



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

**REPORT TO THE NATIONAL TRANSPORTATION SAFETY BOARD CONCERNING
SAFETY RECOMMENDATION M-11-19, ISSUED FOLLOWING THE INCIDENT
INVOLVING THE TANKSHIP EAGLE OTOME**

Christopher A. Hart, Chairman
National Transportation Safety Board
490 L'Enfant Plaza, SW
Washington, DC 20594

Re: National Transportation Safety Board Safety Recommendation M-11-19

Dear Chairman Hart:

This report is issued by the Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun (BOPC or Board) in response to a recommendation by the National Transportation Safety Board (NTSB).

On November 4, 2011, as a result of the investigation into the January 23, 2010, incident involving the tankship EAGLE OTOME, the NTSB issued Safety Recommendations to the governors of twenty four states and territories in which state and local pilots operate, detailing three recommendations concerned with preventing similar incidents from occurring.

On behalf of Governor Brown, Traci Stevens, Acting Secretary of California's Business, Transportation, and Housing Agency, responded to the three recommendations in some detail on January 12, 2012, closing with, "While it is our assessment that existing statutory, regulatory, and BOPC oversight of the San Francisco Bar Pilots appears to satisfy concerns reflected in the NTSB Safety Recommendation, we will refer the NTSB letter to the BOPC for further review and consideration in light of its established expertise in bar pilot practices."

In consideration of the response from Acting Secretary Stevens on behalf of the Governor, Chairman Hersman responded by closing all recommendations but one, M-11-19, which reads "*Ensure that local pilot oversight organizations effectively monitor and, through their rules and regulations, oversee the practices of their pilots to promote and ensure the highest level of safety.*"

In her decision to not close this recommendation, Chairman Hersman interpreted California's response to mean that, following review, a report would be issued by the BOPC, and stated that "Although the NTSB is aware that the State of California has comprehensive pilot statutes and regulations, because the BOPC is conducting a review and will be providing confirmation that the statutes and regulations adequately address this issue, Safety Recommendation M-11-19 is classified 'Open – Acceptable Response' pending our receipt and review of the BOPC's report."

On July 19, 2012, the NTSB classified the response from Acting Secretary Stevens as "Open – Acceptable Response" pending completion of the BOPC review of California's statutes and regulations to verify whether they complied with the NTSB recommendation.

The following report is in response to NTSB's Safety Recommendation M-11-19 and details the comprehensive body of statutes and regulations that are in place to monitor and oversee the practices of pilots within the Board's jurisdiction, thus promoting and ensuring the highest level of safety. In areas that the state and the Board have identified needing potential improvement, we have detailed those efforts.

In summary, to monitor and oversee the practices of the pilots it licenses to promote and ensure safety, the Board does the following:

- The Board employs rigorous standards for the testing and selection of trainees.
- The Board requires that trainees complete a one-to-three-year training program that includes a large number of shiphandling assignments involving various vessel types under a variety of conditions under the supervision of a licensed pilot.
- The Board will deny an application for annual license renewal if the pilot applying for license renewal has not actively piloted vessels for any consecutive period of one year.
- The Board requires pilots to complete periodic continuing education courses.
- The Board requires that pilots and trainees submit to an annual medical assessment and that pilots be evaluated for fitness at more frequent intervals at the instance of either the pilot, physician or the Board, as prescribed in regulation.
- The Board requires toxicological tests at least annually that test for prescription drugs in addition to the dangerous drugs that are included in federal toxicological tests.
- The Board's Incident Review Committee investigates and makes recommendation to the Board concerning each incident that involves a possible cause for discipline against a pilot's license, from suspension or revocation down to lesser measures, such as letters of reprimand or special training.
- By direction from the Legislature, the Board is undertaking a study of pilot fatigue, which will lead to regulations governing hours of work and rest for pilots.
- In response to the NTSB report on the allision of the OVERSEAS REYMAR with the Bay Bridge, the Board has undertaken developing a process to evaluate pilots while underway and additional training in navigating in low-visibility in restricted waters.
- By direction of the Legislature, the Board has instituted a "pull-notice" system whereby it is advised by the state Department of Motor Vehicles of violations by pilots of traffic laws, including driving under the influence.

LEGISLATIVE INTENT TO PROVIDE STATE OVERSIGHT OF PILOTS TO ENSURE SAFETY

The California Legislature has made the following declarations concerning pilotage on waters within the Board's jurisdiction:

[I]t is the policy of the state to ensure the safety of persons, vessels, and property using Monterey Bay and the Bays of San Francisco, San Pablo, and Suisun, and the tributaries thereof, and to avoid damage to those waters and surrounding ecosystems as a result of vessel collision or damage, by providing competent,

efficient, and regulated pilotage for vessels required by this division to secure pilotage services.¹

The need to ensure safe and pollution-free waterborne commerce requires that pilotage services be employed in the confined, crowded, and environmentally sensitive waters of those bays.²

A program of pilot regulation and licensing is necessary in order to ascertain and guarantee the qualifications, fitness, and reliability of qualified personnel who can provide safe pilotage of vessels entering and using Monterey Bay and the Bays of San Francisco, San Pablo, and Suisun.

Following the EAGLE OTOME report, the Legislature added specific authority for Board oversight of pilot fatigue. In California Senate Bill 1408, passed into law in 2012, the Legislature found and declared that, “the enhancement of navigational safety is of the utmost concern in state pilotage,” and, “in order to ensure and promote the highest level of safety in pilotage, the [B]oard is empowered to effectively monitor and oversee the practices of pilots and prevent fatigue resulting from extended hours of service, insufficient rest within a 24-hour period, and disruption of circadian rhythms.”

OVERSIGHT AUTHORITY GIVEN TO A SINGLE-PURPOSE STATE BOARD

As a basis for establishing state oversight, the Legislature acknowledged that the federal government provides minimum standards that ensure port and waterway safety while encouraging state control over pilot qualifications and licensing.³ In recognizing the role of the BOPC, the Legislature found that bar pilotage on the Bays of San Francisco, San Pablo, and Suisun has continuously been regulated by a single-purpose state board since 1850, and that regulation and licensing should be continued.⁴

Pilots licensed by the BOPC have been given exclusive authority (with few exceptions) to navigate vessels from the high seas to ports within the bay and from those ports to the high seas,⁵ and the Legislature set minimum standards for obtaining and retaining such a license.

It is primarily through this licensing regime, established and guided by statutes and regulations, that the Board monitors and provides oversight of pilots in its jurisdiction and is effective in ensuring the highest level of safety.

¹ Harbors and Navigation Code §1100.

² Harbors and Navigation Code §1101 (e) and (f).

³ Harbors and Navigation Code §1101 (d).

⁴ Harbors and Navigation Code §1101 (g).

⁵ Harbors and Navigation Code §§1125 and 1126.

STATE PILOT LICENSING AS A TOOL TO ENSURING SAFETY

Through the licensing process the Board promotes the highest levels of safety. The Legislature contemplated that state licensing would establish standards equal to or exceeding federal standards.⁶ It also gave authority to the Board to, “determine the qualifications for obtaining a license as a state pilot, determine who shall have the license, and issue the license.”⁷

BOARD HAS EXCLUSIVE AUTHORITY TO GRANT LICENSES TO PILOT ON THE BAY

With few exceptions, pilots licensed by the Board have exclusive authority (to the extent not provided otherwise by federal law) to pilot vessels from the high seas to Monterey Bay and the Bays of San Francisco, San Pablo, and Suisun and the ports thereof, and from those bays and ports to the high seas.⁸

COMPULSORY PILOTAGE IS KEY TO ENSURING PROMOTION OF SAFETY

The Harbors and Navigation Code mandates what vessels shall be compelled to take a pilot: “A foreign vessel and a vessel bound between a foreign port and a port of Monterey Bay and the Bays of San Francisco, San Pablo, and Suisun, and a vessel sailing under a register between a port of Monterey Bay and the Bays of San Francisco, San Pablo, and Suisun and another port of the United States, shall use a pilot holding a license issued pursuant to this division, except as otherwise provided by law.”⁹

The process of providing qualified state pilots begins with the Board testing and selecting applicants for the Pilot Trainee Training Program, then overseeing the training of those selected for the program, issuing the initial license, issuing annual license renewals following medical assessment and compliance with mandatory training, and investigating misconduct that may result in the loss of a license. Soon, the Board hopes to add regulations governing the work and rest hours of the licensees.

TESTING AND SELECTION OF TRAINEES

The California Legislature granted the Board the authority to develop a Pilot Trainee Training Program. “The [B]oard shall adopt, by regulation, the qualifications, standards, and rating criteria for admission of pilot trainees to the training program. [T]he [B]oard shall administer and conduct the pilot trainee admission selection in accordance with the regulations for admission.”¹⁰

⁶ Harbors and Navigation Code §1171.5.

⁷ Harbors and Navigation Code §1171(a).

⁸ Harbors and Navigation Code §1125(a).

⁹ Harbors and Navigation Code §1127(d).

¹⁰ Harbors and Navigation Code §1171.5.

The regulatory journey developed by the Board for a potential pilot begins at the application and testing process to become a trainee.¹¹ The regulatory scheme ensures that a fair and objective process is in place to screen applicants for federal licenses, health, character, experience, situational awareness, communication skills, and the ability to make critical and correct decisions under pressure.

The process begins with an application. Those applicants who meet the minimum federal licensing and work experience requirements are allowed to participate in the testing process. The application criteria include a minimum United States Coast Guard license as master,¹² some experience in command¹³ of a vessel, and regulations to ensure that that command experience is not stale.¹⁴ The work experience beyond the minimums for being allowed to test yield experience points that are later factored in the final scoring.

Once the Pilot Trainee Training Program applications have been vetted for eligibility, those applicants meeting the minimum qualifications are allowed to take a multiple-choice exam that tests a knowledge base directly related to piloting and shiphandling.¹⁵ This exam is developed by subject matter experts and administered by the Board in conjunction with psychometricians who help to ensure that the test material is closely related to the findings of a job analysis of piloting tasks. An applicant who achieves a passing score on the written exam is allowed to proceed further in the selection process.

The next step in the Pilot Trainee Training Program selection process is participation in a bridge simulator exercise that tests skills required for ship navigation in pilotage waters. These include the applicant's ability to assimilate and assess a variety of information in a bridge environment, to plan and execute timely, appropriate responses in both routine and emergency situations, and to communicate effectively both with those on the bridge and those outside the ship.¹⁶ Seven skill sets have been identified as relevant and are evaluated during the bridge simulation:¹⁷

- Situational awareness;
- Appropriate response;
- Ability to respond correctly under stress;
- Communication and bridge presence;
- Fundamental shiphandling;
- Bridge resource management; and,
- Rules of the road.

¹¹Harbors and Navigation Code §1171, "(a) The board shall have the sole authority to determine the qualifications for obtaining a license as a pilot pursuant to this division, determine who shall have the license, and issue the license."

¹² 7 California (Cal) Code Regs., §213 (e)(1).

¹³ 7 Cal. Code Regs., §213 (e).

¹⁴ 7 Cal. Code Regs., §213 (f).

¹⁵ 7 Cal. Code Regs., §213 (h).

¹⁶ 7 Cal. Code Regs., §213 (i).

¹⁷ Ibid.

An applicant must achieve a passing score on the bridge simulator exercise to be qualified to appear on the program eligibility list. Final eligibility list ranking for entry into the training program is based on an applicant's combined scores inclusive of the applicant's experience points, written examination points and simulator exercise points, with each category given equal weight¹⁸.

Pilot Trainee Training Program participants are drawn from the eligibility list as needed to fill openings in the training program, with the Board determining the number of trainees to be added to the training program, as recommended by the Pilot Power Committee of the Board, and after a review of the factors required by §237 of the Board's regulations. The objective of that regulation is "to ensure the availability of an adequate number of qualified, rested pilots to provide timely pilotage services." The factors to be considered under this regulation include:

- (1) Total number of vessel moves;
- (2) Total number of pilots assigned to move vessels;
- (3) Number of pilots assigned to move vessels each day;
- (4) Number of bar crossings;
- (5) Number of bay moves;
- (6) Number of river moves;
- (7) Average draft of piloted vessels;
- (8) Average gross registered tonnage of piloted vessels;
- (9) Number of pilots reported sick or injured and number of days each was unable to perform piloting duties;
- (10) Number of times a pilot resumed duties with less than 12 hours off duty, the contributing circumstances, and the actual hours off duty between assignments;
- (11) Number of pilot days during which pilots were engaged in Board-mandated training; and
- (12) Number of pilot days during which pilots were engaged in administrative duties authorized by the Port Agent, with a description of those duties.

PILOT TRAINEE TRAINING PROGRAM

Once the decision has been made to add a new trainee to the training program, Board staff must determine that the applicant ranking highest on the list has experience that is still recent,¹⁹ still currently holds the required federal master's license,²⁰ and is of good mental and physical health.²¹ The eligibility list applicant is also subject to having his or her driving record inspected through the Board's participation in a "pull-notice system" wherein the Board receives reports showing the driving record of each trainee applicant, as recorded by the California Department of Motor Vehicles, showing convictions, failures to appear, license suspensions or revocations,

¹⁸ 7 Cal. Code Regs., §213 (j).

¹⁹ 7 Cal. Code Regs., §213(j)(3).

²⁰ 7 Cal. Code Regs., §213(e)(3)(B).

²¹ Harbors and Navigation Code §1176.6(b) and 7 Cal. Code Regs., §213(e)(2) and §217.5(b)(1).

or any other action taken against the California driving privilege or certificate.²² The Board gives heightened scrutiny to certain convictions, such as driving under the influence: “The [B]oard may refuse to admit an applicant into the pilot training program or may dismiss a pilot trainee from the pilot training program if that person has been convicted of a violation of Section 23152 or 23153 of the Vehicle Code or Section 655. A conviction after a plea of nolo contendere is a conviction within the meaning of this section.”²³

The Legislature has authorized the Board to adopt, by regulation, training standards and a training program for pilot trainees.²⁴ The Legislature further authorized the Board to “establish a pilot evaluation committee consisting of five active pilots who each have at least 10 years' experience as a pilot on the Bays of San Francisco, San Pablo, and Suisun.” It further empowered this committee to “conduct and supervise the pilot trainee training program pursuant to the direction and regulation of the [B]oard and consistent with the intent of this Division.”²⁵

In order to be considered for licensing as a pilot, a pilot trainee must successfully complete the training program conducted and supervised by the Pilot Evaluation Committee of the Board. The Pilot Evaluation Committee plays a key role in tracking the progress of each trainee as he or she progresses through the program. Board regulation §214(c) outlines the program:

The training program for each pilot trainee shall consist of a minimum of one year and a maximum of three years of training. The program may include classroom training and training provided by outside contractors and shall include assignments to ride as an observer on tugs engaged in ship assist work. In addition, the program shall include a minimum of 300 trips while under the direct supervision of a pilot or inland pilot, riding as observer or maneuvering vessels of various sizes and classes on the Bays of San Francisco, San Pablo and Suisun. A minimum of 50 trips shall be with members of the Pilot Evaluation Committee and at least 10 of those trips shall be within the last three months before the committee recommendation that the trainee be issued a certificate of completion. Pilot trainee assignments shall be under the general supervision of the Pilot Evaluation Committee and may be made by the Port Agent, his or her designee, or a member of the Pilot Evaluation Committee.

To guide the Pilot Evaluation Committee in its training, the Board specified the following topics as key training elements²⁶:

- 1) Area geography;
- 2) Port and waterway configuration;
- 3) Hydrography (channel depths and widths, bottom configuration);
- 4) Hydrology and hydraulics;

²² Harbors and Navigation Code §1178.5.

²³ Harbors and Navigation Code §1178.5(j).

²⁴ Harbors and Navigation Code §1171.5.

²⁵ Harbors and Navigation Code §1171.5(e) and (f).

²⁶ 7 Cal. Code Regs., §214(b).

- 5) Tides and currents;
- 6) Winds and weather;
- 7) Aids to navigation (interaction with and information they convey);
- 8) Bottom composition;
- 9) Marine facilities;
- 10) Other traffic and operations (including commercial fishing vessels, recreational boating, dredging and marine regattas);
- 11) Air draft (for bridges and overhead wires);
- 12) Communications;
- 13) Applicable laws, rules and regulations;
- 14) Marine traffic regulation (including Vessel Traffic Service);
- 15) Local and seasonal traffic patterns and densities;
- 16) Ship maneuvering behavior for all vessel types to be piloted including hydrodynamic interactions with respect to other vessels, facilities and channel bathymetry;
- 17) Advantages, limitations and effect on shiphandling of various types of main propulsion and auxiliary maneuvering machinery;
- 18) Shiphandling for piloting, anchoring, docking and undocking, maneuvering with and without the aid of tugs and emergency situations;
- 19) Tug control (for maneuvering assistance);
- 20) Use of ground tackle to aid maneuvering;
- 21) Navigation systems (traditional and electronic);
- 22) Radar systems (manual and automated); and,
- 23) Marine and environmental safety requirements.

There are occasions where a trainee, for varying reasons, is not demonstrating the skill set required to be successful as a pilot. The Board has provided for, in regulation, mechanisms that ensure only candidates with the necessary skill and character continue in the program. Candidates can be dismissed from the program in their first year of training without cause. After the first year, a trainee may be dismissed, suspended, or placed on probation if it has been determined that he or she has: violated the Harbors and Navigation Code or these regulations; failed to carry out the terms and conditions of the training program; willfully disobeyed an order of the Board, Pilot Evaluation Committee, the Port Agent or his designee, or a pilot supervising his training; committed an act of misconduct while on duty; or, failed a chemical test for dangerous drugs.

To complete the Pilot Trainee Training Program, a trainee must demonstrate to the Pilot Evaluation Committee that he or she is proficient in all of the following areas of knowledge:

- a) Local knowledge for the Bays of San Francisco, San Pablo and Suisun, including:
 1. Limits of all local pilotage areas;
 2. Names, positions and characteristics of all buoys, beacons, lights, markers, fog signals and other fixed aids to navigation;
 3. Names, locations and characteristics of all channels, shoals, headlands and points;

4. Names, locations, characteristics and vertical clearances of all bridges, cables and other overhead obstructions to navigation;
 5. Depths of water;
 6. Set, rate, rise and duration of tides, characteristics of tidal currents, and use of tide tables and real time tide data collection system;
 7. Courses and distances for each channel;
 8. Names, locations and characteristics of anchorages;
 9. Names, locations and waterside characteristics of all berths, terminals and docking facilities; and
 10. Systems of radio navigational warning broadcasts and the type of information likely to be included.
- b) A working knowledge of the fundamentals of shiphandling, including:
 1. Shiphandling in piloting waters;
 2. Anchoring;
 3. Docking and undocking;
 4. Appropriate use of tugs;
 5. Shiphandling in emergency situations; and
 6. Appropriate vessel speed control.
 - c) Bridge presence, including proper and timely handling of all shipboard communications using standard terminology;
 - d) Proper and timely handling of communications with other vessels, Vessel Traffic Service and other entities external to the vessel;
 - e) Situational awareness, contingency planning and the ability to keep the vessel on track;
 - f) Appropriate and timely use of bridge equipment, including shipboard navigation and collision-avoidance aids, and knowledge of their capabilities and limitations;
 - g) Appropriate response to vessel traffic;
 - h) Familiarity with maneuvering characteristics of all types of ships that routinely enter the pilotage grounds, including knowledge of capabilities and limitations of typical propulsion and steering systems on Board such vessels;
 - i) Understanding environmental factors affecting ship performance, such as wind, current, tide, channel configuration, water depth, bottom, bank and ship interaction including squat;
 - j) Familiarity with bridge team management, including master-pilot relationship;
 - k) Familiarity with all relevant international, national, state and local laws and regulations applicable to navigational safety, rules of the road, pollution prevention, and contingency planning;
 - l) Familiarity with lines of communication to local authorities, including the U.S. Coast Guard, U.S. Army Corps of Engineers, State Office of Oil Spill Prevention and Response and the Board.
 - m) Familiarity with personal techniques for survival at sea and personal safety, including emergency first aid, cardio-pulmonary resuscitation (CPR) and hypothermia remediation; and
 - n) Consistency of acceptable performance.

When the Pilot Evaluation Committee believes a trainee has completed the requisite training and possesses the requisite knowledge, it recommends to the Board that a certificate of completion be issued. The Board issues a certificate of completion to a pilot trainee only when it determines that the trainee has successfully completed the Pilot Trainee Training Program.²⁷

ADDITIONAL SAFEGUARDS: BOARD DISCRETION

Even when a trainee has successfully completed the training program, there exists an additional regulatory safeguard, which is Board discretion. Once a trainee has been issued a Certificate of Completion, the Board may issue a license, but is not bound to. Harbors and Navigation Code 1171.5(g) states: “The [B]oard shall not issue a pilot’s license to a person who does not receive a certificate of completion of the training program from the [B]oard, although the [B]board may refuse to issue a pilot license to a pilot trainee who has received this certificate.”

To further clarify, Section 214(a) of the regulations state:

The Board may rely upon, but shall not be bound by the recommendations of its Pilot Evaluation Committee in determining whether a trainee has successfully completed the training program or whether or when the trainee should be licensed as a pilot. The Board is not required to license an individual as a pilot at any time after issuance of the certificate of completion authorized by this subsection.” That section goes on to say, in the case where multiple trainees are vying for an open license, “If a license is issued, it shall be issued to the most qualified trainee who has successfully completed the training program. Order of completion of the program is not the determining factor.

ISSUANCE OF ORIGINAL PILOT LICENSE

The Legislature mandated that state licensing be for a term of 12 months²⁸ and that the applicant meet the following requirements²⁹:

- a) The person can meet the qualifications set by the Board, including age limitations, if any.
- b) The person is of good mental and physical health and good moral character.
- c) The person possesses the requisite skill and experience as a navigator and pilot, together with practical knowledge of the currents, tide, soundings, bearings, and distances of the several shoals, and the rocks, bars, points of landings, lights, and fog signals of, or pertaining to, the navigation of the pilot ground for which the person applies for a license to act as a pilot.
- d) The person can satisfy the Board that the person has means available for Boarding and leaving vessels which the person may be called upon to pilot.

²⁷ 7 Cal. Code Regs., §214(a).

²⁸ Harbors and Navigation Code §1172.

²⁹ Harbors and Navigation Code §1175.

RENEWAL OF PILOT LICENSES

After an initial license has been issued, the Board continues to effectively monitor through annual licensing of each pilot.³⁰ Each licensee seeking to renew his or her license must provide proof that he possesses a valid federal license with endorsements for first class pilotage on the high seas and on all waters of the Bays of San Francisco, San Pablo, and Suisun, including the San Joaquin River and the Sacramento deep water ship channel. Each licensee must actively pilot vessels under the authority of their license during the preceeding year, successfully complete a Board-proscribed medical assessment, and have participated in the Board's continuing education program within the last five years, which includes both manned model training and a combination course training^{31, 32}

PILOT CONTINUING EDUCATION

To promote the highest level of safety, the Legislature mandated that the Board adopt continuing education standards and a continuing education program: "[T]he [B]oard shall specify the type, nature, duration, and frequency of the continuing education required and the identity of the pilots who are required to undergo continuing education in the next 12-month period."³³ Pursuant to Harbors and Navigation Code Section 1182, the license of a pilot may be revoked or suspended if he or she fails to complete the continuing education required by this subdivision during the period specified.

In fulfilling the mandate to provide continuing education, the Board adopted a two-part training program. The first of those two parts is that each pilot must:

[A]ttend a manned scale model shiphandling course at least five days in length once every five years which provides realistic experience with models exhibiting maneuvering characteristics of major commercial vessel types that routinely transit the waters under the Board's jurisdiction and under harbor and approach conditions that replicate those that are found in the San Francisco Bay Area.³⁴

The second part of the continuing education program is that each pilot must attend a combination course at least five days in length completed at least once every five years and covering at least the following topics³⁵:

³⁰ Harbors and Navigation Code §1172, and Cal. Code Regs., §216(b),

³¹ Cal. Code Regs., §215.

³² Cal. Code Regs., §216.

³³ Harbors and Navigation Code §1171.5(c).

³⁴ 7 Cal. Code Regs., §215(b)(1).

³⁵ 7 Cal. Code Regs., §215(b)(2).

- a) Bridge resource management for pilots;
- b) Shiphandling on a computer driven ship's bridge simulator including emergency maneuvering and shiphandling in close quarters;
- c) Emergency medical response;
- d) Advanced electronic navigation systems; and,
- e) Regulatory review.

The Legislature also mandates that the Board shall also require that an evaluation of the pilot's performance be prepared by the institution selected by the Board to provide pilot continuing education, and the institution shall provide copies of the evaluation to the pilot and to the Board.

PILOT AND TRAINEE MEDICAL ASSESSMENT

Throughout the licensing program, it is required of pilots and pilot trainees that they be of good mental and physical health:³⁶ "The license of a pilot shall not be renewed unless he or she is found fit for duty...",³⁷ and "A pilot license shall be renewed only upon successful completion of the medical assessment required by this article."³⁸ Regulations provide: "A person applying for an original pilot license, applying for renewal of a pilot license, or holding a pilot license and who is directed to do so shall undergo a medical assessment to determine whether the person is mentally and physically fit to perform the duties of a pilot. A pilot license shall not be issued or renewed unless the person applying for that license or renewal successfully completes a medical assessment and is determined to be fit for duty as described in this article."³⁹

The Legislature tasked the Board with appointing "a physician or physicians who are qualified to determine the suitability of a person to perform his or her duties as a pilot or a pilot trainee," and stated that "An applicant for a pilot trainee position or for a pilot license, a pilot trainee, or a pilot seeking renewal of his or her license shall undergo a physical examination by a Board-appointed physician in accordance with standards prescribed by the Board." Within 30-60 days prior to the examination, the applicant or licensee shall submit to the physician conducting the physical examination a complete list of all prescribed medications being taken by or administered to the applicant or licensee. On the basis of both the examination and an evaluation of the effects of the prescription medications named on the submitted list, the physician shall designate to the Board whether or not the pilot or pilot trainee is fit to perform his or her duties as a pilot or a pilot trainee⁴⁰.

The Board, through regulation, has put in place one of the most advanced and comprehensive pilot medical assessment regimes that exists today. Following the NTSB findings in the COSCO BUSAN incident in which prescription drug use was found to be a factor, weaknesses in the pilot fitness determination (medical examination) processes were also identified. The Board

³⁶ 7 Cal. Code Regs., §1175(b).

³⁷ 7 Cal. Code Regs., §1176(d).

³⁸ 7 Cal. Code Regs., §216(f).

³⁹ 7 Cal. Code Regs., §217.5(a).

⁴⁰ 7 Cal. Code Regs., §1176.

contracted with University of California, San Francisco Medical Center Department of Occupational and Environmental Medicine to conduct a pilot fitness study and to prepare a report with recommendations concerning pilot medical assessments. Based on the recommendations in this report, the Board constructed a new pilot fitness regime by administrative regulations. The study, consideration of the recommendations, and drafting new regulations occurred over a three-year period, and the new regulations became effective April 1, 2014.

Key components of the Board-approved pilot fitness regulations⁴¹ are as follows:

- The regulations instituted, as a baseline, the newest U.S. Coast Guard medical guidelines as the medical standard for conducting the fitness for duty determinations of pilot and pilot trainees.
- The regulations identified minimum and desired qualifications for Board-appointed physicians, including ensuring that the physicians are personally familiar with the physical and cognitive challenges encountered by pilot licensees.
- The regulations establish requirements that exceed the U.S. Coast Guard medical guidelines, and require pilots and pilot trainees to undertake an agility test that simulates the physical demands of providing pilotage services, and to submit to toxicological tests that include testing for anti-depressants, anti-psychotics, anti-convulsants, barbiturates, amphetamines, benzodiazepines, sedative hypnotics, opiates and other pain medications.
- The regulations established a requirement that pilots and pilot trainees inform the Board of the onset of a new medical condition diagnosed by a physician or a current medical condition which impairs, to an appreciable degree, the ability of the individual to conduct his or her piloting duties.
- The regulations call for the appointment of a Medical Review Officer, whose duties will be reviewing fitness for duty determinations made by an examining physician, undertake annual peer review of the Board-appointed examining physicians, and provide advice to the Board on matters relating to pilot fitness.

PRESCRIPTION MEDICATION REPORTING

As noted above, investigations into the COSCO BUSAN revealed that prescription drug use was found to be a factor. In response to that finding, the Legislature added provisions in the Harbors and Navigation Code that call for prescription medication reporting within ten days whenever a new dosage of a medication or a new medication is prescribed, or when a pilot or pilot trainee suspends the use of a prescribed medication. The Board has the authority to terminate a pilot trainee or suspend or revoke the license of a pilot who fails to submit the prescription medication information.⁴²

⁴¹ Cal. Code Regs., §§217 through 217.45.

⁴² Harbors and Navigation Code §1176(e) and (f).

As a check on the above reporting, the toxicological testing incorporated into the recently implemented medical assessment regime would reveal any prescription medication in a pilot's system. This testing information can be referenced back to the disclosures and required reporting for verification.

The toxicological tests shall include the U.S. Department of Transportation tests for dangerous drugs and tests for the presence of anti-depressants, anti-psychotics, anti-convulsants, barbiturates, amphetamines, benzodiazepines, sedative hypnotics, and opiates contained in pain medication. Regulations governing the mandated toxicological tests include:

- 1) Completion of the toxicological test shall be required upon any of the events listed in subsections (a)(1) through (a)(4) of Section 217.10, upon direction by a Board-appointed physician under Section 217.25(a), and as directed by the Port Agent under subsections (g) or (h) of Section 218.
- 2) The toxicological test shall be conducted by a laboratory certified by the U.S. Department of Health and Human Services and selected by the Medical Review Officer.
- 3) The results of the toxicological test shall be reviewed by the examining physician as part of the review to make a determination of fitness for duty, and shall also be reviewed by the Medical Review Officer to make an independent determination of fitness for duty.

INCIDENT REVIEW

Critical to oversight of pilots is the incident review process. A pilot who, through ignorance, willfulness, or neglect, runs a vessel on shore, or otherwise renders a vessel liable for damage to persons, property or the marine environment during the performance of his or her duties is subject to discipline.⁴³ Pilots have a duty to report any such incidents to the Port Agent as soon as possible by the most rapid means available.⁴⁴

The Legislature established a process by which the Board reviews all reports of misconduct or navigational incidents involving pilots, or other matters for which a license issued by the Board may be revoked or suspended. This process begins with an Incident Review Committee, comprised of one public member of the Board and the Board's Executive Director.⁴⁵ This committee, with the assistance of one or more investigators, investigates incidents, pilot misconduct events, or other matters, and prepares a written report to the Board.⁴⁶

The written report developed by the Incident Review Committee relating to an incident, misconduct or other matter shall include, but need not be limited to:

⁴³ 7 Cal. Code Regs., §219(s).

⁴⁴ 7 Cal. Code Regs., §219(g).

⁴⁵ Harbors and Navigation Code §1180.3(a).

⁴⁶ Harbors and Navigation Code §1180.3(b).

- 1) The name of the vessel, time, date and location of the incident and identification of the pilot or inland pilot.
- 2) A description of the weather and sea conditions.
- 3) An illustration and description of the incident, misconduct or other matter under investigation.
- 4) An estimate of damages, if any.
- 5) The names of witnesses providing information relating to the incident, misconduct or other matter under investigation.
- 6) The nature and extent of any injuries.
- 7) A summary of the investigations of any prior incidents, misconduct or other matters involving the pilot or inland pilot, or, if investigating reports of suspected pilot ladder or pilot hoist safety violations, a summary of the investigations of any prior such violation reports involving the same vessel, vessel owner or operator.
- 8) Any relevant correspondence or records from the U.S. Coast Guard relating to the incident, misconduct or other matter under investigation.
- 9) A historical record of the actions taken in the investigation and any action taken in response to the investigation.
- 10) A summary of the factual background of the incident, misconduct or other matter under investigation.
- 11) The following information shall be included in the report ,but shall not be part of the public record:
 - a. The report from the pilot or inland pilot.
 - b. The confidential report of the investigator.

The Board, after full consideration of the evidence, and the report and recommendations by the Incident Review Committee relating to an incident, misconduct, or other matter pursuant to Harbors and Navigation Code Section 1180.3, shall take one or more of the following actions as outlined in Harbors and Navigatin Code Section 1180.6:

- 1) Serve an accusation for suspension or revocation of the pilot' s license on the pilot as provided in Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code, pursuant to Sections 1181 and 1182.
- 2) Enter into a written stipulation for corrective action to be performed by the pilot, which may include, but is not limited to, further training or supervised practice trips.
- 3) Provide counseling for the pilot relating to the duties and obligations of a pilot.
- 4) Issue a warning letter of reprimand to the pilot.
- 5) Take any other action, as provided in the guidelines adopted pursuant to subdivision (e).
- 6) Close the investigation without further action.
- 7) Remand the matter to the Incident Review Committee for further investigation.

Based on the mandate from the Legislature, the Board created regulations concerning the incident review process. The Board provided the Incident Review Committee factors to be considered when considering action resulting from incident review. These include:⁴⁷

- 1) The severity of the misconduct.
- 2) The danger to the public.
- 3) The number and frequency of prior incidents involving pilot error.
- 4) The nature and extent of any injuries, property damage or harm to the environment resulting from the incident.
- 5) The length of time the pilot or inland pilot has been licensed.
- 6) Prior corrective action imposed upon the pilot or inland pilot.
- 7) The degree to which the proposed action is likely to prevent recurrence.
- 8) The effect of the proposed action upon the pilot's or inland pilot's livelihood.
- 9) Corrective action already taken by the pilot or inland pilot relative to the incident under consideration.
- 10) The degree of negligence of the pilot or inland pilot.
- 11) Any other mitigating or aggravating circumstances deemed pertinent by the Incident Review Committee or the Board.

The Board also developed guidelines to assist in determining appropriate action for specific types of misconduct:

- 1) Under the influence of illegal drugs while on duty: Filing an accusation recommending revocation of license.
- 2) Under the influence of alcohol while on duty: First offense - filing an accusation recommending suspension of license (6-12 months), and mandatory participation in a rehabilitation program approved by the Substance Abuse and Mental Health Services Administration; Second offense - filing an accusation recommending revocation of license.
- 3) Refusal to provide specimens required for timely drug and alcohol testing upon being directed by the Port Agent pursuant to the requirements of Section 218: Filing an accusation recommending suspension of license (6-12 months).
- 4) Failure to comply with federal, state or local navigation laws or regulations: From a minimum of reprimand to a maximum of filing an accusation recommending suspension of license (1-3 months).
- 5) Negligently performing duties related to vessel navigation: From a minimum of reprimand to a maximum of filing an accusation recommending suspension of license (2-6 months).
- 6) Neglect of vessel navigation duties: From a minimum of reprimand to a maximum of filing an accusation recommending suspension of license (3-6 months).

⁴⁷ 7 Cal. Code Regs., §210(g).

- 7) Failure to file a written report on a maritime incident in a timely fashion: From a minimum of reprimand to a maximum of filing an accusation recommending suspension of license (2-4 months).

These guidelines are intended to guide the Incident Review Committee in developing its recommendations for corrective action, to guide the Board in determining the appropriate action to be taken, and to promote uniformity in assessing the severity of specific types of misconduct, although it is recognized that the circumstances of any individual case may warrant action that falls outside the ranges provided above.⁴⁸

BOARD INVESTIGATIONS NOT INVOLVING INCIDENT REVIEW COMMITTEE

The Legislature has found that the individual physical safety and well-being of pilots is of vital importance in providing required pilot services.⁴⁹ To this end, all suspected safety standard violations concerning pilot hoists, pilot ladders, or the proper rigging of pilot hoists or pilot ladders are reported to the Board, and the Executive Director investigates the reports. If during the investigation it is found that the vessel's equipment is in violation, or in likely violation of the relevant safety standards, the Executive Director is to notify the appropriate United States Coast Guard (USCG) office.⁵⁰ Furthermore, if the Executive Director alerts the USCG and has reason to believe that the violations will not be corrected prior to the vessel reaching its next port of call, the Executive Director shall request that the USCG report the suspected safety standard violation to the port state control officer or pilot organization in an expected future port of call.⁵¹

COMPOSITION OF THE BOARD

The Board consists of seven members appointed by the Governor and one ex-officio member as follows: two are pilots licensed by the Board;⁵² two are industry members - one from the tanker industry and one from the dry cargo industry;⁵³ three are public members who are neither pilots nor work for companies that use pilots,⁵⁴ and, the Secretary of the California State Transportation Agency, who serves as an ex officio, non-voting member. All voting Board members are appointed by the Governor subject to confirmation by the Senate. Board members serve four-year terms and may be reappointed for one additional four-year term. The public members come from varying backgrounds, usually having considerable business, government or financial expertise.

⁴⁸ 7 Cal. Code Regs., §210(h).

⁴⁹ Harbors and Navigation Code §1101(h).

⁵⁰ Harbors and Navigation Code §1156.6(a).

⁵¹ Harbors and Navigation Code §1156.7.

⁵² Harbors and Navigation Code §1150(a) (1).

⁵³ Harbors and Navigation Code § 1150(a)(2).

⁵⁴ Harbors and Navigation Code §1150(a)(3.)

BOARD STAFF

The Board has a staff of four persons. A key staff member is the Executive Director, who has the authority to perform all duties, exercise all powers, discharge all responsibilities, and administer and enforce all laws, rules and regulations under the jurisdiction of the Board.⁵⁵ Among other duties delegated to the Executive Director, he is a key member of the Incident Review Committee, and is charged with reporting on navigational incidents or other matter for which a license issued by the Board may be revoked or suspended.⁵⁶

The Legislature has also provided for an Assistant Director, appointed by the Secretary of Transportation and serving at his pleasure, as well as one analyst and one office technician.

These positions, together with the Board, support the programs of the Board thereby helping to promote and ensure the highest level of safety.

BOARD CONTRACTORS

To further the Board's mission, the Legislature has allowed for certain contract employees to be hired by the Board. Some of the contracted services are provided by commission investigators.⁵⁷ The Board has adopted standards for the commission investigators to ensure that persons so employed have basic knowledge of investigative techniques and maritime issues.⁵⁸ Other contractors to the Board include psychometricians to support the trainee selection process,⁵⁹ training institutions to support the pilot training program,⁶⁰ certified public accountants to audit the surcharge collection, and medical professionals to administer the pilot fitness regime.⁶¹

BOARD ADVISORY COMMITTEES

It is through the work of various Board Advisory Committees that the Board itself keeps informed of an emerging knowledge base. Each committee is made up of Commissioners, stakeholders, and occasionally, members of the public with particular expertise in an area of interest. Advisory Committees work with Board staff to review issues and conduct research and analysis outside of the Board's monthly meeting. The committees then report back to the Board and advise the Board on a particular action or subject matter.⁶² Committees do not take any official Board actions. All official Board actions are taken by a vote of the entire Board.

While the number of advisory committees changes based on the needs of the Board, there are some core committees that are continually relevant and meet with regularity. These are:

⁵⁵ Harbors and Navigation Code §1156(a).

⁵⁶ Harbors and Navigation Code §1156(a)(5).

⁵⁷ Harbors and Navigation Code §1156(e).

⁵⁸ 7 Cal. Code Regs., §211.5.

⁵⁹ 7 Cal. Code Regs., §213(h).

⁶⁰ 7 Cal. Code Regs., §215(a)-(c).

⁶¹ 7 Cal. Code Regs., §217.

⁶² 7 Cal. Code Regs., §208.

- Pilot Continuing Education Committee, whose mission is to review best practices in pilot education and set curriculum for the Board's Pilot Continuing Education Program;
- Pilot Evaluation Committee, which oversees the progress of trainees in the Board's Pilot Trainee Training Program, and ensures that best practices are being utilized in the training of new pilots;
- Pilot Fitness Committee, which oversees the review of pilot fitness issues, including researching, creating, and monitoring the pilot medical assessment program, and which has been active in researching and selecting a provider for the pilot fatigue study mandated by the Legislature;
- Pilot Power Committee, whose role it is to assess the work load of the pilots and analyze the retirement surveys, and make recommendations to the Board about the number of trainees in the Pilot Trainee Training Program to ensure enough trainees in training to maintain the number of licensees necessary to provide safe pilotage services;
- Rules and Regulations Committee, whose role is to research and draft changes in regulation or new regulations to meet the emerging challenges of a changing environment;
- Incident Review Committee, whose role it is to investigate, report, and make recommendations to the Board on pilot navigational incidents;
- Finance Committee, whose role it is to monitor the Board's fund balances and expenditures and to recommend to the Board changes in the surcharge levels consistent with funding the various functions of the Board; and,
- Pilot Safety Committee, which reviews materials relevant to best practices in piloting and maritime safety, and to make safety recommendations to the Board.

There are a number of standing committees and ad hoc committees that meet only when a specific need arises. These are:

- Navigation Technology Committee, charged with recommending policy with regard to changes in technology employed by the pilots;
- Pension Committee, charged with apprising the Board regarding the San Francisco Bar Pilot Pension Plan established by the Legislature, and to make recommendations to the Board in cases where a pension application may require Board action to effectuate;
- Ad Hoc Committee on Trainee Selection, convened when a review of Pilot Trainee Training Program trainee selection or exam criteria needs review or updating;
- Selection Appeal Committee, convened when an applicant to the Pilot Trainee Training Program entrance examination believes that his application merits further review prior to the examination; and,
- Pilot Boat Advisory Committee, charged with reviewing documentation from the San Francisco Bar Pilots of the need to purchase and finance pilot boats to allow the pilots to safely carry out their duties, or to finance life extending capital improvements to existing pilot boats.

LIAISON TO THE BOARD: THE PORT AGENT

The Legislature specified that one pilot, chosen by a majority of all the pilots licensed by the Board and subject to the confirmation of the Board, shall act as Port Agent to comply with special duties imposed by Board regulation and other applicable laws, and to otherwise administer the affairs of the pilots. The Port Agent is responsible for the general supervision and management of all matters related to the business and official duties of pilots licensed by the Board. In addition to the administrative duties, the port agent is charged with immediately notifying the Executive Director of the Board of a suspected violation, navigational incident, misconduct, or other rules violation that reported to him or her or to which he or she is a witness.⁶³

LAWS AND REGULATIONS RELATED TO PILOTAGE RATES AS A COMPONENT OF PILOT SAFETY

Board-licensed pilots are not government employees but are members of a private business and must look to the vessels that use their services for their revenues.

In California, the Legislature sets the pilotage rate, informed by a recommendation from the Board following a public hearing on the matter.⁶⁴ When preparing a recommendation for the Legislature, the Board shall give consideration to several relevant factors. The following are a few of these factors that have a direct relevance to promoting ensuring safety⁶⁵(as opposed to those bearing on economic factors):

- a. A net return to the pilot sufficient to attract and hold persons capable of performing this service with safety to the public and protection to the property of persons using this service; and the relationship of that income to any changes in cost-of-living indices.
- b. Additional factors affecting income to pilots such as the volume of shipping traffic using pilotage, numbers of pilots available to perform services, income paid for comparable services, and other factors of related nature.
- c. Changes in, or additions to, navigational and safety equipment necessary to insure protection of persons, ships, and waterways.

Since the number of pilots has a direct relationship with rates, it is relevant to discuss the Board's role in determining the number of pilots under the heading of rate determination. The Legislature specifically gave the Board authority over the number of pilots licensed by the Board by stating in §1170 of the Harbors and Navigation Code that the Board shall appoint and license the number of pilots sufficient to carry out the purposes of this division.⁶⁶ Additionally, the Legislature specified that in determining the number of pilots needed, the Board shall take into

⁶³ Harbors and Navigation Code § 1130.

⁶⁴ Harbors and Navigation Code §1201.

⁶⁵ Harbors and Navigation Code §1203.

⁶⁶ Harbors and Navigation Code §1170.

consideration, among other things, the findings and declarations in §1100⁶⁷ and 1101,⁶⁸ fluctuations in the number of vessel calls, the size of the vessels, and whether the need for pilotage is increasing or decreasing.

The Board has stated that its objective in determining the number of pilot licenses to be issued to qualified applicants is to ensure the availability of an adequate number of qualified, rested pilots to provide timely pilotage services. In addition to factors to be considered by statute, the Board regulations call for the Board to consider annually, the following data to be provided by the pilots:

- a) Total number of vessel moves;
- b) Total number of pilots assigned to move vessels;
- c) Number of pilots assigned to move vessels each day;
- d) Number of bar crossings;
- e) Number of bay moves;
- f) Number of river moves;
- g) Average draft of piloted vessels;
- h) Average gross registered tonnage of piloted vessels;
- i) Number of pilots reported sick or injured and number of days each was unable to perform piloting duties;
- j) Number of times a pilot resumed duties with less than 12 hours off duty, the contributing circumstances, and the actual hours off duty between assignments;

⁶⁷ Harbors and Navigation Code § 1100 reads: The Legislature finds and declares that it is the policy of the state to ensure the safety of persons, vessels, and property using Monterey Bay and the Bays of San Francisco, San Pablo, and Suisun, and the tributaries thereof, and to avoid damage to those waters and surrounding ecosystems as a result of vessel collision or damage, by providing competent, efficient, and regulated pilotage for vessels required by this division to secure pilotage services.”

⁶⁸ Harbors and Navigation Code §1101 reads: “The Legislature further finds and declares all of the following:

- (a) The maritime industry is necessary for the continued economic well-being and cultural development of all California citizens.
- (b) The Bays of San Francisco, San Pablo, and Suisun provide a vital transportation route for the maritime industry.
- (c) The increase in vessel size and traffic, and the increase in cargoes carried in bulk, particularly oil and gas and hazardous chemicals, create substantial hazards to the life, property, and values associated with the environment of those waters.
- (d) The federal government has long adopted the policy of providing minimum standards that ensure port and waterway safety while encouraging state control over pilot qualifications and licensing.
- (e) A program of pilot regulation and licensing is necessary in order to ascertain and guarantee the qualifications, fitness, and reliability of qualified personnel who can provide safe pilotage of vessels entering and using Monterey Bay and the Bays of San Francisco, San Pablo, and Suisun.
- (f) The need to ensure safe and pollution-free waterborne commerce requires that pilotage services be employed in the confined, crowded, and environmentally sensitive waters of those bays.
- (g) Bar pilotage in the Bays of San Francisco, San Pablo, and Suisun has continuously been regulated by a single-purpose state board since 1850, and that regulation and licensing should be continued.
- (h) The individual physical safety and well-being of pilots is of vital importance in providing required pilot services.”

- k) Number of pilot days during which pilots were engaged in Board-mandated training; and,
- l) Number of pilot days during which pilots were engaged in administrative duties authorized by the Port Agent, with a description of those duties.

BOARD SURCHARGES AND THEIR ROLE IN ENSURING THE HIGHEST LEVEL OF SAFETY

The Legislature directs the Board to impose surcharge to shipping companies to fund, among other things, the operational expenses of the Board,⁶⁹ training of pilot trainees enrolled in the Pilot Trainee Training Program,⁷⁰ and Pilot Continuing Education Programs,⁷¹ including technology training.⁷² The state has a direct interest in seeking the most qualified applicants to be pilots, having the best training possible for the continuing education program, and funding an organization to effectuate these programs. In adequately funding the Board's operations and these programs, a clear connection can be drawn between trainee training, pilot continuing education, and Board operations and the role they play in the oversight of the practices of pilots to promote and ensure the highest level of safety.

RULES TO PREVENT FATIGUE

Primary to the findings in the NTSB's EAGLE OTOME report was that the regulatory bodies charged with pilot oversight of the Sabine Pilots did not have regulations in place that could have precluded the adverse effects of fatigue-inducing scheduling practices from impairing the very cognitive skills that the pilots needed most to effectively navigate vessels through the Sabine-Neches Canal. The NTSB concluded that the absence of an effective fatigue mitigation and prevention program among the pilots operating under the authority of the Jefferson and Orange County Board of Pilot Commissioners created a threat to the safety of the waterway, its users, and those nearby. It further concluded, in part, that the Jefferson and Orange County Board of Pilot Commissioners should have implemented a fatigue mitigation and prevention program among the Sabine Pilots.

Similarly, this Board had no hours of service rules in place at the time of the EAGLE OTOME accident, instead relying on pilot association guidelines derived from a 1986 study by Manalytics, Inc. That study led to implementation of guidelines calling for 12-hour minimum rest periods between work periods and a one-week-on, one-week-off work cycle. While there was no formal process for enforcement of these guidelines, the Port Agent makes a monthly report to the Board when deviations were made to pilot assignments from the 12-hour minimum rest guidelines.

Following the NTSB recommendations, the California Legislature enacted laws specifically focused on pilot fatigue. The first gives specific oversight authority to the Board in the fatigue

⁶⁹ Harbors and Navigation Code §1159.1.

⁷⁰ Harbors and Navigation Code §1195.

⁷¹ Harbors and Navigation Code 119.

⁷² Harbors and Navigation Code §1196.4.

realm, directly addressing some concerns expressed in the NTSB's EAGLE OTOME report. Harbors and Navigation Code §1102 reads:

The Legislature finds and declares that the enhancement of navigational safety is of the utmost concern in state pilotage. In order to ensure and promote the highest level of safety in pilotage, the [B]oard is empowered to effectively monitor and oversee the practices of pilots and prevent fatigue resulting from extended hours of service, insufficient rest within a 24-hour period, and disruption of circadian rhythms.

Several other additions were made to the Harbors and Navigation Code concurrent with the above. Section 1144 codifies a program that was already in place in the Board's continuing education regime, and reads: "Any continuing education program adopted by the [B]oard shall regularly inform pilots of the hazards of fatigue and of effective strategies to prevent fatigue while on duty." Section 1146 mandates that a pilot refuse to take an assignment when he or she is feeling the effects of fatigue, even when operating within the current guidelines, and reads: "A pilot shall refuse a pilotage assignment if he or she is physically or mentally fatigued and has a reasonable belief that the assignment cannot be carried out in a competent and safe manner."

Along with empowering the Board with oversight of hours of service, the Legislature went one step further and mandated a study of fatigue related factors and that the Board promulgate regulations to prevent pilot fatigue. Section 1196.5 of the Harbors and Navigation code now reads:

- a) The [B]oard shall contract with an independent entity to conduct a study of the effects of work and rest periods on psychological ability and safety for pilots. The study shall evaluate sleep- and human-related factors for pilots, and shall include information and recommendations on how to prevent pilot fatigue and ensure the safe operation of vessels.
- b) The [B]oard shall, based on the results of, and recommendations contained in, the study, promulgate regulations for pilots establishing requirements for adequate rest periods intended to prevent pilot fatigue.
- c) The study required to be conducted pursuant to subdivision (a) shall be funded by revenues received by the [B]oard from the [B]oard operation surcharge, as described in Section 1159.2. The [B]oard shall have authority, consistent with Section 1159.2, to collect and appropriate adequate funding to ensure that the study is completed.

The Board is currently in the process of contracting with San Jose State University Research Foundation to conduct a study consistent with the Legislature's mandate. Once that study is complete and the recommendations in place, the Board will commence the rule making process to promulgate regulations to implement the study's pilot fatigue recommendations.

SAFETY WORK IN PROGRESS

The Pilot Safety Committee meets regularly to review published material with relevance to marine piloting. In January 2015, the United States Coast Guard published its report on the T/V

OVERSEAS REYMAR's allision with the San Francisco-Oakland Bay Bridge (which occurred on January 7, 2013). This report resulted in a number of recommendations, with recommendation five and six, directed at the specifically at the Board:

5. Recommend that the Board of Pilot Commissioners (BOPC) develop a mechanism to evaluate pilots while underway and piloting on a regularly scheduled basis but not to exceed one year.
6. Recommend that the BOPC consider an additional training requirement for pilots to participate in low visibility/restricted waters radar navigation training on an annual basis.

While the Commandant concurred with the intent of recommendation five and partially concurred with recommendation six, he forwarded both recommendations to the American Pilots Association, concluding that they were best suited to update national "best practices."

In light of these recommendations, the Pilot Safety Committee has been reviewing both recommendations along with the most up-to-date available materials on the subjects, and intends to develop a course of action consistent with the recommendations.

Moreover, using a "systems view" of safety, the Pilot Safety Committee is engaged in long term review of the "human element" as it relates to piloting. This review includes careful study of present methods and training compared to all available best practices while taking into account the latest research in safety science. Risk mitigation efforts include identifying traditional hazards such as groundings, etc., as well as port-specific hazards such as narrow channels, assessing their probabilities, and analyzing the effects of high consequence events. The Pilot Safety Committee is also aiming to develop tools and methods to limit risk related to cognitive error, such as understanding the challenges of decision-making under heavy mental workload, identifying error producing conditions, and training for abnormal events.

CONCLUSION

As early as 1850, California saw the need for safe and efficient pilotage to protect the persons, property and environment of San Francisco Bay and the connecting tributaries. Since then, a refined body of law has developed whose sole purpose is to create a pilotage regime that oversees the practices of the marine pilots licensed and regulated by the Board to promote and ensure the highest level of safety. This body of statutory law is further defined by regulations that support and enhance that regime. These regulations, through the work of the Board, remain true to the goals of the California Legislature while providing the flexibility necessary to keep pace with the economy, the environment and an emerging expanse of knowledge and new technology.