doctor	Licensed physician, termed Verifying Physician
<b>Physical Demands</b>	Detailed task lists, including the duties of a "coastal pilot"	Detailed job task list, includes the pilot with the master and mate	List of physical abilities for seafarers	List of shipboard tasks, functions, events, or condition.
<b>Vision and Hearing Standards</b>	Yes	Yes	Yes	Yes
<b>Medication List</b>	General framework with a list of classes of medications	General framework	None	General framework and list of relevant medication classes and categories
<b>Medical Conditions</b>	Medical conditions with high risk	Medical conditions and evaluation data	Medical conditions with a risk basis	Medical conditions subject to further review and evaluation data
<b>Exam Frequency</b>	At any time, a new certificate may be required where as a result of illness, injury or other cause it is believed the seafarer may no longer meet the standards specified	The Marine Medical Certificate is valid for two years.	Seafarer Medical Certificates is valid for a maximum of two years	Merchant mariners every five years; pilots annually.
<b>Appeal Process</b>	Administrative Appeals Tribunal. A person declared unfit for duty at sea may apply for further examination by an independent panel of medical practitioners, of whom one must be an occupational physician and one a specialist from the appropriate specialty		Independent Medical Referee appointed by the Secretary of State for the Department for Transport.	National Maritime Center reviews supporting information and may obtain an examination through its "Trusted Agent" designation of certain physicians.
<b>Published Guidelines</b>	Australian Maritime Safety Authority, "Marine Orders, Part 9 – Health – Medical Fitness	Handbook for Marine Medical Examiners	Approved Doctors' manual	Navigation and Vessel Inspection (NVIC 04-08), medical and Physical evaluation guidelines for Merchant Mariner Credentials, and the Coast Guard Form, CG-719K, Physical Examination Report Form
<b>Latest Version</b>	2006	Draft 05/2008	06/2010	2008

## **REGULATED TRANSPORTATION**

In the United States, three Department of Transportation (DOT) modal administrations have long-standing medical standards programs<sup>27</sup>. These are as follows: the Federal Aviation Administration (FAA), the Federal Motor Carrier Safety Administration (FMCSA), and the U.S.

<sup>27</sup> U.S. Department of Transportation, "Summary of Medical Standards programs of US DOT modal administration", Medical Standards for Railroad Workers, 2005.

Coast Guard (USCG), now part of the Department of Homeland Security. The Federal Railroad Administration (FRA) has had railroad safety oversight for many years, but the only medical standards that it administers are for vision and hearing.

### Federal Railway Administration (FRA)

The FRA regulations set vision and hearing standards for engineers and remote control operators. The railroads are responsible for ensuring that engineers meet the medical standards. The review includes current prescription and over-the-counter medication. The medical examiner is selected by the railroad and may be a physician or physician assistant. The medical examiners are provided with a copy of the standard. The examinations are required every three years. Since 1992, there has been an appeal process established through the Locomotive Engineer Review Board.

### Federal Aviation Administration (FAA)

The FAA has two separate medical standards programs – one for pilots and one for air traffic control specialists. Medical certification is required of all commercial and private pilots. The current medical standards have been in effect since 1959. There are three classes of pilots. There are specific medical standards for vision, hearing, cardiac function (as determined by pulse, blood pressure and electrocardiogram [ECG]), mental disease, and substance dependency. There are exclusions if the airman has designated diseases. The examiners (Aviation Medical Examiners) are selected and designated by regional flight surgeons. There is mandatory multi-day training with retraining within three years. The designated examiners are renewed annually and subject to satisfactory performance and completion of training requirements. There is an application review and waiver process through the Flight Surgeon system.

The FMCSA requires medical certification for commercial drivers operating in interstate commerce. The first medical standards were published in 1939. A medical certificate was first required in 1954. The guidelines are periodically reviewed and updated through expert consensus. The medical standards include vision and hearing standards as well as specific exclusions for some cardiac, neurologic, mental, rheumatologic and orthopedic conditions. The medical examiners are health care providers licensed by their state. The FMCSA does not review the medical examinations nor the performance of the medical examiner. There is an application review and waiver process which is mainly used for vision standards.

**Table 2 – Comparison of the Medical Standards Programs In US Modal Administration**

<b>Federal Motor Safety Administration (FMCSA)</b>	<b>Federal Railway Administration (FRA)</b>	<b>Federal Aviation Administration (FAA)</b>	<b>Federal Motor Carrier Safety Administration (FMCSA)</b>	<b>Coast Guard Mariners</b>
<b>Covered Positions</b>	Locomotive engineers, remote control operators	Aviation pilots, air traffic controllers	Commercial drivers	Licensed (officers, masters and mates), qualified (sailors), and Unqualified (no mariner skills)
<b>Developed Standards</b>	FRA	FAA	FMCSA	Coast Guard with review from National Maritime Center

<b>Frequency of Examinations</b>	Every 3 years	Varies depending of class of aviation pilot (from 6 mo to 3 yr)	Every 2 years, unless examiner decides on closer follow-up	Licensed and qualified every 3 years. Marine pilots annually.
<b>Examiners</b>	Physician (employed or contracted)	FAA designated physicians	State-licensed health care providers	State-licensed health care providers (verifying physician)
<b>Examiner Credentialed</b>	NO	YES – trained and certified	NO	NO
<b>Waiver / exemption</b>	Railroad’s medical officer in consultation with Supervisor of Locomotive Engineers	Special Issuance, Statement of Demonstrated Ability	Waiver when vision does not meet criteria or if driver is using insulin to control diabetes.	Can be placed on limited duty.
<b>Dispute Resolution</b>	Locomotive Engineer Review Board	Federal Air Surgeon	Third party impartial review	National Maritime Center
<b>Information for examiners</b>	Medical Standards in 49 C.F.R. 240.121 and 49 C.F.R. 240.207.	Medical standards in Title 14 CFR Part 67 of the Federal Aviation Regulations	Medical examiners are expected to be familiar with 49 CFR 391.43.	Guidelines of NVIC 04-08

Adapted from “Table 4. Summary of Medical Standards programs of US DOT modal administration”, Medical Standards for Railroad Workers, US Department of Transportation, 2005.

## Analysis of the Regulated Transportation Medical Standards

The regulated transportation medical standards are quite different on a number of aspects. The FAA medical standards specifically consider the physical demands of an airline pilot. It does not apply to other workers in the air. The standards place a premium on fitness to undertake flying with no loss of consciousness and without medication which affects cognition. These regulations are longstanding with elaborate set of rules for designation of examiners and the examination. The FRA does place a premium on the medical standards for an engineer compared to other railway workers. The FMCSA considers all the drivers of commercial vehicles in one category. The consistent theme in these regulated medical standards is the focus on a high level of functioning (no loss of consciousness and no medication or drugs which affects cognition) for the individual directing the operation of the transportation vehicle.

In contrast, the Coast Guard standards apply to anyone who works at sea. While the intent of personal and public safety is equally at the forefront in all of these medical standards, the Coast Guard standards do not place a premium on the medical standards for a pilot. The BOPC needs a medical standard with a premium for pilots and pilot trainees above the basic Coast Guard medical standard.

## Evolution in the Medical Examination Process

For over a century, there have been US vision and hearing standards for mariners. These standards were formalized internationally through the agreement on Conventions at the International Maritime Organization and the International Labour Organization. In 1981, the oversight for the vision and hearing standards was removed from the US Public Health Service. This was initially replaced by a voluntary set of standards by the Seafarers Health Improvement Program (SHIP). Later, the Coast Guard developed a systematic approach to evaluation of everyone employed in the merchant marine through its guidelines in NVIC 04-08 and its companion form CG-719K. The SHIP and NIVC guidelines have always contained intent statements embracing the desire to have mariners who could perform their jobs safely without endangering themselves or others. These guidelines initially approached the issue by developing lists of medical conditions which were either absolute exclusions or temporary exclusions,

pending a review of further information by the National Maritime Center. The examiners used their best efforts to get additional information on an issue of concern and then applied their best judgment. In recent years, a greater emphasis has been placed on the process within the examination. The process now requires that the mariner attest to the completion of the list of medical conditions and medications, the physician attests to the abilities of the mariner to undertake the physical demands of their job and many of these examination tasks must be directly performed or reviewed by the verifying physician. It still remains that these examinations are performed at a point in time (annually for pilots). The next logical step is to require updates when the medication changes, when there is a new medical condition, or when there is reason for the supervisor to require a new examination. The process would be operating effectively in “real time”.

## **Review – Medical Standards**

It is intended that the Board of Pilot Commissioners update its medical standard for pilot fitness. Section 1176(b) of the Harbors and Navigation Code (HNC) indicates that the Board needs to prescribe medical standards and the California Code of Regulations (CCR) Title 7 section 217 (a)(1) (Medical Examination) identifies the Seafarers Health Improvement Program (SHIP) Committee guidelines of April 26, 1985 as the reference guide for the Board appointed physicians. This review of pilot fitness medical standards identifies the current national medical standard as the NVIC 04-08 with the exception of Enclosure (1) Section 12 which applies to Great Lake Pilots. The NVIC 04-08 guidelines are comparable to international jurisdictions and are consistent with the regulated transportation medical standards in the United States.

## **RECOMMENDATION – Medical Standards**

*Recommendation #1 – The Board of Pilot Commissioners replace the Seafarers Health Improvement Program (SHIP) Committee guidelines with the NVIC 04-08 “Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials”, or any successor thereto, as guidance to the Board appointed physician conducting the physical examination and the fitness for duty determination as a pilot or pilot trainee in Harbors and Navigation Code section 1176(b) and (c).*

Portions of NVIC 04-08, or any successor thereto, specifically applicable to “First Class Pilots and those individuals ‘Serving As’ Pilots” should be highlighted and portions dealing with Great Lake Pilots should be excluded. The Physical Abilities Guidelines in Enclosure (2) are not specific to pilots. These guidelines should be met for routine movement and emergency routines. The agility required for embarking and disembarking on a pilot ladder is addressed later in this study.

## **B. QUALIFICATIONS FOR BOARD APPOINTED PHYSICIANS (Medical Surveillance Program Characteristic #1)**

### **Introduction – Qualifications of Medical Examiner**

The first characteristic for a medical surveillance is that the examination is performed by a qualified medical examiner. Title 7 CCR section 217 (Medical Examination) does not outline

the qualifications for Board appointed physicians. This study will review the qualifications outlined in international documents, in regulated transportation within the US and in Coast Guard CG-719K process.

### **Qualifications for Seafarer Medical Examinations from the ILO Guidelines**

In 1997, the ILO developed guidelines in order to reduce differences in medical requirements and examination procedures, and to ensure that medical certificates issued to seafarers are a valid indicator of their medical fitness for the work they will perform. These guidelines are listed in the ILO “Sectoral Guidelines for Conducting Pre-sea and Periodic Medical Fitness Examinations for Seafarers, Part 2, 1997”. The qualifications of medical examiners are listed as follows:

- *should be a licensed physician*
- *should be experienced in general and occupational medicine or maritime occupational medicine*
- *should have knowledge of the living and working conditions on board ships, gained either through special instruction or through personal experience of seafaring*
- *should be provided with written guidance on the procedures for the conduct of medical examinations of seafarers, including information on appeals procedure for persons denied a medical certificate as a result of an examination,*
- *should enjoy absolute professional independence from employers, workers and their representatives in exercising their medical judgment in terms of medical examination procedures.*

### **Qualifications for Seafarer Medical Examinations by National Authorities**

The national standards for the countries identified in Section A require that the examination be performed by an approved physician. In Australia, the approved physician is a medical examiner of seamen; in Canada, the approved physician is a marine medical examiner; and in the United Kingdom, the physician is on an approved list. The national authorities consider experience and training in maritime occupational medicine in its approval process. In Canada, the marine medical examiners undertake specific training and ongoing training.

### **Qualifications for US Regulated Transportation Medical Examinations**

The qualification of the examiners varies among the US regulated transportation authorities. As covered earlier, the Federal Aviation Administration has a very controlled system for designating examining physicians and ongoing training. The Federal Railway Administration requires that examiners be a state licensed physician chosen by the railway. The Federal Motor Carrier Safety Administration and the Coast Guard do not designate physicians or training. Their examinations must be completed by a state licensed physician. For the Coast Guard, the requirement for a verifying physician began in January 2010. Previously, it could be performed by a physician’s assistant. See Table 2.

### **Role of the Verifying Medical Examiner (Sections III, IV, VII, VIII and XI)**

As mentioned earlier, on January 1, 2010 the Coast Guard began to use a new Merchant Mariner Credential Medical Evaluation Report (CG-719K) for the documentation of the medical evaluation. The medical standards for the medical and physical evaluation continue to be the

Navigational and Vessel Inspection Circular (NVIC) 04-08. The intent of the medical evaluation continues to be: “*ensure that mariners:*

- *are of sound health*
- *have no physical limitations that would hinder or prevent performance of duties*
- *are free from any medical conditions that pose a risk of sudden incapacitation, which would affect operating, or working on vessels.”*

The instructions for completing the medical evaluation report which is sent to the Coast Guard provides additional clarity on the role of the physician completing the evaluation. The process now requires all examinations, tests, and demonstrations must be reviewed by a physician or doctor of osteopathy. This “verifying medical examiner” must complete specific sections of the report dealing with the following:

- Section III – Review of Medication
- Section IV – Certification of Medical Conditions
- Section VII – Physical Information and Examination
- Section VIII – Demonstration of Physical Ability
- Section XI – Recommend Competent

### **Role of the Current Medical Examiners in Examinations**

For this study, interviews were conducted with the current medical examiners. These interviews were structured to collect information on their experience, their credentials, the equipment used to test vision and hearing, the extent of the oversight in the examinations, and their approach to common problems of current medication and medical conditions.

The current medical examiners are experienced in the performance of regulated medical examinations for many different purposes. Some perform more regulated transportation examinations; others perform more job and exposure specific examinations. The examiners work in clinics where the focus is on regulated examinations and urgent care for workplace injuries. The vision and hearing tests are performed on equipment consistent with the standard. Prior to the past year, the review of medical conditions, review of medication, the assessment of physical abilities and medical examination were performed by physician assistants. Now these components of the examination are being performed directly by the physician.

The approach by the medical examiners to medical conditions requiring additional review is to gather more information from the primary care provider and seek appropriate consultation. From the interview, one had the impression that most of the cases were routine and medical conditions requiring additional review appeared infrequently.

The medical examiners are performing the requirements to complete the Coast Guard form CG-719K. They assist the applicant in obtaining any waivers which may be required due to the non-conforming issues of medical conditions or medications. In addition, the current examiners submit the statement of fitness to work to the BOPC. They do not submit a copy of their assessment, the form CG-719K, any waivers nor any other personal medical information.



## **Summary of the Qualifications for Examiners for Regulated Transportation**

The ILO Sector Specific Guidelines for Seafarer Medical Examinations did address the issue of qualification for the medical examiner. It stated that the examiner should have a local medical license, be experienced in occupational medicine, and be knowledgeable about the physical demands of the job. National authorities have taken the approach of using licensed physicians and approving those with experience, interest, and sometimes additional training in maritime occupational medicine. This approach of only using approved physicians is also used by the Federal Aviation Administration for medical examiners. The only requirement from the Coast Guard is that the verifying medical examiner has a state medical license. The business owner can apply a higher requirement through the contract with an experienced medical doctor.

## **Analysis of the Qualification Requirements for Regulated Industries**

The intent of medical examinations in regulated transportation is to ensure that the applicant does not have a medical condition which may pose a risk of sudden incapacitation that might affect his / her ability to operate the vessel (airplane, railway engine or ship). Sudden incapacitation creates the risk of an accident which may affect the operator, the individuals on board, the general public in the area of the accident, the surrounding environment, and the loss of the vessel and its cargo. The risk of severe and widespread consequences to an accident leads to the labeling these operator jobs as safety sensitive.

The medical examination is the tool used to eliminate as far as reasonably possible, the risk of sudden incapacitation. The question becomes “what qualifications are required of the medical examiner”?

The medical curriculum taught in schools of medicine is focused on imparting students with the knowledge and skills to handle the medical conditions which they will confront in their practice. There is an emphasis on listening to the complaints of the patient, postulating possible diagnoses, adding information through diagnostic testing, determining the actual diagnosis and treating it. The curriculum is very crowded. There are only a few dozen hours devoted to the conditions which relate to exposures from work over the four years of training. Only a short period of time is devoted to understanding the manner in which work is done and what are the requirements (physical and cognitive) for work.

Once in practice, physicians are confronted with the need to complete insurance statements about fitness to work. In the absence of formal training, they develop their own personal style for completing the forms and the associated evaluations. In larger practices, new physicians can seek the counsel of their colleagues. Other physicians pursue additional training to gain understanding and competency in performing these examinations.

When one considers the specialties within medicine, occupational medicine is the domain of medicine which deals with individuals and groups in the context of the physical, chemical, and biological hazards in the workplace and their prevention. It deals with the prevention of accidents and exposures, and with strategies to minimize their impact when they do occur. A basic component of the curriculum is to develop an understanding of how the work is done and the demands on the worker. The difficulty is that there are an insufficient number of occupational medicine physicians to handle all the issues which relate to the workplace. Basic

treatment of workers is provided by primary care physicians. Specialized assessments are provided by specialists in occupational medicine.

## **Proposed Standard for the Qualifications for the Board Appointed Physicians**

The bar pilot navigates large shipping vessels in local waters. The job as a bar pilot should be considered a safety-sensitive position. The medical evaluations of a bar pilot should be performed by a physician trained in understanding the work environment, the demands of jobs, and the impact of accidents. The physician performing the medical evaluation should have experience in occupational medicine, ideally trained as a specialist in occupational medicine.

### **Review – Qualifications for Board Appointed Physicians**

It is intended that the Board of Pilot Commissioners appoint physicians to conduct a physical examination and provide the physician with the prescribed medical standards. HNC section 1176(a) does not establish specific qualifications for the appointed medical examiners. NVIC 04-08 does not establish qualifications for its verifying physician completing CG-719K. The work of a bar pilot is a more physically and cognitively demanding job than the merchant mariner. The physicians appointed for evaluating the fitness for duty of the San Francisco Bar Pilots should be experienced and knowledgeable about the job tasks. The Board of Pilot Commissioners should ensure that the medical examiners have a copy of the NVIC 04-08 guidelines, the CG-719K form, and the opportunity to accompany a pilot on a familiarization run or obtain equivalent experience.

### **RECOMMENDATION – Qualifications for Board Appointed Physicians**

*Recommendation #2 – The Board of Pilot Commissioners establishes the following qualifications for the appointed physician through the contracting process in support of Harbors and Navigation Code section 1176(a):*

- 1. licensed by the Medical Board of California*
- 2. at least five years of experience in general occupational medicine or maritime occupational medicine*
- 3. preferably has accompanied a Board licensed pilot on at least one familiarization trip, or if he or she is physically unable to do so, has obtained equivalent experience acceptable to the Medical Review Officer (MRO) once per contract period. The equivalent experience is intended to focus on increasing the understanding of the physical and cognitive demands on the pilot. It includes witnessing an agility test of a pilot, reviewing the San Francisco Bar Pilots (SFBP) video showing the job of a pilot (including pilot ladder), and undertaking an interview with the MRO. The review of the SFBP video should be in the company of a Board licensed pilot, the Executive Director of the BOPC, or the MRO in order to provide additional commentary and answer questions.*

*Recommendation #3 – The Board of Pilot Commissioners adds a requirement to the contract for Board appointed physicians to review and maintain a copy of the following:*

1. *the NVIC 04-08 or its successor “Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials”*
2. *the National Maritime Center form CG-719K, “Medical Evaluation Report”*
3. *the Board of Pilot Commissioners, Statement of Fitness for Duty form*
4. *state statutes and regulations relevant to the determination of a pilot’s fitness for duty, including the Harbors and Navigation Code section 1176 and Title 7 California Code of Regulations section 217.*

*Annually, the MRO and / for the Executive Director meets with each Board appointed physician to ensure that he / she remains current on the above references and forms, and that the forms are filled out properly and consistent with the guidelines.*

*Recommendation #4 – The Board of Pilot Commissioners amend 7 CCR section 217 (Medical Examination) to conform to Harbors and Navigation Code section 1176, including a complete review of statutory and regulatory language to ensure consistency in terminology (e.g. “Board appointed physician” in the statutory language and “a physician designated by the Board” in the regulatory language).*

## **C. PHYSICAL AND COGNITIVE DEMANDS FOR SAN FRANCISCO BAR PILOTS**

### **(Medical Surveillance Program Characteristic #2)**

#### **Introduction – Demands of the Job**

The intent of the medical surveillance program for San Francisco bar pilots is to ensure as far as reasonably possible that all pilots and pilot trainees are physically and cognitively fit to undertake their job each day. The determination of fitness to work matches the abilities of the pilot to the demands (physical and cognitive) of the job. It is important to detail both sides of the matching process – abilities of the pilot and the demands of the job. The abilities of the pilot are assessed through the medical assessment of the pilot. The demands of the job of the San Francisco bar pilots are developed through a job analysis.

#### **JOB ANALYSIS – SAN FRANCISCO BAR PILOTS**

The traditional approach to understanding the demands of a job has been to look at a job description. There are national standardized job descriptions and company specific job descriptions.

#### **Standardized Job Description**

The US Department of Labor, Bureau of Labor Statistics (US BLS) classifies all jobs in its document titled, “Standard Occupational Classification”<sup>28</sup>. Bar pilots are included in 53-5021

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<sup>28</sup> US Bureau of Labor, Standard Occupational Classification (SOC), 2010. <http://www.bls.gov/SOC/>

Captains, Mates, and Pilots of Water Vessels. It provides the following generic job description for pilots, ship:

53-5021.03 - Pilots, Ship

*Command ships to steer them into and out of harbors, estuaries, straits, and sounds, and on rivers, lakes, and bays. Must be licensed by U.S. Coast Guard with limitations indicating class and tonnage of vessels for which license is valid and route and waters that may be piloted*

The US BLS also has a document titled, “Dictionary of Titles (DOT)”<sup>29</sup> which provides additional information for “pilot, ship” on tasks, tools and technology, knowledge, skills, work abilities and work context. The following is their list of tasks.

53-5021.03 - Pilots, Ship - Tasks

- *Set ships' courses that avoid reefs, outlying shoals, and other hazards, utilizing navigational aids such as lighthouses and buoys.*
- *Direct courses and speeds of ships, based on specialized knowledge of local winds, weather, water depths, tides, currents, and hazards.*
- *Steer ships into and out of berths, or signal tugboat captains to berth and unberth ships.*
- *Prevent ships under their navigational control from engaging in unsafe operations.*
- *Consult maps, charts, weather reports, and navigation equipment to determine and direct ship movements.*
- *Give directions to crew members who are steering ships.*
- *Maintain ship logs.*
- *Serve as a vessel's docking master upon arrival at a port and when at a berth.*
- *Operate ship-to-shore radios to exchange information needed for ship operations.*
- *Provide assistance in maritime rescue operations.*

This list of tasks from the UC BLS DOT describes the “activities” undertaken by a bar pilot while on the bridge. It does not describe the physical and cognitive demands of the job.

## **Specific Job Description**

Previously, the San Francisco Bar Pilots Association has undertaken to develop a detailed description of their job. This description is provided in Appendix C.1. This description of the job as San Francisco bar pilot does extend the standard description into physical tasks and environmental conditions encountered in the course of the job. It advances the description of the physical demands of the job using an approach to list the tasks as agreed upon.

## **Customized Job Analysis**

In order to provide the medical assessor with a description that includes the physical and cognitive demands of the job, it is useful to think about the demands of the San Francisco bar

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<sup>29</sup> US Department of Labor, Dictionary of Titles (DOT), 2010. <http://www.occupationalinfo.org/>

pilot job slightly differently. This alternate approach is the ergonomic approach to detailing the demands of a job. The demands considered in this approach include the physical demands, the cognitive demands, the environment, and the personal protective equipment worn.

This approach endeavors to be logical, methodical, and comprehensive. An ergonomic approach to describing the demands of a job considers the job in a cycle. A cycle is one complete occurrence of the activity which brings you back to the same position before it repeats. For each job, there may be one or more cycles. Within each cycle there are a series of steps to be completed. Some of the steps may be cyclical returning to the starting point; other steps will be linear with a starting point and a finishing point.

As an example, consider the work of a stock handler picking orders. The cycle begins when the handler picks up an order sheet and continues through the steps of picking each part; packing each part; closing the package; and delivering it to the shipper. Then, the cycle begins again with another order. Within this cycle, picking up an individual part would be a step in a cycle, while closing the package would have a start and end point.

Let's consider the San Francisco bar pilot job as a number of cycles within one work day. The pilot begins at the home base, proceeds through a trip (or series of trips) and returns to base. There are a series of linear steps (tasks) which the pilot undertakes before completing one cycle or trip. The following list is a logical division of the cycle into a series of tasks.

### **List of Tasks for a San Francisco Bar Pilot**

1. Pilot Boat Ride Out – Embark and Ride Outbound
2. Embarkation of the Vessel
3. Transit to the Bridge
4. Navigation
5. Docking / Undocking
6. Disembarkation
7. Pilot Boat Ride In – Ride Inbound and Disembark
8. Participate in Emergencies – Exiting, Lifeboat

A trip can begin at sea with the pilot navigating the vessel to a berth or a trip can begin at a berth navigating to sea. From a berth, the embarkation will likely be by gangway and the disembarkation will be onto the pilot boat requiring the use of a hand rope.

### **Physical Demands Analysis**

The determination of an individual's ability to undertake regular work or accommodated work requires a comparison between the functional capacities of the worker with the physical demands of the job. These physical demands are determined by detailing each task through observation and measurement, specifically looking at the movements of the individual along with the use of tools, machinery, and instruments, and at the environment in which the work is performed. This process is termed physical demands analysis. The output is detailed information movements of the worker in undertaking the job. This information may be formatted either as collection of task summaries or a consolidation of physical demands for all the tasks into a summary document.

An overall summary will include the time spent in each step of the cycle and identify which steps must be performed by this worker. Such steps are deemed to be essential duties of the job.

This approach has drawbacks. Due to the constraints of time, only a limited number of tasks within a job can be observed and measured. It may not be possible to consider the breadth of possible tasks. For the bar pilots, it may not be possible to directly observe all types of vessels and not possible to directly observe all conditions. This constraint can be moderated by refining the physical demands analysis through interviews with the individuals who have actual experience in all types of vessels and observed conditions.

### Cognitive Demands Analysis

The cognitive demands analysis is similar to the physical demands analysis. It focuses on the intellectual aspects of the job rather than the movement aspects. It goes beyond the traditional medical approach to assessing mental status to observing the intellectual skills required to perform the job. This would include the sensory aspects, communication between individuals, working within a group, arithmetic and logic skills and information processing. These observations are made at the same time as the physical demands observations.

### Environment and Personal Protective Equipment

The final aspect of the ergonomic approach is the impact of the environment and the personal protective equipment required to mitigate its impact. This aspect is necessarily broad in order to consider all the possibilities of work environments. Some of the broad aspects include: indoor versus outdoor work, hot and cold environments, and time of day of the work shift. It also includes recognition of hazards such as slippery floors, sharp instruments, trip hazards, and moving machines. These aspects are also made at the time of the physical and cognitive demand observations.

### Job Analysis of the San Francisco Bar Pilots

The bar pilots job has been observed using this ergonomic approach. The summary information for each task is listed in Table 1. This includes a short description of each task along with a determination of the essential nature of the task. Estimates have been provided for the time of the task within a cycle and the percentage of the cycle. These are rough estimates which provide an “order of magnitude” on the time of the task. Some of the notable critical demands are included.

**Table 3 – List of the Tasks for a San Francisco Bar Pilot**

	Task with Description	Essential (Yes / No)	Percentage of One Trip	Average Time per Trip in Minutes	Critical Demands
1.	<b>Pilot Boat – Embark and Ride Outbound</b> The pilot boards the pilot boat from the dock, takes a seat for the	Yes	6 %	20 – 30	

Pilot Fitness Study for the Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun – by Dr. Robert Kosnik, University of California, San Francisco

	ride to the vessel, and climbs to the deck of the pilot boat.				
2.	<b>Embarkation</b> The pilot stands on the deck of the pilot boat, holding onto a tied rope with one hand, watches the Jacob’s ladder on the vessel, transfers across to the ladder and climbs to the main deck.	Yes	2%	6 – 10	<ul style="list-style-type: none"> <li>• Judge the relative motion of the pilot boat and the vessel</li> <li>• Climbing a vertical ladder safely requires three points of contact ( 3 of 2 hands and 2 legs)</li> <li>• Climb the Jacob’s Ladder by first lifting one leg, then pressing the body upward while using the arms to stabilize the upper body</li> <li>• The arms are in “static loaded” to stabilize the upper body.</li> <li>• In all weather and sea conditions, at any time of the day.</li> </ul>
3.	<b>Transit to the Bridge</b> The pilot arrives on the main deck, traverses the deck to the bridge stairway, and climbs the stairway to the bridge as quickly as possible. The bridge can be 4 to 10 stories above the main deck.	Yes	2%	6 – 10	<ul style="list-style-type: none"> <li>• Traverse the deck of the vessel in all weather at any time of the day.</li> <li>• Climb up 4 to 10 stories quickly</li> </ul>
4.	<b>Navigation</b> The pilot leads the ship navigation through the local conditions of underwater typography, tides, current, and winds in a waterway active with other vessels and recreational crafts.	Yes	60%	180 – 300	<ul style="list-style-type: none"> <li>• Physical ability and stamina to stand for prolonged periods up to 5 hours</li> <li>• Use of senses – vision, hearing, balance</li> <li>• Use of instruments – radar</li> <li>• Use of hand radio(s)</li> <li>• Situational awareness</li> <li>• Relative motion</li> <li>• Hazard anticipation</li> </ul>
5.	<b>.Docking</b> The pilot directs the actions to move the vessel from the route to the dock coordinating the efforts of the tug boats with the vessel’s capacity to move and steer.	Yes	20%	30 – 60	<ul style="list-style-type: none"> <li>• Traverse the bridge to its edge in all weather at any time of the day</li> <li>• Use of hand radio</li> <li>• Situational awareness</li> <li>• Relative motion</li> </ul>
6.	<b>Disembarkation</b> The pilot moves from the bridge to the deck of the main vessel, climbs down the Jacob’s ladder, uses a hand rope, and transfers across to the deck of the pilot boat.	Yes	2%	6 – 10	<ul style="list-style-type: none"> <li>• Climb down from the bridge</li> <li>• Traverse the main deck to the edge in all weather at any time of the day</li> <li>• Climb down the Jacob’s ladder using the three points of contact in reverse.</li> <li>• Relative motion of the vessel to the pilot boat</li> <li>• Transfer to the pilot boat (jump and land)</li> <li>• In all weather and sea conditions at any time of the day</li> </ul>
7.	<b>Pilot Boat – Ride Inbound and Disembarkation</b> The pilot traverses the deck of the pilot boat, takes a seat for the ride to the base dock and climbs to the dock.	Yes	6%	20 – 30	
8.	<b>Participate in Emergencies</b> The pilot participates as directed by the captain in emergency procedures.	Yes	2%		
	Total		100%		

The detailed information for each task is included in data collection forms attached in Appendix B. They provide detailed information for each task on the movements of the pilot, the intellectual aspects of the job, the hazards of the work environment, and the personal protective equipment used.

## Conclusions

A review of this analysis of the San Francisco bar pilots does provide a few key points for the medical assessors. These are as follows:

- The embarkation task can easily be visualized as hazardous due to the drama inherent in the transfer at sea. It requires not only agility and strength, but also, the cognitive demand of relative motion.
- The disembarkation task has the additional task of grabbing the hand rope and judging the relative motion “over the shoulder”. This increases the movement requirement for the neck and shoulder.
- The embarkation and disembarkation tasks are dramatic, but only represent about 5% of the job cycle. Both are essential tasks.
- The navigation and docking tasks are filled with cognitive requirements. These requirements include reading, writing, decision making, working as a leader, dynamic reasoning, arithmetic calculations, relative motion, situational awareness and memory.
- The navigation and docking tasks have great cognitive demands, but few physical demands. These tasks represent about 80% of the job cycle.

## Review – Physical and Cognitive Demands of the San Francisco Bar Pilot Job

It is intended that the pilots and pilot trainees are mentally and physically fit for their job. Some aspects of their job have particular physical agility demands; other aspects have particular cognitive demands. Both of these sets of demands are difficult to test in a medical examination. The documentation outlining the process to complete the CG-719K form suggests that the verifying physician obtain additional testing when needed. It would be stronger to require agility testing and to repeat the testing regularly. There currently are no objective and quantifiable cognitive tests which can be used to evaluate the particular cognitive demands for a San Francisco bar pilot, including loss of situational awareness.

## RECOMMENDATIONS – Demands of the Job

*Recommendation #5 - The Board of Pilot Commissioners amend 7 CCR section 217 (Medical Examination) to require pilots and pilot trainees to undertake an agility test which simulates the physical demands of the job as follows:*

1. *prior to entry into the training program, issuance of the original license, return to work after a medical condition affecting physical abilities tested in this test;*
2. *biannually thereafter; and*
3. *as directed by a Board appointed physician or the Medical Review Officer.*

*The agility test will be administered by a qualified personal trainer, physiotherapist, occupational therapist, or kinesiologist. The content of the agility test is designed to reflect*



*balance, a pilot ladder circuit climb, stair climbing, floor to waist lifts, a single rope slide and heart rate recovery after activity.*

*The Board appointed physician shall review the agility test results as part of the review to determine pilot fitness. The MRO reviews the agility test results as part of the second review to determine concurrence with the statement of pilot fitness for duty. The MRO routinely reviews the test itself and compares with the track record of pilots or pilot trainees who become not fit for duty as a result of a physical limitation that should have been identified by the agility test. The MRO will periodically report to the Board on his or her observations and recommend adjustments to the test itself.*

*Recommendation #6 – The Board of Pilot Commissioners includes in the duties of the Medical Review Officer a requirement to stay apprised of the developments in cognitive function testing and to report those developments periodically to the Board.*

## **D. FITNESS FOR DUTY STATUS REQUIREMENTS**

### **(Medical Surveillance Program Characteristic #3, #4, and #5)**

#### **Introduction – Fit for Duty**

This report has already considered the nature of the certification requirements for mariners by the Coast Guard and the professional training which should be in place for the medical examination. In order to work as a San Francisco bar pilot, the pilot must be certificated by the Coast Guard and declared fit for duty by the BOPC designated physician. This report will now look at both of these requirements in greater detail.

#### **NVIC No. 04-08 – Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials issued September 15, 2008<sup>30</sup>**

The Coast Guard provides guidance for evaluating the physical and medical conditions of applicants for a Merchant Mariner Credential in order to assist medical practitioners in evaluating a mariner's physical and medical status. This guidance is an update of the previous NVIC 02-98 which was published in 1998. It provides medical certification standards that apply for the different types of credentials. From its table, NVIC requires that "all deck officers, including pilots, regardless of route, tonnage or vessel type" meet the following standards: 1) demonstration of physical ability, 2) general medical exam, 3) vision and hearing standards, and 4) a completed CG-719K. The NVIC enclosure on medical certificates goes on to identify the following specific requirements for pilots:

- Every licensed first class pilot serving as a pilot on a vessel of 1600 GRT or more shall have a thorough physical examination each year. *See 46 CFR 10.709.*

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<sup>30</sup> Navigation and Vessel Inspection Circular (NVIC) 04-08, "Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials", COMDTPUB 16700.4, Sep 15, 2008.

- First class pilots on vessels of 1600 GRT or more shall provide the Coast Guard with copies of their most recent physical examination upon request. *See 46 CFR 10.709*
- First class pilots should annually submit a CG-719K or approved equivalent form to meet this requirement. *See 46 CFR 15.812(b)(3) and (c).*
- All pilots of 1600 GRT or more are required to provide the passing results of their annual chemical test for dangerous drugs to the Coast Guard. *See 46 CFR 15.812(b)(3) and (c).*

The NVIC includes a series of enclosures to be used as guidance to the medical examiners. These include the following:

- Enclosure 2 – Physical Ability Guidelines – For a series of 13 shipboard tasks, function, event or condition, the guidance outlines the related physical ability and activity which the examiner should be satisfied can be performed.
- Enclosure 3 – Medical Conditions – The guidance provides a detailed listing of medical conditions subject to further review by the National Maritime Center – Medical Evaluation Branch along with the recommended evaluation data.
- Enclosure 4 – Medications – The guidance provides a non-exhaustive list of prescription and over-the-counter medications that may be subject to further medical review. In general, the list does not identify specific drugs; but rather, it identifies classes of drugs. The use of these drugs is not directly precluded. The applicant requires a waiver.
- Enclosure 5 – Vision and Hearing Standards – The guidance outlines the visual acuity and color vision standards requirements.
- Enclosure 6 – Medical Review Process – The guidance outlines the medical review process requirements for applicants who do not meet the physical or medical standards. It details the information that is required for review. Applicants who are denied a credential are provided with the details of a process for reconsideration.

The NVIC repeatedly explains that the NMC medical staff is available to provide consultations and educational outreach to medical practitioners and encourages connection with the health care providers.

## **CG-719K – Instruction Guide to The Merchant Mariner Physical Examination Report**

The Coast Guard released a new version of the Merchant Mariner Credential Medical Evaluation Report (CG-719K) and the Merchant Mariner Evaluation of Fitness for Entry Level Ratings (CG-719K/E) to take effect on January 1, 2010. The intent was to align the NVIC 04-08 guidelines with the credentialing process.

The applicant provides the following information, completes the release of information section of the form, and attests that the information is true and does not omit relevant information:

- applicant information for identification
- prescription medications “filled or refilled and/or taken within 30 days prior to the day that the applicant signs the CG-719K form”
- relevant medical conditions to the best of their knowledge

The verifying physician attests that the following reported information is true and correct:

- complete medical history
- physical examination and associated tests.
- complete the section on medical conditions
- complete a demonstration of physical ability
- verification of medications, including reporting any omitted medications
- recommendation on the fitness of the applicant as one of the following: 1) recommended competent, 2) not recommended competent or 3) needing further review.

### **BOPC – Fit for Duty Process**

Once a pilot has been determined “competent” by the Coast Guard then, the BOPC requires that a designated medical examiner declare the pilot “fit for duty” prior to working as a San Francisco bar pilot. Both of these requirements are renewed annually.

The BOPC requires that both of these medical assessments are performed by a physician which it designates. The designated medical examiner provides a statement in which one of the following fit for duty statuses is identified: 1) fit for duty, 2) not fit for duty, or 3) permanently not fit for duty. At the moment, there are three designated physicians.

### **Analysis – Fitness for Duty**

The NVIC 04-08 provides a strong foundation for guidance on medical standards for review of medical conditions and medications, vision and hearing standards, and physical examination. It has strengthened the medical standards since the 2004 guidance. There is more detail on the job tasks, a broader list of medications, and more guidance on evaluation data for medical conditions. It has added the need for physician involvement as the verifying medical practitioner. This has the advantage of unifying the distinct parts of the evaluation: vision and hearing, review of medical conditions and medications, and physical examination. The process for completion of the associated CG-719K form is robust in that it requires the applicant to attest to the completeness of the information and the verifying physician to attest to the review of medication, the review of medical conditions, and the physical examination. The completed form and any evaluation data are reviewed by the NMC and the medical certificate is issued. The waivers are issued to the applicant and the verifying medical practitioner.

The BOPC must have its own statement of fitness for duty. Using the Coast Guard certification from the CG-719K form is a good foundation and first step, but it has three drawbacks. First, the physical and cognitive demands of the job as bar pilot are not specifically evaluated. Only when the verifying medical practitioner doubts the ability of the applicant to perform the job tasks will the applicant be required to demonstrate his or her ability. There is routine testing. Secondly, the CG-719K and any evaluation data are protected health information which is not directly available to the BOPC. Thirdly, the CG-719K and any waivers are not reviewed on behalf of the BOPC. It is possible that a pilot has a medical condition which is certified as competent by the Coast Guard, but the medical condition precludes work as a San Francisco bar pilot.

The Coast Guard process is a “point in time” review of medical status performed each year. The BOPC needs to have the fit for duty statements up to date throughout the year between the Coast Guard certification. It needs to be assured that the bar pilot is fit for duty after changes in medication, the onset of any medical condition and the completion of leaves for disability. Ideally, the process should more closely approach a continuous review. One approach to achieving this goal would be to adopt an event-driven process whereby a change in medical condition or medication, or the onset of a new medical condition or the addition of a medication listed in NVIC 04-08 requires a review.

## **Review – Current Medication and Medical Conditions**

Medical surveillance program characteristic #3 includes a review of relevant information on current medications. It is intended that the pilots or pilot trainees perform their duties without their physical or cognitive function being impaired by drugs including prescribed medication, over-the-counter medication, prohibited intoxicants or illegal substances (as defined in 46 CFR 16.105). NVIC 04-08 Enclosure (4) provides a description on these classes of drugs and on categories of medication which may need further review. The waivable categories of drugs include the following: anti-depressants, anti-psychotics, anti-convulsants, barbiturates, amphetamines, benzodiazepines, sedative hypnotics and codeine.

The pilots or pilot trainees participate in three current programs with this intention. First, the pilots participate in randomized drug testing for illegal substances as a requirement of their federal license. The pilot trainees are tested for illegal substances as directed by BOPC policy. It is noted that due to the randomization of the drug testing, the gap between the drug tests might be large, even over one year. Second, when completing the current CG 719K, the pilot or pilot trainee reports all prescription medication prescribed, filled or refilled, and / or taken within 30 calendar days prior to the date the applicant signs the CG-719K. Third, a pilot or pilot trainee must submit within ten days any new or changing medication to the Board appointed physician. The later two programs require personal reporting by the pilot or pilot trainee. Because of the potential for high value losses and an adverse environmental impact, it would be ideal if these later programs could be objectively confirmed.

Toxicological testing for categories of medication in NVIC 04-08 where a waiver is required (listed above) would provide the objective information to support the attestation in the CG 719K. This confirmation with objective testing would be done annually. It would be particularly helpful after an incident.

The proposed toxicological testing could be carried out in a fashion similar to the current testing which includes a point of collection, a chain of custody for the collected samples, and standardized analysis. The results of the test would be reviewed by the BOPC appointed MRO. A pilot or pilot trainee with a positive test would be asked about the presence of a medication which required a waiver. If the testing identified a previously unreported medication, the BOPC would place the application of the pilot or pilot trainee on hold pending the waiver review by the NMC.

### **RECOMMENDATIONS – Current Medications**

*Recommendation #7 - The Board of Pilot Commissioners includes in the duties of the Medical Review Officer a requirement to stay apprised of the developments in the federal drug testing program and to report those developments periodically to the Board.*

*Recommendation #8 – The Board of Pilot Commissioners includes in the duties of the Medical Review Officer a requirement to stay apprised of changes in the pilot attestation to the list of medications in the CG-719K, or its successor thereto, and to report those developments periodically to the Board.*

*Recommendation #9 – The Board of Pilot Commissioners will continue to follow Harbors and Navigation Code section 1176(e) which requires the following actions:*

- *a pilot, or a pilot trainee who is prescribed either a new dosage of a medication or a new medication, or suspends the use of a prescribed medication must submit that information within ten days to the Board appointed physician who conducted the last fitness for duty examination.*
- *if the physician determines that the medication change results in the pilot or pilot trainee being unfit for duty, the physician shall inform the board.*

Recommendation #10 – The Board of Pilot Commissioners amend 7 CCR section 217 (Medical Examination) to require pilots and pilot trainees to undertake with their application for license and, post-incident, the following toxicological tests: anti-depressants, anti-psychotics, anti-convulsants, barbiturates, amphetamines, benzodiazepines, sedative hypnotics and opiates in pain medication.

### **Review– Vision and Hearing Testing, and Medical Examinations**

Medical surveillance program characteristic #3 includes the performing vision and hearing tests. It is intended that the Board of Pilot Commissioners' Board appointed physician perform these vision and hearing tests. It is intended that the pilot or pilot trainee meet the hearing and vision standards in NVIC 04-08. The current CG-719K report requires the recording of the performance on the vision and hearing tests. There is no need to recommend any changes to the examination process at this time.

### **RECOMMENDATION – Vision and Hearing Testing**

*Recommendation #11 – The Board of Pilot Commissioners includes in the duties of the Medical Review Officer a requirement to stay apprised of changes in the vision or hearing standards within the NVIC 04-08, or its successor, and to report those developments periodically to the Board.*

## **Review – Fitness for Duty**

It is intended that the Board of Pilot Commissioners obtain a statement on fitness for duty as a pilot or pilot trainee prior to entering into the training program, the issuance of the original license or the renewal of his or her license. The appointed physician currently provides a written statement on one of the following possible findings: fit for duty, not fit for duty, and permanently not fit for duty as outlined in the proposed revisions to 7 CCR section 217(c)(1) (Medical Examination).

The form CG-719K, “Medical Evaluation Report”, in support of the merchant mariner certification as a pilot, has established a systematic approach to collecting and detailing information. The fitness for duty process determination can be strengthened in two ways: 1) a second review of the CG-719K and information supporting a waiver as a merchant mariner by a Medical Review Officer looking at the physical and cognitive demands of a pilot, and 2) a requirement to review the fitness for duty status following changes in medical conditions or in medication by the appointed physician with concurrence by the MRO.

This expansion on the fitness for duty status determination to include a second review does require that CG-719K and any information supporting a waiver be transferred to the second reviewer, and possibly the Board appointed physician if, in the future, the CG-719K medical evaluation was performed by a physician who was not Board appointed. The process for transferring this information needs to ensure the voluntary disclosure of the pilot’s private personal health information. Form CG-719K does provide a concise overview of the privacy requirements on the first page of the current form.

## **RECOMMENDATIONS – Fitness for Duty**

*Recommendation #12 – The Board of Pilot Commissioners maintain 7 CCR subsections 217 (a)(1), 217(b)(1) and 217(b)(2) (Medical Examination) to require pilots and pilot trainees to provide a fitness for duty status from a Board appointed physician prior to each of the following:*

- 1. the entry into a training program and annually thereafter while in the program*
- 2. the issuance of the original license*
- 3. the renewal of a license (annually)*

*Recommendation #13 The Board of Pilot Commissioners amend 7 CCR section 217 (Medical Examination) to require pilots and pilot trainees to submit a notification to the Board and to submit a notification along with supporting information to the Board appointed physician who conducted the last examination of fitness for duty requesting a review of their fitness for duty, following:*

*The onset of a new or a change of a current medical condition diagnosed by a physician and listed in CG-719K, or the successor thereto, under circumstances that would require further review or a waiver under NVIC 04-08, or the successor thereto.*

*Supporting information includes a statement from his / her personal physician providing care for the pilot or pilot trainee along with diagnostic tests, consultations, or other information as*

*outlined in the NVIC 04-08, or the successor thereto, for medical conditions subject to further review.*

*Recommendation #14 – The Board of Pilot Commissioners amend 7 CCR section 219(q) (Duties of Pilots) to require of pilots and pilot trainees (who are not covered under section 219(q)) as follows:*

*If the medical disability continues for either 30 consecutive days or a total of 30 days in any 60-day period, to be medically examined in accordance with subsection (d) of 7 CCR section 217(Medical Examination) prior to returning to duty.*

*Recommendation #15 – The Board of Pilot Commissioners amend 7 CCR section 217 (Medical Examination) to require the Board appointed physician who conducted the last examination to issue a statement on fitness for duty upon receipt of a notice from a pilot, or pilot trainee for the following changes in medication or medical condition:*

- 1. a change in a medication*
- 2. the onset of a new medical condition*
- 3. a change in a medical condition*
- 4. the return to duty after a medical disability.*

*Recommendation #16 – The Board of Pilot Commissioners adopts a procedure requiring applicants for the training program, the license or renewal, and pilot trainees undergoing annual physical examination to provide the most recent completed CG-719K, all supporting documentation for medical conditions / medications requiring further review or waiver under NVIC 04-08, or the successor thereto, and results of the review / waiver to the Board appointed physician and the Medical Review Officer.*

*This procedure involves the release of personal health information. The procedure shall require an acknowledgement and a release to ensure the proper authorization and disclosure of the information. The following two steps are recommended:*

- 1. the applicants acknowledge the requirement to disclose personal health information to the Board appointed physician and the Medical Review Officer (concurring physician) similar to the privacy act statement on page 1 of the most recent CG-719K.*
- 2. the pilot, or pilot trainee sign a release of information on the statement of fitness for duty. This release could serve as authorization under 7 CCR section 217 (Medical Examination) to provide the information to the reviewing physician(s). It could be similar to the release in Section II of the most recent CG-719K form.*

*Recommendation #17 – The Board of Pilot Commissioners amends 7 CCR subsection 217(c)(1) (Medical Examination) whereby the Board appointed physician attests to having reviewed the most recent CG-719K, the information supporting a waiver, the list of medications mandated in Harbors and Navigation Code 1176(b), the most recent toxicological tests, and the information supporting any interim events listed in Recommendation #7 or #8 (that is, any changes in medical condition, or medical disability) since the last annual examination and provides a statement on fitness for duty status. The Medical Review Officer, having reviewed the same information, attests to the review and, the concurrence or non-concurrence of the findings of the Board appointed physician.*

*A suggested application form and a statement of fitness for duty form have been drafted to illustrate this content and process. The details as to the number of forms and details beyond the medical issues will be left to the Board staff. The statement of fitness for duty form should reflect the following:*

- 1. attestation by the Board appointed physician to what he or she reviewed.*
- 2. affirmative showing the physician discussed the status determination (whether FFD, NFD, or PNFFD) with the pilot inland pilot or pilot trainee).*
- 3. authorization by the pilot or pilot trainee to discuss and share all documentation and examination results with the MRO).*
- 4. attestation by the MRO as to his / her independent determination of the fitness for duty status.*

## **E. MEDICAL REVIEW OFFICER (Medical Surveillance Program Characteristic #6)**

### **Introduction – Medical Review Officer**

Title 7 Section 217 of the California Code of Regulations<sup>31</sup> addresses the medical examinations of pilots for the Board of Pilot Commissioners. It describes that a designated physician will perform an examination according to guidelines set forth in the “Reference Guide for Physicians Physical Examination for Retention of Seafarers in the U.S. Merchant Marine as adopted by the Seafarers Health Improvement Program (SHIP) Committee on April 26, 1985”.<sup>32</sup> The designated physician provides the BOPC with a statement on fitness for duty and provides the pilot with the completed CG-719K to the Coast Guard. The information obtained from the examination and the analysis of that information is kept external to the BOPC. This approach keeps the medical decision independent, but it does not provide with the BOPC any opportunity to validate the fit for duty status determination. When the regulation was adopted, it was believed that this process was sufficient because the intent of BOPC was aligned with the intent of the Coast Guard on pilot fitness.

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<sup>31</sup> California Administrative Code Title 7, Section 217 (Medical Examination).

<sup>32</sup> California Administrative Code Title 7, Section 217 (a)(1) (Medical Examination).



Over time, the determination of fitness for duty has become more complex. The guidelines for medical standards have evolved and the assessment of fit for duty has become more extensive. These changes and the associated complexity were described previously. Additionally, this report has already recommended a change in medical standards used for this examination as well as the addition of agility and toxicity testing to supplement the material for review by the examiner. This report has also recommended a second review of the medical information used to support the CG-719K and the fit for duty status determination. Finally, it has been recognized that there may be situations where the pilot has a medical condition for which the Coast Guard has issued a waiver, but nevertheless precludes work as a San Francisco bar pilot.

With this increasing complexity to the medical examination process, the BOPC needs to have more assurance that the determination of fitness for duty is sufficiently robust. One approach is to appoint a physician with greater background in occupational medicine to provide a second review and quality assurance of the process. For the purposes of discussion, this role will be termed Medical Review Officer.

## **Role**

Broadly, the Medical Review Officer is licensed physician with training and experience in occupational medicine who performs a second review of fitness for duty and undertakes systematic monitoring, evaluation and, when needed, the revision of the pilot fitness for duty process to ensure that the medical standards set by the BOPC are being met. The role of the MRO will include the following:

- Act as a resource to the Board appointed physician when the pilot has a medication or medical condition that affects his or her ability to perform their duties as a pilot. The Board appointed physician will retain the responsibility for completing the CG-719K form and the statement on fitness for duty form.
- Review of the CG-719K and any supporting information, and the additional testing performed prior to the determination of the fitness for duty status. This will be a second review.
- Act as the lead in the development of testing for agility. The physical and cognitive demands of the job as a bar pilot should be more detailed. The BOPC should have a better assurance that the evaluation considers the particular physical and cognitive demands of a pilot which distinguishes the pilot from other mariner positions.
- Provide peer review of the Board appointed pilots.
- Provide quality assurance on medical examination and fitness for duty processes.
- Provide advice to the BOPC on matters relating to pilot fitness.
- Provide advice to the BOPC to reduce the risks from exposure to contagious diseases and other hazards during the performance of duties.
- Participate as a member of the appeals board to review fitness determinations of pilots, including the appointment of an independent medical evaluator.

## **Qualifications**

The physician who performs the role of Medical Review Officer should be a senior physician with the following qualifications:

- A physician licensed by the Medical Board of California
- Board Certified in Occupational Medicine by the American Board of Preventive Medicine
- 10 years of experience in occupational medicine, and
- Ideally, experience with the biomedical surveillance of groups of workers

## **Review – Medical Review Officer**

It is intended that pilots and pilot trainees are fit for duty. The medical evaluation required for the Merchant Mariner Credential applies to all merchant mariners, not just to pilots. The Board appointed physician makes a determination of the mental and physical health, and fitness for duty separate from the NMC medical evaluation report. This determination will consider that the pilot has greater physical demands in his or her job than those working in other merchant mariners jobs. The NMC medical evaluation and waiver system has a different threshold for physical and cognitive abilities than may be appropriate for the bar pilots. Ideally, the Board appointed physician would have the opportunity to discuss any issues for concern with another physician, or to have a concurrence of the determination by a second experienced specialist physician. This second physician could be more closely associated with Board activities and be involved with the ongoing evolution of the pilot fitness process.

## **RECOMMENDATIONS – Medical Review Officer**

*Recommendation #18 – The Board of Pilot Commissioners amends 7 CCR section 217 (Medical Examination) to include a separately appointed physician termed a Medical Review Officer. The duties of the Medical Review Officer will include the following:*

- 1. Following a review the CG-719K, related medical information, agility test results, changes to medication or medical conditions, toxicological testing results and the findings of the Board appointed physician, provide a specific statement on fitness for duty and a statement of concurrence or non-concurrence with the statement from the Board appointed physician.*
- 2. Maintain a separate set of files with the personal health information on each pilot. The MRO contract should include language to ensure ease of access file for appeals and in the event of a change in MRO.*
- 3. Review the agility test itself and compare the track record of pilots or pilot trainees who become not fit for duty as a result of a physical limitation that should have been caught by the agility test and periodically report to the Board on his or her observations and recommend adjustments to the test itself.*
- 4. Stay apprised of any changes in the NVIC 04-08, the CG-719K, or the federal drug testing requirements, and report those to the BOPC.*

5. *Stay apprised of the developments in cognitive function testing, and report those developments periodically to the BOPC.*
6. *Undertake annual peer review of the Board appointed physicians.*
7. *Undertake annual quality assurance on the medical examination and the pilot fit for duty processes.*
8. *Provide advice to the BOPC on matters relating to pilot fitness.*
9. *Participate as a member of the appeal board to review fitness determinations of pilots, including the appointment of an independent medical evaluator. The appeal board to review the fitness determination of a pilot will include the following – the MRO, a physician identified by the pilot and a third physician jointly identified by the first two.*

*Recommendation #19 – The Board of Pilot Commissioners establishes the following qualifications for the Medical Review Officer which will be used in the contracting process to support the proposed amendments to 7 CCR section 217 (Medical Examinations) in Recommendation #18:*

1. *licensed by the Medical Board of California*
2. *Board Certified in Occupational Medicine by the American Board of Preventive Medicine*
3. *at least ten years of experience in occupational medicine*
4. *ideally, experience with the oversight of medical monitoring programs on groups of workers, and*
5. *preferably has accompanied a Board licensed pilot on at least one trip per contract period, or if he or she is physically unable to do so, has obtained equivalent experience acceptable to the Executive Director of the BOPC. The equivalent experience is intended to focus on increasing the understanding of the physical and cognitive demands of the pilot. It includes witnessing an agility test of a pilot, reviewing the San Francisco Bar Pilots video showing the job of a pilot (including pilot ladder), and undertaking an interview with the Executive Director. The review of the SFBP video should be in the company of a Board licensed pilot and the Executive Director in order to provide additional commentary and answer questions.*

## **F. REVIEW OF MEDICAL SERVICE REQUIREMENTS**

### **Introduction – Medical Service Requirements**

This report makes several recommendations which will affect the requirements of the BOPC for medical services. Currently, the Board of Pilot Commissioners requires medical services for the completion of the medical examinations outlined in 7 CCR section 217 (Medical Examinations) and the review of medication in the HNC section 1176. Annually, each pilot or pilot trainee uses this medical service of the Board appointed physician in order to complete and submit the CG-719K form to the National Maritime Center and submit the completed “Fit for Duty” status form to the BOPC. In between evaluations, the pilots submit any changes in prescription medication to the Board appointed physician for review. Currently, medical services are provided by three Board appointed physicians located in the Bay Area. The recommendations of this report

expand the medical service requirements for determination of fitness for duty and outline the role of the Medical Review Officer as a second reviewer and the provider of medical oversight of pilot fitness processes.

### Medical Services and associate Administrative Processes

The recommendations of this report will provide input to the administrative processes for contracting the Board appointed physician and MRO. Additionally, the recommendations will require that the BOPC develop new medical administrative processes. The question arises, how will the new medical services fit together into these medical administrative processes?

Table 4 captures the medical service provider (or the BOPC) and the outcome delivered for each of the recommendations. It assigns an administrative process(es) to each recommendation.

**Table 4 – Medical service requirements from recommendations**

	<b>Recommendations</b>	<b>Provider</b>	<b>Outcome</b>	<b>Administrative Process</b>	<b>Annual Estimates for Planning</b>
<b>A</b>	<b>Pilot Fitness Standards</b>				
1	Medical Standards – use of the NVIC 04-08 and CG-719K reviewed	MRO	BAP – Annual Audit Criteria	Quality Assurance	8 hr
<b>B</b>	<b>Qualifications of Board Appointed Physician</b>				
2	Board appointed physician (BAP) qualifications	BOPC Regulations	Contract Criteria	BAP – Contract	
3	BAP – maintenance of required materials reviewed	MRO	BAP – Annual Audit	Quality Assurance	Part of #1
4	Consistent regulatory language	BOPC			
<b>C</b>	<b>Physical and Cognitive Demands</b>				
5	Agility Testing	Qualified personal trainer, physiotherapist, kinesiologist	Completed Agility Test Report	Pilot Fitness for Duty	35 + review tests
6	Cognitive Function Testing	MRO	Regular Review	Board Reporting	6 hr
<b>D</b>	<b>Fit For Duty Requirements</b>				
7	Federal Drug Testing	MRO	Regular Review	Board Reporting	2 hr
8	CG-719K Review	MRO	Regular Review	Board Reporting	2 hr
9	Prescribed medication	MRO, BAP	Fitness for Duty	Pilot Fitness for Duty	30 review

Pilot Fitness Study for the Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun – by Dr. Robert Kosnik, University of California, San Francisco

	notification		Statement		
10	Toxicological Testing	MRO, BAP	Fitness for Duty Statement	Pilot Fitness for Duty	65 tests
11	Vision and Hearing Standards	MRO	Regular Review	Board Reporting	2 hr
12	Medical Examinations prior to training or license and annual renewal	MRO, BAP	Fitness for Duty Statement	Pilot Fitness for Duty	65 review
13	Post event review of fitness after absence for medical reasons	MRO, BAP	Fitness for Duty Statement	Pilot Fitness for Duty	15 review
14	Return to work following medical disability	MRO, BAP	Fitness for Duty Statement	Pilot Fitness for Duty	10 review
15	Medical Statement of fitness for duty	MRO, BAP	Fitness for Duty Statement	Pilot Fitness for Duty	
16	Submit Personal Health Information to BAP and Medical Review Officer (MRO)	Pilot, Pilot Trainee	Fitness for Duty Statement	Pilot Fitness for Duty	
17	BAP and MRO attestation of review, statement and concurrence	MRO, BAP	Fitness for Duty Statement	Pilot Fitness for Duty	65 annual 55 review
<b>E</b>	<b>Medical Review Officer (MRO)</b>				
18	MRO - Role			Pilot Fitness for Duty Quality Assurance Peer Review Appeal Board Board Reporting	Additional 2 hr per week
19	MRO – Qualifications		Contract Criteria	MRO - Contract	
<b>F</b>	<b>Models for Medical Services</b>				
20	Medical Service Model			Contract Administration	

Using the analysis of the recommendations in the table above, Table 5 describes eight administrative processes which are affected. It also articulates the actions of the Board appointed physician and the MRO within the administrative processes with medical service content. Articulating the role of BOPC administration to support these processes is beyond the scope of this study. Where the process is primarily administrative, Table 5 indicates that the process is performed by the BOPC without detailing any actions.

**Table 5 – List of Processes related to the Pilot Fitness Program**

	<b>NAME OF PROCESS</b>	<b>DESCRIPTION</b>
1	<b>BAP – Contracting</b>	This process is performed by the BOPC.
2	<b>MRO – Contracting</b>	This process is performed by the BOPC.
3	<b>Pilot Fitness for Duty</b>	The BAP determines a pilot’s fitness for duty by performing the following: 1) review the list of medications, list of medical conditions, agility testing, and toxicology testing, 2) perform the vision and hearing testing and medical examination, 3) completes the CG-719K and the statement on the fitness for duty, and 4) forwards all information to the MRO who reviews, may interview and / or may perform a medical examination prior to determining pilot fitness for duty and concurring with the BAP. This process also includes the review of changes in medications or medical conditions intercurrent to the annual assessment. The process also includes referral for consultation to clarify the status of a medical condition which affects the determination of the fitness for duty.
4	<b>Quality Assurance</b>	The MRO will perform at least annual visits to each BAP along with the Executive Director, BOPC.
5	<b>Peer Review</b>	The MRO will perform, at least annually, a critical review of the content of the CG-719K and will be available for conversations with the BAP exploring aspects of the effect of medication and medical conditions on fitness for duty.
6	<b>Board Reporting</b>	The MRO reports regularly on changes to the federal licensing procedures for medical conditions, medications, drug testing, vision and hearing testing and the CG-719K. The MRO also reviews the status of serial agility testing and cognitive testing to monitor situational awareness. The MRO is available to assist the BOPC in issues of pilot fitness as they arise.
7	<b>Appeal Board</b>	The MRO participates as a member of the appeals board and in choosing the independent medical evaluator member.
8	<b>Contract Administration</b>	This process is performed by the BOPC.

### **Staffing Model of Medical Service Delivery**

The Board appointed physician and MRO will more fully appreciate the demands of the job as San Francisco bar pilot. They will have more information and test results to assist in the determination of the fitness for duty. It is critical that each Board appointed physician perform a sufficient number of examinations to be at ease with determining pilot fitness and the associated administrative processes. Ideally, each physician would perform at least one or two assessments each month. With a complement of roughly 60 bar pilots and five pilot trainees, the staffing model would need to have two to four Board appointed physicians.

The delivery of the determination of fitness for duty needs to be timely. This will require a degree of coordination between the pilot and the providers of the agility testing, the toxicology testing, the Board appointed physician and the MRO. The working relationship between the providers needs to be cordial, cooperative, and efficient.

An efficient model would be to have all of the providers located within one medical facility. This approach would take advantage of the natural link among the Board appointed physicians, the Medical Review Officer, any medical consultants, and ideally, the agility testers. This approach takes advantage of the existing internal systems for booking appointments, obtaining medical consultations and provides the opportunity for direct contact between providers.

### **Review – Medical Service Staff Model**

It is intended that the Board appointed physicians are familiar with the demands of the job as a San Francisco bar pilot, with the medical standard guidelines, with the determination of pilot fitness for duty, and with the medical administrative processes of the BOPC. A critical factor in developing and maintaining this familiarity is the frequency of assessments performed by a Board appointed physician. The Board appointed physician should perform at least one or two assessments each month. It is vital that the pilot fitness for duty process develops a timely and efficient administrative protocol. The various service providers (agility tester, the provider of toxicology testing, board appointed physician, medical review officer) need a collaborative working relationship and administrative processes which support the intent.

It would be ideal from the logistical and medical viewpoints, if all the service providers were located within one medical facility. Logistically, it would be more efficient for the transfer of reports and forms. From the medical viewpoint, the proximity of the service providers assists in the communication between providers, in the transferring of information between providers, and in identifying additional consulting resources. A recommendation on this point would relate to the BOPC internal administrative processes which are beyond the scope of this study.

### **RECOMMENDATION – Medical Service Staff Model**

*Recommendation #20 – The Board of Pilot Commissioners contract with a limited number of Board appointed physicians. From a quality perspective, each Board appointed physician should perform at least one assessment of fitness for duty each month.*

## **SUMMARY**

This study on pilot fitness was conducted in order to review and make recommendations about the current physical and medical fitness standards for pilots and pilot trainees licensed by the Board of Pilot Commissioners. This study included a detailed review of the licensing requirements set forth in California Harbors and Navigation Code section 1176 and California Code of Regulations section 217 (Medical Examinations). This study reviewed the current standards for regulated medical examinations in the United States as well as the approach taken by international governmental authorities to assess the fitness of pilots. This study focused on the qualifications of physicians performing examinations for pilots, on a detailed review of the physical and cognitive demands of the tasks of a pilot, and on the content of the parts of the Coast Guard medical evaluation report that pertain to medication, medical conditions and the physical examination. Finally, this study considered how the Board of Pilot Commissioners could be kept apprised of any changes concerning pilot fitness that were made by the regulatory authorities and / or by advances in medicine.

The study reviewed the characteristics of a medical surveillance program in order to establish a framework for making recommendations. These characteristics formed the basis for the separation of the study into different sections. The detailed review of various features about pilot fitness assisted in the identification of a number of actions that the BOPC could develop into detailed recommendations. These actions identified for recommendations included the following:

1. replace the medical and physical examinations guidelines
2. establish minimum qualifications in occupational medicine for all Board appointed physicians in occupational medicine
3. provide all Board appointed physicians with opportunities to better understand the physical and cognitive demands of the tasks as a pilot
4. establish the determination of pilot fitness as a decision which seeks objective information concerning the pilot including physical capacity, medications, medical conditions, vision and hearing, and the physical examination
5. provide a second level of medical review for pilot fitness and establish agreement between physician reviewers through the appointment of a Medical Review Officer
6. approximate continuous monitoring of pilot fitness by reviewing this status after any event which causes a change in medication or medical condition
7. provide the Board a way to keep apprised of matters relating to pilot fitness

These areas for recommendations are a combination of the current medical practices in medical surveillance programs and suggestions to close gaps which were identified during the research.



## APPENDICES

### APPENDIX A. Listing of the Pilot Fitness Recommendations

	Recommendations	Medical Surveillance Program Characteristic	Proposed Change in Rules and Regulation	Proposed Change in Forms	Proposed Characteristic for Contracting	Impact on Budget
<b>A</b>	<b>Pilot Fitness Standards</b>					
1	Medical Standards	Definitional	7 CCR 217			
<b>B</b>	<b>Qualifications of Board Appointed Physician</b>					
2	Board appointed physician (BAP) qualifications	1			Yes	
3	BAP – Materials reviewed	1			Yes	
4	Consistent regulatory language	Administrative	7 CCR 217, HNC Section 1176			
<b>C</b>	<b>Physical and Cognitive Demands</b>					
5	Agility Testing	2	7 CCR 217		Yes	Yes
6	Cognitive Function Testing	2				
<b>D</b>	<b>Fit For Duty Requirements</b>					
7	Federal Drug Testing	3			Yes	Yes
8	CG-719K Review	3			Yes	Yes
9	Prescribed medication notification	3	HNC Section 1176 (maintained)			Yes
10	Toxicological Testing	3	7 CCR 217		Yes	Yes
11	Vision and Hearing Standards	3			Yes	Yes
12	Medical Examinations prior to training or license and annual renewal	4	7 CCR 217 (maintained)			Yes
13	Post event review of fitness for duty	5	7 CCR 217	Yes		Yes
14	Return to work following medical disability	5	7 CCR 219	Yes		Yes
15	Medical Statement of fitness for duty	Administrative	7 CCR 217	Yes	Yes	Yes
16	Submit Personal Health Information to BAP and Medical Review Officer (MRO)	Administrative	License application and statement on fitness for duty	Yes		Yes
17	BAP and MRO attestation of review, statement and concurrence	Administrative	7 CCR 217		Yes	Yes
<b>E</b>	<b>Medical Review Officer</b>					
18	MRO – Role	Administrative	7 CCR 217		Yes	Yes
19	MRO – Qualifications	1			Yes	
<b>F</b>	<b>Models for Medical Services</b>					
20	Medical Service Model	Administrative			Yes	Yes

## APPENDIX B. Board of Pilot Commissioners – Current Board Approved Physicians

### Background Information – Source (Medical Board of California)

Medical Training	State License	Physician Boards of Examinations	Primary Practice Areas	Secondary Practice Areas	
MD	Yes	None	Emergency Med Family Med General Surgery Occupational Medicine	None provided	
MD	Yes	Emergency Medicine not renewed	Occupational Medicine	None provided	
MD	Yes	None	Occupational Medicine	General Practice	
MD	Yes	Family Practice	Family Practice	Occupational Medicine	

## **APPENDIX C.1. - San Francisco Bar Pilot – Duties and Responsibilities**

### **DUTIES AND RESPONSIBILITIES OF A STATE LICENSED PILOT AND THE PHYSICAL REQUIREMENTS NECESSARY TO PERFORM THOSE DUTIES**

A State licensed maritime pilot, under the authority of the master, assists with the navigation of ships from sea into and out of harbors, estuaries, straits, rivers and bays, berthing and unberthing ships at docks in dozens of different locales, using specialized knowledge of local conditions including winds, weather, tides, and current. The pilot orders officers and helmsman by giving course and speed changes and navigates the ship to avoid conflicting marine traffic, congested fishing and recreational fleets, reefs, outlying shoals and other hazards to shipping, utilizing formal aids to navigation, such as lights and buoys, as well as informal ones, such as landmarks and geographic features. The pilot utilizes a ship's bridge equipment, including radar, fathometer, speed log, gyro, magnetic compass, whistle or horn and other navigational equipment as needed. A pilot must use radio equipment in contacting U.S. Coast Guard vessel traffic system and other ships while in transit. The pilot directs ship's officers, crewmen, and tug boat captains as necessary when transiting bridges, narrow waterways, anchoring, docking, and undocking. The pilot must perform duties day or night in all sea and weather conditions, including high winds, fog, mist, rainfall, falling snow and other adverse conditions, as encountered.

A Pilot's duties include:

- . Safely navigating vessels of up to 1200 ft. in length through narrow channels during all hours of the day or night in any weather condition.
- . Safely mooring and anchoring those same vessels.

A Pilot's responsibilities include:

- . Protecting people, property and the environment from the hazards associated with vessel collisions, allisions, and groundings.
- . Determining if the proposed vessel transit is safe considering such factors as vessel characteristics, weather, current, draft, etc.
- . The ability to bring to the safest possible conclusion any contingencies that may arise.

Physical requirements necessary to perform pilotage duties include:

- . Transferring between vessels at sea in all weather conditions.
- . Being capable of boarding a vessel from and leaving a vessel onto a pilot boat via a Jacob's ladder and a gangway. A Jacob's ladder involves a vertical climb or descent of up to nine meters and requires both physical energy and mental judgment
- . Once reaching the deck of the ship via the Jacobs ladder, the pilot must be capable a further stair climb of as much as 10 stories to reach the navigation bridge.
- . Having eyesight and hearing up to standards adequate to perform the above duties, according to criteria specified by the State.
- . Have the stamina to be on call and available for duty 24 hours per day, 7 days per week.
- . Be capable of withstanding long periods of stress and concentration periodically interspersed with short periods of extreme stress.

## APPENDIX C.2. – San Francisco Bar Pilot - Detailed Task Analysis

### San Francisco Bar Pilot: *Pilot Boat Ride Out*

**Task Description:** The pilot boards the pilot boat from the dock, takes a seat for the ride to the vessel, and climbs to the deck of the pilot boat. **Comment:** The duration of this task is reasonably constant; however, there may be long periods of waiting in a pilot boat prior to embarkation.

**Essential** Task(% Of Cycle): 1-5% ReviewerName: R Kosnik  
 Duration: 20 Minutes  
 Entire Cycle Duration: 260 Minutes LastDate: 01-Mar-10  
 Environmental Conditions: Noise, Humidity, Outside Work, Cold

#### Spinal Postures

**Sitting**  **Essential** Cycle: 6-33% Duration: 11-30 minute  
 **Standing**  **Essential** Cycle: 6-33% Duration: 11-30 minute  
 **Walking**  **Essential** Cycle: 1-5% Duration: 1-5 minute  
 **Twisting**  **Essential**  
 **Balance**  **Essential** Relative Motion between dock and boat  
**Cervical Spine**  
 **Forward**  **Essential** Cycle: (Duration)  
 **Backward**  **Essential** Cycle: Duration:  
 **Rotation**  **Essential**  
 **Eye/Hand/FootCo-ordination**  **Eye/Hand/FootCo-ordinationEssential**

#### Lower Limb

**Crouch/Squat**  **Essential** Cycle: Duration  
 **Craw**  **Essential** Cycle: Duration  
 **Climbing**  **Essential** Cycle: 1-5% Duration: <1 minute Depending on the relative position of the pilot boat and the dock  
 Type: ladders Steps:  
 **Kneeling**  **Essential** Cycle: Duration  
 **FootAction**  **Essential**

#### Upper Limb

**Lifting**  **Essential** Cycle: Duration:  
 **FloorToWaist**  **WaistToShoulder**  **AboveShoulder**  
 **Carrying**  **Essential** Cycle: Duration  
 **1Hand**  **2Hand**  **Handles** Vertical Horizontal  
 **Pushing**  **Essential** Cycle: Distance  
 Weight: Vertical Horizontal  
 **Pulling**  **Essential** Cycle: Distance:  
 Weight: Vertical Horizontal  
**Shoulder**  **Flexion**  **Extension**  **Abduction**  
**Elbow**  **Flexion**  **Extension**  
**Wrist**  **Flexion**  **Essential**  **Dominant**  **Non-dominant**  **Both**  
 **Extension**  **Essential**  **Dominant**  **Non-dominant**  **Both**  
 **Rotation**  **Essential**  **Dominant**  **Non-dominant**  **Both**

### San Francisco Bar Pilot: *Pilot Boat Ride Out*

- Hand**
- |  |   |                                   |                                       |  |
|--|---|-----------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Dexterity           | <input type="checkbox"/> Essential            | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input type="checkbox"/> Both            |
| <input checked="" type="checkbox"/> Grasping | <input checked="" type="checkbox"/> Essential | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input checked="" type="checkbox"/> Both |
|  | <input checked="" type="checkbox"/> Power     | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input checked="" type="checkbox"/> Both |
|  | <input type="checkbox"/> Pinch                |                                   |                                       |  |

#### Senses

- |   |   |  |  |
|---|---|--|--|
| <input checked="" type="checkbox"/> Vision  | <input checked="" type="checkbox"/> Essential | <input type="checkbox"/> Colour Vision | <input checked="" type="checkbox"/> Depth Perception |
| <input checked="" type="checkbox"/> Hearing | <input checked="" type="checkbox"/> Essential |  |  |
| <input type="checkbox"/> Smell              | <input type="checkbox"/> Essential            |  |  |

#### Cognitive

- |  |  |                                    |  |
|--|--|------------------------------------|--|
| <input type="checkbox"/> Reading               | <input type="checkbox"/> Essential                 |                                    |  |
| <input type="checkbox"/> Writing               | <input type="checkbox"/> Essential                 |                                    |  |
| <input type="checkbox"/> Speech                | <input type="checkbox"/> Essential                 |                                    |  |
| <input type="checkbox"/> Decision              | <input type="checkbox"/> Essential                 |                                    |  |
| <input type="checkbox"/> DeadLine              | <input type="checkbox"/> Essential                 |                                    |  |
| <input type="checkbox"/> Alone                 | <input type="checkbox"/> Essential                 |                                    |  |
| <input type="checkbox"/> InGroup               | <input type="checkbox"/> Essential                 |                                    |  |
| <input type="checkbox"/> DynamicReasoning      |  |                                    |  |
| <input type="checkbox"/> SituationalAwareness  | <input type="checkbox"/> ConflictResolution        | <input type="checkbox"/> OverTime  |  |
|  | <input type="checkbox"/> InteractingWithPeople     | <input type="checkbox"/> ShiftWork |  |
| <input type="checkbox"/> ArithmeticCalculation | <input type="checkbox"/> TelephoneWork             | <input type="checkbox"/> Memory    |  |
| <input type="checkbox"/> StrategicConcept      | <input checked="" type="checkbox"/> RelativeMotion |                                    |  |

#### Personal Protective Equipment

- |   |   |  |  |
|---|---|--|--|
| <input type="checkbox"/> Gloves                 | <input type="checkbox"/> Essential                    |  |  |
| <input type="checkbox"/> Goggles                | <input type="checkbox"/> Essential                    |  |  |
| <input checked="" type="checkbox"/> SafetyBoots | <input checked="" type="checkbox"/> Safety Jacket     |  |  |
| <input type="checkbox"/> EarPlugs               | <input checked="" type="checkbox"/> Non Skid Footgear |  |  |

## San Francisco Bar Pilot: *Embarkation*

Task Description: The pilot stands on the deck of a pilot boat while holding onto a tied rope with one hand, and watching the Jacob's Ladder on vessel, transfers across onto the ladder, and climbs to the main deck. Comment: The duration of this task is reasonably similar.

Essential Task(% Of Cycle): 1-5% ReviewerName: R Kosnik  
 Duration: 6 Minutes  
 Entire Cycle Duration: 260 Minutes LastDate: 01-Mar-10  
 Environmental Conditions: , Humidity, Lighting, Outside Work, Cold

### Spinal Postures

Sitting  Essential Cycle: Duration:  
 Standing  Essential Cycle: 67-100% Duration: 1-5 minute  
 Walking  Essential Cycle: 1-5% Duration: <1 minute  
 Twisting  Essential  
 Balance  Essential

#### Cervical Spine

Forward  Essential Cycle: (Duration)  
 Backward  Essential Cycle: Duration:  
 Rotation  Essential  
 Eye/Hand/FootCo-ordination  Eye/Hand/FootCo-ordinationEssential

### Lower Limb

Crouch/Squat  Essential Cycle: Duration  
 Crawl  Essential Cycle: Duration  
 Climbing  Essential Cycle: 67-100% Duration: 1-5 minute Climb Jacob's Ladder up to 10m  
 Type: ladders Steps: 21-50  
 Kneeling  Essential Cycle: Duration  
 FootAction  Essential

### Upper Limb

Lifting  Essential Cycle: 6-33% Duration: 1-5 minute Lift one leg at a time climbing up the ladder  
 20-50 lbs  FloorToWaist  WaistToShoulder  AboveShoulder  
 Carrying  Essential Cycle: Duration  
 1Hand  2Hand  Handles Vertical Horizontal  
 Pushing  Essential Cycle: Distance  
 Weight: Vertical Horizontal  
 Pulling  Essential Cycle: Distance:  
 Weight: Vertical Horizontal  
**Shoulder**  Flexion  Extension  Abduction  
**Elbow**  Flexion  Extension  
**Wrist**  Flexion  Essential  Dominant  Non-dominant  Both  
 Extension  Essential  Dominant  Non-dominant  Both  
 Rotation  Essential  Dominant  Non-dominant  Both

### San Francisco Bar Pilot: *Embarkation*

- Hand**
- |  |   |                                   |                                       |  |
|--|---|-----------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Dexterity           | <input type="checkbox"/> Essential        | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input type="checkbox"/> Both            |
| <input checked="" type="checkbox"/> Grasping | <input type="checkbox"/> Essential        |                                   |                                       |  |
|  | <input checked="" type="checkbox"/> Power | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input checked="" type="checkbox"/> Both |
|  | <input type="checkbox"/> Pinch            |                                   |                                       |  |

#### Senses

- |   |   |  |  |
|---|---|--|--|
| <input checked="" type="checkbox"/> Vision  | <input checked="" type="checkbox"/> Essential | <input type="checkbox"/> Colour Vision | <input checked="" type="checkbox"/> Depth Perception |
| <input checked="" type="checkbox"/> Hearing | <input checked="" type="checkbox"/> Essential |  |  |
| <input type="checkbox"/> Smell              | <input type="checkbox"/> Essential            |  |  |

#### Cognitive

- |  |   |   |  |
|--|---|---|--|
| <input type="checkbox"/> Reading               | <input type="checkbox"/> Essential                        |   |  |
| <input type="checkbox"/> Writing               | <input type="checkbox"/> Essential                        |   |  |
| <input type="checkbox"/> Speech                | <input type="checkbox"/> Essential                        |   |  |
| <input type="checkbox"/> Decision              | <input type="checkbox"/> Essential                        |   |  |
| <input checked="" type="checkbox"/> DeadLine   | <input checked="" type="checkbox"/> Essential             |   |  |
| <input type="checkbox"/> Alone                 | <input type="checkbox"/> Essential                        |   |  |
| <input type="checkbox"/> InGroup               | <input type="checkbox"/> Essential                        |   |  |
| <input type="checkbox"/> DynamicReasoning      |   |   |  |
| <input type="checkbox"/> SituationalAwareness  | <input type="checkbox"/> ConflictResolution               | <input type="checkbox"/> OverTime             |  |
|  | <input checked="" type="checkbox"/> InteractingWithPeople | <input checked="" type="checkbox"/> ShiftWork |  |
| <input type="checkbox"/> ArithmeticCalculation | <input type="checkbox"/> TelephoneWork                    | <input type="checkbox"/> Memory               |  |
| <input type="checkbox"/> StrategicConcept      | <input checked="" type="checkbox"/> RelativeMotion        |   |  |

#### Personal Protective Equipment

- |   |   |  |  |
|---|---|--|--|
| <input checked="" type="checkbox"/> Gloves      | <input type="checkbox"/> Essential                    |  |  |
| <input type="checkbox"/> Goggles                | <input type="checkbox"/> Essential                    |  |  |
| <input checked="" type="checkbox"/> SafetyBoots | <input checked="" type="checkbox"/> Safety Jacket     |  |  |
| <input type="checkbox"/> EarPlugs               | <input checked="" type="checkbox"/> Non Skid Footgear |  |  |

### San Francisco Bar Pilot: *Transit to the Bridge*

**Task Description:** The pilot arrives on the main deck, traverses the deck to the bridge tairway, and climbs the stairway to the bridge as quickly as possible. The bridge can be 4 - 10 stories above the main deck. **Comment:** The duration of this task is reasonably constant.

**Essential** Task(% Of Cycle): 1-5% ReviewerName: R Kosnik  
 Duration: 6 Minutes  
 Entire Cycle Duration: 260 Minutes LastDate: 01-Mar-10  
**Environmental Conditions:** , Heat, Humidity, Lighting, Outside Work, Cold

#### Spinal Postures

- Sitting**  **Essential** Cycle: Duration:
- Standing**  **Essential** Cycle: 6-33% Duration: 6-10 minute
- Walking**  **Essential** Cycle: 6-33% Duration: 1-5 minute
- Twisting**  **Essential**
- Balance**  **Essential**
- Cervical Spine**
- Forward**  **Essential** Cycle: (Duration)
- Backward**  **Essential** Cycle: Duration:
- Rotation**  **Essential**
- Eye/Hand/FootCo-ordination**  **Eye/Hand/FootCo-ordinationEssential**

#### Lower Limb

- Crouch/Squat**  **Essential** Cycle: Duration
- Crawf**  **Essential** Cycle: Duration
- Climbing**  **Essential** Cycle: 67-100% Duration: 6-10 minute  
 Type: stairs Steps: 21-50
- Kneeling**  **Essential** Cycle: Duration
- FootAction**  **Essential**

#### Upper Limb

- Lifting**  **Essential** Cycle: Duration:  
 FloorToWaist  WaistToShoulder  AboveShoulder
- Carrying**  **Essential** Cycle: Duration  
 1Hand  2Hand  Handles Vertical Horizontal
- Pushing**  **Essential** Cycle: Distance  
 Weight: Vertical Horizontal
- Pulling**  **Essential** Cycle: Distance:  
 Weight: Vertical Horizontal
- Shoulder**  Flexion  Extension  Abduction
- Elbow**  Flexion  Extension
- Wrist**  Flexion  Essential  Dominant  Non-dominant  Both  
 Extension  Essential  Dominant  Non-dominant  Both  
 Rotation  Essential  Dominant  Non-dominant  Both



### San Francisco Bar Pilot: *Transit to the Bridge*

- Hand**
- |  |   |  |  |                               |
|--|---|--|--|-------------------------------|
| <input type="checkbox"/> Dexterity           | <input type="checkbox"/> Essential            | <input type="checkbox"/> Dominant            | <input type="checkbox"/> Non-dominant            | <input type="checkbox"/> Both |
| <input checked="" type="checkbox"/> Grasping | <input checked="" type="checkbox"/> Essential |  |  |                               |
|  | <input checked="" type="checkbox"/> Power     | <input checked="" type="checkbox"/> Dominant | <input checked="" type="checkbox"/> Non-dominant | <input type="checkbox"/> Both |
|  | <input type="checkbox"/> Pinch                |  |  |                               |

#### Senses

- |   |                                    |  |   |
|---|------------------------------------|--|---|
| <input checked="" type="checkbox"/> Vision  | <input type="checkbox"/> Essential | <input type="checkbox"/> Colour Vision | <input type="checkbox"/> Depth Perception |
| <input checked="" type="checkbox"/> Hearing | <input type="checkbox"/> Essential |  |   |
| <input type="checkbox"/> Smell              | <input type="checkbox"/> Essential |  |   |

#### Cognitive

- |  |  |                                    |  |
|--|--|------------------------------------|--|
| <input type="checkbox"/> Reading               | <input type="checkbox"/> Essential             |                                    |  |
| <input type="checkbox"/> Writing               | <input type="checkbox"/> Essential             |                                    |  |
| <input type="checkbox"/> Speech                | <input type="checkbox"/> Essential             |                                    |  |
| <input type="checkbox"/> Decision              | <input type="checkbox"/> Essential             |                                    |  |
| <input type="checkbox"/> DeadLine              | <input type="checkbox"/> Essential             |                                    |  |
| <input type="checkbox"/> Alone                 | <input type="checkbox"/> Essential             |                                    |  |
| <input checked="" type="checkbox"/> InGroup    | <input checked="" type="checkbox"/> Essential  |                                    |  |
| <input type="checkbox"/> DynamicReasoning      |  |                                    |  |
| <input type="checkbox"/> SituationalAwareness  | <input type="checkbox"/> ConflictResolution    | <input type="checkbox"/> OverTime  |  |
|  | <input type="checkbox"/> InteractingWithPeople | <input type="checkbox"/> ShiftWork |  |
| <input type="checkbox"/> ArithmeticCalculation | <input type="checkbox"/> TelephoneWork         | <input type="checkbox"/> Memory    |  |
| <input type="checkbox"/> StrategicConcept      | <input type="checkbox"/> RelativeMotion        |                                    |  |

#### Personal Protective Equipment

- |   |   |  |  |
|---|---|--|--|
| <input checked="" type="checkbox"/> Gloves      | <input type="checkbox"/> Essential                    |  |  |
| <input type="checkbox"/> Goggles                | <input type="checkbox"/> Essential                    |  |  |
| <input checked="" type="checkbox"/> SafetyBoots | <input checked="" type="checkbox"/> Safety Jacket     |  |  |
| <input type="checkbox"/> EarPlugs               | <input checked="" type="checkbox"/> Non Skid Footgear |  |  |

## San Francisco Bar Pilot: *Navigation*

**Task Description:** The pilot leads the ship navigation through the local conditions of underwater topography, tides, current and winds in a waterway active with other vessels and recreational crafts.

**Comment:** The duration of this task varies depending on the point of embarkation and the location of the docking.

**Essential** Task(% Of Cycle): 34-66% ReviewerName: R Kosnik  
 Duration: 180 Minutes  
 Entire Cycle Duration: 260 Minutes LastDate: 01-Mar-10  
**Environmental Conditions:** Noise, Heat, Humidity, Lighting, Outside Work, Cold

### Spinal Postures

- Sitting**  **Essential** Cycle: Duration:  
 **Standing**  **Essential** Cycle: 67-100% Duration: >1 hour standing for 4 hours or more  
 **Walking**  **Essential** Cycle: 6-33% Duration: 31-59 minute Walking is a part of the standing required. There is movement between stations on the bridge.  
 **Twisting**  **Essential**  
 **Balance**  **Essential**  
**Cervical Spine**  
 **Forward**  **Essential** Cycle: (Duration)  
 **Backward**  **Essential** Cycle: Duration:  
 **Rotation**  **Essential**  
 **Eye/Hand/FootCo-ordination**  **Eye/Hand/FootCo-ordinationEssential**

### Lower Limb

- Crouch/Squat**  **Essential** Cycle: Duration  
 **Crawf**  **Essential** Cycle: Duration  
 **Climbing**  **Essential** Cycle: Duration:  
 Type: Steps:  
 **Kneeling**  **Essential** Cycle: Duration  
 **FootAction**  **Essential**

### Upper Limb

- Lifting**  **Essential** Cycle: Duration:  
 **FloorToWaist**  **WaistToShoulder**  **AboveShoulder**  
 **Carrying**  **Essential** Cycle: Duration Includes the carrying of the required portable instruments  
 **1Hand**  **2Hand**  **Handles** Vertical Horizontal  
 **Pushing**  **Essential** Cycle: Distance  
 Weight: Vertical Horizontal  
 **Pulling**  **Essential** Cycle: Distance:  
 Weight: Vertical Horizontal  
**Shoulder**  **Flexion**  **Extension**  **Abduction**  
**Elbow**  **Flexion**  **Extension**  
**Wrist**  **Flexion**  **Essential**  **Dominant**  **Non-dominant**  **Both**  
 **Extension**  **Essential**  **Dominant**  **Non-dominant**  **Both**  
 **Rotation**  **Essential**  **Dominant**  **Non-dominant**  **Both**

## San Francisco Bar Pilot: *Navigation*

- Hand**
- |   |   |                                   |  |                                       |                               |
|---|---|-----------------------------------|--|---------------------------------------|-------------------------------|
| <input checked="" type="checkbox"/> Dexterity | <input type="checkbox"/> Essential            | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant        | <input type="checkbox"/> Both         |                               |
| <input checked="" type="checkbox"/> Grasping  | <input checked="" type="checkbox"/> Essential | <input type="checkbox"/> Power    | <input checked="" type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input type="checkbox"/> Both |
|   | <input checked="" type="checkbox"/> Pinch     |                                   |  |                                       |                               |

### Senses

- |   |   |   |   |  |
|---|---|---|---|--|
| <input checked="" type="checkbox"/> Vision  | <input checked="" type="checkbox"/> Essential | <input checked="" type="checkbox"/> Colour Vision | <input type="checkbox"/> Depth Perception | Vision is required in general room lighting, indoor lighting at night along with the ability to see visual landmarks which may be obscured by fog or rain during the day or night. |
| <input checked="" type="checkbox"/> Hearing | <input checked="" type="checkbox"/> Essential |   |   |  |
| <input type="checkbox"/> Smell              | <input type="checkbox"/> Essential            |   |   |  |

### Cognitive

- |   |   |   |  |
|---|---|---|--|
| <input checked="" type="checkbox"/> Reading               | <input checked="" type="checkbox"/> Essential             |   |  |
| <input checked="" type="checkbox"/> Writing               | <input checked="" type="checkbox"/> Essential             |   |  |
| <input type="checkbox"/> Speech                           | <input type="checkbox"/> Essential                        |   |  |
| <input checked="" type="checkbox"/> Decision              | <input checked="" type="checkbox"/> Essential             |   |  |
| <input checked="" type="checkbox"/> DeadLine              | <input checked="" type="checkbox"/> Essential             |   |  |
| <input checked="" type="checkbox"/> Alone                 | <input checked="" type="checkbox"/> Essential             | As the leader of navigation.                  |  |
| <input checked="" type="checkbox"/> InGroup               | <input type="checkbox"/> Essential                        |   |  |
| <input checked="" type="checkbox"/> DynamicReasoning      |   |   |  |
| <input checked="" type="checkbox"/> SituationalAwareness  | <input type="checkbox"/> ConflictResolution               | <input type="checkbox"/> OverTime             |  |
| <input checked="" type="checkbox"/> ArithmeticCalculation | <input checked="" type="checkbox"/> InteractingWithPeople | <input checked="" type="checkbox"/> ShiftWork |  |
| <input type="checkbox"/> StrategicConcept                 | <input checked="" type="checkbox"/> TelephoneWork         | <input checked="" type="checkbox"/> Memory    |  |
|   | <input checked="" type="checkbox"/> RelativeMotion        |   |  |

### Personal Protective Equipment

- |                                      |   |  |  |
|--------------------------------------|---|--|--|
| <input type="checkbox"/> Gloves      | <input type="checkbox"/> Essential                    |  |  |
| <input type="checkbox"/> Goggles     | <input type="checkbox"/> Essential                    |  |  |
| <input type="checkbox"/> SafetyBoots | <input type="checkbox"/> Safety Jacket                |  |  |
| <input type="checkbox"/> EarPlugs    | <input checked="" type="checkbox"/> Non Skid Footgear |  |  |

## San Francisco Bar Pilot: *Docking / Undocking*

Task Description: The pilot leads the actions to move the vessel from the route to the dock coordinating the efforts of the tug boats with vessels capacity to move and steer. Comment: The duration of this task is reasonably similar.

---

Essential Task(% Of Cycle): 6-33% ReviewerName: R Kosnik  
 Duration: 30 Minutes  
 Entire Cycle Duration: 260 Minutes LastDate: 01-Mar-10  
 Environmental Conditions: , Heat, Humidity, Lighting, Outside Work, Cold

### Spinal Postures

Sitting  Essential Cycle: Duration:  
 Standing  Essential Cycle: 67-100% Duration: 31-59 minute  
 Walking  Essential Cycle: 6-33% Duration: Walking around the side deck of the bridge.  
 Twisting  Essential Twisting may be needed to obtain direct visualization of docking  
 Balance  Essential Standing on the bridge  
**Cervical Spine**  
 Forward  Essential Cycle: (Duration)  
 Backward  Essential Cycle: Duration:  
 Rotation  Essential  
 Eye/Hand/FootCo-ordination  Eye/Hand/FootCo-ordinationEssential

### Lower Limb

Crouch/Squat  Essential Cycle: Duration  
 Crawl  Essential Cycle: Duration  
 Climbing  Essential Cycle: Duration:  
 Type: Steps:  
 Kneeling  Essential Cycle: Duration  
 FootAction  Essential

### Upper Limb

Lifting  Essential Cycle: Duration:  
 FloorToWaist  WaistToShoulder  AboveShoulder  
 Carrying  Essential Cycle: Duration  
 1Hand  2Hand  Handles Vertical Horizontal  
 Pushing  Essential Cycle: Distance  
 Weight: Vertical Horizontal  
 Pulling  Essential Cycle: Distance:  
 Weight: Vertical Horizontal  
**Shoulder**  Flexion  Extension  Abduction  
**Elbow**  Flexion  Extension  
**Wrist**  Flexion  Essential  Dominant  Non-dominant  Both  
 Extension  Essential  Dominant  Non-dominant  Both  
 Rotation  Essential  Dominant  Non-dominant  Both

### San Francisco Bar Pilot: *Docking / Undocking*

- Hand**
- |   |   |  |                                       |                                       |                               |
|---|---|--|---------------------------------------|---------------------------------------|-------------------------------|
| <input checked="" type="checkbox"/> Dexterity | <input type="checkbox"/> Essential            | <input checked="" type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input type="checkbox"/> Both         |                               |
| <input checked="" type="checkbox"/> Grasping  | <input checked="" type="checkbox"/> Essential | <input type="checkbox"/> Power               | <input type="checkbox"/> Dominant     | <input type="checkbox"/> Non-dominant | <input type="checkbox"/> Both |
|   | <input checked="" type="checkbox"/> Pinch     |  |                                       |                                       |                               |

#### Senses

- |   |   |  |   |
|---|---|--|---|
| <input checked="" type="checkbox"/> Vision  | <input checked="" type="checkbox"/> Essential | <input type="checkbox"/> Colour Vision | <input type="checkbox"/> Depth Perception |
| <input checked="" type="checkbox"/> Hearing | <input checked="" type="checkbox"/> Essential |  |   |
| <input type="checkbox"/> Smell              | <input type="checkbox"/> Essential            |  |   |

#### Cognitive

- |   |   |  |  |
|---|---|--|--|
| <input checked="" type="checkbox"/> Reading               | <input checked="" type="checkbox"/> Essential             |  |  |
| <input type="checkbox"/> Writing                          | <input type="checkbox"/> Essential                        |  |  |
| <input checked="" type="checkbox"/> Speech                | <input checked="" type="checkbox"/> Essential             |  |  |
| <input checked="" type="checkbox"/> Decision              | <input checked="" type="checkbox"/> Essential             |  |  |
| <input type="checkbox"/> DeadLine                         | <input type="checkbox"/> Essential                        |  |  |
| <input checked="" type="checkbox"/> Alone                 | <input checked="" type="checkbox"/> Essential             | Works alone as the person in charge.       |  |
| <input checked="" type="checkbox"/> InGroup               | <input checked="" type="checkbox"/> Essential             | Leader among the group.                    |  |
| <input checked="" type="checkbox"/> DynamicReasoning      |   |  |  |
| <input checked="" type="checkbox"/> SituationalAwareness  | <input type="checkbox"/> ConflictResolution               | <input type="checkbox"/> OverTime          | Relative motion of the vessel to the dock influenced by the situation. |
|   | <input checked="" type="checkbox"/> InteractingWithPeople | <input type="checkbox"/> ShiftWork         |  |
| <input checked="" type="checkbox"/> ArithmeticCalculation | <input checked="" type="checkbox"/> TelephoneWork         | <input checked="" type="checkbox"/> Memory |  |
| <input type="checkbox"/> StrategicConcept                 | <input checked="" type="checkbox"/> RelativeMotion        |  |  |

#### Personal Protective Equipment

- |   |   |  |  |
|---|---|--|--|
| <input type="checkbox"/> Gloves                 | <input type="checkbox"/> Essential                    |  |  |
| <input type="checkbox"/> Goggles                | <input type="checkbox"/> Essential                    |  |  |
| <input checked="" type="checkbox"/> SafetyBoots | <input type="checkbox"/> Safety Jacket                |  |  |
| <input type="checkbox"/> EarPlugs               | <input checked="" type="checkbox"/> Non Skid Footgear |  |  |

## San Francisco Bar Pilot: *Disembarkation*

Task Description: The pilot moves from the bridge to the deck of the main vessel, climbs down the Jacob's ladder, uses a hand rope, and transfers across to the deck of the pilot boat. Comment: The duration of this task is reasonably similar.

Essential Task(% Of Cycle): 1-5% ReviewerName: R Kosnik  
 Duration: 6 Minutes  
 Entire Cycle Duration: 260 Minutes LastDate: 01-Mar-10  
 Environmental Conditions: , Heat, Humidity, Lighting, Outside Work, Cold

### Spinal Postures

- Sitting  Essential Cycle: Duration:  
 Standing  Essential Cycle: 67-100% Duration: 1-5 minute  
 Walking  Essential Cycle: Duration:  
 Twisting  Essential  
 Balance  Essential  
 Cervical Spine  
 Forward  Essential Cycle: (Duration)  
 Backward  Essential Cycle: Duration:  
 Rotation  Essential  
 Eye/Hand/FootCo-ordination  Eye/Hand/FootCo-ordinationEssential
- The pilot needs to look down over their shoulder as they step from the ladder to the deck of the pilot boat.  
 The pilot needs to climb down a vertical ladder.

### Lower Limb

- Crouch/Squat  Essential Cycle: Duration  
 Crawl  Essential Cycle: Duration  
 Climbing  Essential Cycle: 67-100% Duration: 6-10 minute  
 Type: ladders Steps: 21-50  
 Kneeling  Essential Cycle: Duration  
 FootAction  Essential
- During the final steps of the descent, the pilot needs to grab a hand rope to assist in the transfer to the deck of the pilot boat.

### Upper Limb

- Lifting  Essential Cycle: Duration:  
 FloorToWaist  WaistToShoulder  AboveShoulder  
 Carrying  Essential Cycle: Duration  
 1Hand  2Hand  Handles Vertical Horizontal  
 Pushing  Essential Cycle: Distance  
 Weight: Vertical Horizontal  
 Pulling  Essential Cycle: 67-100% Distance:  
 Weight: Vertical Horizontal
- The pilot is required to hold onto the ladder, in effect pulling the body towards the ladder.

- Shoulder  Flexion  Extension  Abduction  
 Elbow  Flexion  Extension  
 Wrist  Flexion  Essential  Dominant  Non-dominant  Both  
 Extension  Essential  Dominant  Non-dominant  Both  
 Rotation  Essential  Dominant  Non-dominant  Both

### San Francisco Bar Pilot: *Disembarkation*

- Hand**
- |  |   |                                   |                                       |  |
|--|---|-----------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Dexterity           | <input type="checkbox"/> Essential            | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input type="checkbox"/> Both            |
| <input checked="" type="checkbox"/> Grasping | <input checked="" type="checkbox"/> Essential | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input checked="" type="checkbox"/> Both |
|  | <input checked="" type="checkbox"/> Power     | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input checked="" type="checkbox"/> Both |
|  | <input type="checkbox"/> Pinch                |                                   |                                       |  |

#### Senses

- |   |   |  |  |
|---|---|--|--|
| <input checked="" type="checkbox"/> Vision  | <input checked="" type="checkbox"/> Essential | <input type="checkbox"/> Colour Vision | <input checked="" type="checkbox"/> Depth Perception |
| <input checked="" type="checkbox"/> Hearing | <input checked="" type="checkbox"/> Essential |  |  |
| <input type="checkbox"/> Smell              | <input type="checkbox"/> Essential            |  |  |

#### Cognitive

- |  |  |  |   |
|--|--|--|---|
| <input type="checkbox"/> Reading                         | <input type="checkbox"/> Essential                 |  |   |
| <input type="checkbox"/> Writing                         | <input type="checkbox"/> Essential                 |  |   |
| <input type="checkbox"/> Speech                          | <input type="checkbox"/> Essential                 |  |   |
| <input type="checkbox"/> Decision                        | <input type="checkbox"/> Essential                 |  |   |
| <input type="checkbox"/> DeadLine                        | <input type="checkbox"/> Essential                 |  |   |
| <input checked="" type="checkbox"/> Alone                | <input checked="" type="checkbox"/> Essential      |  |   |
| <input type="checkbox"/> InGroup                         | <input type="checkbox"/> Essential                 |  |   |
| <input checked="" type="checkbox"/> DynamicReasoning     |  |  |   |
| <input checked="" type="checkbox"/> SituationalAwareness | <input type="checkbox"/> ConflictResolution        | <input type="checkbox"/> OverTime          | The pilot is required to judge the relative motion of the vessel to the pilot boat in three dimensions. |
|  | <input type="checkbox"/> InteractingWithPeople     | <input type="checkbox"/> ShiftWork         |   |
| <input type="checkbox"/> ArithmeticCalculation           | <input type="checkbox"/> TelephoneWork             | <input checked="" type="checkbox"/> Memory |   |
| <input type="checkbox"/> StrategicConcept                | <input checked="" type="checkbox"/> RelativeMotion |  |   |

#### Personal Protective Equipment

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Gloves      | <input checked="" type="checkbox"/> Essential         |
| <input type="checkbox"/> Goggles                | <input type="checkbox"/> Essential                    |
| <input checked="" type="checkbox"/> SafetyBoots | <input checked="" type="checkbox"/> Safety Jacket     |
| <input type="checkbox"/> EarPlugs               | <input checked="" type="checkbox"/> Non Skid Footgear |

## San Francisco Bar Pilot: *Pilot Boat Ride In*

Task Description: The pilot traverses the deck of the pilot boat, takes a seat for the ride to the base dock and climbs to the dock. Comment: The duration of this task will vary. At times the pilot will need to wait in the pilot boat at sea prior to embarking the next ship or returning to port.

Essential Task(% Of Cycle): 1-5% ReviewerName: R Kosnik  
 Duration: 6 Minutes  
 Entire Cycle Duration: 260 Minutes LastDate: 01-Mar-10

Environmental Conditions: , Heat, Humidity, Lighting, Outside Work, Cold

### Spinal Postures

- Sitting  Essential Cycle: 34-66% Duration: 6-10 minute
- Standing  Essential Cycle: 6-33% Duration: 1-5 minute
- Walking  Essential Cycle: 1-5% Duration: 1-5 minute
- Twisting  Essential
- Balance  Essential

The pilot needs to balance on the deck of the pilot boat.

### Cervical Spine

- Forward  Essential Cycle: (Duration)
- Backward  Essential Cycle: Duration:
- Rotation  Essential
- Eye/Hand/FootCo-ordination  Eye/Hand/FootCo-ordinationEssential

### Lower Limb

- Crouch/Squat  Essential Cycle: Duration
- Crawl  Essential Cycle: Duration
- Climbing  Essential Cycle: Duration:
- Kneeling  Essential Cycle: Duration
- FootAction  Essential

### Upper Limb

- Lifting  Essential Cycle: Duration:
  - FloorToWaist  WaistToShoulder  AboveShoulder
- Carrying  Essential Cycle: Duration A pilot needs to carry his portable devices.
  - 1Hand  2Hand  Handles Vertical Horizontal
- Pushing  Essential Cycle: Distance
  - Weight: Vertical Horizontal
- Pulling  Essential Cycle: Distance:
  - Weight: Vertical Horizontal
- Shoulder**  Flexion  Extension  Abduction
- Elbow**  Flexion  Extension
- Wrist**
  - Flexion  Essential  Dominant  Non-dominant  Both
  - Extension  Essential  Dominant  Non-dominant  Both
  - Rotation  Essential  Dominant  Non-dominant  Both



### San Francisco Bar Pilot: *Pilot Boat Ride In*

- Hand**
- |  |   |                                   |                                       |  |
|--|---|-----------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Dexterity           | <input type="checkbox"/> Essential            | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input type="checkbox"/> Both            |
| <input checked="" type="checkbox"/> Grasping | <input checked="" type="checkbox"/> Essential | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input checked="" type="checkbox"/> Both |
| <input checked="" type="checkbox"/> Power    | <input type="checkbox"/> Essential            | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input checked="" type="checkbox"/> Both |
| <input type="checkbox"/> Pinch               | <input type="checkbox"/> Essential            | <input type="checkbox"/> Dominant | <input type="checkbox"/> Non-dominant | <input type="checkbox"/> Both            |

#### Senses

- |   |   |  |  |
|---|---|--|--|
| <input checked="" type="checkbox"/> Vision  | <input checked="" type="checkbox"/> Essential | <input type="checkbox"/> Colour Vision | <input checked="" type="checkbox"/> Depth Perception |
| <input checked="" type="checkbox"/> Hearing | <input checked="" type="checkbox"/> Essential |  |  |
| <input type="checkbox"/> Smell              | <input type="checkbox"/> Essential            |  |  |

#### Cognitive

- |  |  |  |   |
|--|--|--|---|
| <input type="checkbox"/> Reading               | <input type="checkbox"/> Essential                 |  |   |
| <input type="checkbox"/> Writing               | <input type="checkbox"/> Essential                 |  |   |
| <input type="checkbox"/> Speech                | <input type="checkbox"/> Essential                 |  |   |
| <input type="checkbox"/> Decision              | <input type="checkbox"/> Essential                 |  |   |
| <input type="checkbox"/> DeadLine              | <input type="checkbox"/> Essential                 |  |   |
| <input type="checkbox"/> Alone                 | <input type="checkbox"/> Essential                 |  |   |
| <input checked="" type="checkbox"/> InGroup    | <input checked="" type="checkbox"/> Essential      |  |   |
| <input type="checkbox"/> DynamicReasoning      |  |  |   |
| <input type="checkbox"/> SituationalAwareness  | <input type="checkbox"/> ConflictResolution        | <input type="checkbox"/> OverTime          | The pilot needs to judge the relative motion of the pilot boat to the dock. |
| <input type="checkbox"/> ArithmeticCalculation | <input type="checkbox"/> InteractingWithPeople     | <input type="checkbox"/> ShiftWork         |   |
| <input type="checkbox"/> StrategicConcept      | <input type="checkbox"/> TelephoneWork             | <input checked="" type="checkbox"/> Memory |   |
|  | <input checked="" type="checkbox"/> RelativeMotion |  |   |

#### Personal Protective Equipment

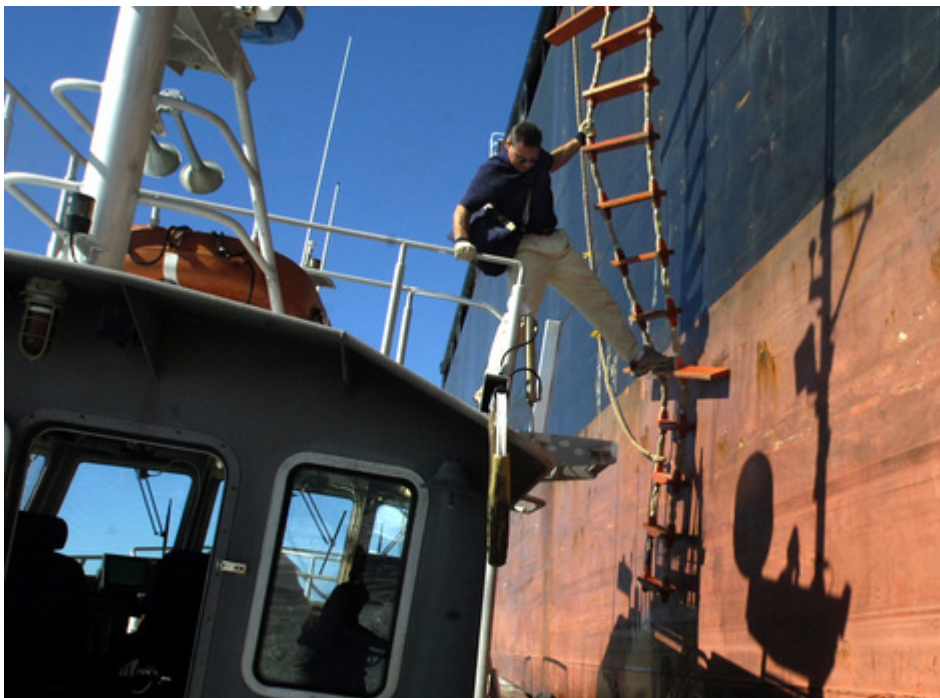
- |   |   |  |  |
|---|---|--|--|
| <input type="checkbox"/> Gloves                 | <input type="checkbox"/> Essential                    |  |  |
| <input type="checkbox"/> Goggles                | <input type="checkbox"/> Essential                    |  |  |
| <input checked="" type="checkbox"/> SafetyBoots | <input checked="" type="checkbox"/> Safety Jacket     |  |  |
| <input type="checkbox"/> EarPlugs               | <input checked="" type="checkbox"/> Non Skid Footgear |  |  |

### APPENDIX.C.3. – Proposed Agility Test Scoring Sheet

<b>Board of Pilot Commissioners – Bays of San Francisco, San Pablo and Suisun</b>	
Applicant / Pilot: _____	Date: _____
Change in Medical Condition _____	Biannual _____
Age: _____	Gender: M F
Resting HR: _____	Resting BP: _____
Relevant medical history:	
Pilot meets pre-test criteria: Yes No Comments: _____	
Required Equipment: harness, jacket, and back pack or waist pack, gloves optional unless otherwise stated.	
<u>ACTIVITY</u>	<u>COMPLETED</u>
<b>Treadmill warm-up</b> (7 minutes at 2.5 mph to 3.5 mph)	Yes No
<b>Balance Activities ( 2 repetitions)</b> Walk the length of 2 tilt boards; 360 degrees on a “BAPS” board, walk across inflated air mattress	Yes No
<b>Floor-to-waist Lift</b>	
20 pounds	Yes No
40 pounds	Yes No
<b>Pilot ladder circuit climb / platform</b> : one foot per rung (touch top rung)	
Step from 2’ x 4’ board to platform, 24” from pilot ladder	Yes No
Climb up / down 12 rungs of a vertical ladder (one foot per rung)	Yes No
Step back onto platform; back onto 2’ x 4’ board	Yes No
<b>Pilot ladder circuit climb / hand rope</b> (must wear gloves, touch top rung)	
Climb up / down pilot ladder (one foot per rung)	Yes No
Single rope (28mm) grasp; slide to the ground level from the height of 6’	Yes No
	Yes No
<b>Stair climb</b> (4 sets of 36 stairs) Recite message to “captain” (criteria to be determined)	
3 minute post climb HR _____ BP _____	
<b>RESULTS:</b>	
_____ Pilot completed activities for body mechanics and activity criteria	
_____ Pilot did not complete activities for body mechanics and activity criteria due to: _____	
Evaluator : _____ (print name) _____ (signature)	

Adapted from the Columbia River Bar Pilot Association – Work Test Evaluation Form

## APPENDIX C.4. – Pictures of Embarkation / Disembarkation



Tampa Pilots



Chronicle / Michael Macor



## APPENDIX C.5. – International Maritime Pilot’s Association

# REQUIRED BOARDING ARRANGEMENTS FOR PILOT

In accordance with I.M.O. requirements and I.M.P.A. recommendations

**INTERNATIONAL MARITIME PILOTS' ASSOCIATION**

H.Q.S “Wellington”, Temple Stairs, Victoria Embankment, London WC2R 2PN Tel: +44 20 7240 3973 Fax: +44 20 7240 3518

**RIGGING FOR FREEBOARDS OF 9 METRES OR LESS**

**HANDHOLD STANCHIONS**  
 Min. diam. 12mm  
 120cm above bulwark  
 min. 70cm  
 max. 80cm apart

**MAN-ROPEs**  
 without knots  
 min. diam. 28mm  
 IF REQUIRED BY PILOT

**SPREADER**  
 Min. 180cm long

Min. 40cm  
 30-38cm  
 Max. 8 steps between spreaders

5th step must be a spreader.

Height required by pilot

**SHIPS WITH HIGH FREEBOARD (MORE THAN 9M)**  
 When no side door available

**PILOT LADDER**  
 Must extend at least 2 metres above lower platform

**OFFICER IN CONTACT WITH BRIDGE**

**ACCOMMODATION LADDER**  
 Should rest firmly against ship's side  
 Should lead aft  
 Maximum 55° slope  
 Lower platform horizontal  
 Rigid handrails preferred

Ladders to rest firmly against ship's side

A PILOT LADDER COMBINED WITH AN ACCOMMODATION LADDER is usually the safer method of embarking or disembarking a pilot on ships with a freeboard of more than 9 metres

0.5m  
 2m  
 2m  
 3 to 7 metres depending on size of pilot launch and height of vessel

Recommended 9 metre mark

Stern → Bow

**MECHANICAL PILOT HOIST**

Drove

Two man-ropes ready for immediate use  
 Min. diam. 18mm

Rigid part  
 Guard ring  
 Flexible part

A pilot hoist made and rigged in accordance with SOLAS Chapter V, together with a pilot ladder rigged alongside for immediate transfer, may be used subject to agreement between the Master and the Pilot. It should be noted that the distance between the nearest side ropes of the pilot hoist and pilot ladder will be at least 1.4 metres.

**NO!**  
 No shackles  
 No knots  
 No splices

**NO!**  
 The steps must be equally spaced

**NO!**  
 The steps must be horizontal

**NO!**  
 Spreaders must not be lashed between steps

**NO!**  
 The side ropes must be equally spaced

**NO!**  
 The loops are a tripping hazard for the pilot and can become foul of the pilot launch

**NO!**  
 Very dangerous ladder too long

Two handhold stanchions rigidly secured to ship's structure

Responsible officer

**NO OBSTRUCTIONS**

Lifebuoy with self-igniting light  
 Bulwark ladder secured to ship

**AT NIGHT**  
 Pilot ladder and ship's deck lit by forward shining outside light



## APPENDIX D.2. – Board of Pilot Commissioners – Proposed Form Statement of Fitness for Duty

**TO: TO THE BOARD OF PILOT COMMISSIONERS,  
FOR THE BAYS OF SAN FRANCISCO, SAN PABLO, AND SUISUN**

**RE: CAPTAIN**

(Name of pilot, inland pilot, pilot trainee or applicant to Board's pilot trainee training program)

I am familiar with the duties of a pilot, inland pilot and a pilot trainee and with the standards prescribed by the Board of Pilot Commissioners.

I have examined the above named individual to determine his or her suitability to perform the duties of a pilot or a pilot trainee in accordance with the standards prescribed by the Board. On the basis of the examination, the completed Coast Guard CG-719K form and related materials, the agility test, the toxicological testing and an evaluation of the effects of the prescription medications named on the list submitted by the examinee, I have found this individual:

<input type="checkbox"/> Fit for Duty	<input type="checkbox"/> Not Fit for Duty	<input type="checkbox"/> Permanently Not Fit for Duty
_____	_____	_____
<b>Board appointed physician (Printed)</b>	<b>Signature</b>	<b>Date</b>

### RELEASE BY APPLICANT

1. I hereby authorize the Board appointed physician to release to, or discuss with the Medical Review Officer, any pertinent information in his / her possession regarding any physical or medical condition that may be required review by the Medical Review Officer prior to determining whether the Board should issue a pilot license.

2. I understand that this authorization is voluntary. I also understand that failure to provide authorization could affect the Board's ability to make a timely determination as to whether the Board will issue me a pilot license.

3. I have read and understand the following statement about my rights.

a. I may revoke this authorization at any time prior to its expiration date by notifying the Board appointed physician and the Medical Review Officer in writing, but the revocation will not have any effect on any actions taken before they received the notification.

b. Upon request, I may see or copy the information described in this release.

_____	_____	_____
<b>Applicant's Name (Printed)</b>	<b>Signature</b>	<b>Date</b>

### MEDICAL REVIEW OFFICER

I am familiar with the duties of a pilot, inland pilot and a pilot trainee and with the standards prescribed by the Board of Pilot Commissioners.

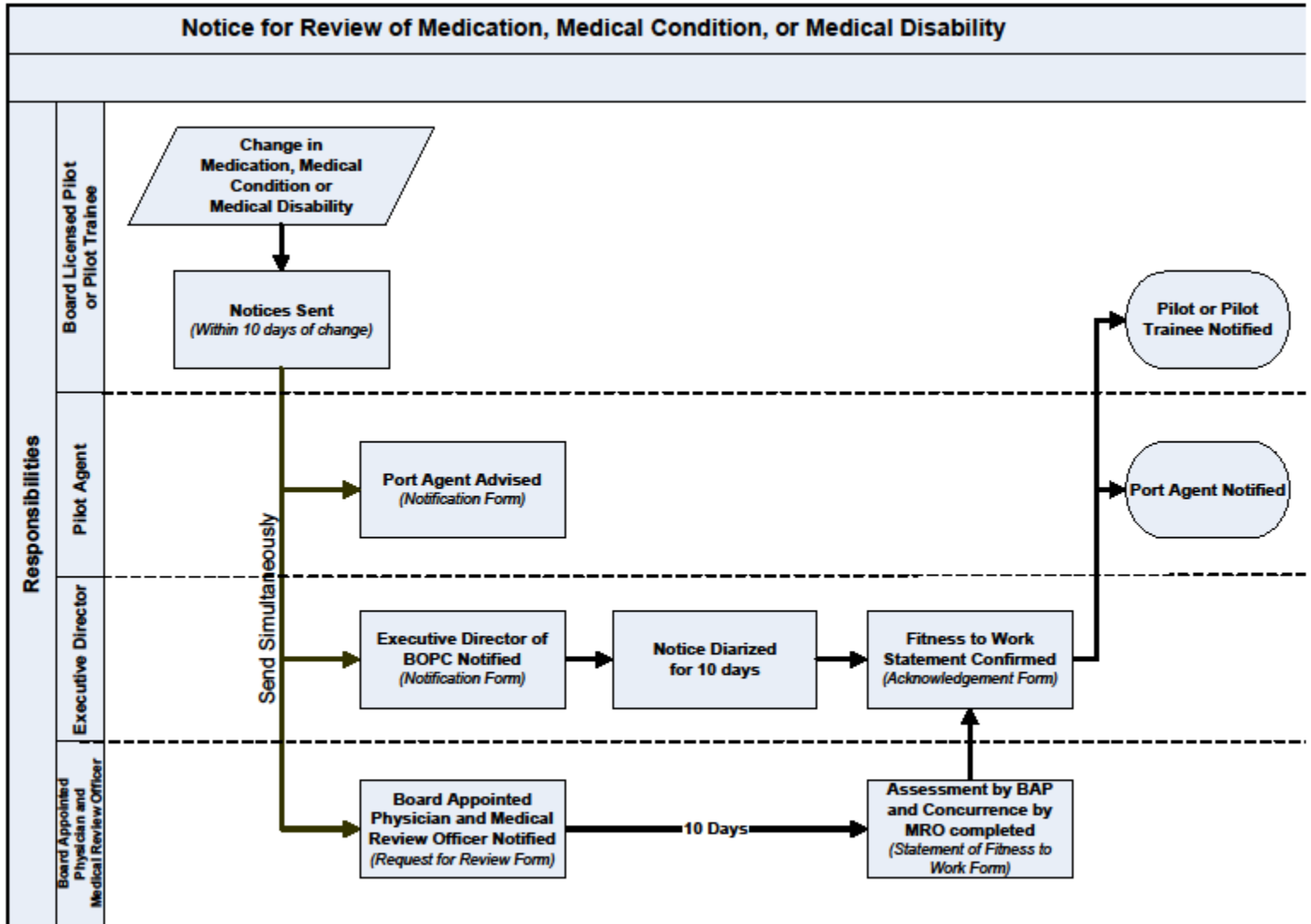
I have reviewed the completed Coast Guard CG-719K form and related materials, the agility test, the toxicological tests and the prescription medications named on the list submitted by the examinee. I have formed an opinion on the above named individual's ability to suitability to

perform the duties of a pilot or a pilot trainee in accordance with the standards prescribed by the Board. On this basis, I have found this individual

<input type="checkbox"/> Fit for Duty	<input type="checkbox"/> Not Fit for Duty	<input type="checkbox"/> Permanently Not Fit for Duty
<input type="checkbox"/> I concur with the Fitness for Duty Statement by the Board appointed physician	<input type="checkbox"/> I do not concur with the Fitness for Duty Statement by the Board appointed physician	
_____	_____	_____
<b>Medical Review Officer (Printed)</b>	<b>Signature</b>	<b>Date</b>



### APPENDIX D.3. – Process Flowchart



## APPENDIX D.4. – Proposed Notification Form – Review of Fitness for Duty

Printed on BOPC Letterhead

### Notification Form – Review of Fitness for Duty

**TO: Executive Director, Board of Pilot Commissioners**

I, \_\_\_\_\_, as a licensed pilot or pilot trainee hereby advise you that I have requested a review of my Statement of Fitness for Duty on \_\_\_\_\_(MM/DD/YY) from the Board appointed physician (BAP) who completed my most recent CG-719K form.

I have provided the Board appointed physician with the information outlined in the request for review form along with a telephone contact number. I am available to discuss the information provided, to answer any questions, and to undertake a supplemental agility test or physical examination. I understand that the Board appointed physician will undertake to provide you with a review of my fitness for duty within 10 working days. Further, I understand that any delay in this review due to my failure to provide the required information may affect my license.

I did attach to my request a signed “Review – Statement of Fitness for Duty” form where I have read and signed the release for the Board appointed physician to release to, or discuss with the Medical Review Officer, any pertinent information in his/ her possession regarding any physical or medication condition that may be required for review by the Medical Review Officer prior to determining whether the Board should continue my pilot license.

\_\_\_\_\_  
**Applicant’s Name (Printed)**

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**

**Cc: Port Agent**

## APPENDIX D.5. – Proposed Request for Review Form - Fitness for Duty

Printed on BOPC letterhead

### Request for Review of Statement of Fitness for Duty

TO: DR. \_\_\_\_\_, Board Appointed Physician

I, \_\_\_\_\_, as a licensed pilot or pilot trainee am requesting that you to review my Statement of Fitness for Duty. You were the Board appointed physician who completed my most recent CG-719K.

I am requesting this review because there has been the following change:

I have been prescribed either a new dosage of a medication or a new medication, or have suspended the use of a prescribed medication. I have attached a statement from a licensed physician documenting the medication change.

I have recently been diagnosed with a medical condition listed on the CG-719K form. I have attached a copy of the clinical investigations, and consultations considered in making the diagnosis. I have also included a copy of the medical records from my primary care physician regarding this diagnosis.

I have recently had a change in a medical condition which impairs, to an appreciable degree, my ability to conduct my piloting duties. I have attached a copy of the clinical investigations, and consultations considered. I have also included a copy of the medical records from my primary care physician regarding this diagnosis.

I have had a medical disability lasting longer than 30 days. I have attached a copy of the clinical investigations, any consultations considered, and the medical records from my primary care physician regarding this diagnosis.

I understand that it may be necessary to discuss the information, update the agility test, or undertake another physical examination. I can be contacted by telephone at the following number (\_\_\_\_) - \_\_\_\_ - \_\_\_\_\_.

I have attached a signed “Review – Statement of Fitness for Duty” form where I have read and signed the release for the Board appointed physician to release to, or discuss with the Medical Review Officer, any pertinent information in his/ her possession regarding any physical or medication condition that may be required for review by the Medical Review Officer prior to determining whether the Board should continue my pilot license.

\_\_\_\_\_  
Applicant’s Name (Printed)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## APPENDIX D.6. – Proposed Form – Review – Statement of Fitness for Duty

Print on BOPC letterhead

### Review - Statement of Fitness for Duty

**TO: TO THE BOARD OF PILOT COMMISSIONERS,  
FOR THE BAYS OF SAN FRANCISCO, SAN PABLO, AND SUISUN**

**RE: CAPTAIN \_\_\_\_\_** (Name of pilot, or pilot trainee)

I am familiar with the duties of a pilot and a pilot trainee and with the standards prescribed by the Board of Pilot Commissioners.

I have reviewed all the information submitted by the above named individual and conducted a supplemental agility test or physical examination to determine his or her suitability to perform the duties of a pilot or a pilot trainee in accordance with the standards prescribed by the Board. On the basis of this review and related materials, and an evaluation of the effects of the prescription medications named on the list submitted by the examinee, I have found this individual:

<input type="checkbox"/> Fit for Duty	<input type="checkbox"/> Not Fit for Duty	<input type="checkbox"/> Permanently Not Fit for Duty
_____ <b>Board Appointed Physician (Printed)</b>	_____ <b>Signature</b>	_____ <b>Date</b>

#### RELEASE BY APPLICANT

1. I hereby authorize the Board appointed physician to release to, or discuss with the Medical Review Officer, any pertinent information in his / her possession regarding any physical or medical condition that may be required for review by the Medical Review Officer prior to determining whether the Board should issue a pilot license.
2. I understand that this authorization is voluntary. I also understand that failure to provide authorization could affect the Board's ability to make a timely determination as to whether the Board will issue me a pilot license.
3. I have read and understand the following statement about my rights.
  - a. I may revoke this authorization at any time prior to its expiration date by notifying the Board appointed physician and the Medical Review Officer in writing, but the revocation will not have any effect on any actions taken before they received the notification.
  - b. Upon request, I may see or copy the information described in this release.

\_\_\_\_\_  
**Applicant's Name (Printed)**

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**

#### MEDICAL REVIEW OFFICER

\_\_\_\_\_  
I am familiar with the duties of a pilot and a pilot trainee and with the standards prescribed by

the Board of Pilot Commissioners.

I have reviewed the information submitted by the above named individual and any supplemental information from the Board appointed physician to determine his or her suitability to perform the duties of a pilot or a pilot trainee in accordance with the standards prescribed by the Board. On the basis of this review and related materials, and an evaluation of the effects of the prescription medications named on the list submitted by the examinee, I have found this individual

<input type="checkbox"/> Fit for Duty	<input type="checkbox"/> Not Fit for Duty	<input type="checkbox"/> Permanently Not Fit for Duty
<input type="checkbox"/> I concur with the Fitness for Duty Statement by the Board physician		<input type="checkbox"/> I do not concur with the Fitness for Duty Statement by the Board physician
_____	_____	_____
<b>Medical Review Officer (Printed)</b>	<b>Signature</b>	<b>Date</b>

**APPENDIX D.7. – Acknowledgement Form – Review Completed – Fitness for Duty**

Printed on BOPC Letterhead

**Acknowledgement Form – Review of Fitness for Duty**

**TO: Executive Director, Board of Pilot Commissioners**

**RE: CAPTAIN \_\_\_\_\_** (Name of pilot or pilot trainee)

You have requested a review of your fitness for duty status. The material which you submitted has been reviewed by the Board appointed physician and the Medical Review Officer. The Board of Pilot Commissioners relies on their determination of your fitness for duty. It has been determined that fitness for duty status is as follows:

- Fit for Duty
- Not Fit for Duty
- Permanently Not Fit for Duty

Should you have any questions about this determination, please contact me directly.

Name of Executor Director, BOPC (Printed)	Signature	Date
--	-----------	------

**Cc: Port Agent**

## APPENDIX E. Curriculum Vitae

### University of California San Francisco CURRICULUM VITAE

Prepared: March 2011

**Name:** Robert E. Kosnik

**Position:** Associate Clinical Professor, Step Three  
Division of Occupational and Environmental Medicine  
Department of Medicine, School of Medicine

**Address:** 1600 Divisadero Street, Box 1661  
UCSF – Occupational Health Service  
San Francisco, CA 94115

Voice: (415) 885-7891  
Fax: (415) 771-4472  
Email: [robert.kosnik@ucsf.edu](mailto:robert.kosnik@ucsf.edu)  
<http://www.ucsf.edu/homepage>

#### EDUCATION:

1969 – 1972 Bachelor of Science, University of Toronto, Toronto  
1972 – 1976 Doctor of Medicine, Faculty of Medicine, University of Toronto, Toronto  
1976 – 1977 Intern, Toronto East General Hospital, University of Toronto, Toronto  
1978 – 1979 Diploma of Industrial Health, School of Public Health, Faculty of Medicine, University of Toronto, Toronto

#### LICENSES, CERTIFICATION (Original Year to Current Year):

1977 Certificate of Registration, Medical Council of Canada  
1977 Medical Licensure, Ontario, Canada  
1981 Diploma, National Board of Examiners of the United States of America  
1983 Certificate, Canadian Board of Occupational and Environmental Medicine  
1986 American Board of Preventive Medicine (Occupational Medicine)  
1988 Royal College of Physicians and Surgeons of Canada (Occupational Medicine)  
2006 Medical Licensure, California, United States of America  
2008 United States Department of Justice, Drug Enforcement Administration Certification

#### EMPLOYMENT:

##### Principal positions held (Part-Time):

1977 – 1981 General Practice, Toronto  
1977 – 1998 Emergency Room Physician, Toronto East General Hospital, Toronto

1979 – 1983 Assistant Professor, Occupational and Environmental Health Unit, Division of Community Medicine, Faculty of Medicine, University of Toronto, Toronto  
1981 – 1998 Medical Consultant, Royal Bank of Canada, Toronto  
1982 – 2005 Medical Consultant, Labatt's Metro Brewery, Toronto  
1986 – Current Director of Occupational Health Services, Xerox Canada Inc, Toronto  
1988 – 1996 Corporate Medical Director, Consumers Packaging Group, Toronto  
1996 – 2005 Medical Director, Employees' Health Services, St. Michael's Hospital, Toronto  
1997 – 2005 Medical Director and Management Team Member for Medisys on the contract with Canada Post, Toronto  
2006 – 2007 UCSF Occupational and Environmental Health Multidisciplinary Clinic, Medical Director  
2006 – 2007 UCSF Medical Center – Employee and Occupational Health Services, Medical Director  
2006 – Current UCSF Medical Center, Needlestick Exposure Hotline, Medical Director  
2007 – Current UCSF Occupational Health Services, Medical Director

**Academic Appointments (Part-time and Full-time):**

1979 – 1983 Assistant Professor, Occupational and Environmental Health Unit, Division of Community Medicine, Faculty of Medicine, University of Toronto, Toronto  
1996 – Current Lecturer, Department of Medicine, Division of Occupational Medicine, University of Toronto, Toronto  
2006 – Current UCSF Associate Clinical Professor (Step Three), Division of Occupational and Environmental Medicine, Department of Medicine, School of Medicine (Full Time)

**Other positions held Concurrently (Part-Time):**

1979 – 1985 Medical Consultant, Transamerica Life Insurance Company, Toronto  
1979 – 1986 Medical Director, Atomic Energy of Canada Ltd, Candu Operations, Sheridan Park Research Community, Mississauga  
1980 – 1981 Associate Physician, Union Carbide Canada, Toronto  
1981 – Current Medical Consultant, Occupational and Environmental Health Clinic, St. Michael's Hospital, Toronto  
1983 – 1985 Medical Consultant, Lincoln National Life Reinsurance, Toronto  
1985 – 1988 Medical Consultant, Loblaw's Companies Ltd, Mississauga  
1985 – 1992 Medical Consultant, Weston Bakeries Ltd, Toronto  
1986 – 1988 Medical Consultant, Wm. Neilson's Dairies Ltd, Halton Hills  
1992 – 1999 Medical Consultant, WinPak Portion Packaging, Toronto  
1996 – 1998 Medical Consultant, Medisys Executive Health Clinic, Toronto  
1996 – 1998 Corporate Medical Director, Avenor Inc., Montreal  
1997 – 1999 Corporate Medical Director, Bell Canada, Montreal  
1997 – 2002 Medical Consultant, Rio Algom, Toronto  
2002 – 2005 Consulting Corporate Medical Director, Canada Post, Ottawa

**HONORS AND AWARDS:**

1969 – 1972 St Michael's College, Tuition Scholarship, University of Toronto  
1972 Gold Medal in Science, St. Michael's College, University of Toronto  
1979 Cunningham Prize (achievement in the program),



2004 Occupational and Environmental Unit, Faculty of Medicine, University of Toronto  
Ontario Counsel of Teaching Hospitals – Outstanding Contribution in Meeting the Challenge of SARS

2004 Meritorious Service Award – Outstanding Contribution to Occupational Medicine in Canada, Occupational and Environmental Medicine Association of Canada

**KEY WORDS / AREAS OF INTEREST:**

Occupational and Environmental Health, Health Effects of Physical Agents, Infection Control in Health Care Workers, Research Workers, Musculoskeletal Disorders in the Workplace, Occupational Work Relatedness, Control Strategies for Workplace Injuries, Chronic Disorders in the Workplace, Accessibility of the Workplace, Health Surveillance of Bar Pilots, Disability Issues, Emergency Preparedness and Bioterrorism, Management of Occupational Health Programs and Systems

**PROFESSIONAL ACTIVITIES:**

**PROFESSIONAL ORGANIZATIONS:**

**Memberships:**

Canadian Board of Occupational Medicine  
Canadian Medical Association  
College of Physicians and Surgeons of Ontario  
Medico-Legal Society of Toronto  
Occupational and Environmental Medical Association of Canada  
Ontario Medical Association  
Royal College of Physicians and Surgeons of Canada

**Service to Professional Organizations:**

1979 – 1986 Toronto East General Hospital; Member, Tissue and Audit Committee  
1982 – 1994 Ontario Medical Association; Executive Committee, Section on Occupational Health  
1984 – 1990 Academy of Medicine; Chair, Section of Occupational Medicine  
1984 – 1986 Academy of Medicine; Member of Council  
1988 – 1991 Ontario Medical Association; Member, Committee on Rehabilitation  
1989 – 1996 Occupational and Environmental Medical Association of Canada; Executive  
1989 – 2004 Occupational and Environmental Medical Association of Canada; Board of Directors  
1990 – 1992 Ontario Medical Association; Chair Section on Occupational Health,  
1991 – 1992 Royal College of Physicians and Surgeons of Canada; Corresponding Member, Specialty Committee in Occupational Medicine  
1992 – 1998 Royal College of Physicians and Surgeons of Canada; Member, Specialty Committee of Occupational Medicine  
1992 – 1994 Occupational and Environmental Medical Association of Canada; President  
1996 – 2006 Occupational and Environmental Medical Association of Canada; Chair, Committee on Board Development  
2006 – 2011 Association of Occupational and Environmental Clinics, Board of Directors, Member  
2007 – 2008 Association of Occupational and Environmental Clinics, Board of Directors, Secretary  
2008 – 2009 Association of Occupational and Environmental Clinics, Board of Directors, President-Elect

2009 – 2010 Association of Occupational and Environmental Clinics, Board of Directors, President

**Service to Professional Accrediting Organizations:**

1988 – 2002 Canadian Board of Occupational Medicine; Member, Examination Committee  
1996 – 2004 Royal College of Physicians and Surgeons of Canada; Member, Examination Committee for Occupational Medicine  
1999 – 2002 Royal College of Physicians and Surgeons of Canada; Chair, Examination Committee for Occupational Medicine

**Service in Continuing Medical Education:**

1987 Occupational Medical Association of Canada; Annual Meeting Organising Committee  
1989 Short Course on Occupational Medicine, Occupational and Environmental Health Unit, University of Toronto, Member Planning Committee,  
1992 Occupational Medical Association of Canada; Chair, Annual Meeting Organising Committee  
1995 Occupational and Environmental Medical Association of Canada, Co-Chair, Annual Meeting Organising Committee  
1999 Occupational and Environmental Medical Association of Canada; Member, Scientific Organising Committee  
2006 Co-Chair, UCSF Course on Occupational and Environmental Medicine Including 12-hour Module on Pain Management  
2008 Co-Chair, UCSF Course on Occupational and Environmental Respiratory Disease and Occupational and Environmental Medicine Update  
2009 Co-Chair, UCSF Course on Health and Safety in Transportation Workers: Air, Sea, and Land and Occupational and Environmental Medicine Update  
2011 Chair, UCSF Course on Health and Safety in Construction and Occupational and Environmental Medicine Updates

**INVITED PRESENTATIONS:**

**Regional and Other Invited Presentations: (1999 – Current)**

1999 Xerox International Environmental, Health and Safety Seminar, Rochester; (“Supporting Recovery: An Active Approach for Return to Work, Part 1”)  
2000 Xerox International Environmental, Health and Safety Seminar, Rochester; (“Supporting Recovery: An Active Approach for Return to Work, Part 2”)  
2000 Cunningham Society Oration, Calgary; (“Exploring the Golden Threads of Occupational Medicine from 2000 back to 1900”)  
2002 Federated Press Meeting on Managing Disability, Toronto; (“Is the Absenteeism Problem due to Illness or Poor Management?”)  
2003 Canada Post Corporation, Ottawa, (“Stress Conditions: Understanding the Issues for Return to Work”)  
2006 Pandemic Planning Strategies, Alameda County; (“Lessons Learned from SARS: How Toronto Responded”)  
2006 UCSF Occupational Medicine Update, (“Preventing Occupational Pain: Workplace Injury Control Strategies”)

- 2007 UC Risk Management Summit, Pandemic Planning Workshop, (“Avian Influenza”)
- 2007 UC Risk Management Summit, (“The SARS Virus: Our First Response”)
- 2010 West Coast Regional Pilotage Regulators Meeting, (“UCSF Pilot Fitness Study”)

**Peer Reviewed Open Invitations – Presentations (2007 – Current)**

- 2007 International Congress on Occupational Health, 7<sup>th</sup> International Conference on the Health of Healthcare Workers, Vancouver; (Presentation: “Violence Against Home Health and Hospice Workers”)
- 2007 International Congress on Occupational Health, 7<sup>th</sup> International Conference on the Health of Healthcare Workers, Vancouver; (Poster: “SARS: The Occupational Health Challenges”)

**UNIVERSITY AND PUBLIC SERVICE**

**UNIVERSITY SERVICE:**

**University of Toronto Medical Center:**

- 1998 – 2005 St. Michael’s Hospital; Chair, Infection Control Committee
- 1998 – 2005 St. Michael’s Hospital; Quality and Utilization Review Committee
- 2001 – 2005 St. Michael’s Hospital; Chair, Research Biosafety Committee
- 2002 – 2005 St. Michael’s Hospital; Operational Review and New Technology Committee
- 2003 – 2005 St. Michael’s Hospital; Bioterrorism Committee
- 2003 – 2005 St. Michael’s Hospital; Pandemic Preparedness Committee

**University of California System wide:**

- 2006 – Current UC Employee Health Medical Directors Committee, UCSF Representative
- 2007 – Current UC Pandemic Preparedness and Business Continuity Committee, Professional Representative

**UCSF Medical Center:**

- 2006 – Current UCSF Medical Center, Infection Control Committee
- 2006 – Current UCSF Medical Center, Influenza Advisory Committee
- 2007 – Current UCSF Medical Center, Outbreak Exposure Technical Committee
- 2008 – Current UCSF Medical Center, Staff Safety MAT Committee
- 2011 – Current UCSF Medical Center, Emergency Management Committee

**University of California San Francisco**

- 2006 – 2007 UCSF Ad Hoc Committee on Health and Safety
- 2006 – 2009 UCSF Chancellor’s Advisory Committee on Disability Issues
- 2006 – Current UCSF Institutional Biosafety Committee
- 2006 – Current UCSF Chancellor’s Advisory Committee on Occupational Health Services
- 2007 – Current UCSF Wellness Initiative Committee
- 2009 – Current UCSF Emergency Operations Centre, Health and Medical Branch, Director

**UCSF Department of Medicine Service**

- 2006 – Current Division of Occupational and Environmental Medicine, Resident Advisory Committee
- 2010 – Current Residency Program, Occupational and Environmental Medicine, Case Conference Coordinator

**PUBLIC SERVICE:**

- 1988 – 1993 Saint Elizabeth Visiting Nurses Association, Toronto; Board of Directors
- 2007 – 2009 Ontario Ministry of Social Services, Employment Accessible Standards Development Committee, Chair
- 2008 – Current Canadians Standards Association, Guidelines for Design and Construction of Canadian Health Care Facilities, Member of the Technical Sub Committee

**INTERNATIONAL PUBLIC SERVICE:**

- 2001 International Labor Organization, Tripartite Meeting of Experts on the Management of Disability at the Workplace, Geneva, National Expert representing Canada

**Summary of Service Activities:**

The service activities support my ongoing interest and role in the development of policies, programs and procedures to reduce the impact of chemical, biological and physical agents on the workers of the University of California in general and UCSF in particular. I serve as a member of these various committees. A fundamental role is to bring attention to the worker health perspective in the many forums about the different exposures in the UC Medical Center, the UC research community, and the UC campus. This role includes a perspective on emergency preparedness, disability issues, bioterrorism and pandemic influenza planning. The many audiences include UCSF staff and students as well as the larger medical community. It is expanded to a national perspective as a member of the Board of the American Occupational and Environmental Health Clinics and in Canada to leadership roles in developing provincial and national standards.

**TEACHING AND MENTORING:**

**UNIVERSITY OF TORONTO, TEACHING PRESENTATIONS (1999-Current)**

- 1999 Second Year Medical Students, University of Toronto, “Health Hazards in Hospitals”
- 2000 Second Year Medical Students, University of Toronto, “Health Hazards in Hospitals”
- 2001 Second Year Medical Students, University of Toronto, “Health Hazards in Hospitals”
- 2001 Occupational Resident Training Seminar, University of Toronto, “Infectious Disease Surveillance Programs in Hospitals”
- 2004 Occupational Resident Training Seminar, University of Toronto, “The Disability Process: Medical Management or Business Process”

**UNIVERSITY OF CALIFORNIA**

- 2004 Course on Emerging Infectious Diseases: What Occupational Health and Safety Professionals Need to Know, Oakland; University of California, “Bioterrorism: Implementing a Plan for Worker Safety”
- 2006 Session on Clinical Occupational Diseases
- 2006 Residency Orientation, “Employee Health Services and the Needlestick Exposure Hotline”.
- 2007 Residency Orientation, “Employee Health Services and the Needlestick Exposure Hotline”.
- 2008 Session on Clinical Occupational Diseases
- 2008 Residency Orientation, “Employee Health Services and the Needlestick Exposure Hotline”.
- 2008 Course on Emerging Infectious Diseases: “Planning for Influenza: What Occupational Health and Safety Professionals Need to Know”, Oakland; University of California.
- 2009 Residency Orientation, “Employee Health Services and the Needlestick Exposure Hotline”.

Pilot Fitness Study for the Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun – by Dr. Robert Kosnik, University of California, San Francisco

2010 Residency Orientation, “Employee Health Services and the Needlestick Exposure Hotline”.

**INFORMAL TEACHING:**

2006 – 2011 Attending Rounds in Occupational Medicine  
2006 – 2011 Attending Occupational Medicine Case Conference

**RESEARCH AND CREATIVE ACTIVITES**

**CURRENT RESEARCH ACTIVITIES**

National Institute of Occupational Safety and Health – Public Health Institute: “Violence against Home Health and Hospice Workers”, (Principal Investigator 5%; 9/1/06 – 11/30/10).

Board of Pilot Commissioners, San Francisco: “Medical Surveillance Program for the Board of Pilot Commissioners”, (10/1/09 – 9/30/11)

**PEER REVIEWED PUBLICATIONS:**

1. Holness DL; House RA; Corbet K; Kosnik R, (1997) Characteristics of Occupational Medicine Practitioners and Practice in Canada, *Journal Occupational and Environmental Medicine* 39(9):895-900.

**NON-PEER REVIEWED PUBLICATIONS AND OTHER CREATIVE ACTIVITIES:**

1. Kosnik, R. (1996). Respirators: Behind the Mask, *Occupational Health and Safety Canada*, September/October.

**Organizational Reviews**

1. Kosnik, R. (1997). Organizational Review, Corporate Occupational Health Service, Workers’ Compensation Board of Ontario  
2. Kosnik, R. (2000). Organizational Review, Occupational Health Services, The Toronto Star Newspaper

**Consensus Reviewed Documents**

1. Association of Occupational and Environmental Clinics, “Revised Protocol: Criteria for Designating Substances as Occupational Asthmagens on the AOEC List of Exposure Codes”, Member of Review Committee (2006-2011)